1.1 LA: Multiple-choice questions

1. directly observable activity.

2. Thinking

3. Behaviour, cognition and emotion may influence each other.

4. process for planning and conducting an investigation

5. data collected through scientific research.

1.2 LA 1: Review

1.

a. The aim is a statement outlining the purpose of the investigation; whereas the hypothesis is a prediction about the relationship between two or more variables that will be tested by the investigation.

b. A theory is a body of interrelated concepts that attempt to explain interrelated observations and make predictions about future events; whereas a model is a representation to describe and/or explain one or more aspects of behaviour and/or a mental process(es).

c. Differences may include:

- a research hypothesis is used in a research study/investigation to test the relationship between variables of interest, whereas theories and models are not used to test a prediction
- a research hypothesis is judged by the data collected to test it (e.g. results are compiled then used to support or refute), whereas theories and models explain how findings and ideas may fit together and what they mean, and tend to not be judged in terms of their accuracy but rather in terms of their usefulness
- a research hypothesis is a very specific statement, whereas theories and models vary in scope, complexity and detail
- a research hypothesis may be used to test a theory or an element of a theory, whereas a theory or model cannot be used to test a research hypothesis
- a useful research hypothesis is unlikely to have any limitations, whereas a useful theory or model is likely to have one or more limitations.

2. Example:

Characteristics	Summary
refers to events or characteristics that can be observed and measured and is therefore testable	testable
states the existence of a relationship between two or more variables	relationship between variables
states the expected relationship between the variables/direction of the relationship (e.g. how one variable will influence the other)	expected relationship
states a possible explanation of the results	possible explanation
based on observations, a theory, model or research findings	prior knowledge basis
prepared as a carefully worded written statement (rather than a question)	statement
expressed clearly and precisely (rather than vaguely and generally)	clear and precise
written as a single sentence	single sentence

3. Limitations may include:

− expressed as a question rather than a statement

− not a predication e.g. what relationship will be found between variables to be tested?

− vague, lacks precision e.g. what do 'send mental messages' and 'receive mental messages' mean?

4.

a. Examples:

- Lack of attention will cause forgetting.
- If a participant does not pay attention to a stimulus, then they will be unable to recall or recognise the stimulus.
- Adolescents who attend to novel visual stimuli will score higher on a test of recall of the stimulus items than adolescents who do not attend.

b. Examples:

− People who feel they are crowded will be more aggressive.

− Participants will be more aggressive when they feel crowded.

− Males who are crowded will be more aggressive than females.

− Aggressive behaviour in rats will occur when population density within a confined space exceeds 50%.

c. Examples:

− Positive thinkers will be more successful than negative thinkers in job interviews.

− People who think positively about their abilities will be more predisposed towards success in a job interview than will people who think negatively.

− Participants who think positively about their performance in a job interview will be more likely to achieve a successful outcome.

d. Examples:

− People are more motivated to succeed when an incentive is offered.

− The offer of an incentive will have a motivating effect for success.

− Participants who are offered an incentive will be motivated for success to a greater degree than people who are not offered an incentive.

e. Examples:

− Rote learning will improve recall.

− Students who rote learn information will have better recall than those who do not rote learn.

− Participants who rote learn information will have better recall of the information than participants who do not use rote learning or any other technique.

f. Examples:

− Taking a bottle of water to drink during an exam will improve performance on the exam.

− Students who take a take a bottle of drinking water into an exam perform better on the exam than those who don’t.

− Participants permitted to take a bottle of water into an exam will achieve higher scores on the exam.

1.2 LA 2: Multiple-choice questions

1. purpose

2. The aim and research question must be related.

3. is based on scientific knowledge or experience in order to understand and test ideas.

4. Regular exercise will improve mental wellbeing.

5. not supported by the results obtained.

1.2 LA 3: Review

1.

a. something that can change in amount or type over time and is measurable

b. the variable that is manipulated or changed in some way by the experimenter in order to measure its effect on the DV

c. the variable that is used to observe and measure the effects of the IV/the variable in an experiment that is expected to change as a result of the manipulation of the IV

d. something that can change in amount (e.g. varies in quantity) over time and is measurable

e. something that can change in type (e.g. varies by attribute or characteristic) over time and is measurable

2.

a. controlled variable: a variable that can have an effect on the DV so it is held constant ('controlled') to remove its potential effects

b. Explanation should demonstrate understanding that the effect of the IV needs to be isolated e.g. ensure only the IV can effect(s) the DV/minimise/prevent influence on the DV of any variable other than the IV being manipulated; isolate the effect of the IV when interpreting results.

3.

a. Explanation should refer to change in the aspect of participant behaviour or experience measured by the DV.

b. Explanation should refer to intentional change or variation in some systematic way by an experimenter/researcher in order to measure the effect on the DV. Variation may include different values/levels.

c.

i. quantitatively: e.g. frequency and/or duration of all daily sleep episodes or REM and NREM sleep periods; time of sleep onset and/or arousals during a sleep episode and/or awakening from a sleep episode; number of arousals during a sleep episode/REM or NREM period qualitatively: e.g. self-reports on sleep quality following awakening (such as refreshing/non-refreshing); subjective experience when awakening following X sleep debt; sleep deprived/not deprived; sleep interrupted/not interrupted

ii. quantitatively: e.g. light intensity (lux); timing or duration of exposure to light qualitatively: e.g. light or no light; natural or artificial light

iii. quantitatively: e.g. degrees C or F; timing or duration of room temperature change qualitatively: e.g. hot or cold; participant control or no control over room temperature; participant informed or not informed about true room temperature

iv. quantitatively: e.g. number of syllables; number of repetitions of a word/how often a particular word is used; amount of rehearsal time/how many repetitions to learn a word; number of errors in relation to word learning or recall qualitatively: simple or complex; noun or verb; familiar or novel; nonsense or coherent; emotive or non-emotive

v. quantitatively: e.g. number of kg; change in body weight; self-rating of body weight on a Likert scale qualitatively: e.g. light, medium or heavy; body weight known or unknown by Ps; Ps given or not given accurate or inaccurate body weight data.

4.

a. IV: reward (for studying)

DV: amount of time spent studying

b. IV: love state (e.g. being in love/not in love)

DV: perception ratings/scores

c. IV: position of information/item in a list

DV: recall accuracy (a measure such as score)

d. IV: type of stimulus (e.g. auditory or visual stimulus)

DV: reaction time

e. IV: exposure to adult language

DV: amount of vocabulary/number of words used

f. IV: lying/telling a lie

DV: voice pitch

g. IV: task complexity

DV: frequency of daydreaming/daydreams

h. IV: work condition (e.g. working alone or in a small group)

DV: productivity/level of productivity

i. IV: type of movie clip (e.g. violent or non-violent)

DV: change in heart rate and blood pressure when viewing

j. IV: type of stimulus (e.g. simple or complex)

DV: attention duration

5.

a. IV1: bell ringing

IV2: food presentation/presence of meal

b. DV: standing on hind legs

measure: time spent standing

c. Explanation should refer to baseline data for comparison, i.e. researcher did this in order to compare the change in the amount of time spent standing as a consequence of bell conditioning.

6.

a. IV: ethnicity/type of person in need of help

values or levels: 4 values/levels — drunk/blind, First Nations/non-First Nations

b. the actor pretending to be blind or drunk; the person is First Nations/non-First Nations

c. DV: helping behaviour

measure: time taken /how long it takes for help to be given

1.2 LA 4: VCAA exam questions

1. wording of the question.

2.

Independent variable	Dependent variable
age	reaction time

3. IV: learning technique; DV: number of nonsense syllables correctly recalled.

4. Warning signs lead to a decrease in speeding behaviour.

5. the presence of the warning signs.

1.2 LA 5: Review

1. Explanation should demonstrate understanding that operationalisation involves defining or describing IVs and DVs in terms of the specific operations (procedures, actions or processes) used to manipulate or measure them in that particular experiment.

2. Potential benefits include:

- helps ensure the independent and dependent variables are testable and therefore that the research hypothesis is testable
- all researchers involved in conducting the experiment know exactly what is being observed and measured and how this will occur (which helps avoid experimenter bias and differences that can affect the results in an unwanted way)
- when the variables are defined in a very precise way, another researcher interested in the results, or perhaps even doubting them, will be able to replicate the experiment in order to test the results obtained for accuracy or for relevance to other groups or situations (and if the results are repeatable there is greater confidence in their validity).

3.

a. IV/anxiety e.g. heart and respiration rates when exposed to an anxiety-inducing stimulus

DV/forgetting e.g. number of nonsense syllables that cannot be recalled one hour after learning

b. IV/crowding e.g. proximity of others to participant (cm) during a specified time period (min)

DV/aggression e.g. number of times certain words are used during a specified time period (min) (i.e. verbal aggression)

c. IV/relaxation: e.g. heart and respiration rates after X amount of time performing a slow breathing relaxation technique

DV/stress: e.g. score on self-report stress rating scale

d. IV/practice: e.g. frequency and/or duration of task-specific practice sessions

DV/learning: e.g. score on task performance

e. IV/sex of participant: e.g. male/female adolescents aged 13–21 years

DV/talk: e.g. mean duration of conversation time and number of words by males and females in a balanced mixed sex group

4.

a. IV/incentive: e.g. access (or no access) to a lolly reward e.g. for a correct response on a novel problem solving task

DV/motivation to succeed: e.g. number of correct responses for novel problem solving tasks; score on a self-report motivation scale

b. IV/rote learning or learning technique: e.g. using maintenance rehearsal/rote learning vs elaborative rehearsal/non-rote learning to learn 20 new Latin anatomical terms and definitions

DV/recall: number/percentage of correct answers in a recall test

c. IV/access (or no access) to a bottle of water during an exam

DV/exam performance e.g. exam score or grade

d. IV/parental attention: attending to ignoring tantrum behaviour immediately after onset e.g. presence or absence of verbal and non-verbal communication

DV/tantrum behaviour: e.g. duration of tantrum/number of instances of specific, target tantrum behaviours such as crying, screaming, kicking, lashing out, throw self on floor

e. IV/sleep deprivation: duration of sleep deprivation period/amount of sleep loss (hours and minutes)

DV/reaction time when riding a bike: e.g. speed and accuracy of avoidance responses (such as to non-predictable objects randomly presented in the participant's visual field when wearing a 3D virtual reality device while riding a treadmill bicycle in a lab setting)

1.2 LA 6: VCAA exam questions

1. room temperature.

VCAA comment:

The independent variable (IV) is the treatment variable that is manipulated by the researcher to assess the effect(s) on the dependent variable (DV).

In this experiment, Dr Terrace is manipulating the room temperature (IV) to assess the effects on the time taken for people to fall asleep (DV).

2. method of learning the word list, number of words recalled.

3. age, cycling ability.

4. driving speed.

5.

i. Whether students listen to classical music before completing the paper task or not.

VCAA comment:

Although 'listening to classical music' was acceptable, 'listening to classical music while performing the paper folding and cutting task' was not correct.

ii. The score obtained on the paper folding and cutting test or the performance on spatio-temporal tasks.

1.3 LA 1: Review

1. sample: a subset/part/portion of the population that is selected for research purposes
population: the entire group from which a sample is drawn and to which the researcher will seek to generalise their results

2. Explanation should demonstrate understanding that characteristics (i.e. alpha letters) are distributed in Sample Y in the same proportions as in the population (so the sample is representative); whereas Sample X has certain characteristics (i.e. C) overrepresented and underrepresented (i.e. A) so Sample X is biased.

3. Explanation should refer to proportional representation of characteristics of the sample in relation to the population when considering bias. The sample may or may not be biased depending on this important point.

4.

a. All Year 10 students enrolled at X co-educational secondary college.

All Year 10 students enrolled in government and non-government, co-educational schools within the Southern metropolitan region (as defined by the Dept. of Education and Training)

b. All teachers in a large government multi-campus college who have been teaching for more than 10 years

All teachers in government and non-government schools who have been teaching for more than 10 years

c. All police officers employed by Victoria Police who are currently on stress-related leave

All currently employed emergency services personal in Victoria who have been on stress-related leave for two or more weeks

d. All people diagnosed with a type of anxiety disorder aged 21 years or older currently receiving treatment through a public health service

All people aged 21 years or older diagnosed with a type of anxiety disorder at X psychiatric unit during the past 3 years

5.

a. Sample: 10 adults with a fear of flying

population: all adults who have completed a Qantas fear of flying course in the last 12 months

b. Sample: 5 males and 5 females born to mothers aged over 40 years, 5 males and 5 females born to mothers aged over 45 years, 5 males and 5 females born to mothers aged over 50 years (all without IVF) population: all people clinically diagnosed with a major mental illness (as defined by the researcher) at a public or private mental health service/facility since 1985.

6. Limitations may refer to:

- increased likelihood of a biased sample/non-representative sample/the sample not representing its population adequately
- making a generalisation/misleading estimate of the occurrence of what was studied in the target population
- loss of confidence in the true effect of variables being observed, manipulated, measured, tested etc; may produce false/misleading results
- loss of validity
- loss of reliability

7. The following are two examples of high-scoring responses.

The researchers need to consider if the sample is representative of the population of Parkinson's disease. If not representative of the population, the researcher is unable to generate insights/observations that align with the population.

The sample of newly diagnosed Parkinson's patients may not represent all patients with PD and therefore the results may not be able to be applied to all people with PD.

8. Population: All first year psychology students from Kookaburra University. Sample: The 40 students (20 male and 20 female) who volunteered to take part in the study.

VCAA comment:

It was not necessary to repeat the reference to the specific university in the description of the sample, as long as it was identified in the description of the population. Many students wrongly identified 'all first year psychology students' or 'students' as the population. The answer needed to contain all identifying details.

9. Considerations may include:

- sample size
- degree of similarity between sample and target population
- accessibility of the population and sample e.g. who can be located and contacted
- availability of the population and sample
- time constraints
- other practical constraints

1.3 LA 2: Multiple-choice questions

1. subset; population

2. 50; 200

3. Include a larger sample of adolescent boys from both suburban and rural schools.

VCAA comment:

A and C would both improve the design of the study and the quality of the data but D would result in a sample that is both larger and more representative, increasing generalisability.

4. Victorians, 93 Victorian bike riders.

5. participant selection in an unbiased way.

1.3 LA 3: Review

1.

Sampling technique	Description	Advantages	Limitations
random sampling	selecting a sample by ensuring every member of the target population has an equal chance of being selected to be part of the sample (to help achieve a representative sample)	• helps achieve a highly representative sample (if sufficient size) • representative sample enables generalisations with greater confidence	• requires a complete and current list of the target population • can be time-consuming e.g. accessing population lists, contacting participants, selection process • no guarantee that the sample is representative, especially if small size
stratified sampling	selecting a sample from a population comprised of various subgroups in such a way that each subgroup is represented (random stratified sampling helps	• enables sampling of specific subgroups within a population for comparison purposes • useful to study psychological characteristics that vary greatly among different subgroups of a population	• can be carried out only if relatively complete lists of the target populations) are available and accessible

	ensure each subgroup is representative)	• when there is random sampling from the strata help ensure that the sample is highly representative/there can be greater precision in the study and its findings when compared to a standard random sample	• if accessed, a representative sample cannot be obtained unless stratified random sampling is used • more complex than the other techniques • can be a very time-consuming and expensive

2.

a. Examples using random numbers:

- random sampling (the whole school or college is the population): using a current school/college roll, assignment of a number to each student starting with 1 for the first student in the roll, using a random number table/generator to select 10 students

- stratified sampling: if the whole school or college is the population and it is believed that one or more participant variables will be influential, determine proportions using relevant data, organise according to strata and select (preferably random selection in required proportions/ratios)

b. Explanation should demonstrate understanding that stratified sampling with random selection for sufficiently large strata would result in the most highly representative sample.

c.

i. convenience sampling (the whole school or college is the population): the first 10 students in the school or college outdoor area at lunchtime who respond to a request for volunteers

ii. Explanation should refer to sample bias.

3.

a. Example: VCE students in all Melbourne and Mildura schools, TAFEs and other VCE providers.

b. Explanation should refer to a procedure that ensures any VCE student in Melbourne and Mildura has an equal chance of being selected (as any other VCE student), e.g. randomly

selecting one or more VCE providers in Melbourne and Mildura and randomly selecting from those providers using their student rolls/administrative records.

4.

a. Example for preschool children: all children enrolled in a preschool in Richmond; for teenagers: all years 9-12 students enrolled in a secondary school in Richmond; for people aged over 65 years: all people aged over 65 years residing in a retirement village in Richmond.

b. Explanation should refer to a procedure that ensures any individual in each target population has an equal chance of being selected (as any other individual).

5.

a. Explanation should demonstrate understanding that:

– **random sample** is a **sample** in which every member (or element) of the target population has an equal chance of being selected;

– a random sample is therefore assumed to be representative of that larger group;

– the sample obtained by the researcher will be non-representative/biased because a true random sampling procedure has not been used e.g. biases due to Myer customers (or browsers) not being representative of consumers in general (i.e. may have socio-economic bias); sample including only those people who live near the mall, who shop on Friday evenings, some other non-representative group etc.

b. Explanation should demonstrate understanding that:

– **random sample** is a **sample** in which every member (or element) of the target population has an equal chance of being selected;

– a random sample is therefore assumed to be representative of that larger group;

– the sample obtained by the researcher will be non-representative/biased because a true random sampling procedure has not been used e.g. biases due to Myer customers (or browsers) not being representative of consumers in general (i.e. may have socio-economic bias); sample including only those people who live near the mall, who shop on Friday evenings, some other non-representative group etc.

6.

a.Explanation should demonstrate understanding that:

– the sample is based exclusively on readers of the specific magazine and may not be representative of teenagers/adolescents/target population

– readers who choose to respond or have or make the time to respond and deliver responses may have unique personal characteristics/attributes (which biases the sample)– readers who choose to respond may have strong beliefs, attitudes, etc. about binge-drinking e.g. participants may have volunteered because they have their own agenda/ulterior motives

b. As per 6(a) above. Note that studies have found that 'audience participation' samples for call-in surveys conducted by TV and radio shows on controversial topics (e.g. abortion, affirmative action, gun control, etc.) tend to overrepresent individuals who have strong opinions.

c. • Explanation should demonstrate understanding that the sample is not representative and therefore biased e.g. includes only those with landlines and listed numbers and excludes people without either or both; will also represent only people at home at 6pm on weeknights who answer the phone and give consent.

d. Explanation should demonstrate understanding that the sample is biased as it includes only Facebook subscribers, and only those who use 'like' functionality e.g. Facebook users may underrepresent or exclude very young and older population segments; those who use 'like' may have different personal attributes, preferences, motives etc. (e.g. bias of volunteer respondents) when compared with Facebook users in general and with the general population.

e. Explanation should demonstrate understanding of sample bias inherent in a convenience sample of this type.

f. Explanation should demonstrate understanding that the sample is not representative and therefore likely to be biased e.g. may overrepresent people present and readily available at that time, such as elderly people who have retired, not employed etc., and underrepresent people of a working age, in employment etc.; may underrepresent females with child care, school pick-up, meal preparation etc obligations; in general, unique characteristics of pokie gamblers willing to submit to an interview, such as differences between recreational vs regular gamblers

7.

a. Explanation should refer to a procedure that ensures any individual in each target population has an equal chance of being selected (as any other individual).

b. Explanation should demonstrate understanding that the sample will comprise volunteers who select themselves by choosing to be in the study.

Note that the researcher may exclude those who don't meet certain criteria, so, if the sample is viewed as those included as participants in the research, then the sample is not necessarily self-selected.

c. Possibly.

Explanation: Sample is likely to include only those who access the ad (or other media that may be used by the researchers) and primarily those who need/want an incentive for research participation, especially research of this type. Participants may or may not be in treatment — whether or not they are can add bias.

Responses of such individuals may be different in some way of particular relevance to the DV, such as the influence of a disproportionate number of people in financial need or a tendency for such participants to be overly cooperative or make a greater effort to guess the hypothesis in order to respond 'appropriately' (i.e. feeling a need to behave in some way due to payment).

Note, however, that many in the general population volunteer for research regardless of any incentive e.g. although the advertisement refers to an incentive, some people may have an altruistic motive and may not be swayed by the reward.

d. No. Exclusion may occur when volunteers do not meet selection criteria.

e. Very low likelihood that sample will be representative of the population of specific research interest (nor is there any attempt to make the sample representative).

f. Yes.

Explanation: Sample bias does not preclude generalisations, especially for research of this type as convenience sampling is typically the best or only means of obtaining data. However, generalisations to the population of research interest will be very tentative because of the sample bias/non-representativeness, especially if a relatively small sample (and assuming the study has been well controlled in other aspects of its design and the results/findings are significant).

Note that the sampling procedure may actually involve *purposive sampling*, a subjective sampling procedure for which there is no intention to select a representative sample in order to make generalisations.

Generally, the main goal of purposive sampling is to target particular characteristics of a population that are of interest, which will best enable the research question(s) to be answered i.e. the researcher explicitly seeks individuals who meet certain criteria.

Unlike random sampling and stratified sampling, which are classified as *probability sampling* (and therefore permit generalisations defined by the sampling frame), purposive sampling is considered a type of *non-probability sampling* and therefore, technically, does not actually permit generalisations (but would not necessarily preclude them for this type of study).

Convenience sampling is also classified as a type of non-probability sampling (as it does not give every individual in a target population an equal chance of being chosen).

1.3 LA 4: VCAA exam questions

1. stratified sampling.

2. assigning each VCE student a number and putting all numbers into a box and drawing out 20 numbers.

3. generating a random list of 25 names from a list of all VCE students in the school

4. a sample of people who are selected for certain characteristics

VCAA comment:

Many students incorrectly selected Alternative C (a sample that equally represents all members of a population) as the best description of a stratified sample. However, to meet this requirement, members of all sections of a population would have to be included in the sample and they would have to comprise the same numbers of members so it would not constitute a stratified sample. A stratified sample is a subset of a population comprising people who are selected for certain characteristics (Alternative B) that the researcher believes may be important to the variables being tested.

5. A researcher could place the names of all under-16 basketball players from Sunnydown Basketball League

into a hat and draw out 100 names as participants for the experiment so that each under-16 player from the league has an equal chance of selection.

The researcher could then allocate the participants into two groups. The experimental group would drink sports drinks prior to a match and the control group would not drink sports drinks. The performance of the players in the two groups could then be evaluated by the number of goals each team was able to score.

Award 1 mark for correctly identifying the population as the Sunnydown Basketball League under-16 players.

Award 1 mark for identifying an appropriate random sampling method.

Award 1 mark for a valid explanation of the investigation.

VCAA comment:

The scenario stated that the Sunnydown Basketball League has 1500 players aged 12-18. The question asked students to explain how a researcher could design a random sampling

procedure to investigate the effect of sports drinks on the performance of under-16 basketball players in the Sunnydown Basketball League.

Many students focused on random allocation to groups rather than random sampling.

Award 1 mark for a correct criticism.

1.4 LA 1: Review

1. Key distinguishing features are:

- used/suitable to test for a cause–effect relationship between variables of research interest
- random allocation/assignment to different conditions of the experiment
- experimenter control of variables that can impact on the DV

2.

a. Experimental group: participants are exposed to the IV/treatment under investigation

Control group: participants are not exposed to the IV/treatment under investigation

b. Explanation should refer to control/minimising influence/maintaining constancy of all participant personal characteristics that might cause a change in the DV so that the effect(s) of the IV on the DV can be isolated and determined. (One or more uncontrolled personal characteristics may become a confounding variable that causes a change in the DV/or has the potential to cause that change.)

c. Explanation should refer to use of standardised instructions and procedures i.e. essential to treat the experimental and control groups/participants the same, except for exposure of the experimental group to the IV.

3. Explanation should refer to comparison with experimental group responses to the IV to assess the influence of an IV i.e. provides a standard/baseline against which performance/results of the experimental group/s can be compared in order to determine the effect of the IV on the DV/whether the IV has caused change in the DV. Note that students should be able to answer this type of question in relation to a particular experiment that may be described in an exam (rather than giving a generic answer).

4. random allocation: procedure used to place (assign/allocate) participants in groups/experimental conditions so that they are as likely to be in one group/condition as the other

5. Explanation should demonstrate understanding that random allocation achieves equivalence in the distribution of participant characteristics across all groups/conditions due to the systematic nature of the procedure that ensures each participant has an equal chance of being selected for any of the groups/conditions used in the experiment/research.

6. Explanation should demonstrate understanding that the procedure is essential for minimising differences in the composition or make-up of the experimental and control groups by ensuring that any participant variables that might affect the DV/results are evenly spread in the experimental and control groups.

7. Explanation should demonstrate understanding that both techniques enhance validity e.g. random sampling helps ensure sample representativeness/minimise sample bias (thereby enhancing external validity/generalisability); random allocation helps control participant variables (thereby enhancing experimental design and therefore internal validity).

8.

a. IV: e.g. playing a video game with similar age peers cheering or jeering

DV: e.g. score on video game

b. Experimental group: others/peers present and cheering or jeering when P is game playing

Control group: P is alone when game playing

c. Variables may include:

- prior experience with the specific game
- prior experience with video games in general
- prior experience with the technology e.g. device used for the game playing such as a smart phone app vs tablet vs PC
- participant mood
- participant motivation
- ensuring test conditions (instructions and procedures) are standardised e.g. the game, game playing time, venue, distractions
- order effect if repeated measures is used e.g. practice, fatigue

Students should be encouraged to *explain* the need for control in relation to the particular experiment.

1.4 LA 2: Multiple-choice questions

1. independent and dependent variables.

2. not meditate at all.

3. control group.

4. assigned to one of the conditions on the basis of chance alone.

5. control of participant variables that can influence the DV and therefore the results.

1.4 LA 3: Review

1.

Experimental design	Key feature	Advantages	Limitations
between subjects	Each participant is randomly allocated to one condition (group) only and each participant provides only one score for data analysis.	• strict control of participant variables through random allocation to all groups/conditions • time and cost effective e.g. use of random allocation avoids time-consuming participant matching on key variables (as per matched participants design); repetition as per repeated measures not required • no order effects between conditions to control (as per repeated measures) • participant attrition less common e.g. unlike repeated measures, can usually be completed on one occasion so not often a need to spread out time period between different conditions	• need to ensure sample size is big enough to help ensure spread of participant variables within the sample matches the distribution within its population • potentially less control over participant variables than repeated measures and matched participants designs, especially when a small sample is used • elimination of the influence of unwanted variables is not always possible

within subjects	Each participant is involved in all conditions and provides multiple scores	• strict control of participant variables (including known and unknown characteristics) as same participants are in all conditions, incl. random allocation to conditions • requires a relatively smaller number of participants when compared with other experimental designs as same participants are in all conditions • pre-testing on key variables not often required (unlike matched participants), so is often less time consuming and resource demanding than comparable studies using other designs	• order effects may influence the DV/results/outcome if uncontrolled • participant attrition, especially when a long time period between conditions • elimination of the influence of unwanted variables is not always possible
Mixed design	features of both the between subjects and within subjects designs	• can assess potential differences between two or more separate groups of participants (i.e. between subjects) as well as a change in the individual members over time (i.e. within subjects) • capitalise on strengths of between and within subjects designs • fewer participants required	• limitations of both between and within subjects designs

2. Generally refers the specific procedures to be followed in a scientific experiment in order to test a hypothesis and reach a valid conclusion, particularly the different conditions to which participants will be allocated and how this will occur. The term may also be used in relation to

the design process (e.g. planning), a specific experimental procedure (e.g. how participants are allocated to different conditions) or both planning and implementation.

3. All are experimental methods in which the IV is manipulated/changed and its effects on the DV are measured whilst controlling (holding constant) all other variables to allow a conclusion about cause-effect relationship between the IV and DV. Random allocation to conditions is essential. Therefore, crucial features are:

- IV that is manipulated to test for a cause-effect relationship between the IV and
- use of random allocation
- controlled conditions

4.

a. between subjects

b. within subjects (and possibly mixed design)

c. within subjects (and possibly mixed design)

d. within subjects (and possibly mixed design)

5. random allocation/assignment

6.

a. within subjects

b. between subjects

c. • within subjects (same participants are tested before and after medication use)

• between subjects (one group receives the medication and another group a placebo/a fake version of the medication with no active ingredient; testing before involves use of a baseline/starting point measure)

• mixed design (combination of both of the above designs)

d. between subjects

e. within subjects

f. between subjects

1.4 LA 4: Analysis and evaluation of a controlled experiment

a. • population: all Year 10 students at a local secondary school

• sample: 24 Year 10 students (from the local secondary school)

b. Explanation should demonstrate understanding of the role of Group 2 as a control group for comparison purposes in relation to the DV for this specific experiment i.e. not merely a generic statement such as a 'standard of comparison'. The question asked specifically that students refer to 'this particular study'.

c. between subjects

d. IV: exposure to Mnemonica technique /learning Mnemonica /learning memory improvement through Mnemonica

DV: score on test of recall/memory ability test

e. Features include:

• use of random allocation to create equivalence of participant variables in control and experimental groups

• manipulation of an IV (to test effect on a DV)

• control of other variables e.g. C group watched a video of the same length at the same time as the E group; all completed the same test for the DV

f. Advantage should refer to testing/establishing cause–effect under controlled conditions i.e. test whether Mnemonica actually causes an improvement in memory/recall/learning and memory.

1.4 LA 5: VCAA exam questions

1. between subjects

2. the use or absence of the 3-second distractor task prior to recall

3. between subjects

4. the same participants are used in both the control and experimental conditions.

5. the same participants are used in both the control and experimental conditions.

1.5 LA 1: Review

1. Explanation should refer to a research method used to investigate the relationship/association/covariance between variables without any control of the conditions in which the relationship occurs or any intervention or manipulation of an IV, but not a causal relationship.

Example may relate to any behaviour, mental process or event not described in the text.

2. Explanation should refer to cause–effect relationship between variables of interest (experiment) versus degree and type of correlation/association/co-relationship between variables of interest (correlational study).

3. Explanation should refer to the appropriateness/suitability and practicality of the research method in relation to the specific research question or hypothesis to be tested.

4. positive correlation: two variables vary/change, in the same direction i.e. as one variable increases, the other variable tends to increase (and vice versa).

negative correlation: two variables vary/change, in opposite directions i.e. as one variable increases, the other variable tends to decrease (and vice versa).

zero correlation: no relationship between variables of interest

5. direction of correlation: a positive relationship between the variables identified through absence of a minus sign (but may sometimes show a plus sign), or, a negative relationship between the variables identified through presence of a minus sign (always shown)

strength of correlation: whether the relationship is strong/high, moderate/medium or zero/weak; identified by the size/magnitude of the decimal number of the correlation coefficient

6. Explanation should demonstrate understanding that two correlation coefficients that have the same score/value but differ in sign (positive or negative) indicate the same strength/degree of association/relationship. Only the direction of the relationship differs.

7.

a. strong, positive correlation; the more time spent studying for an exam, the higher the grade likely to be achieved for the exam; the less time spent studying for an exam, the lower the grade likely to be achieved for the exam

b. moderate/medium, negative correlation; the lower the number of close friends, the higher the level aggressiveness; the higher the number of close friends, the lower the level aggressiveness

c. weak/low, negative correlation; the greater the number of cigarettes smoked during pregnancy, the lower the birth weight of the newborn infant; the lower the number of cigarettes smoked during pregnancy, the higher the birth weight of the infant;

d. relatively weak positive correlations; the higher level of job satisfaction, the higher the pay rate, and vice versa.

e. No/very low/very weak correlation; no relationship between the two variables

8.

a. length of time spent studying for an exam and exam grade achieved: e.g. motivation, social life, mental health, family circumstances/socio-economic background

number of close friends and level of aggressiveness: e.g. temperament, sociability, personality type, mental health, family circumstances/socio-economic background

b. Yes

9.

a. Hypothesis should predict a positive correlation e.g. The higher the IQ score the higher the level of achievement on …….

b. Hypothesis should predict a positive correlation e.g. The more time spent using a mobile phone when driving in a built up area, the greater the likelihood of a road accident.

c. Hypothesis should predict a negative correlation e.g. The more time a student spends playing video games the higher their school absenteeism is likely to be.

10. Advantages include:

• assess/investigate/discover direction and strength of the relationship between variables without intervening

• test hypotheses when ethically not permissible to experimentally manipulate the IV of interest

• test hypotheses when impractical or not possible to conduct an experiment

• may be able to exclusively rely on existing information on variables of interest

• enable quantification of relationships between variables

• avoid use of an artificial lab setting

• some correlations can suggest causal relationships

• identify important factors/variables

• may indicate patterns or trends which might lead to hypotheses testing through further research using experiments to test and possibly establish a cause-effect relationship

• contribute to development and testing of theories

Limitations include:

• cannot test/identify/establish/prove a cause-effect relationship between variables/no evidence that one variable actually causes a change in the other

• lacks the control of an experiment/can be difficult or impossible to control unwanted variables, especially variables that may offer alternative explanations

1.5 LA 2: Multiple-choice questions

1. a numerical value between –1.00 and 1.00.

2. –1.00.

3. whether the association is positive or negative.

4. positive correlation.

5. Correlational studies can be used to make tentative predictions.

1.5 LA 3: VCAA exam questions

1. a negative correlation

2. a large negative correlation can be just as significant as a large positive correlation.

VCAA comment:

It cannot be emphasised too strongly, correlational research is not attempting to explain cause and effect.

3. within subjects

VCAA comment:

Since the same participants are used for the three different conditions of the Independent Variable (time of exposure of stimulus), within subjects is clearly correct.

4. Unhappy people watch a lot of television.

VCAA comment:

The students who believed that a correlation of -0.85 between hours of television watched and level of happiness shows that 'Watching television makes people unhappy' exhibited a lack of understanding that a correlation does not show cause and effect; a fundamental flaw that needs to be addressed.

5. a weak relationship between two variables; one of which increases while the other also increases.

1.6 LA 1: Review

1.

Self-report	Description	Advantages	Limitations
Interview - structured	Involves questions asked by the researcher with the intention of prompting and obtaining specific information from an individual participant Participant is asked	useful for measuring characteristics that cannot easily be directly observed. Access to often rich and detailed data when unstructured in particular Easier/Less expertise required to administer than other types Control of unwanted variables through use of standardised administration procedures easier	• language dependent • Not suited to large samples • Time consuming • Often rely on participant self-awareness and memory • Data collected is more difficult to manage and report on when free response and open ended questions are used • potential to introduce bias into answers

	specific, pre-determined questions in a controlled manner; answer options also tend to be fixed and pre-determined	than unstructured to compare responses among participants easier than unstructured to replicate the investigation	• Limits opportunity for the interviewer to follow up on issues or points raised by the participant • Limitations described for interviews in general are also relevant
- unstructured	researcher has an overall aim of what data should be collected but the questions asked may be generated spontaneously and the types of answers given can vary widely among participants; interview is highly flexible	• participants can answer in their own way using their own terms and give more or less emphasis to relevant issues • freedom of interaction between interviewer and participant	• more difficult to maintain standardised procedures e.g. questions can vary between participants • more challenging data issues than for structured interviews

Questionnaire	Written set of questions designed to prompt self-report information; may take the form of rating scale with a fixed -response set of questions or statements for which participants rank each item by selecting from a number of choices	• useful for measuring characteristics that cannot easily be directly observed. • Suited to large samples; • can be more efficient, timely, cost-effective etc administration and data collection • Control of unwanted variables through use of standardised administration procedures	• potential to introduce bias into answers • language dependent • Often rely on participant self-awareness and memory • Data collected is more difficult to manage and report on when free response and open ended questions are used
Focus group	Uses a small group of people (8-12 in number) who share characteristics and are selected to discuss a topic of which they have personal experience. Participant interaction is encouraged rather than	• • Richness of data that can be generated • Easy to organise and inexpensive • More accessible for people with reading, writing or communication difficulties • Group situation can encourage participation	• Potential for answers to be influenced by social desirability or other variables associated with interviewer presence • Potential for non-response bias when large samples are used

	being questioned one at a time.		

2.

i. VCAA does not provide answers for short answer questions in sample exams.

ii. VCAA does not provide answers for short answer questions in sample exams.

3. Value

- Case studies provide a detailed and complete (or near complete) description of one person's situation, experiences and evaluation of treatment, including background, family history and environment, through one-on-one interviews, individual testing, etc.
- It can provide ideas for theoretical explanations and experimental research.

Limitation

- t is very difficult to generalise data to other people. Many case studies involve unique situations, large differences between brains or plasticity of the brain, etIt
- is very difficult to analyse such a huge collection of data (intense and time consuming).

- One mark was allocated to the value and one mark to the limitation. Any of the above items gained credit.

4.

a. Numerous examples are possible. Discuss your examples with the teacher or another student to check understanding.

b. Numerous examples are possible. Discuss your examples with the teacher or another student to check understanding.

c. Numerous examples are possible. Discuss your examples with the teacher or another student to check understanding.

1.6 LA 2: Multiple-choice questions

1. to researcher questions.

2. experiment

3. research participants' accounts of their own experiences and behaviours.

4. essay

5. How would you rate your sleep quality on scale of 1–10?

1.7 LA 1: Review

1. observational study: a research method involving collection of data by carefully observing/watching and recording behaviour as it occurs without any intervention or manipulation of the behaviour being observed

2.

a. A naturalistic observational study involves data collection in a field setting, without laboratory controls or manipulation of variables; whereas a controlled observational study involves observations in a controlled/contrived environment/ a setting established for the specific purpose of conducting the study.

b. A structured observation involves use of a prepared system to guide and record observations (e.g. a checklist), whereas an unstructured observation involves observation being made without a predetermined format.

c. In event sampling a record is made every time a target behaviour occurs; whereas in time sampling a record is made at fixed point in time and/or for designated periods of time.

d. In participant observation the researcher is part of the group being observed whilst attempting to remain inconspicuous and not intervene, whereas non-participant observation involves observations in an entirely inconspicuous manner so that the observer's presence doesn't influence behaviour being observed.

3.

a. Discuss your answer with the teacher or another student to check accuracy.

b. Explanation should demonstrate understanding that an observational study may use a between subjects-design but cannot be considered a true experiment because it lacks key features of an experiment and therefore cannot reveal a cause-effect relationship e.g. no intervention, random allocation or control of unwanted variables that can impact on the target behaviour.

4.

a. Discuss your answer with the teacher or another student to check accuracy.

b. Explanation may refer to:

– the independent groups design resembles a between-subjects experiment through use of one or more existing, naturally formed or occurring groups, but not groups created and managed by the experimenter (as with the between subjects experiment) e.g. there is no random allocation to groups/conditions as occurs with the between subjects experiment

– no strict control of all relevant variables e.g. there may be naturally occurring variables of interest but there is no intervention that might disrupt what is occurring naturally

– cannot test a cause–effect relationship

5. observer bias: a predisposition or tendency of the observer to make observations in accordance with expectations i.e. researcher is influenced by personal biases when making observations, recording etc. control: generally, use two or more observers for data collection and check for inter-rater ('inter-observer') consistency (reliability).

7. Advantages include:

- researchers can watch and record behaviours in their natural real-life settings, which can overcome the artificiality of contrived environments (especially the lab experiment) that can cause an unnatural change in behaviour and therefore unnatural responses measured by the DV
- enable study of certain human behaviours that would be inappropriate/unethical or impractical to study in a laboratory situation
- structured observations through use of checklists and specific criteria enhance the accuracy of data collection and therefore the results obtained → more so in contrived settings rather than naturalistic, tends to support replication
- do not usually require the cooperation of participants being observed
- can reveal a relationship between variables observed (but not a cause–effect relationship as does an experiment) and may be used to generate new theories or hypotheses

Limitations include:

- can be difficult to determine the causes of the observed behaviour of interest, especially naturalistic observations i.e. only a true experiment can test/establish cause–effect and control unwanted variables
- observer bias can occur
- naturalistic observations in particular often lack a representative sample so results may not readily be generalised to the sample's population (or other populations)
- lack of control of variables in naturalistic observation settings does not support replication
- when participants know they are being observed they may behave differently, impacting on validity of the results

- some observational studies can be very time-consuming e.g. if the observer doesn't directly influence the behaviour being observed in an unobtrusive observational study, it may require a lot of time and patience to wait for the behaviour of interest to naturally occur.

8. Generally, reality TV programs of this genre produce little more than glimpses of authentic human behaviour, if any. Unlike everyday life in their true natural environments, 'reality stars' have sound recording devices attached, are monitored/followed by camera crews, and often interviewed on camera for personal commentaries and confessionals. Considering this type of contrived environment and 'participant' awareness that their behaviours are on widespread public display for entertainment purposes, it is reasonable to doubt the authenticity of human behaviours in reality TV programs such as Married at First Sight, Real Housewives and Survivor. Moreover, editorial activity generally biases the behaviour that is depicted, usually in pre-determined ways for commercial reasons.

In contrast, observational studies conducted by psychological researchers typically observe, record and collect data unobtrusively with minimal interference so that individuals behave as they normally would in a given situation rather than modifying their behaviour in unnatural ways simply because they are being observed. This helps ensure a higher degree of realism ('ecological validity'), thereby enhancing the ability to generalise the findings of the research. Importantly, behaviour targeted for observation is recorded and reported, without editorial intervention that biases the results.

9. Complete the following table to analyse different observational studies.

Observational study	Structured vs Unstructured	Naturalistic vs Contrived setting	Participant vs Non-participant
(a) A teacher concerned about the unsafe behaviour of students at the school's bus stop at the end of the school day organises an observational study. Observations will be made from a nearby classroom with reference to a checklist.	structured	naturalistic	non-participant
(b) Trainee counsellors will be assessed while they conduct consultations with each other, taking turns to be the counsellor then the client. All assessments will be conducted in a room at the university set up for that purpose. The course leader will video record each session and a criteria sheet will be used to guide feedback to trainees.	structured	contrived	non-participant

(c) The captain of the school's senior hockey team will analyse the players' communication styles during an upcoming match.	unstructured	naturalistic	participant
(d) A researcher will record the number of drivers who obey a give way sign at a roundabout.	structured	naturalistic	non-participant
(e) Researchers will compare the behaviour of AFL football spectators who sit behind the goals with those who sit in a grandstand. Observations will target the number of comments directed at umpires and players (but not the content).	structured	naturalistic	participant (as the researcher must sit amongst the spectators to hear comments and will most likely try to conceal presence as a researcher)
(f) A VCE student is planning to conduct an observational study in a shopping mall to find out whether people look at their own reflections or avoid doing so when walking past a large department store. Sex differences will be recorded using a 3-point rating scale based on 'Yes', 'No' and 'Not sure'.	structured	naturalistic	non-participant
(g) A VCE student is planning to conduct an observational study at school to find out whether junior school students are more disruptive with a replacement teacher. There will be two observation sessions conducted in the same period, in the same classroom, on the same day across two weeks. In week 1, the student will observe a year 7 Maths class from a storeroom when taught by their usual teacher. Only 6 of the students will be observed — two seated mid-front row, two mid-middle row and two mid-back row. In week 2, the student will observe students in the same class, seated in the same positions, but when taught by a replacement teacher who has never previously been at the school. Disruptive behaviour has been operationalised to	structured	naturalistic	non-participant

enable development of observation criteria.			

1.7 LA 2: Multiple-choice questions

1. non-participant; naturalistic

2. participant; naturalistic

3. experiment using an observation technique in a naturalistic setting.

4. experiment using an observation technique in a contrived setting.

5. correlational study

1.7 LA 3: Analysis and evaluation of research

1.

a. Examples:

• Soft reprimands to disruptive students will have a greater effect on disruptive behaviour than loud reprimands.

• Giving soft reprimands to a disruptive student will have a greater effect than loud reprimands.

• The use of soft reprimands is more effective than using loud reprimands when dealing with disruptive students.

b. Advantages include:

- quick/time efficient access as Ps are readily available are readily/easily available at a local primary school
- sample can be used to identify possible trends or patterns in students' behaviour and teacher reprimand types
- Limitations include:
- sample bias/non-representativeness as no random selection

- sample bias/non-representativeness means low level of confidence for application of results to other samples of children of the same age and other ages too i.e. low external validity

Note: Answers should explicitly refer to the particular study.

c. Explanation should demonstrate understanding that:

- time sampling involves observations of the occurrence of specified behaviour(s) during specified time periods, whereas event sampling targets one or more behaviours and observes all occurrences throughout the entire observation period;
- the researchers scheduled observations for a 20 minute period during daily arithmetic lessons across 4 weeks, following a schedule of observing for 20 seconds then recording for 10 seconds;
- therefore the researchers used the time sampling procedure.

d. Explanation should demonstrate understanding that the baseline measurements involved measures of disruptive behaviour before the treatment intervention was made, thereby providing a standard ('basis') of comparison for pre- and post-intervention comparison.

e. structured

f. non-participant observation

g. naturalistic observation

- Explanation should refer to the key features of naturalistic observation in relation to the particular study e.g.
- observations were conducted within the participant's natural/usual classroom environment
- observations were conducted in an inconspicuous/unobtrusive manner so that the researcher's presence did not influence the target behaviours i.e. the trained observers/researchers sat at the back of the classroom and did not directly influence/interfere with the behaviour being observed

h. IV: type of teacher reprimand/ loud or soft teacher reprimands

DV: frequency of disruptive behaviour

i. Example: Disruptive behaviour of two children during the phases of loud and soft teacher reprimands

j. Explanation should demonstrate understanding that:

- the graphs/charts show change/variability of disruptive behaviour across the observation days and also the mean level of disruptive behaviour during the four phases/conditions for each of the two children
- mean frequencies are lower for 'soft reprimand' phases/conditions for both children

k. The use of soft reprimands tends to be more effective than using loud reprimands when dealing with disruptive students.

l. Explanation should demonstrate understanding that generalisability to the sample's population and other samples of children of the same age and other ages over time is limited by:

• sample bias/non-representativeness (which means low external validity)

• control of potential unwanted (i.e. extraneous and confounding) variables e.g. proximity of teacher when giving a reprimand (teacher must be close for a soft reprimand to be heard, so is it teacher proximity or soft reprimand that changes behaviour?), features of the reprimands other than volume that may have contributed to change (such as tone of voice, intensity, harshness) (which means low internal validity).

1.8 LA 1: Review

1. Key features include:

- in-depth investigation • involve a single individual, group, event etc.
- multiple types of data are usually collected
- allow for detailed/intensive analysis
- non-experimental method/cannot establish cause-effect
- limited in the extent to which findings may be generalised

2. Discuss your answer with the teacher or another student to check understanding. Note that a case study is not a single participant experiment per se.

3. Examples include:

- work-related issues of concern to assembly line workers, team leaders etc.
- the factory's job description/duties list for assembly line workers
- job expectations of workers
- job expectations of team leaders, management
- shift work requirements
- work patterns
- worker interactions at the assembly line and during breaks
- leadership style of the manager
- staff absenteeism
- pay type, amount e.g. piece rate
- leave entitlements • OHS

4.

a. Advantages include:

allows for intensive analysis

yield rich/detailed data

avoid artificiality

potentially valuable source of hypotheses for further research or for data to support theory/model building or challenge a theory/model's assumptions.

can be conducted over a prolonged period

Limitations include:

cannot test a cause–effect relationship

not replicable in order to test results (e.g. with other participants) as is the experiment

sample e.g. often a small size, use of a convenience sample (rather than a random sample)

extent of generalisations very limited

tend to be more susceptible to biased information from the participant or the researcher

detailed and comprehensive data usually obtained makes process of analysing, summarising and reporting these data time-consuming.

b. If conducted over a long period of time, then the case study is adopting a longitudinal approach and may be essentially a longitudinal ('long-term') study and therefore have such

limitations (e.g. longer time to complete, participant attrition which is particularly significant if a small sample size, need to be alert to unexpected unwanted variables that were not present at the outset but may arise during the period of study).

1.8 LA 2: VCAA exam questions

1. case studies could provide ideas for further research into brain injuries.

2. a case study.

3. the research does not enable strict control of all variables.

4. Case studies can provide ideas for further research.

5.

a. The lack of control over the variables means (either of):

- a cause and effect relationship between variables cannot be established
- a variable other than the independent variable may influence the value of the dependent variable.

VCAA comment:

The instruction 'in terms of research' was not taken into account by many students.

b. Case studies provide detailed information about an individual or event that can be used to propose hypotheses or theories about the brain and behaviour.

VCAA comment:

The instruction 'in terms of research' was not taken into account by almost all students in this part.

1.9 LA 1: Review

1. simulation study: a research method involving the reproduction of a situation/environment/setting in a realistic way to investigate the behaviour and/or mental processes of individuals in that environment.

2. Discuss example with others to clarify conceptual understanding.

3.

Advantages include:

- access to environments which cannot be easily accessed/are unavailable in the real world for appropriate research e.g. to conduct an experiment to test a cause–effect relationship
- conduct experiments that would not be ethically permissible in the real world
- potentially valuable source of hypotheses for further research or for data to support or challenge a theory
- greater experimental control
- suits replication
- wider range of data may be collected relatively easily, especially when digital technology is used e.g. simulator, VR
- can be a time- and cost-effective alternative to a standard lab or field experiment

Limitations include:

- artificial environment so may lack realism
- participants know that the environment they are in is fake so they may behave differently than they would in that situation in reality
- generalisations very limited

1.9 LA 2: VCAA exam questions

1. self-report.

2. compared with experiments, observational studies do not require controlled variables.

3. it produces highly detailed results.

4. could use a self-report design.

5. within subjects

1.9 LA 3: Review

1.

a. Method: controlled experiment

Explanation: Aim is to test a causal relationship i.e. whether noise effects memory; can randomly allocate participants to different conditions with an E group exposed to the IV (noise) and a C group not exposed (quiet/no noise); a simulation study using VR would be impractical and unnecessary

b. Method: questionnaire/interview

Explanation: Ask about experiences and feelings using structured measures (e.g. questionnaire with fixed-responses questions and rating scales) for a large sample of different types of community health workers.

c. Method: questionnaire or interview

Explanation: researchers can ask questions about preferences then compare data

d. Method: observational study (naturalistic)

Explanation: A description of behaviour as it occurs in a real-life situation is being sought; no intervention or control over variables is possible or desirable; observational studies are a descriptive research method most appropriate for this investigation; a simulation study using VR would be inappropriate and impractical e.g unnecessary, expensive

e. Method: case study

Explanation: In-depth information is being sought about the way in which a variety of biological, psychological and social factors, such as age, marital relationship dynamics, physical health, mental health, job satisfaction, work stressors, prior experience, education, , motives, values, expectations, income level, access to social support, cultural background etc., may have interacted to influence the decision.

f. Method: simulation study (using controlled experiment)

Explanation: Replicate the operating theatre environment to assess effect of an IV (routine vs critical incident) on the DV (behaviour patterns) in an ethically permissible and practical way

g. Method: correlational study

Explanation: Use both sets of results to measure the degree of association/relationship/co-variance of the two variables e.g. a random sample of students enrolled in a range of VCE Units 3 and 4 studies sit practice exams during the swat vac period and results are correlated with results for final exams

h. Method: questionnaire/interview (structured to support comparison of like data)
Explanation: Ask joggers and non-joggers about their sleep quality and compare data; same set of questions may be asked in writing or orally; could include a rating scale e.g. self-report of sleep quality on a 7-point scale

i. Method: controlled laboratory experiment or s simulation study

Explanation: Recreate the situation/environment in an ethically permissible and practical way. Note the classic 'smoke-filled room' experiment that created an emergency situation in an ethically permissible way to investigate responses when alone or in the presence of others. May also be recreated in simulated environment e.g. virtual reality as described in the journal report at https://core.ac.uk/download/pdf/82872456.pdf

j. Method: observational study (naturalistic, using observational technique)

Explanation: Watch and record what happens when a research assistant (a student) sits close to someone working in the library (a student) despite availability of vacant chairs well away from the working area; simulation study using VR would be inappropriate and impractical e.g unnecessary, expensive

k. Method: correlational study

Explanation: Assess how the two variables are co-related using relevant measures of each variable e.g. mean ratings on a 10-point scale for each variable for a random or stratified sample.

l. Method: controlled experiment (incl. use of a questionnaire)

Explanation: Test a cause-effect relationship by randomly allocating Ps to either an E group (use melatonin pills for 1 month) or C group (use a pill that looks like the melatonin pill but has no active ingredient i.e. a placebo); all Ps keep a sleep diary and record daily data on sleep quantity and quality, then compare scores on the DV (e.g. mean number of hours of sleep and mean self-reported sleep quality ratings by each group).

1.10 LA 1: Review

1.

Criteria	Random errors	Systematic errors
a. Source of error	due to chance alone i.e. occur arbitrarily or indiscriminately when an unknown or uncontrolled factors affect the variable	flaw in research design, its procedures (e.g.

	being measured or the measurement process	measurement tool) or implementation
b. Example of error type	unexpected participant variables impacting on measured responses, unexpected disturbance during an experiment	flawed measurement tool, measurement error, sample bias
c. Direction of error	either of two directions – positively or negatively	always in the one direction – either positive or negative
d. Variability in degree or value of the error	inconsistent/differs each time	constant/the same each time
e. Preventability of error	unpreventable	preventable
f. Predictability of error	specific errors are unpredictable	most systematic errors are foreseeable and therefore predictable
g. Effect of error on DV	affects performance on the DV and therefore produces an error in the results	affects performance on the DV and therefore produces an error in the results
h. Effect of error on accuracy (validity) of results	Cause inaccuracy	Cause inaccuracy
i. Effect of error on consistency (reliability) of results	Reduce consistency (i.e. results vary in pos. or neg. direction)	Do not reduce consistency (i.e. results constantly vary in the same direction, either pos. or neg)
j. Improvement of accuracy by repeating measurements	Possible	Possible
k. How to eliminate, control or minimise occurrence or effect of error	Take additional measurements and average out the effect; repeat the experiment; stricter control/refine the measurement technique	Use valid measurement tools; improve the research design/procedures

1.10 LA 2: Review

1.

a. extraneous variable: any variable that is not the IV that may affect the DV/results
confounding variable: any variable that is not the IV has affected the DV/results (and therefore provides an alternative explanation for the results)

b. controlled variable: a variable that is not part of the experiment itself but can have an effect on the DV so it is held constant ('controlled') to remove its potential effects; control/constancy ensures its effect is identical for all participants

uncontrolled: a variable that an experimenter cannot hold constant/control or measure in an experiment so it's not identical for all participants and may therefore affect the DV/results in an unwanted way/may produce random or systematic errors

2. alike: both can affect the DV/results; neither are the IV; a confounding variable may have its origin as an extraneous variable/ an extraneous variable could become a confounding variable; both can make it difficult to isolate the real effect of the IV, moreso a confounding variable

different: e.g. confounding variable actually causes a measurable change in the DV that is consistent with what was predicted in the hypothesis, whereas an extraneous variable may or may not affect the DV in a significant way; a confounding variable systematically varies with the DV, whereas an extraneous variable does not; the effects of an extraneous variable on the DV may be isolated from the IV but the effects of a confounding variable cannot be isolated from those of the IV with any certainty; an extraneous variable does not necessarily provide an alternative explanation for the results (i.e. the change in the DV), whereas a confounding variable does.

3.

a. Explanation should demonstrate understanding that:

The experimenter needs to strictly control all variables other than the IV in order to isolate the effect(s) of the IV on the DV and be able to conclude with confidence that any change in the DV is attributable to the IV (after the potential role of chance has been estimated through a test of significance).

The presence of a confounding variable will prevent the experimenter from concluding that the IV caused the predicted (hypothesised) change in the DV. This outcome also suggests that there may be one or more alternative explanations for the results obtained in the experiment — i.e. the change in the DV may have been caused by a variable other than the DV. The more alternative explanations there are for the results, the less confident the experimenter will be that their IV was responsible for the results.

b. Generally, an abbreviated expression for 'presence of a confounding variable', that a confounding variable has been identified in their experiment.

c. Generally, refers to the presence and influence of a confounding variable on the DV measure and therefore results and interpretation of the results i.e. a potential limitation when drawing conclusions.

4.

a. IV: having just awoken or just run a kilometre

DV: reaction time

potential extraneous or confounding variables e.g.:

participant variables/individual participant differences of relevance to the experiment's DV (if random allocation is not used) e.g. age, physical health or fitness, sleep quality, motivation, prior experience with the reaction time technology instructions and procedures of relevance to the experiment's DV (if not standardised) e.g. substantial differences in instruction format or materials, test venue, environment, times etc.

b. IV: goal shooting alone or in the presence of others

DV: goal shooting accuracy/number of goals scored

potential extraneous or confounding variables e.g.:

participant variables/individual participant differences of relevance to the experiment's DV (if random allocation is not used) e.g. age, motivation and prior experience with the task; sex, age or behaviour of 'others' required to be present may be confounded with their mere presence instructions and procedures of relevance to the experiment's DV (if not standardised) e.g. substantial differences in instructions, goal shooting set up and task, behaviour requirements of 'others' required to be present, test venue (such as indoor vs outdoor; windy vs not windy; hot vs cold; facing sunlight/not facing sunlight) or test times (such as early vs late)

c. IV: whether the participant is told the person has the same or a different cultural background

DV: characteristics selected

potential extraneous or confounding variables e.g.:

participant variables/individual participant differences of relevance to the experiment's DV (if random allocation is not used) e.g. age, intelligence/educational background/language skills, cultural background, motivation/boredom instructions and procedures of relevance to the experiment's DV (if not standardised) e.g. participants may see or hear each other's answers; cultural background of the researcher, different test materials and test venues or times, such as early morning vs very late, just before lunch vs just after lunch

5.

a. IV: new information to be learned

DV1: rate of forgetting/time taken to forget

DV2: amount of forgetting/number or percentage of words not retained

b. Variables may include:

participant variables/individual participant differences of relevance to the experiment's DV (if random allocation is not used) e.g. memory ability, use of memory aids, educational background, motivation/boredom, mood, age, meaningfulness of nonsense words (some nonsense words could have more or less meaning attributed to them as a result of experience with electronic communication, such as message texting) instructions and procedures of relevance to the experiment's DV (if not standardised) e.g. test format, materials, venue, environment, times etc.

c. random allocation of participants (from a reasonably sized random sample) to experimental conditions should control/minimise influence of all participant variables, including prior experience use of standardised instructions and procedures should control/minimise other variables

6.

a. IV: interest value of the task/type of text

DV: number of errors detected

b. Potential confounding variable: e.g. task difficulty

Explanation: in addition to being less interesting, the physics text might have been more difficult to spellcheck. If so, task difficulty would have been confounded with task interest, making it impossible to determine whether performance differences were caused by task interest or task difficulty.

1.10 LA 3: VCAA exam questions

1. a valid conclusion can be made about the effect of the independent variable on the dependent variable.

2. A. the research is not controlled for potential confounding variables.

VCAA comment:

Option C was chosen by 21 per cent of students; however, the case study approach described was not an experimental design. Control and experimental groups are not relevant in this form of research.

3. the memory skill of the participants.

4. gender of the participants.

VCAA comment:

The fact that all participants were first-year university students suggests a reasonable degree of consistency in the level of education of the participants; similarly all had been deprived of sleep for a similar amount of time. The fact that caffeine effects are likely to be influenced by body mass, which in turn is likely to be lower for females than males suggests that gender is the most likely confounding variable.

5. Participant effects: the participants' characteristics are the same for both conditions. Therefore, this factor is even across both conditions and should not cause a difference in the results for each condition.

VCAA comment:

Any nominated personological variable that could reasonably have an effect in this study was also acceptable, such as:

- experience with meditation
- body mass
- type of insomnia.

For example, experienced meditators may achieve a trance state much more quickly than others and be more relaxed. It was essential that the nominated effect and explanation were congruent.

1.11 LA 1: Review

1. participant variable: any personal characteristic of an individual participant, other than one that may be the IV, that may influence the results

2. Explanation should demonstrate understanding that random allocation ensures a uniform spread of participant characteristics across the experimental conditions/in the experimental

and control groups (assuming suitable sample size) so that the effect of participant variables on the DV/results is cancelled out.

3. Explanation should demonstrate understanding that the larger the sample size, the more likely the sample will be representative of its population (assuming use of random sampling) and therefore less likely to produce a biased sample e.g. too many or too few/disproportionate numbers of unwanted characteristics that may influence the results

4. situational variable: an external/non-participant factor associated with the experimental setting, other than one that may be the IV, that may influence participant responses and therefore the results

5.

• environmental conditions e.g. room, lighting, noise

• experimenter and research assistants who are present in the setting e.g. appearance, behaviour, manner

• variations in instructions and procedures for different participants

• any other non-participant related variable i.e. must be external to the participant

It is also essential that all participants experience the same environment and procedures, with the only exception being exposure to the independent variable. Variations in instructions and procedures that may be a source of extraneous or confounding variables can be controlled by standardisation ('consistency') across the different conditions. Using standardised instructions and procedures means that instructions and procedures are the same for all participants (except for variations required for experimental group participants exposed to the IV).

6.

a. Variables may refer to:

- environmental conditions where the study technique is taught/learnt and where the exam will be conducted e.g. room, lighting, noise
- experimenter and research assistants who are present in either setting e.g. appearance, behaviour, manner
- variations in instructions and procedures for different participants in the setting
- any other non-participant related variable i.e. must be external to the participant

b. Variables may refer to:

- environmental conditions where motor task performance is assessed e.g. room, lighting, noise
- experimenter and research assistants who are present in the setting e.g. appearance, behaviour, manner
- variations in instructions and procedures for different participants in the setting
- any other non-participant related variable i.e. must be external to the participant

7.

a. counterbalancing: systematically varying/changing/alternating the order of experimental treatments/tasks for participants in the different groups/conditions of an experiment so that any order effect occurs equally in all groups/conditions

Note: The exam report did not supply an answer. Instead, the report notes that the question was poorly answered.

b. used to control order effects when a within subjects experimental design is used; order effect is a potential extraneous or confounding variable that can have an unwanted effect on the DV/performance/results; when counterbalancing is used, order effects occur equally in all groups/conditions, so they are reduced or avoided by balancing each other out in the results

Note: The exam report did not supply an answer. Instead, the report notes that the question was poorly answered.

8. Suggestion should refer to any systematic randomisation procedure for balancing of order effects by randomly creating different orders under which different participants are tested or exposed to different conditions e.g. tossing a coin separately for each participant to determine whether he or she does condition 1 or 2 first, or randomising the order of trials within a condition.

9.

a. Order effects:

- residual aggressive behaviour effects of having played a violent computer game in the first session may carry over and influence behaviour in the second session e.g. effects may last for over 45 minutes and may still be present when the children are measured after playing a non-violent computer game, so aggression may be influenced by both violent and non-violent computer games
- fatigue due to measurement in two different sessions over a considerable period of time e.g. may reduce physical effort in relation to aggression
- Counterbalancing procedure: Arrange the order in which the conditions of the repeated measures design are experienced so that each condition occurs equally often in each position e.g. one half of the children play the violent game first and the other half play

the non-violent game first, with the order of play determined randomly. This would ensure that carry over and fatigue occur just as often in each condition and are therefore accounted.

Note that counterbalancing does not actually reduce carry over or fatigue.

b.

i. Example: Random allocation for equivalence of males and females in groups, then alternate the order in which the experimental and control groups are exposed to each condition so that each group is exposed to each condition in a different order e.g. Group A experiences condition 1 first, then 2 and Group B experiences condition 2 first, then 1.

ii. Example: Male research assistants test half the participants in each condition and female research assistants test the other half.

1.11 LA 2: Multiple-choice questions

1. within subjects

2. random allocation to different conditions.

3. using random selection and allocation procedures.

4. noise

5. gender of the person in each photo.

1.11 LA 3: VCAA exam questions

1. alternate the order of exposure to the independent variable.

2. Yes, because the order of the condition might affect the number of words recalled.

3. it would eliminate participant differences.

4. The researcher is using a within subjects design.

5. convenience sampling and standardised procedures

1.11 LA 4: Review

1. demand characteristic: a cue in an experiment that may influence or bias a participant's response, thereby distorting the results

2. Sources may refer to:

- experimental setting e.g. situational variables
- the experimenter e.g. experimenter effects
- other participants outside the experimental setting

3. Explanation should demonstrate understanding that:

- a participant variable is any personal characteristic of an individual participant (other than the IV) that may influence the results; and
- a demand characteristic a cue external to the participant that influences their expectations and responses.
- Therefore, a demand characteristic could not be classified as a participant variable

4. Explanation should demonstrate understanding that (1) the potential benefits of an experiment must justify its use, and, (2) there is no feasible alternative to its use.

5.

a. Similarities include:

- both control expectations/expectancy effects in experiments in which knowledge of the conditions might affect responses/behaviour
- both ensure participants are unaware of the condition to which they have been allocated i.e. experimental or control group

Differences: for single blind the experimenter knows the condition to which participants have been assigned; whereas with double blind the experimenter does not.

b. More control: double blind

Explanation: controls both participant and experimenter expectations/expectancy effects

c. single blind

6.

a. standardised instructions and procedures: use and administration of the same instructions and procedures/measures/techniques for participants, as relevant to the specific group (condition) to which they have been assigned.

b. Explanation should demonstrate understanding that standardised instructions and procedures could help prevent cues in instructions, procedures (including aspects of the setting) that can influence participant expectations and bias their responses.

7. experimenter effect: any influence in addition to the IV that the experimenter (or any other researcher) may have on the results

8. Examples may refer to:

- interaction with participants
- unintentional errors when making observations, measuring responses, when analysing or interpreting the results

9. double blind procedure

1.11 LA 5: VCAA exam questions

1. standardised instructions and double-blind procedures

2. the participants do not know whether they are taking the placebo or the real drug, unlike Harvey who does know.

3. experimenter effect.

4. employ a research assistant, who is unaware which group the participants are in, to collect the results.

5. the difference in the results between the placebo group and experimental group is due to the independent variable, and not the participants' expectations.

VCAA comment:

A significant number of students chose the incorrect options B or C for this question. This clearly indicates that there was widespread misunderstanding about the way in which a placebo (control) group is used in an experiment.

1.11 LA 6: VCAA exam questions

1. that they could be in either the control group or the experimental group

2. participant expectations.

3. powdered sugar; caffeine

4. Acceptable responses included either of:

- a single-blind procedure is used to avoid the effect where participants' expectations may affect the performance (placebo effect) as the participants are 'blind' as to whether they are in the control or experimental group
- if the experimenter is 'blinded', then the effects of the experimenter's expectations will be eliminated.

The key terms here were 'expectations' or 'bias'.

5. Name: placebo effect/participant expectations/Hawthorne effect

Definition: Participant expectations (or the placebo/Hawthorne effect) will influence individuals' behaviour, meaning that the independent variable will not be the only variable influencing the value of the dependent variable. Many students did not achieve marks for this question because they answered as if the participants were unaware of the group to which they had been allocated.

1.12 LA 1: Review

1. ethics: standards that guide moral judgments about what is right/acceptable and what is wrong/ unacceptable in relation to any research

2. Explanation should refer to protection of wellbeing and rights of research participants.

3. Concepts are:

- integrity: the research follows all recognised ethical standards for responsible and honest research and reporting
- justice: the researcher ensures use of fair procedures and fair distribution of costs and benefits of the investigation
- beneficence: the researcher maximises all possible good outcomes while minimising risks of harm to participants and to the community in general; potential benefits must justify any risk
- non-maleficence: the researcher must avoid harm and potential harm must never exceed potential benefits
- respect: the researcher recognises and takes account of the value of all individual participants and their rights, beliefs, perceptions and cultural backgrounds

4. Procedures include:

- ensure consent is informed e.g. understand nature and purpose of the investigation and potential risks
- ensure consent is voluntary
- ensure participant is competent to give informed consent; ensure use of a parent or guardian when required
- ensure information provided about the research is sufficient and can be understood by participants
- ensure opportunity for participant questions
- provide documentation where appropriate.

5. Explanation should refer to debriefing of participants.

6. Explanation should demonstrate understanding of the importance of safeguarding the wellbeing of all participants during and after the research. For example:

- wellbeing of participants must always be a high priority of any research/researcher.
- risks to participant wellbeing should be considered and addressed before the research begins
- participant wellbeing should be monitored during the research (and afterwards where appropriate)
- the researcher should remind the participant of their withdrawal right and encourage and support withdrawal if deemed appropriate
- the researcher should assess the level of distress and potential long-term effects, offering or providing counselling where required; if the researcher lacks expertise to assess mental wellbeing competently then ensure this is addressed through use of a mental health professional
- check wellbeing of other participants
- suspend or cancel the research immediately if warranted
- ensure debriefing addresses all concerns
- inform participants of right to complaint and the process
- ensure participant distress is addressed in the research report.

7. Explanation should demonstrate understanding that the privacy principles:

- set out standards, rights and obligations for the handling of personal information, which includes information collected through research
- relate to how personal information will be handled e.g. protecting anonymity of participants, appropriate data use, secure storage
- complement ethical standards in the National Statement and APS Code.

8.

Statement	Ethical value

a. The process of recruiting participants is fair.	justice
b. The researcher does not 'make fun' of a participant's unexpected responses.	respect
c. The researcher sees it as their duty to do no harm or allow any harm to all participants	non-maleficence
d. The researcher has a commitment to following all relevant ethical standards.	integrity
e. The researcher does not put pressure on a participant to consent to study participation.	respect
f. The researcher is certain that what is likely to be learnt from their study justifies the risks of harm or discomfort to participants.	beneficence
g. The researcher ensures easy access to the results of the research when available.	justice
h. Every single human being has value in himself or herself.	respect
i. The researcher ensures all members of the research team are properly qualified to undertake their respective responsibilities.	integrity
j. The researcher is willing and able to answers even the most trivial questions about the research.	informed consent/respect

9.

a. Ethical issues include:

voluntary participation i.e. participants must freely choose to take part in research; must not be pressured to participate or experience negative consequences if choose not to justice i.e. ensuring no unfair burden on a particular group informed consent procedures, i.e. consent must be based on information about the nature and purpose of the proposed research, including consequences of participation; use of appropriate documentation etc.

b. Ethical issues include:

- use of deception: this is likely to be justifiable (including no informed consent) to ensure validity of the results
- use of deception makes proper debriefing of particular relevance
- ensure participant privacy and confidentiality.

c. Ethical issues include:

- Ethical concepts such as respect and beneficence in particular need to justify the research.
- Confidentiality is important, especially given consequences for disclosing cheating behaviour (but there is a dilemma of whether cheating behaviour on an exam should be disclosed to course authorities and non-maleficence needs consideration).

Note that informed consent is not ordinarily required for naturalistic observation of public behaviour but deciding what is 'public behaviour' is not always easy. Requiring informed consent for this particular study would change the research situation dramatically, making it difficult for the target behaviour to be observed and recorded as it 'naturally occurs'.

d. Ethical issues include:

- informed consent procedures: consent must be based on information about the nature and purpose of the research; use of an appropriate consent form outlining purpose, methods, demands, risks, inconveniences, discomforts and possible outcomes
- non-maleficence: must avoid psychological harm
- withdrawal rights: participants must know they can withdraw from the research at any time, without giving a reason and with no negative consequences
- respect: despite participant complaints, the researcher continued testing
- use of deception: cannot be used when distress is possible
- debriefing: after research using deception is conducted, address complaints, clarify participants' understanding of the study; if necessary provide information about services available to treat any distress due to participation

e. Ethical issues include:

- informed consent procedures: no justification for non-adherence; participants and parents of child participants have the right to be fully informed of all aspects of the research
- respect: ignored parental rights to know
- use of deception: although no risk of harm is involved, not justified
- debriefing: must disclose the deception

Note that the student's teacher is responsible for the research and must ensure all ethical concepts and guidelines are considered and followed (and is therefore responsible for the student's conduct). Note additional guidelines in the study design for teachers, i.e. 'teachers and schools have a legal and moral responsibility to ensure that students demonstrate ethical conduct' undertaking psychological research.

f. Ethical issues include:

- The research is likely to be illegal e.g. in Qld it is an offence to 'observe or visually record another person, in circumstances where a reasonable adult would expect to be afforded privacy […] without the other person's consent'
- Ethical concepts such as respect and beneficence in particular may not justify the serious invasion of privacy.
- Confidentiality is important.
- Debriefing would alert the researcher to participant concerns that had been overlooked.

Note that informed consent is not ordinarily required for naturalistic observation of public behaviour but deciding what is 'public behaviour' is not always easy. As with Study 3 above, requiring informed consent for this particular study would change the research situation dramatically, making it difficult for the target behaviour to be observed and recorded as it 'naturally occurs'. Nonetheless, illegal behaviour cannot be justified under any circumstances.

1.12 LA 2: VCAA exam questions

1.

Children	Adults with a mental disorder
deception can be used in research with children if their parent/ guardian has consented	a placebo treatment may be used with informed consent despite intentionally denying access to treatment

2. withdrawal rights

3. the adolescents and their parent/guardian.

4. debriefing

5. the guardian provided consent and the patient understood to the best of their ability the nature, purpose and risks of the study.

1.13 LA 1: Review

1. primary data: information collected directly from the source by the researcher (or through others) for their own specific purpose e.g. data collected through an experiment

secondary data: information collected by someone other than the original user who did so for their own purpose e.g. data by another researcher published in a journal article

2.

a. qualitative data: information about the qualities or characteristics of what is being studied e.g. an adolescent's verbal description of a friend; involves descriptions

quantitative data: information about the quantities or amounts of what is being studied e.g. an adolescent's rating of a friend's level of support during a personal crisis; involves numbers

Example

Quantitative	Qualitative
1 teacher	teacher's name is Ms Smith
25 students	students are a mix of socio-economic backgrounds
16 females, 9 males	mix of males and females
23 students aim for university studies, 2 aim for TAFE studies	students are highly motivated
class mean score for SAC Unit 3 test is 81%	the class enjoys studying psychology

b. Quantitative data strengths:

- tends to allow for bigger samples, thereby enhancing the generalisation of the results
- greater accuracy and precision of results as data are in numbers
- more precise reporting of results
- more detailed and precise data analysis e.g. easier to detect patterns and trends, make comparisons, use statistical tests
- numerical form tends to make it easier to draw conclusions
- tends to be more suited to precise comparisons with different samples over time, thereby better supporting replication

Quantitative data weaknesses:

- may oversimplify the complexity of human experience through representation in numbers
- results are limited to numerical descriptions rather than detailed narratives and generally provide less elaborate or insightful accounts of human experience

Qualitative data strengths:

- tends to be richer and more detailed about how people think, feel and behave
- tends to promote openness in responses e.g. open-ended questions, free expression through art representations of how people think, feel and behave
- often represents the true individuality and complexity of human experience (that may not be assessed by quantitative measures)
- can help explain responses when used together with quantitative data collection

Qualitative data weaknesses:

- tends to be more difficult to summarise precisely
- tends to be more difficult to detect patterns and trends and to make systematic comparisons due to richness and variety of the information collected
- collection and analysis tends to be more dependent on the skills of the researcher
- tends to be more difficult to validate the collected data through statistical testing
- tend to use smaller samples due to time-consuming collection and analysis requirements

3.

Investigation	**Primary data or Secondary data**	**Qualitative data or Quantitative data**	**Objective data or Subjective data**
a. A researcher compares the detail in paintings by people with a phobia and people with schizophrenia	Secondary data	Qualitative data	Subjective data
b. A researcher compares the differences in visual perceptual abilities of kittens with and without damage to the visual cortex in the brain	Primary data	Quantitative data	Objective data
c. A researcher observes how much time male and female adolescents take to get ready for a deb ball	Primary data	Quantitative data	Objective data
d. A researcher reviews a YouTube mini-documentary showing participant responses during	Primary data	Quantitative data	Objective data

an experiment on the effects of playing violent video games			
e. A researcher uses diary records kept by people hospitalised with a mood disorder to study their mental experiences	Secondary data	Quantitative data	Objective data
f. A researcher analyses the content of media reports that attribute causation to the results of correlational studies	Primary data	Qualitative data	Subjective data
g. A researcher uses diary records kept by people hospitalised with a mood disorder to study their mental experiences	Primary data	Qualitative data	Subjective data
h. A researcher analyses the emotional content of a blog on the ethics of animal research	Secondary data	Qualitative data OR Quantitative data	Subjective data
i. A researcher collects data to assess the relationship between scores on a standardised test for antisocial personality disorder and the length of sentences for prisoners convicted of a violent crime	Primary data	Quantitative data	Objective data
j. A researcher analyses participant scores on a test of recall in a study on long-term memory decline and ageing	Primary data	Quantitative data	Objective data
k. A researcher uses free response questions to investigate how people feel when stressed	Primary data	Qualitative data	Subjective data

1.13 LA 2: VCAA exam questions

1. questionnaire with qualitative data.

2. quantitative and qualitative

3. provide access to volumes of data that the researcher may not be able to gather.

4.

Type of data	Data collection method	Sample size
qualitative	interviews	small

5. quantitative only.

1.14 LA: VCAA exam questions

1. There is a strong positive correlation between the two variables.

2. there is a strong negative relationship between a person's age and the number of friendships they have.

3. -.8

4. a weak relationship between two variables; one of which increases while the other also increases.

5. Possible Answer:

Strong negative or inverse or positive (moderate or moderate to strong was accepted).

Although the relationship appears negative, and convention indicates a negative relationship,

the axes were not labelled so it was accepted that the relationship could be either positive or negative.

1.15 LA 1: VCAA exam questions

1. it contains outliers, very small or large values in the scores that are not typical.

2.

Mean change score for avoidance strategy	Mean change score for approach strategy
+6.2	+1.5

3. clustered around a central score.

4. 15

5. 17

1.15 LA 2: Review

1. Measures of variation indicate how widely scores are distributed or spread around the central point of the data i.e. variability of scores within a set of scores.

2.

a. SD summarises how far scores within a set of scores deviate/are dispersed/spread out from the mean for those scores i.e. a measure of variation/variability in the form of a specific score/descriptive statistic.

b. Explanation should refer to the SD providing a point of comparison between the means and the spread of two or more different sets of score.

3. SD1: 68.26%

SD2: 95.44%

4.

a. High variability

b. Low variability

c. High variability

d. High variability

e. Low variability

5.

a. Both classes have an identical average score. Therefore, it may be concluded that students in both classes demonstrated the same average ability in their knowledge of Psychology measured through the practice exam.

b. Class A has a very low SD indicating low variability of scores/individual scores are densely clustered around the 75% level, suggesting far more students with results at or close to this mean score (when compared with Class B).

Class B has a high SD indicating high variability of scores in relation to the mean, suggesting there are students with very good results (e.g. much higher than 75%) and students with not so good results (e.g. much lower than 75%).

6.

a. Outliers can affect the standard deviation (just as they do the mean) and therefore distort the representation of the spread e.g. can pull the SD value towards the outlier(s) score.

b. Visual scanning of the data for extreme scores unlike and/or far away from the others, especially if organised (e.g. highest to lowest) or graphed.

c. Causes may refer to:

- random errors
- systematic errors
- personal 'human' error
- inherent ('naturally occurring') variability in the data

d. Actions may include:

- check for a possible error or underlying cause i.e. do not dismiss or overlook
- reflect on how it would affect the results and validity of the investigation, if any
- decide on what to do about the outlier e.g. include or exclude; recalculate a score if due to a personal error (such as a miscalculation) and recalculation is possible
- refer to the outlier in the report and incorporate in the discussion e.g. explain its occurrence and effect on the results and validity of the research (if any)

1.15 LA 3: Multiple-choice questions

1. reliable.

2. high reliability and low validity.

3. reliable.

4. reproducibility

5. repeatability

1.15 LA 4: Review

1. Explanation should refer to possible alternative explanations (e.g. other than the IV) of the results e.g. Although the results alone may indicate that the hypothesis is supported, the results may have been influenced in a significant way by variables other than (or in addition to) the IV. Therefore, uncontrolled extraneous variables and potential confounding variables also need to be considered when drawing a conclusion. The researcher must be confident that any change in the DV was due to the IV alone and not any other variable.

2.

a. Validity refers to the accuracy of the measures and results; whereas reliability refers to their consistency.

b. External validity refers to whether the results can be applied to similar individuals in a different setting or not; whereas internal validity refers to whether the research investigated what it set out and/or claims to have investigated

c. Reproducibility refers to how close the results are to each other when the research is conducted again (replicated) under different/changed conditions; whereas repeatability refers to the degree to which the research obtains similar results when it is conducted again under the same conditions.

d. An opinion is a judgement/point of view not necessarily based on verifiable evidence and therefore disputable; whereas an anecdote is a verbal report of a casual observation that is scientifically inadequate but may be useful information.

e. A conclusion tends to relate to the specific results of a study (e.g. in relation to the research hypothesis), whereas a generalisation relates to the application of the results to the population from which the sample was drawn and often beyond that population.

3. Generally, the extent to which the instrument will produce very similar/the same results whenever used to measure the DV.

4. When very similar or the same results are not obtained when the investigation is replicated i.e. when either repeated under the same conditions or reproduced under different conditions

5. The extent to which the measure correctly/actually measures/assesses what it claims to /is supposed to, and not some other characteristic/attribute

6. The results for the investigation do not support the hypothesis/The hypothesis is refuted on the basis of the results obtained for the investigation.

7. Explanation should refer to a randomly occurring factor/event/phenomenon that is unexpected and/or has a relatively low level of predictability (probability level of occurrence) and can influence the research results.

Example: an unexpected influential extraneous or confounding variable in an experiment that is not necessarily distinguishable or identifiable and is the basis of a random error

8. Procedures should refer to lack of control of relevant extraneous or confounding variables, such as:

1. sample bias due to sampling technique
2. uncontrolled participant variables due to no random allocation or inappropriate experimental design
3. relevant situational variables
4. demand characteristics
5. experimenter effects
6. placebo effect

9. Procedures include:

- random selection to ensure representative sampling, and the bigger the random sample the more representative It Is likely to be
- conducting the experiment in a real-world setting that is appropriate to the research question of interest and more like an event in 'real life' can also improve external validity

10. random and systematic errors (but not personal errors)

11.

a. Explanation should demonstrate understanding that a measure (or results) can be reliable even though not valid but a measure cannot be valid unless it is reliable e.g. a thermometer may record the same temperature under the same environmental conditions every time it is used (i.e. reliability) but consistently do so incorrectly each time because it is flawed/has a fault (no validity).

b. Explanation should demonstrate understanding that an investigation actually studied what it was supposed to investigate and the results/conclusions reflect that (i.e. internal validity), but may not apply to similar individuals in a different setting (i.e. lack of external validity).

1.15 LA 5: VCAA exam questions

1. Using participants from one specific source means the results may not be generalised to the wider population.

2. Include a larger sample of adolescent boys from both suburban and rural schools.

A and C would both improve the design of the study and the quality of the data but D would result in a sample that is both larger and more representative, increasing generalisability.

3. high reliability

4. generalise the results to the wider population.

5. The perceived level of stress was greater for those who exercised fewer than five hours per week than for those who exercised more than five hours per week.

2.1 LA: Multiple-choice questions

1.brain and spinal cord

2.the brain

3.spinal cord

4.receive, process and coordinate a response to incoming information.

5.enteric, sympathetic and parasympathetic nervous systems

2.2 LA 1: Review

1. circuit of interconnected neurons along which information travels.

2. carries information to and from the central nervous system.

3. a. Roles are:

- receive sensory information from the body (via the PNS) and transmit it to the brain for processing (via ascending tracts)
- receive motor information from the brain and send/relay it to relevant parts of the body (via the PNS) to control muscles, glands and internal organs so that appropriate actions can be taken (via descending tracts)

b. Initiating certain types of reflex responses that occur independently of the brain e.g. spinal reflex.

4. Explanation should refer to the role of nerves with the spinal cord as pathways for transmission of sensory and motor information required for control of voluntary movements from the brain to the body i.e. when the spinal cord is injured, the brain loses both sensory input from and control over the body (but the severity of feeling loss and paralysis depends on where the spinal cord is injured and the severity of the injury).

5. Roles should refer to:

- PNS carries information to the CNS (specifically to the brain via the spinal cord) from the body's muscles, organs and glands (about the internal environment) and from the sensory organs (about the external environment) for processing by the brain
- PNS carries information from the CNS to the body's muscles, organs and glands so that appropriate actions can be taken

2.2 LA 2: Review

1. Roles are:
• sensory function: carries sensory information to the central nervous system

• motor function: carries motor information for voluntary movements from the central nervous system.

2. Examples:

- sensory function: when touching an ice cube with a fingertip, sensory receptors in the skin detect touch (pressure) and temperature information and transmit to the central nervous system
- motor function: any voluntary movement involving skeletal muscles e.g. intentional/deliberate and not reflexive.

3.

- afferent: sensory information, towards/incoming/into the central nervous system
- efferent: motor information, outwards/outgoing/leaving the central nervous system

4.

- sensory function: e.g. detection of presence of the glass through touch (pressure) sensations from skin receptors and transmission of sensory information via sensory neurons to central nervous system
- for meaningful interpretation (such as combining with other information to determine spatial location, weight etc.)
- motor function: e.g. initiating voluntary movements via motor neurons to grasp and pick up the glass, such as holding the glass appropriately, control of skeletal muscles attached to finger bones to enable grasping and lifting

5. Explanation should demonstrate understanding:

- of the role of the somatic nervous system i.e. carries sensory information to the central nervous system and motor information from the central nervous system
- that limb movements for tennis are primarily voluntary, involving skeletal muscles attached to bones
- that voluntary movement is controlled through the coordinated actions of both motor and sensory information e.g. voluntary movement for tennis is also dependent on sensory input
- that spinal cord injury/damage resulting in the brain's loss of both sensory input from and control over the body as the spinal cord is a pathway for transmission of relevant sensory and motor information

- the severity of feeling loss and paralysis depends on where the spinal cord is injured and the severity of the injury e.g. the higher up on the spine the injury is and the greater the severity, the greater the number of nerve connections between the brain and body that are severed.

2.2 LA 3: VCAA exam questions

1. experiencing the sensation of heat when holding a cup of coffee.

2. scratching your head.

3. all the nerves outside the brain and spinal cord.

4. sensory receptors; CNS

5. There were three valid interpretations of this question. Full marks could be achieved by providing an accurate identification and a correct and coherent outline of the involvement of any one of the following in activating the response:

- the somatic nervous system
- the brain
- the autonomic nervous system.

Responses indicating that the spinal cord activated the response were incorrect as the scenario clearly described a conscious action. A response identifying the autonomic nervous system was considered valid if it described accurately how an autonomic flight response might alert the conscious decision-making system to the need to move away from the fire, thus being the subdivision that 'activated' the conscious response. The range of responses accepted reflected the wording of the scenario, and valid understandings of the word 'activated' in the context of the nervous system.

2.2 LA 4: Review

1.

a. Explanation should demonstrate understanding that many organs, glands and processes under ANS control have built-in mechanisms for their regulation and therefore usually function independently/without conscious effort/activation and not normally under voluntary or conscious control.

b. Explanation should demonstrate understanding that the ANS is not completely self-regulating as it is linked to the cerebral cortex so voluntary control of some autonomic responses is possible at certain times e.g. with conscious effort, someone can change and

therefore control their breathing rate at any time when awake; techniques such as biofeedback can be learnt and used to enable control of certain autonomic responses such as heart rate, perspiration etc.

2. Description should demonstrate understanding that the ANS regulates activity of visceral muscles, organs and glands but also provides feedback to the brain about their activities, which can in turn influence (increase or decrease) their activity e.g. the fight–flight–freeze response described in Topic 3, demonstrates role of ANS (initiating without cortical input/conscious effort, a fight, flight or freeze reaction) and CNS/brain interaction (e.g. interpreting the event that automatically activated fight–flight–freeze in a way which maintains or changes autonomic responses).

3. Differences include:

- skeletal muscles are involved in or enable voluntary movements of limbs and other body parts and visceral muscles are involved in or enable activity of internal organs and glands
- skeletal muscle activity requires initiation by motor neuron messages from the brain and visceral muscle activity does not require motor neuron information/is under ANS control/has built-in mechanisms for generating activity.

4. Explanation should demonstrate understanding of the self-regulation of survival functions such as respiration and heart beat and that their autonomic activities are maintained/regulated without conscious/voluntary effort through naturally occurring changes in consciousness.

5. Explanation should demonstrate understanding of the respective roles of the ANS and CNS in survival, taking account of the meaning of survival per se i.e. maintaining an organism in a living state. Explanation may also refer to impact on survival without (or serious malfunctioning) of one system or the other.

6.

- (A) blinking
- (S) talking on the phone
- (S & A) pressing a key to send an email
- (S) laughing at a joke
- (A) sweating before having to give an important speech
- (A) feeling your heart race when startled by a loud noise
- (S) washing the dog
- (S & A) eating dinner

2.2 LA 5: Review

1. The **sympathetic** nervous system arouses the body for vigorous activity or to deal with a stressful or threatening situation; whereas the **parasympathetic** nervous system restores the body to a state of calm, once the need for nervous system activation has passed. When the need for nervous system activation has passed, the **enteric** nervous system will play a predominant role in restoring digestive processes to their normal level of functioning.

2.enteric nervous system

3.enteric nervous system

4.

a. Examples from Table 2.1 include:

- heart rate
- respiration rate
- adrenal gland activity.

b. Examples from Table 2.1 include:

- saliva production
- stomach contractions
- gall bladder activity.

5. Functions include:

- counterbalance sympathetic nervous system activity in regulating heart rate — aid maintenance of normal bodily functioning/restore heart rate if accelerated by sudden sympathetic system reaction to vigorous activity or a fear stimulus or stressor
- counterbalance sympathetic nervous system activity in regulating body temperature — help maintain a steady, normal body temperature; decrease perspiration if sweat glands excreted at a higher level due to sympathetic system reaction to vigorous activity or a fear stimulus or stressor.

6. Explanation should refer to:

- the immediacy of sympathetic system actions to a threat stimulus
- secretion of adrenal hormones as a part of the sympathetic system fight–flight–freeze activity
- lingering presence of adrenal hormone effects (not under voluntary control) compared to restoration to normal functioning of other autonomic reactions (even though there is conscious awareness of the threat etc. having passed).

7.

a. Parasympathetic

b. Sympathetic

c. Sympathetic

d. Sympathetic

e. Sympathetic

8. a.

i. Embedded within the walls of the gut/ gastrointestinal tract/digestive system of the body, between the oesophagus and the rectum.

ii. Examples include oesophagus, stomach, intestines (small and large), rectum i.e. hollow organs.

iii. Examples include liver, pancreas gall bladder.

b. Regulate functioning of the gastrointestinal tract/digestive system.

c. Explanation should demonstrate understanding that the ENS is connected to and functions interactively with the brain and other subdivisions of the autonomic system but some digestive functions can be carried out independently of the rest of the nervous system e.g. contractions of muscles that move food and waste along the digestive tract (i.e. peristalsis), vomit reflex in response to a harmful organism in food and drink that enters the digestive tract. The ENS is not a 'second brain'.

d. inhibit/slow/decrease; stimulate/activate/increase/restore

2.2 LA 6: VCAA exam questions

1. an inability to move due to parasympathetic dominance.

2.

Autonomic nervous system functioning		Physiological response
Parasympathetic nervous system	Sympathetic nervous system	
non-dominant	dominant	increased blood pressure

3. The component of the autonomic nervous system that was activated when Nerissa saw the needle was the sympathetic nervous system, which actively energises the body, thus shifting it away from its homeostatic status (thus, option C is incorrect). Option D is incorrect as the

activation of the autonomic nervous system does not necessarily activate all internal muscles, organs and glands.

VCAA comment*:*

Some students understood this question as specifically referencing the sympathetic division of the ANS. Other students responded in terms of the ANS broadly, given that the stress response was alluded to in the scenario.

4. the sympathetic branch of the autonomic nervous system

5.

Running	Increased breathing	Shaking hands
somatic	sympathetic	sympathetic

2.3 LA 1: Review

1.

Conscious response	Unconscious response
• a reaction that involves awareness	• a reaction that does not involve awareness
• voluntary, 'intentional' reaction	• an involuntary, unintentional reaction e.g. reflex
• able to exercise some degree of control over it	• usually unable to exercise control but can learn to exercise some degree of control over certain responses (e.g. through biofeedback)

2.spinal reflex: an unconscious, automatic response controlled solely by neural circuits in the spinal cord (without any involvement of the brain)

3.Explanation should demonstrate understanding that the immediacy of the response enables a faster reaction time (i.e. a fraction of a second) to a harmful/potentially harmful stimulus before the brain actually processes and interprets the stimulus.

4.

Examples should not involve skeletal muscle contraction and therefore the somatic nervous system e.g. autonomic reflexes such as an eye blink to a puff of air, contraction/dilation of the pupil to light, salivation when hungry, gag reflex.

Note that autonomic reflexes (also called visceral reflexes) connect to smooth muscle, so they initiate actions over which we normally have no control, such as how wide the arteries are dilated, churning of the stomach and excretion from sweat glands. A spinal reflex is classified as a somatic reflex. All of the processing of the entire physiological reaction is completed within the spinal cord. An autonomic reflex involves different brain areas and does not always trigger motor activity. Coughing, swallowing, sneezing, or vomiting are considered autonomic reflexes, however, these require at least some participation of the skeletal muscles.

5.

a. Yes.

Explanation: Some degree of pain is likely to be experienced from the electric shock shortly/immediately after the knife is released and/or hand withdrawn assuming sufficient stimulation. Although there is a reflex response initiated within the spinal cord, the spinal cord will also carry the message to the brain where the conscious perception of pain is processed.

b. Correct sequence of steps:

1. Pain stimulus of electric shock

2. Sensory receptors within the skin detect and respond to the stimulus, initiating a neural message that is carried by a sensory neuron to interneurons in the spinal cord.

3. Interneurons transmits the message to a motor neuron and to the brain.

4. Motor neuron carries a message back from the spinal cord to initiate and enable knife release and hand withdrawal actions

5. Knife release/hand withdrawal

6. Brain processes the conscious perception of pain.

c. Correct sequence of steps:

1. Sensory receptors detect and respond to the pain stimulus of electric shock, initiating a neural message that is carried by a sensory neuron to an interneuron in the spinal cord.

2. Interneurons transmit the message to a motor neuron and to the brain.

3. Motor neuron carries a message back from the spinal cord to initiate and enable withdrawal actions, while the brain processes the conscious perception of pain.

Note that a spinal reflex/reflex arc is often described as the simplest and most primitive nerve pathway in the human body. Often, only two or three neurons are involved in the reflex. For the withdrawal reflex experienced by Ava, interneurons will be involved and possibly more than one motor neuron (unlike a patellar reflex that can involve as few as two neurons — a sensory neuron and a motor neuron).

2.3 LA 2: VCAA exam questions

1. 'A conscious response by the nervous system is voluntary and attention is given to the stimulus' is the correct option. (A) is incorrect because a conscious response is voluntary. (C) is incorrect because an unconscious response is involuntary. (D) is incorrect because an unconscious response is not always regulated by the autonomic nervous system (it could also include the spinal cord reflex).

2. the adaptive nature of the human nervous system.

Use of the word 'decision' in Option B was considered to be incompatible with a reflex response.

3. an automatic response that occurs in the spinal cord.

Option A is incorrect as the spinal reflex is the response to an incoming stimulus that is automatically 'reflected back' from the spinal cord before the brain processes a conscious perception of the stimulus. Option B is incorrect as the spinal reflex is an involuntary response. Option D is incorrect as the spinal reflex is an unconscious response.

4. activation of the sympathetic nervous system

Increased heart rate and production of sweat are physiological responses indicative of the activation of the sympathetic nervous system. Options A and C are incorrect as they are relating to different branches of the nervous system. Option B is incorrect as the parasympathetic nervous system is involved in maintaining homeostasis, not the sympathetic nervous system.

5. the somatic nervous system.

2.4 LA 1: Review

1. a chemical messenger
2. a point of communication between neurons where axons and dendrites meet.

3. synaptic gap, terminal buttons, dendrites

The synapse is made up of the:

synaptic gap (a microscopic gap between the pre-synaptic and post-synaptic neurons)

terminal buttons (of the pre-synaptic neuron)

dendrites (of the post-synaptic neuron).

4. recycled back into the presynaptic neuron.

5. All of the above are correct

6. Explanation should demonstrate understanding that an excitatory effect occurs when a neurotransmitter such as glutamate (the primary excitatory neurotransmitter in the CNS) stimulates or activates a postsynaptic neuron to perform its functions, whereas an inhibitory effect occurs when a neurotransmitter such as GABA (the primary inhibitory neurotransmitter in the CNS) blocks or prevents a postsynaptic neuron from firing and therefore performing its functions.

7. Influences include:

- the type of receptors on the postsynaptic neuron e.g. properties)
- the location of the receptors/synapse in the brain

8.

(a) presynaptic neuron	sending neuron
(b) reuptake	when terminal buttons 'take back' neurotransmitter
(c) receptor site	where neurotransmitter is received
(d) glutamate	an excitatory neurotransmitter in the CNS
(e) neurotransmitter	neural message in a chemical form
(f) inhibitory effect	block or prevent a postsynaptic neuron from firing
(g) gamma-amino butyric acid (GABA)	an inhibitory neurotransmitter in the CNS
(h) synaptic gap (cleft)	tiny space between the terminal buttons of a sending neuron and the dendrites of receiving neuron
(i) binding	attachment of neurotransmitter to a receptor site
(j) excitatory effect	stimulate or activate a postsynaptic neuron
(k) synapse	point of communication between adjacent neurons
(l) terminal button	where neurotransmitter is released
(m) postsynaptic neuron	receiving neuron

2.4 LA 2: VCAA exam questions

1. Glutamate makes the post-synaptic neurons more likely to fire.

2.

Structure	Function
pre-synaptic neuron	releases neurotransmitters from vesicles

3. The likelihood of the post-synaptic neuron being activated may decrease because dendrites receive the neurotransmitters from the synapse.

Option D is correct. Option A is incorrect because the dendrite does not play a role in providing energy for the cell. Option B is incorrect because the axon conducts electrical energy away from the cell body. Option C is incorrect because neurotransmitters are released at the axon terminals into the synapse.

Note: The Study Design assumes that the neurotransmission process is prior knowledge.

4. dendrite, axon, synapse, neurotransmitter.

Note: The Study Design assumes that the neurotransmission process is prior knowledge.

5. receive neurotransmitters across the synaptic gap.

2.5 LA 1: Multiple-choice questions

1. neurotransmitters.
2. neuromodulator.
3. serotonin and dopamine
4. how receptors react to another type of neurotransmitter.
5. affect the activity of multiple neurons simultaneously.
6. An entire brain area may be influenced by exposure to a neuromodulator's action.

2.5 LA 2: Analysis and evaluation of research on dopamine treatment for gambling addiction

a. A sample is a group that is a subtest or portion of a larger group chosen to be studied for research purposes

- sample: adults who met diagnostic criteria for a gambling addiction and did not have any other disorder
- a population is a larger group from which is sample is drawn for a research study
- population: adults who living in the USA and had access to and read the newspaper(s) in which the research advertisements was published

b. Participants were recruited through newspaper advertisements

- 26 people responded to the advertisements
- all 26 people were then interviewed by the researchers over the telephone
- of the 26 people interviewed, 7 males and 10 females met the diagnostic criteria for gambling addiction and did not have any other disorder
- these 7 males and 10 females were selected to participate in the study.

c. Explanation should demonstrate understanding that the sample is biased because a random sampling procedure was not used. Only those people who had access to and read the particular newspaper on the day(s) the research was advertised had the opportunity to volunteer to participate in the study. (The sample is called a convenience sample and such samples are typically biased.)

d. Naltrexone will/would reduce the urges and behaviour associated with gambling addiction.

e. The researchers obtained baseline data (at the beginning of the treatment) on the total number of gambling episodes in the last 7 days, the amount lost in the last 7 days, gambling thought frequency, gambling urge frequency and gambling urge strength from the participants.

• The researchers then prescribed all 17 participants naltrexone for 6 weeks.

• Side-effects were assessed weekly over the 6 week period—at the end of week 2 one participant was terminated because of nausea and at the end of week 3 two further participants were terminated (one due to nausea and one due to diarrhoea).

• At the end of the 6 weeks of treatment with naltrexone, a researcher took terminal data on the total number of gambling episodes in the last 7 days, the amount lost in the last 7 days, gambling thought frequency, gambling urge frequency and gambling urge strength on the remaining 14 participants.

f. Example: Participants' gambling symptom data at beginning and end of treatment with naltrexone.

g. The results of the study suggest that naltrexone appears to very effective in treating participants' gambling addiction because:

- the number of gambling episodes in the last 7 days decreased from mean of 7.56 at baseline to 1.69 at the end of treatment;
- the amount lost in the last 7 days significantly decreased from $US547.50 at baseline to $US68.80 at the end of treatment;
- gambling thought frequency decreased from 3.94 at baseline to 1.24 at end of treatment;
- gambling urge frequency decreased from 2.91 at baseline to 1 at end of treatment;
- gambling urge strength decreased from 6.12 at baseline to 1.41 at end of treatment.

h. Possible limitations include:

- the short duration of the trial (i.e. 6 weeks)—it is possible that the improvements may reflect a significant placebo effect and tolerance may develop in pathological gamblers treated for a longer period;
- given the point above, the fact that there was no control group may be a limitation (despite the use of baseline data for comparison);
- it was a biased sample, thereby limiting the generalisability of the results;

- it was a relatively small sample size (N=14), thereby limiting the generalisability of the results, e.g. there was no control over the 'severity' of the disorder of different participants and the use of mean scores in the results could be easily distorted by few extreme scores.

i. Alternatives may include:

- Use a between groups experimental design for which each participant randomly allocated to an experimental group (who are given naltrexone) and a control group (who are given a placebo). However, more participants than N=14 may be needed in order for the data to be meaningful.
- Use a within groups experimental design for which all participants are given naltrexone for half of the study, then naltrexone for the other half and/or vice versa. This could include either the single- or double blind procedure, although double blind is considered the gold standard.

j. Limitation should refer to the risk of harm e.g. side effects that were serious enough to terminate involvement of 3/17 participants.

Note that naltrexone treatment is more likely to be successful if it's part of a comprehensive treatment program that includes counselling, psychotherapy and a positive network of peers and friends, and a support group.

2.6 LA 1: Review

1. synaptic plasticity: the ability of the synapse to change in response to experience

Examples include:

- growth/creation of new dendritic or axonal extensions e.g. sprouting,
- formation/establishment of new synaptic connections e.g. rerouting
- disuse of synaptic connections that weaken or eliminate the synapse e.g. synaptic pruning
- LTP and LTD

2. sprouting: creation of new extensions/nerve endings/sprouts/branches on the axon or dendrite of a neuron to allow it make new connections with other neurons

rerouting: when new connections are made between neurons to create alternate neural pathways

pruning: elimination of weak, ineffective or unused synapses

3. Explanation should refer to the flexibility associated with changes in neural connections and pathways (i.e. plasticity) to accommodate new experiences (i.e. learning) and their storage in the brain (i.e. memory).

For example, when something new is learnt and remembered, neurons and their synaptic connections physically change in response to the experience in order to represent and store this information in memory. The brain actually changes its structure and function by 'rewiring' itself (even if at a relatively micro level). Existing connections between neurons can reorganise, and new networks or pathways can form and strengthen through use during the learning (and memory formation) process.

4. Explanation should refer to:

Hebb's rule i.e. learning involves the establishment and strengthening of neural connections at the synapse; these enable creation of cell assemblies, or interconnected groups of neurons that form networks or pathways

When neurotransmitter is repeatedly sent across the synaptic gap, presynaptic and postsynaptic neurons are repeatedly activated at the same time. When a presynaptic and a postsynaptic neuron are active at the same time, this changes the structure or chemistry of the synapse, strengthening the connections between these two neurons at the synapse.

When the synaptic connection is strengthened, this makes them more likely to fire together again and to transmit their signals more forcibly and efficiently in the future. Conversely, not firing together — e.g. through disuse — weakens the connections between neurons and also makes them less likely to fire together at the same time in the future.

5. Answer should demonstrate understanding that:

- A memory of a single bit of information may be stored within many connections, and each connection may be involved in several different memories.
- Thus, multiple memories may be stored within a single neural pathway and have multiple synaptic connections.
- Similarly, a single memory may involve simultaneously activating several different groups of neurons in completely different areas of the brain so that the information can be brought into conscious awareness.

6.

Characteristic	LTP	LTD
Definition	long-lasting enhancement of synaptic transmission due to repeated strong stimulation	long-lasting decrease in the strength of synaptic transmission and neuronal response
Where it occurs	synapses (primarily in brain areas involved in learning and memory)	synapses (primarily in brain areas involved in learning and memory)

How it occurs	repeated stimulation by neurotransmitter between pre- and postsynaptic neurons (through use/neurotransmitter activity)	lack of stimulation of pre- and postsynaptic neurons or prolonged low-level stimulation (through little or no use/neurotransmitter inactivity), except in the cerebellum where LTD is due to persistent strong stimulation.
Change in excitability or responsiveness of postsynaptic neurons	postsynaptic neurons become more excitable/responsive/less easily activated	postsynaptic neurons become less excitable/responsive/less easily activated
How enduring	long lasting (i.e. long term)	long lasting (i.e. long term)
Effect on neuronal communication	enhanced or more effective synaptic transmission → improves the ability of presynaptic and postsynaptic neurons to communicate with one another at the synapse i.e. strengthens synaptic connections in a way that enables postsynaptic neurons to be more easily activated → the postsynaptic neurons become more and more responsive to the presynaptic neurons as a consequence of repeated stimulation by neurotransmitters i.e. 'neurons that fire together, wire together'	less effective synaptic transmission or no communication at the synapse; elimination of weak/ineffective/unused synapses through LTD may prune unimportant or unwanted connections, leaving only the important connections that have been strengthened through repeated use by LTP
Role in learning and memory formation	Believed to play a critical role in learning and subsequent memory formation. The more that synaptic connection is activated, the more it is strengthened. The more the connection is strengthened, the more the relevant neural pathway is strengthened, increasing the efficiency in transferring information along the pathway and decreasing the likelihood that what has been learned will be forgotten. In addition, the more we use the information being remembered, the more the LTP process strengthens the pathway, making it easier to retrieve that information.	Believed to play a critical role in learning and subsequent memory formation e.g. enables old memories or unused synaptic connections and neural pathways for previously learned/remembered information or skills to be cleared out ('use it or lose it')

7. Explanation should refer to LTP and LTD involving change in the strength of synaptic transmission and responsiveness of postsynaptic neurons to neurotransmitter e.g. they demonstrate change at a synapse in response to experience

8. Explanation should refer to:

- Hebb's explanation of change in neural connections to form cell assemblies during learning
- LTP underlies and accounts for the change in these neural connections i.e. 'neurons that fire together, wire together'; conversely, without activity-based LTP, cell assemblies required for the neural representation of learning (and the associated memory) will not form.

9.

a. Explanation may refer to:

- both involve and are influenced by many of the same neural mechanisms and processes
- all memory involves neurological changes that occur as a result of learning i.e. memory depends on learning and is a neurological representation of the learning; conversely, without learning, there will be no associated neurological change or representation of the learning that can be retrieved as its memory
- learning may be viewed as the capability of modifying information already stored in memory based on new sensory input or learning experiences.

b. Explanation may refer to:

- learning is the acquisition of skill or knowledge, while memory is the expression of what has been acquired — the existence of memory indicates that learning has occurred
- without memory, learning would not be possible because we need the capability to retain and retrieve what we have learned when needed. Similarly, if no learning occurs there is nothing to remember. Nor would learning have any value if we could not remember — we usually learn with the understanding that at some future time we will be able to recall what we learned.

2.6 LA 2: VCAA exam questions

1. long-term potentiation, which increases synaptic communication when she presses the buttons on the controller.

2.

Long-term potentiation	Long-term depression
results in a change in excitability of the post-synaptic neuron	does not involve an increase in excitability of the post-synaptic neuron

3. The likelihood of the post-synaptic neuron being activated may decrease because dendrites receive the neurotransmitters from the synapse.

4. long-term potentiation.

5. acting as an excitatory neurotransmitter released across the synaptic gap.

3.1 LA: Review

1. Explanation should refer to stress as having both psychological and physiological/biological components and consequences e.g.

- psychological: activation/arousal/changes in thoughts/cognitions and feelings/emotions
- physiological: bodily arousal/activation/changes

2. Distinguishing characteristics may include:

- psychological responses primarily involve the mind/mental processes, whereas physiological responses primarily involve the body/bodily processes;
- psychological responses are indirectly observed (including self-reports), whereas physiological responses can be directly observed;
- physiological responses typically occur involuntarily and cannot be consciously controlled, whereas psychological responses are not necessarily involuntary and many individuals can learn to exercise some degree of control over them;
- many physiological responses are largely predictable, whereas psychological responses are more variable among individuals.

3. Prior experience with a situation or event can either alleviate or exacerbate a person's psychological response to stress/a stressor.

Examples: Joe has just found out that he has got two important exams on the same day.

- The last time Joe had two exams on the same day he failed both of them because he found having to study for two subjects concurrently too difficult to manage. This prior experience has triggered a stress reaction (i.e. he may be experiencing physiological arousal, feeling anxious and may be thinking that he couldn't manage and failed last time this situation happened, so it will happen again).
- The last time Joe had two exams on the same day he got over 80% for both of them. He therefore experiences quite a different reaction (i.e. he may be feeling quite upbeat and may be thinking that he did really well the last time he had two exams on the same day, so there is no reason to think that the same thing won't happen this time).

4. This question is intended to encourage you to contemplate the role of personal interpretation prior to studying the Lazarus and Folkman model.

You should recognise that an individual's personal interpretation of stressor (a kind of stressor 'appraisal') and their ability to cope with it may impact on their stress response. For example:

- a situation or event will only lead to stress if an individual interprets (appraises) that situation or event as unpleasant, uncomfortable or perhaps 'the worst thing that could happen to me' and they also think that they do not have the necessary resources to cope with it;
- an individual's personal interpretation of the situation/event and their resources for coping with that situation/event therefore determines whether or not they experience a stress response (and the nature of their stress response);
- an individual's personal interpretation of a stressor can mediate their stress response.

3.2 LA: Review

1. Distinction should demonstrate understanding that a stressor is something that causes/produces stress and stress is the organism's reaction/state/condition due to exposure to a stressor e.g. stress:

- stress: a psychological or physiological response produced by internal or external stressors
- stressor: a stimulus that causes or produces stress. Example may refer to any type of internal or external stressor, either real or imagined (e.g. pain, extremes in temperature, loud noise, intense light, changing schools, failing an exam, living in poverty, arguing with a friend)

2. causal/cause-effect (not association/correlational)

3. a. Explanation should account for the difference in terms of source i.e. internal or external source.

Discuss your example with the teacher or another student to check understanding.

b. Examples include:

- physical hunger
- physical thirst
- physical fatigue
- pregnancy
- 'jet lag'
- physical injury
- migraine/headache
- a chronic pain condition
- infection
- disease
- arthritis
- inflammation
- fever.

4. Explanation should demonstrate understanding that a physical stimulus is a potential stressor because it can produce stress/a stress response with physiological and psychological components for instance.

− physiological: involuntary bodily changes involving various autonomic responses

− psychological: various emotional and/or cognitive changes

- Example: A factory worker works in an extremely noisy (90+ decibels) environment during their 8-hour shift each day. The noise is constant, physically uncomfortable, uncontrollable (e.g. ear plugs are only partially effective), interferes with the worker's ability to concentrate on their work tasks and inhibits any verbal interaction with their co-workers. The worker experiences stress in the workplace as a result.

3.3 LA: VCAA exam questions

1.

Internal	External
emotion state	interactions with her boss

2. chronic; external

3. social.

4. increased alertness momentarily, increased motivation and an elevated heart rate.

5. External factor: working in the very low temperatures of the cool room. [1 mark]

Description: This could increase the functioning of Travis's sympathetic nervous system [1 mark], exacerbating the stress response [1 mark]

VCAA comment:

This question contained a scenario describing a number of stressors on Travis, who was undertaking his first year of university. The question asked students to identify one (external) stressor from the scenario and explain how it may exacerbate Travis's physiological response to stress.

Poor performance on this question was due to students failing to identify the external stressor from the scenario and/or failing to explain how this would affect the physiological aspects of the stress response.

Marks were awarded for:

- identifying the external stressor from the scenario. The only valid response based on information given in the scenario was the low temperatures in the coolroom at Travis's work.

- identifying the potential effect of the external stressor on Travis's autonomic nervous system (i.e. physiological aspect of stress response)

- indicating that the change in the autonomic nervous system functioning would lead to an increased stress response.

3.4 LA 1: Multiple-choice questions

1. sympathetic nervous system

2. active avoidance; passive avoidance

3. passive avoidance; active avoidance

4. sympathetic; parasympathetic

5. unconscious

3.4 LA 2: VCAA exam questions

1. an inability to move due to parasympathetic dominance.

VCAA comment:

This question asked students to consider Vicki's response once she has become so frightened she is unable to move. Option A was the best response as Option D referred to activation of the somatic nervous system and Option B referred to heart rate only in regards to sympathetic nervous system activation. The inability to move (as part of the freeze response) is associated with heart rate deceleration, due to parasympathetic dominance.

2.

Sam	Marcus
fight response	freeze response

3. relaxed bladders and dilated pupils

4. stomach contractions will decrease and his levels of stress hormones will increase.

Each time Ben prepares for an audition, it is likely that his stomach contractions will decrease and his levels of stress hormones will increase.

5. Acceptable responses included any two of the following:

- release of adrenaline makes her more alert and able to concentrate on the road
- redistribution of blood supply to muscles gives her more energy
- dilated pupils enable her to see better and foresee hazards
- increased glucose secretion gives her increased energy.

VCAA comment:

The question related to a scenario about Annie, who was described as being generally able to function well in everyday life, but is stressed about her driving test scheduled for today. Students were asked to give two reasons why this level of stress may be helpful when Annie takes her driving test, referring to the physiological aspects of the stress response.

Marking protocol:

Award 1 mark for each correctly identified physiological aspect of the stress response (up to a maximum of 2 marks) and another mark associated with each physiological aspect if they also provided a correct reason for why this response could be helpful in performing the driving test.

3.4 LA 3: Review

1.

a. Adrenaline or noradrenaline (Cortisol is also secreted in the second part/stage of the response to help keep us alert for fight, flight or freeze but adrenaline and noradrenaline are secreted first.)

b. cortisol

2.

a. fight-or-flight-or-freeze response: an automatic/involuntary response to a threat/danger/emergency/stressor involving physiological changes produced by the sympathetic nervous system in readiness for readiness to confront the threat (i.e. fight), escape (i.e. flight) or keep absolutely still to avoid detection (i.e. freeze)

b. Explanation should demonstrate understanding that fight or flight can occur either before or after freeze e.g. an animal can react with freeze to assess a situation, then fight if detected and attacked, or take the opportunity for flight after having been in a frozen state.

Note: When freeze precedes fight or flight, the freeze reaction may in some situations be a conscious response, rather than a true freeze reaction without conscious awareness.

3.

- Generally, any internal or external stimulus that presents suddenly as an immediate stressor or a perceived threat to wellbeing, either real or imaginary e.g.

  − internal: e.g. anticipatory anxiety about a phobic stimulus, an upcoming performance, exam etc.

  − external: e.g. being in a car accident, sight of a snake at a zoo, hearing thunder, slipping on a wet floor, door slamming suddenly, extreme temperature, daily pressures/hassles (e.g. missing a bus when in hurry, crowding)

4.

- fight: sympathetic
- flight: sympathetic
- freeze: parasympathetic

Note: autonomic is too general to be an acceptable answer.

5.

- When considered collectively, an unconscious response (but can be conditioned/learnt).

Explanation should demonstrate understanding that fight-or-flight-or-freeze is an innate, immediate/instantaneous and involuntary or autonomic/reflexive type response that precedes conscious processing/occurs without conscious awareness and involves physiological reactions (not psychological) initiated and regulated by the autonomic nervous system (which functions relatively independently of cortical input).

6.

a. fight or flight reaction:

− amygdala sends a threat/distress signal to the hypothalamus

− activation of the sympathetic nervous system and suppression/blocking of the parasympathetic nervous system

− adrenal glands secrete stress hormones such as adrenaline, noradrenaline and cortisol into the bloodstream

− increased heart rate and blood pressure

− redistribution of blood supply from the skin and intestines to the skeletal muscles

− increased breathing rate (to increase oxygen supply)

− increased glucose (sugar) secretion by the liver (for energy)

− dilation of the pupils (so the eyes can take in as much light as possible)

− suppression of functions that are not immediately essential in order to conserve energy (such as digestion and immune system activity)

b. freeze reaction:

- motionless/absolutely still/ tonic immobility/inability to move e.g. tense muscles collapse and become still, cessation of body movements

- orienting response of the head or eyes towards the direction of the threat
- hypervigilance e.g. being on guard, watchful, or extremely alert
- cessation of vocalisations
- racing heart slows very significantly
- blood pressure drops very quickly.

7.

a.

- sudden, unexpected, potential threat automatically and immediately activates physiological changes to mobilise the body for a fight, flight and/or freeze reaction, including increased heart rate and blood pressure.
- These physiological changes are initiated by the sympathetic nervous system (activated by the hypothalamus) and involve other responses such as adrenal glands secreting stress hormones into the bloodstream, especially adrenaline and noradrenaline in the first part of the response, followed by cortisol to boost activity; redistribution of blood supply from the skin and intestines to the muscles, increased respiration, pupil dilation etc. as per question 6b.

b. The parasympathetic system will have restored the body to normal functioning relatively quickly.

8. Explanation should demonstrate understanding of fight-or-flight-or-freeze having the overall effect of physiologically arousing and energising the body to deal with an immediate threat.

In relation to freeze, arousal supports hypervigilance and a 'stop, look and listen' behavioural response to assess the situation before making a next move, which may be fight, flight or remain in freeze.

9.

Reaction	Example of when adaptive	Example of when not adaptive
fight–flight	• automatic, rapid reaction to deal with an immediate threat e.g. confront and/or escape to minimise harm/enhance survival	• flee from (including avoid) an important event that is stressful e.g. not present for an exam • reaction persists and stress hormones remain at elevated levels over a prolonged period, thereby contributing to onset of illness or disease etc.
freeze	• automatic, rapid reaction to deal with an immediate threat e.g. avoid	• freeze in a stressful situation e.g. exam, job interview,

		detection, conserve energy for fight or flight; minimise number of attacks by a predator through tonic immobility	making an oral presentation or when in some other public performance situation of importance • reaction persists

3.5 LA 1: Review

1.

a. cortisol: a hormone (corticosteroid) secreted/released as part of the stress response

b. adrenal glands (adrenal cortex)

2. Roles include:

- increase/maintain high glucose/blood sugar level
- enhance energy, metabolism etc. to keep the body in an alert, elevated arousal/energised state
- suppression of immune system activity
- anti-inflammatory effect/reduce inflammation by blocking the activity of white blood cells that contribute to inflammation

suppress/turn off other bodily systems not immediately required to deal with a stressor

3. Explanation should refer to the cortisol remaining in the bloodstream at an elevated level for a prolonged period due to chronic stress (i.e. ongoing demands, pressures and worries that are long lasting), which may impair normal immune system actions/functioning, thereby increasing vulnerability to illness and disease. In addition, an excessive/elevated level of glucose in the bloodstream is associated with diabetes.

3.5 LA 2: VCAA exam questions

1.

Released into bloodstream	Function
adrenaline	Activate various organs in the body for the 'fight-flight-freeze' response.

2. suppress the immune system

Option A is incorrect as the presence of cortisol energises the body by increasing energy supplies and enhancing metabolism, shifting it away from homeostasis. Option B is incorrect as the hormone is produced as the result of activation of the HPA axis. Option D is incorrect as cortisol is involved in the HPA axis, not the sympathetic/parasympathetic systems.

3. an increase in cortisol.

4. Cortisol may be depleted.

3.5 LA 3: Analysis and evaluation of research on passenger stress when train commuting

a. The amount of cortisol in saliva produced by participants.

b. IV: commute time

DV: level of salivary cortisol

c.

i. Example: Relationship between level of cortisol and commute time.

ii. Examples:

– People with longer commutes show higher levels of cortisol.
– Longer commutes are associated with elevated cortisol.
– The greater the duration of the commute, the larger the magnitude of salivary cortisol

iii.

Examples:

– People with longer train commutes will show higher levels of stress.
– People with longer rail commutes will have higher levels of cortisol.
– Suburban rail commuting over a long journey causes stress.

d. Classification: external stressor

Explanation should refer to an external stressor originating outside the individual from situations and events in the environment i.e. rail commuting.

e.

i. Symptom may refer to:

– persistence e.g. on a task requiring concentration, attention to detail
– concentration e.g. difficulty concentrating on a task/maintaining concentration attention.

ii. Examples:

– People with longer train commutes will persist for less time on a proofreading task at the end of the commute.
– The greater the duration of a train commute, the greater the levels of perceived stress, and the less the commuter's persistence on a task at the end of the commute.
– People with longer train commutes will show higher levels of cortisol, poorer proofreading performance and higher levels of perceived commuting stress.

f. Questions may refer to:

– sample selection to control for participant sociodemographic characteristics e.g. convenience vs random sampling
– representativeness of sample e.g. hardened commuters vs non-hardened
– passenger density at different commute times
– whether commuters had own seat
– conditions of train e.g. clean vs dirty
– train timetable delays
– whether baseline salivary cortisol measurements were made for comparison e.g. workday vs weekend cortisol levels; start of commute vs end of commute
– standardisation of procedures e.g. tracking commute duration and train transfers to reach destination; procedures for saliva collection, monitoring and measuring task completion.

g. Conclusions may refer to:

– the relationship between rail commuting duration when travelling to work and passenger stress i.e. rail commuting duration affects passenger stress; longer commutes are significantly associated with elevated cortisol, poorer proofreading performance and higher levels of perceived commuting stress
– no significant sex differences e.g. rail commuting duration affects the level of stress (and task persistence) in both male and female passengers
– effect of stress level on task persistence etc. after rail commuting to work
– potential adverse impact of rail commuting stress on physical and mental health e.g. duration of stress on health.

h. Tentative generalisations may be made, taking account of the potential limitations.

- Generally, the higher the internal validity and the more representative the sample of its population, the more confident the researcher can be in making relevant generalisations.
- Note that the study attempted to control relevant variables. For instance, the researchers recruited over 200 participants who rail commuted from New Jersey to

Manhattan at least three times per week. Their commutes ranged from 45 to 180 minutes. On an appointed weekday morning, the participants undertook their usual train ride, during which they filled out questionnaires about their commute. They also indicated how stressful they found the commuting experience by evaluating statements such as 'It takes a lot of effort to commute to work' on five-point Likert scales. For about the last 10 minutes of their trip, they completed a proofreading task, evaluating how many errors they failed to detect. When the participants arrived at their destination, the researchers collected a saliva sample to measure the participants' levels of the stress hormone cortisol. That weekend, the researchers collected another sample of cortisol at the same time of morning to compare workday and weekend stress levels. The participants' partners also assessed their interactions with participants over the past week.

- Sample size suggests a considerable number of regular, home-to-work, rail commuters but is relatively small in relation to its population of an estimated 400 000 who commute from New Jersey to Manhattan daily and 2 million+ rail commuters from elsewhere to New York city.
- Additionally, according to the researchers, over 100 million Americans commute to work every day, with a significant number using trains.

3.6 LA: Multiple-choice questions

1. provide communication pathways between the brain and digestive tract.

2. gut microbiome

3. Each individual has a unique combination of gut microbiota.

4. All of the above are correct.

5. The gut microbiome tends to be relatively unaffected by stress.

3.7 LA 1: Review

1. General Adaptation Syndrome (GAS): a three-stage physiological response to any stressor involving alarm reaction (shock/counter shock), resistance and exhaustion (but all three stages are not necessarily experienced)

2. According to Selye (1936), stress is the body's physiological response to both physical and psychological demands and 'represents the body's generalised effort to adapt itself to new conditions'.

3. Explanation should demonstrate understanding that the GAS occurs regardless of the source of the stressor/specific type nature of the stressor.

4. Stage 1: Alarm reaction (immediate response):

− overall, a brief, general defensive reaction to the stressor

− shock: the body goes initially into a temporary state of shock; its ability to deal with the stressor falls below its normal level; body reacts if injured e.g. blood pressure and

body temperature drop, temporary loss of muscle tone and loss of fluid from body tissues

− counter shock: rebound involving sympathetic nervous system fight

– flight physiological reactions e.g. adrenaline, noradrenaline and cortisol hormones increase arousal, heart and respiration rates; body's ability to deal with the stressor rises above its normal level; − if stress persists, then enter stage 2

Stage 2: Resistance (maximise resources to cope and adapt)

– overall, a relatively prolonged stage during which body's resistance to the particular stressor rises above normal as it tries to cope and adapt

– physiological arousal diminishes through parasympathetic nervous system activity but remains at a level above normal (even though heart and respiration rates may have slowed down)

– resistance imposes demands on body's resources

– cortisol (and other steroid hormones) maintains most of the physiological effects e.g. energising the body, acting as an anti-inflammatory agent and providing fast-acting pain relief for inflammation that may have occurred, but also weakens immune system activity and its continuing presence at an abnormally high level impairs body's ability to fight disease and protect against further damage

– although resistance to the initial stressor increases during this stage, resistance to other stressors, such as illness or disease, may decline

– if resistance is successful, then body eventually returns to its normal state; if not, enter stage 3

Stage 3: Exhaustion (vulnerable and weak)

– may enter this final stage if stressor is not dealt with successfully during resistance and stress is not relieved

– depleted resources (e.g. less cortisol) in dealing with the stressor/stress weaken the organism, exhaustion sets in and becomes more vulnerable to physical and mental disorders

– physical disorders can include extreme fatigue, physical wear and tear, hypertension, gastrointestinal problems and heart disease, possibly death

– mental disorders can include high levels of anxiety, symptoms of depression and nightmares

5.

a. alarm reaction (shock)

b.

- **i.** Name: Stage 2: resistance
- Description and explanation:

  − Despite staying up late every night studying and feeling tired, Chloe was managing her workload. She is probably experiencing stress and in stage 2: Resistance.

  − During the resistance stage the body's resistance to a stressor (exams) rises above normal as it tries to cope and adapt. This appears to be the case for Chloe as she was able to cope well enough to study for all her exams despite loss of sleep quantity and/or quality. However, during the resistance stage, the body's ability to resist effects of an additional stressor may decline.

  − Chloe's dog then got hit by a car, which is a new additional stressor.

  − As Chloe's body has been focused on dealing with the initial stressor (her exams), her body's resistance was weakened (especially a weakened immune system), hence the onset of flu-like symptoms.

- **ii.** Generally, Chloe will be vulnerable to a physical disease if she continues to stay up every night studying and worry about her dog (as appears to be happening, given onset of flu-like symptoms).

  – If Chloe maintains her study regime, especially while physically weakened by flu-like symptoms, she may enter the exhaustion stage of the GAS.

- Organisms in the exhaustion stage have been trying to deal with the stressor for some time, so their bodily resources are depleted. Resistance to disease is very weak and they are more vulnerable to the development of physical and mental disorders.

6.

- **a.** Strengths include:

  – describes and explains both immediate and long-term effects of stress with reference to research

  – highlights both specific and non-specific aspects of stress – developed awareness and understanding of a link between stress and disease e.g. that stress could weaken the body's ability to resist infection and increase the likelihood of developing a physical disorder

  – identifies biological processes associated with the body's stress response e.g. roles of endocrine system

– developed awareness and understanding that the body has limited resources to cope with chronic/prolonged stress

– description and explanation of the potentially detrimental effects of the three-stage adaptation process following exposure to a persistent stressor e.g. that the body has limited resources to cope with chronic/prolonged stress and becomes increasingly vulnerable to disease as the stress persists.

- Limitations include:

– a 'one size fits all' model i.e. assumes everyone has the same general, predictable and automatic physiological/biological responses to any kind of stressor

– does not fully take account of or explain individual differences in physiological responses to a chronic stressor e.g. that some people may develop coronary disease whereas others may not or may develop some other disorder

– tends to overlook the roles of bodily systems other than the endocrine system in the stress response

– overemphasises physiological/biological responses to a stressor and ignores psychological responses to different types of stressors e.g. does not take into account cognitive aspects, specifically the role of the brain in appraising or interpreting a situation or event as stressful, resulting in qualitatively different responses to the same stressor by different individuals

– different types of stressors can trigger their own distinctive physiological reactions so the description of the GAS as a non-specific stress response may be limited

– primarily based on the results of animal research and may therefore be of limited relevance to the human stress response e.g. responses of lab rats with relatively short life spans may be significantly different to a human's under real-life conditions

b. Check that the more significant strengths and limitations are included.

3.7 LA 2: VCAA exam questions

1. increases glucose in the bloodstream and reduces inflammation

2.

Stage	Reason
shock	Jamie's immune system is immobilised so his body can fight the stressor.

Option B is the correct answer. Option A is incorrect because 'shock' is not a key stage of the GAS model. Option C is incorrect because the exhaustion stage is characterised by more serious physical and mental disorders than catching a cold (such as extreme fatigue, high levels of anxiety, heart disease, etc.). Option D is incorrect because adrenaline is released

during the countershock phase of the alarm stage and cortisol is involved in weakening the immune system.

3. shock, which activated her parasympathetic nervous system.

Nerissa experiences shock during the alarm reaction stage, which occurs when the person first becomes aware of the stressor (needle).

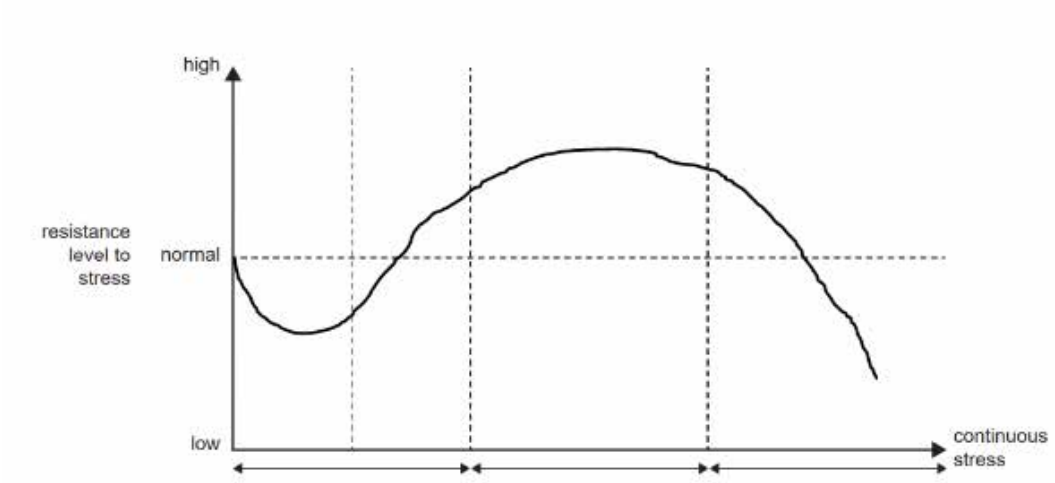
All other options are incorrect as Nerissa's response is reflective of the initial temporary state of shock (drop in blood pressure); countershock would activate the sympathetic nervous system, while resistance and exhaustion occur after a period of time if the stressor is not dealt with successfully.

4. Stress hormones will be secreted.

5.

a.

i. Students were required to indicate a dip in the normal levels of resistance to stress in the 'alarm/shock' stage, a rise in resistance level in the 'resistance' stage and another dip in resistance level in the 'exhaustion' stage (lower than in the alarm stage).



Common errors were to fail to start at the 'normal'/origin line, and not show the level of resistance to increase above normal before the graph entered stage 2 – resistance stage.

ii. The answer was Alarm/alarm reaction, Resistance, Exhaustion.

Students commonly mislabelled the stages as Stage 1, 2 and 3 without identifying the names of the stages. All three stages needed to be correctly identified for the mark.

b. VCAA comment :

Students needed to identify that Bob was in the resistance stage of Selye's General Adaptation Syndrome, and justify this by referring to the ongoing release of cortisol to overcome stress and the suppression of his immune system.

A common error was to identify it as the exhaustion stage. It is not this because Bob is still continuing to function and only suffering from a cold, which is not a severe illness. For full marks, the ongoing release of cortisol was required (not simply cortisol release).

The following is an example of a high-scoring response.

> *Bob is likely in the resistance stage of GAS. The ongoing stress from his work resulted in his body releasing cortisol over a period of time to help overcome the stressor; however, this caused his immune system to be suppressed, making him more vulnerable to catching a cold.*

c. Students needed to identify that Bob was in the exhaustion stage, explaining that due to Bob's physiological resources having been depleted as his systems had been operating at an elevated rate, his heart was weakened by the elevated heart rate and his resistance levels to stress dropped below normal.

The response needed to address the heart condition specifically experienced by Bob. Most students were able to identify that Bob was in the exhaustion stage. Common errors included identifying the stage as the alarm-reaction stage, or resistance, or not referring to any stage. Another common error was not referring to the heart condition in the explanation.

The following is an example of a high-scoring response.

Bob is experiencing the exhaustion stage of the GAS. His heart has been operating at a higher rate as his body tries to resist the stressors, this has resulted in weakening of the heart (wear and tear on his heart) and it has become damaged.

3.8 LA 1: Review

1.

- Explanation should refer to an encounter, interaction or exchange between the individual and the environment i.e.

  – stress involves an encounter ('transaction') between an individual and their external environment i.e. a person–environment transaction

  – stress is not a result of the individual alone or the environment alone:

    - the environment can influence the individual, and

- the individual can also influence the environment.

(The transaction is influenced by/depends on the impact of the stressor as determined by the individual's primary and secondary appraisals.)

2. Explanation should refer to the two different types of appraisal of an event/potential stressor by the individual that occur in a two-step sequence.

3.

- Role may refer to:

  – whether a person experiences stress depends upon the individual's appraisal/evaluation/interpretation of a particular situation or event/potential stressor

  – a situation will only lead to stress if an individual appraises/evaluates/interprets that situation negatively e.g. as being unpleasant, undesirable, terrible, catastrophic.

4.

- Additional appraisals involve deciding if a situation is harmful, threatening or challenging i.e.:

  – harm/loss: an assessment of how much damage has already occurred e.g. 'I have lost my job'

  – threat: an assessment of harm/loss that may not have yet occurred but could occur in the future e.g. 'I mightn't be able to afford the rent'

  – challenge: an assessment of the potential for personal gain or growth from the situation e.g. 'I'll get any other job I can and will learn to budget and save money'

5. Explanation should demonstrate understanding of the Lazarus and Folkman model as a psychological model i.e. how psychological factors, especially cognitive appraisals of events or situations and therefore how we think about a potential stressor and our ability to cope determine the extent to which an event is (or situation) is experienced as stressful.

6. Explanation should demonstrate understanding that appraisal is a highly subjective and personal process in that two people may appraise the same situation entirely differently and therefore respond differently to the same event because of how they appraise it e.g.

– Xanthe feels anxious and *primarily appraises* the SAC requirements as highly stressful with the potential for *harm/loss* (e.g. looking foolish in front of peers, loss of casual work hours for SAC preparation) rather than irrelevant or *benign/positive*. Having perceived and being confronted by a stressor, the second appraisal follows, which is an assessment of her coping resources and options. Xanthe's stress is

exacerbated by her secondary appraisal that the SAC requirements may exceed her ability and available resources to cope.

– Olivia is looking forward to getting the presentation done and out of the way so she *primarily appraises* the SAC requirements as *benign/positive*, rather than *irrelevant* or *stressful*, and will meet all requirements and other priorities as best she can.

7. VCAA comment:

This question asked students to identify two strengths and two limitations of Lazarus and Folkman's Transactional Model of Stress and Coping. This question was not well answered.

Marking protocol:

Award 2 marks maximum for any two strengths from the following:

– focuses on psychological determinants of the stress response over which we have control

– stresses the personal nature and individuality of the stress response

– views stress as an interaction with the environment in which the individual has an active role

– respects personal appraisals of a situation, thereby interpreting the situation from an individual's perspective

– explains why individuals respond in different ways to the same sorts of stressors

– allows for the fact that stressors and the circumstances under which they occur can change over time

– allows us to change our thinking about a stressor and our response

– proposes different methods for managing psychological responses to stressors.

Award 2 marks maximum for any two limitations from the following:

– difficult to test through experimental research because of the subjective nature of individual responses to stress

– individuals may not always be conscious of all the factors causing them to experience a stress response

– we can experience a stress response without ever having thought about a situation or event (appraisal not necessary)

– overlooks physiological responses

– the linear approach does not allow for individual variation in progression through the stages

– primary and secondary appraisals can interact with one another and are often undertaken simultaneously

– primary and secondary appraisals are difficult to isolate for study as separate variables.

3.8 LA 2: VCAA exam questions

1. that she could cope with the delay by using her existing surfboard.

2. She views it as an opportunity to begin her acting career.

3. is unable to be researched experimentally because primary and secondary appraisals often occur simultaneously.

4. of the situation as good practice for the finals.

5. secondary appraisal, where he considers his options should his plan of living with his aunt be rejected.

VCAA comment:

Option A is incorrect as assessing possible harm occurs in the primary appraisal.

Options B and C are incorrect as Andrew planning ahead in the case of being rejected by his aunt, which is an evaluation of his coping options and resources for dealing with the event, demonstrates a secondary appraisal of the situation.

3.9 LA 1: Review

1.

- Coping: use of a strategy to manage the demands of a stressor in some effective way
- Lazarus & Folkman: 'cognitive and behavioural efforts to manage specific internal and/or external stressors that are appraised as taxing or exceeding the resources of the person'

2.

a. context-specific effectiveness: when there is a match/'good fit' between the coping strategy that is used and the stressful situation

b. Elements are:

– the physical environment/situation in which the stressor occurs

– the stressor e.g. its specific demands

– the individual involved e.g. personal characteristics of relevance to the situationally specific demands of the stressor

c.

i. Discuss your example with the teacher or another student.

ii. Discuss your example with the teacher or another student.

3.

- coping flexibility: the ability to effectively modify or adjust one's coping strategies according to the demands of different stressful situations
- high coping flexibility: able to readily adjust coping strategies if a particular strategy is proving to be ineffective; typically a good fit between the coping strategies used and the specific situational demands; tend to use different types of coping strategies across a variety of stressful situations
- low coping flexibility: difficulty in adjusting/adapting a coping strategy to suit the stressful situation; consistent use of the same type of coping strategies across different stressful situations; persist with coping strategies despite ineffectiveness; approach Discuss your examples with the teacher or another student.

4. Descriptions should demonstrate understanding that coping flexibility helps ensure context-specific effectiveness and that context-specific effectiveness of a coping strategy is more likely to occur for individuals with high coping flexibility e.g. the higher an individual's coping flexibility the more likely a coping strategy will have context specific effectiveness.

5.

a.

Coping strategy	Description	Key features	Examples
approach	effort to confront a stressor and deal directly with it and its effects	activity is focused *towards* the stressor, its causes and a solution that will address the underlying problem, issue or concern and minimise or eliminate its impact	Discuss your examples with the teacher or another student.
avoidance	effort to evade a stressor and deal indirectly with it and its effects	activity is focused *away* from the stressor and there is no attempt to actively confront the stressor and its causes	Discuss your examples with the teacher or another student.

b.

- Explanation should demonstrate understanding of:

– overall effectiveness of approach strategies in minimising the experience of undesirable stress-related psychological and physical symptoms/problems and thereby enabling more effective functioning in everyday life

– approach strategies involving efforts to respond to stressors in constructive ways and thereby minimise or eliminate a stressor's impact or long-term persistence, whereas avoidance strategies can prevent people from responding to stressors in constructive ways so they are more likely to persist e.g. approach strategies target the cause of the stress in a practical way and aim to remove or directly reduce the stressor so they deal with the root cause of the stressor/problem, thereby providing a long-term solution

– approach strategies allowing for appropriate action and/or the possibility for noticing and taking advantage of changes in a situation that might make it more controllable.

- **c.** Generally, avoidance strategies may be considered adaptive if they reduce stress and prevent the stress/anxiety from becoming crippling.
- Examples include:

  – When coping with a number of stressors at the one time, selectively avoiding to deal with unchangeable aspects of a stressor by 'switching off' may be considered an adaptive strategy. This allows for the conservation of energy to focus on other stressors that can be changed. Disengagement, for example, might be appropriate in a situation where nothing can be done (such as awaiting the outcome of an important medical test).

  – Avoidance strategies can be more effective in coping with stress in the short term. For example, many students find preparing for exams very stressful. In this situation, using avoidance strategies such as listening to music, playing video games or going to a movie can all decrease stress.

  – An avoidance strategy such as ignoring a relationship problem for a couple of days while focusing on an important priority at work can provide 'time out' from one stressor while minimising potential stress from another source, such as the workplace.

  – An avoidance strategy allows for ventilation of stress affects.

  – Note that there is evidence that avoidance can be better than approach if the situation is uncontrollable, whereas approach tends to be better if there is potential control e.g. approach can allow the individual to take advantage of opportunities for control, if these are present (Roth & Cohen, 1986).

d.

Many stressors and stressful situations are actually quite complex, so both approach and avoidance strategies may be used for coping. For example, in some situations, we may first use an avoidance

strategy, which allows us to deal with the intense emotions that have been triggered by an especially overwhelming stressor. Then, later on, when we are feeling somewhat better, we can evaluate our situation and use an approach strategy to look for ways of managing the stressor or solutions. Of course, in other situations, the strategies may be used in the opposite order.

e.

i. avoidance — activity is focused away from the stressor e.g. focuses on dealing with the arousal and not on solving the problem/confronting the stressor and its causes

ii. avoidance — activity is focused away from the stressor e.g. does not directly provide a possible solution or solve the problem

iii. avoidance — activity is focused away from the stressor e.g. postponement of action/effort to confront the stressor and its causes/solve the problem

iv. approach — although it involves not acting, 'restraint coping' whereby the individual intentionally holds back and doesn't act prematurely, there is a focus on dealing effectively with the stressor, with restraint as a necessary and functional response for the stress event/situation

v. avoidance — activity is focused away from the stressor e.g. most likely involves emotional venting in a supportive environment rather than problem solving

vi. approach — activity is focused towards the stressor e.g. focuses on solving the problem

vii. avoidance — activity is focused away from the stressor e.g. focuses on dealing with the arousal and not on solving the problem/confronting the stressor and its causes.

f.

i.

- strategy: avoidance
- explanation: activity is focused away from the stressor and there is no attempt to actively confront the stressor and its causes

ii.

- Examples:

  – Advantage in short term: relief/break/timeout from a stressor e.g. temporary relief; when experiencing multiple stressors, conservation of energy to focus on another stressor/s that can be changed

  – Advantage in long term: relief/break/timeout from a stressor doesn't provide a long-term solution. That is, there is no long term advantage to this strategy.

  – Disadvantage in short term: stressor persists as doesn't address cause/underlying problem, issue or concern

Disadvantage in long term: stressor persists as doesn't provide a long-term solution/doesn't address cause/underlying problem, issue or concern.

3.9 LA 2: VCAA exam questions

1. Research other shops to find an appropriate replacement surfboard.

2. set a meeting time to speak to her boss directly about the issue.

VCAA comment:

Option B is the correct answer because Marguerite is directly addressing the stressor by speaking to her boss. While option A (exercise) can be a way of coping, it is an avoidant coping strategy, as is option C (changing the subject); they do not focus on removing or reducing the stressor. Option D relates more to coping flexibility, where she may change or use a different coping strategy when her current strategies are not effective.

3. avoidance and approach strategies.

4. emotion-focused coping

5. problem-focused coping.

4.1 LA: Review

1.

a. learning: a relatively permanent change in behaviour that occurs as a result of experience

b. Characteristics may include:

- results from experience
    - interdependence with memory
- involves relatively permanent change in behaviour (but modifiable)
- change may occur immediately or gradually over time
    - can occur intentionally or unintentionally/voluntarily or involuntarily/consciously or non-consciously
- can be an active or passive process
- ongoing throughout the lifespan
- observed in performance/what the organism does (but learning may be latent/remain 'hidden').

2. Discuss example with another student or the teacher to check understanding of conditioning.

3.

a. • learned behaviour: behaviour acquisition through experience e.g. playing a trombone

• reflexive behaviour: response to a stimulus that is involuntary or free from conscious control; acquisition is not dependent on experience (unless a conditioned reflex/response) but requires the experience of a stimulus to be elicited/produced e.g. startle reflex

• behaviour dependent on maturation: behaviour dependent on biological processes involved in an organism's becoming functional or fully developed; experience may influence performance but not necessarily onset e.g. riding a bicycle

b. Example:

behaviour dependent on maturation: behaviour dependent on biological processes involved in an organism's becoming functional or fully developed (e.g. development of the brain, nervous

system, muscles etc.); experience may influence performance but not necessarily onset e.g. walking, riding a bicycle. No amount of practice will hasten walking or bike riding unless maturationally ready and able to do so. Similarly, birds cannot fly until their feathers, wings, muscles and nervous system have grown and developed in the required ways. They do not need to learn to fly. Instead, they are simply capable of doing so at a certain age when they are maturationally ready and able do so.

c. reflexive behaviour: Although reflexes are primarily unlearned behaviours that are inborn and genetically determined, we can modify or control some of our reflexive behaviours through conscious intervention. For example, we can exercise some control over certain responses that are self-regulated by the autonomic nervous system, such as heart beat, respiration and blinking.

Our extensive repertoire of reflexes may also include some involuntary responses that are acquired as the result of experience. For example, a dog may be trained to elicit a reflexive response to virtually any type of stimulus, including one it has never previously experienced. As explained in the next topic, this was demonstrated by Ivan Pavlov when his laboratory dog salivated to the sound of a bell that it had come to associate with food. Pavlov called this a *conditioned reflex*. Any other type of animal, or person, can acquire this type of conditioned reflexive behaviour.

behaviour dependent on maturation: although this type of behaviour is acquired independently of learning, experience can shape its expression e.g. practice can influence how well certain maturationally dependent behaviours are performed following acquisition (but maturation will maintain a limit to how well).

4.2 LA: Multiple-choice questions

1. All of the above are correct.

2. behaviourism.

3. 20th

4. associating different stimuli.

5. interaction with the environment

4.3 LA 1: Review

1. • Example based on the study design definition (p. 35) i.e. a three phase learning 'process … that results in the involuntary association between a neutral stimulus and unconditioned stimulus to produce a conditioned response':

• ‘a learning process that results in the involuntary association between a neutral stimulus (which becomes a conditioned stimulus) and unconditioned stimulus to produce a conditioned response’.

2. • Explanation may refer to:

− the involuntary, reflexive salivation response of Pavlov’s dogs

− classically conditioned responses *are* conditioned reflexes that are acquired through associative learning i.e. they are ‘conditional’ upon an organism’s experience

3. • Examples:

• A type of associative learning that occurs in a series of three phases — before conditioning, during conditioning and after conditioning.

• A response that is automatically produced by one event becomes associated with another event that would not normally produce this response.

• Learning is said to have occurred when a response/behaviour is linked with an event that does not normally produce this response and the new/different event alone actually produces the response.

• A type of associative learning that is said to have occurred when a response/behaviour is linked with an event that does not normally produce this response and the new/different event alone actually produces the response. The learning process occurs in a sequence of three phases: before conditioning, event A produces the response to be conditioned/learnt and event B produces an irrelevant response; during conditioning, events A and B are repeatedly presented together until B alone produces the target response; after conditioning, B presented alone will produce the target response and has therefore become a learnt/conditioned response to event B.

4.

a. • UCS: unconditioned stimulus — any stimulus that consistently produces a particular, naturally occurring, automatic response.

• NS: neutral stimulus (NS) — any stimulus that does not normally produce a predictable response. In particular, this stimulus is ‘neutral’ to the UCR. Through repeated association with the UCS, the originally neutral stimulus becomes a CS that elicits a very similar or identical response to that caused by the UCS.

• CS: conditioned stimulus — the stimulus that is neutral at the start of the conditioning process and does not normally produce the UCR but eventually becomes associated with the

UCS and in itself elicits a very similar response to that caused by the UCS — a response that has become a CR.

• CR: conditioned response — the learned response that is produced by the CS. The CR occurs after the NS has been associated with the UCS and has become a CS. The behaviour involved in a CR is very similar to that of the UCR, but it is triggered by the CS alone.

• UCR: unconditioned response — the response that occurs automatically when the UCS is presented; a reflexive, or involuntary, response is a UCR as it is predictably caused by a UCS.

b. • The neutral stimulus becomes the CS after repeated associations with the UCS.

• The neutral stimulus is any stimulus that does not normally produce a predictable response. In particular, this stimulus is 'neutral' to the UCR.

• For example, dogs do not normally salivate in response to the ringing of a bell. Pavlov's dogs had to be conditioned to do so through repeated pairing of the bell ring with meat powder, a food stimulus that does produce the particular response.

• Through repeated association with the meat powder (UCS), the originally neutral stimulus (the bell ring) becomes a conditioned stimulus that triggers a very similar or identical response to that caused by the UCS.

• Therefore, the conditioned stimulus (CS) is the stimulus that is 'neutral' at the start of the conditioning process but eventually triggers a very similar response to that caused by the UCS — a response that has become a conditioned response.

c.

i. • the response by the learner is usually a reflexive involuntary one e.g. salivating or blinking (so the association of the two stimuli is often not conscious or deliberate)

ii. generally, repeated pairings of the NS and UCS during conditioning

iii. • NS must come before the UCS and UCS must usually follow very close in time (ideally about half a second)

• Note that single-trial acquisition of a classically conditioned response is possible, as often occurs with taste aversion (i.e. learning to avoid a food that causes nausea, sickness, vomiting etc.) and sometimes with a specific phobia.

5. • when the CS alone produces the CR

6.

- Ways may refer to:

  − control of presentation of different stimuli, e.g. amount of meat powder, frequency/constancy of intensity of visual and auditory stimuli

  − control of exposure to other stimuli that may produce saliva

  − control of dogs' responses, e.g. restricting range of possible movements and other responses

  − precise observations/measurements of the quantity and rate of saliva produced

4.3 LA 2: Identifying elements of classical conditioning

1. a.

- UCS: cyclone
- UCR: fear
- NS/CS: bathroom
- CR: fear

b.

- UCS: planes crashing into buildings
- UCR: anxiety
- NS/CS: seeing or hearing a low-flying plane
- CR: anxiety

c.

- UCS: electric shock
- UCR: hand movement
- NS/CS: buzzer
- CR: hand movement

4.3 LA 3: Analysing classical conditioning scenarios

1. unconditioned stimulus; neutral stimulus

2.

a. chemotherapy treatment; reduced immune system functioning

b. cues

c. reduced immune system functioning

3.

a. • Explanation: The NS/UCS is 'sights and sounds of a big pokie win' and the UCR is a 'huge buzz' or euphoria. Through classical conditioning, the 'sight and sound of a big pokie win' (NS/UCS) becomes associated with the sight of a gaming venue (CS) and the CS alone produces the CR of euphoria.

b.• Explanation: Leeches are the NS/UCS and the UCR is disgust. Through classical conditioning, the leeches (NS/UCS) become associated with the lake (CS), and the CS alone produces the CR of disgust.

c.• The NS/UCS is sleepiness and the UCR is sleep. Sleepiness (NS/UCS) becomes associated with the sound of a vacuum cleaner (CS) and the CS alone produces the CR of sleep.

d. • The NS/UCS is a monster and the UCR is fear. Through classical conditioning, the doorbell ringing (CS) becomes associated with the presence of a monster (NS/UCS), and the CS alone produces the CR of fear.

e. • The flashing light has previously been associated with an alarming event through classical conditioning. The NS/UCS was an alarming stimulus and the UCR an adrenaline burst. Through classical conditioning, the flashing light (CS) becomes associated with an alarming event (NS/UCS) and the CS alone produces the CR of an adrenaline burst.

4.3 LA 4: VCAA exam questions

1. unconditioned stimulus is his girlfriend.

2. Sally salivating when she sees the bus approach her bus stop.

3. conditioned stimulus.

4. a conditioned response.

5. loud noise, red balloon.

4.4 LA 1: Review

1.

a. operant conditioning: a type of learning/learning process whereby the consequences of behaviour determine the likelihood that it will be performed again in the future

b. Explanation should demonstrate understanding that operant conditioning involves associating stimuli with responses (behaviours) which are in turn influenced by consequences.

2.

- operant: any voluntary response (or set of responses) that acts ('operates') on the environment to produce some kind of consequence
- Example: any response or behaviour of an organism that is modifiable by its consequences. (An operant is a voluntary action that people and animals initiate and often perform on a daily basis. Smiling, drinking water, listening to music, watching TV, Googling for information and liking on Facebook are common human operants. Although operants first appear spontaneously and can be controlled by the organism, they are greatly influenced by their consequences.)

3.

a. Explanation should demonstrate understanding of an involuntary response (CC) vs voluntary response (OC) to a stimulus i.e. unlike the classical conditioning process which involves involuntary, reflexive responses that are automatically elicited by a stimulus, operant conditioning involves voluntary responses.

b.

- Explanation should demonstrate understanding that:

  – an antecedent is a stimulus that precedes and influences the occurrence of a response/behaviour in CC, one antecedent stimulus that elicits a specific response (e.g. food) is linked with a second antecedent stimulus that does not elicit the response (e.g. bell) and learning has occurred when the second stimulus alone will also elict the specific response

4.

a.

- The three-phase model of operant conditioning has three parts that occur in a specific sequence:

1. antecedent (A), a stimulus that occurs before the behaviour, signals the probable consequence for the behaviour and therefore influences the occurrence of the behaviour
2. the behaviour (B) that occurs due to the antecedent
3. the consequence (C) to the behaviour.

This is usually expressed as antecedent (A) → behaviour (B) → consequence (C).

Basically, a specific antecedent prompts relevant behaviour that is followed by a specific consequence.

In more formal terms, the three-phase model of operant conditioning means that the probability of particular behaviour occurring in response (B) to an antecedent stimulus (A) is a function of ('depends on') the consequence (C) that has followed (B) in the past.

b. An antecedent precedes/occurs before a behaviour and a consequence occurs after a behaviour.

5.

Antecedent (A)	Behaviour (B)	Consequence (C)	Effect on future behaviour
Running a mini-marathon	Charlotte increases her running — she runs 10 km three times per week	Experiencing 'runner's high' due to endorphin release	Positive reinforcement — more likely to maintain running behaviour, possibly even increasing

6.

Antecedent (A)	Behaviour (B)	Consequence (C)	Effect on future behaviour
full bladder	urination in potty	praise or stickers	positive reinforcement — more likely to seek potty seat when bladder is full
full bladder	wetting accident/not using the potty	parental disapproval	punishment (positive) — less likely to have a wetting accident

Alex has learnt that urinating in the potty (B1) when she has a full bladder (A) has the consequence of parental praise or stickers (C), whereas a wetting accident/failure to use the potty (B2) when she has a full bladder (A) will result in the punishment of parental disapproval (C).

4.4 LA 2: VCAA exam questions

1. is an antecedent.

2. operants.

3. voluntary, the somatic nervous system.

4. discriminative stimulus.

5. Mary kicking and screaming.

4.4 LA 3: Review

- **1.** reinforcement: As a process, using a stimulus (object or event) to strengthen or increase the frequency or likelihood of a response/behaviour that it follows. This may involve using a positive stimulus or removing a negative stimulus to subsequently strengthen or increase the frequency or likelihood of a preceding response or operant
- Discuss your example with the teacher or another student to check conceptual understanding, including the distinction between reinforcement and reinforcer i.e. reinforcer is the stimulus whereas the term reinforcement may be used in relation to the consequences of a reinforcer, the act/process of delivering/presenting/providing a reinforcer and sometimes in relation to the stimulus and therefore interchangeably with the term reinforcer.

2.

- positive reinforcer: a stimulus that strengthens or increases the frequency or likelihood of a desired response by providing a satisfying consequence
- negative reinforcer: any unpleasant or aversive stimulus that, when removed or avoided, strengthens or increases the frequency or likelihood of a desired response

3.

- Similarities:

  – both have a satisfying/desirable consequence

  – a reinforcer *will* promote or strengthen a response/behaviour and a reward *tends* do so as well.

- Difference:

  – a stimulus may be a reward but is not necessarily a reinforcer unless it promotes or strengthens behaviour, whereas a reinforcer is both rewarding and promotes or strengthens behaviour.

4.

a.

- aversive stimulus: anxiety
- behaviour being strengthened: cigarette smoking

b.

- aversive stimulus: argument with another person
- behaviour being strengthened: giving in/submission/submissive behaviour

c.

- aversive stimulus: loud noise/music
- behaviour being strengthened: submissive behaviour

d.

- aversive stimulus: thunderstorm, possible lightening
- behaviour being strengthened: personal safety, thunderstorm aversion

e.

- aversive stimulus: hot weather
- behaviour being strengthened: fanning oneself

f.

- aversive stimulus: irritating clanging sound in car
- behaviour being strengthened: wearing seat belt

g.

- aversive stimulus: solitary confinement
- behaviour being strengthened: obeying prison rules

5.

a.

- Common principles include:

– both have a satisfying/desirable/pleasant consequence for the organism performing the behaviour e.g. a positive reinforcer involves a presentation of a pleasant stimulus and a negative reinforcer involves removal of an unpleasant stimulus — in either case, the consequence or outcome is one that is desired

– both promote or strengthen a response and make it more likely to recur

b. Discuss your examples with another student or the teacher to check conceptual understanding.

c. Explanation should demonstrate understanding that the important distinction between positive and negative reinforcement is that positive reinforcers are *given* and negative reinforcers are *removed* or *avoided*.

6.

a. Explanation should refer to the

antecedent: red sweat band; and

behaviour: wear when competing; and

consequence: win the race/national title

Arup has learnt that winning a race (B) when he wears the red sweat band (A) has the consequence of winning (C).

b.

- Examples may include crossing the street to avoid walking under a ladder or to avoid a black cat, patting a pokie machine before spinning, blowing on a dice before rolling, wearing a specific pair pf socks when competing in a sports match, and so on.
- Skinner demonstrated the conditioning of superstitious behaviour using pigeons. He conditioned pigeons to spin around in circles (clockwise or anticlockwise), nod their heads, or to make swaying or other unusual motions.

An example of the conditioning procedure used by Skinner is:

1. Set the food dispenser to deliver food to animals in a Skinner box at a fixed time interval e.g. every 2 minutes.
2. Whatever behaviour is occurring at the scheduled time of the food being dispensed is reinforced.
3. The pigeons associated whatever behaviour they were engaging in at the time of the food being dispensed with the delivery of the food.
4. The likelihood of those behaviours occurring again then increased.

- Note that in conditioning of superstitious behaviour, reinforcement is not contingent on any behaviour. Reinforcement essentially occurs 'accidentally'/coincidentally when or after the 'superstitious' response occurs. And whatever behaviour was occurring at the time of reinforcement tended to reoccur, even though it had no effect whatsoever in bringing about reinforcement.

4.4 LA 4: Review

1.

a. punishment: delivery of an unpleasant consequence following a response, or removal of a pleasant consequence following a response

b. Explanation should refer to punishment as involving the weakening of a response, or decreasing the probability of that response occurring again over time.

Example: Until the 1960s or so, teachers in Victorian schools were permitted to use corporal punishment (e.g. 'the strap') to suppress or weaken student behaviour such as inattentiveness, lateness, use of disrespectful expressions.

2.

- positive punishment: the presentation (or introduction) of a stimulus, thereby decreasing (or weakening) the likelihood of a response occurring again e.g. when Principal Skinner requires Bart Simpson to write lines on the blackboard: 'I will not waste chalk'
- negative punishment: the removal of a stimulus and thereby decreasing (or weakening) the likelihood of a response occurring again, e.g. when Principal Skinner sets detention for Bart Simpson after school, he removes a positive (free time)

Note: 'In both positive and negative punishment, the intended effect on the punished behaviour is to weaken and prevent it from recurring.' When distinguishing between them, 'consider the mathematical terms of adding (+) and taking away (–), rather than good and bad or the 'feelings' of the recipient'

3. Differences may refer to:

– Punishment has the same unpleasant quality as a negative reinforcer, but unlike a negative reinforcer, the punishment is given or applied, whereas the negative reinforcer involves removal of an aversive stimulus.
– The outcome of punishment is the opposite to removal of a negative reinforcer — punishment weakens the response, or decreases the probability of that response

occurring again over time; whereas negative reinforcement has the effect of increasing the likelihood of a response being repeated and thereby strengthening the response.
– Punishment may either add something negative or remove something positive to create an undesirable outcome to weaken behaviour; whereas negative reinforcement involves removal only.
– Example: Sam conscientiously drives under the speed limit to avoid getting a ticket (i.e. negative reinforcement — the desirable/legal driving behaviour occurs in order to avoid an aversive consequence).

He has not exceeded the speed limit for over two years when he regained his licence following its suspension for a serious speeding offence (i.e. negative punishment — loss/taking away his licence for a period of time weakened subsequent speeding behaviour) as well as being fined for speeding (i.e. positive punishment — monetary penalty was added to help ensure weakening of speeding behaviour in the future).

4. Example: talkative, attention-seeking Sam may respond to being verbally reprimanded in class — her teacher's intended punisher — by increasing her talkative behaviour. For her, the verbal scolding at least gives her the attention she likes and this attention then acts as a reinforcer for the talkative behaviour.

Discuss your example with another student or the teacher to check your understanding.

5. Explanation should refer to time out involving removal from desirable situations that normally allow access to reinforcement e.g. at home, time out prevents access to the reinforcement of being with the rest of the family, use of products elsewhere in the home etc; at school, time out prevents access to reinforcement of being with friends etc.

6.

- pre-intervention: Antecedent: gap under the backyard fence → Behaviour: crawling through the gap → Consequence: escape
- intervention: Antecedent: gap under the backyard fence → Behaviour: stay inside the backyard/not crawl through the gap/escape → Consequence: no high-pitched noise/avoid high-pitched noise
- positive punishment: the noise is added; to weaken escape behaviour

7.

a. The students have learnt that rowdiness and inattentiveness (B) during this teacher's lesson in the last period (A) will be rewarded/reinforced (C).

b.

- antecedent (A): lesson during the last period with the specific teacher
- behaviour (B): rowdiness and inattentiveness

- consequence (C): let out/dismissed early

8.

a. negative reinforcement — by avoiding the unpleasant school situation or by removing the unpleasant stimulus, Maria feels better and therefore experiences a satisfying consequence

b. punishment — exposure to the unpleasant stimulus of bullying behaviour decreased Maria's school attendance behaviour

9. Discuss your answer with another student or the teacher to check conceptual understanding.

4.4 LA 5: Distinguishing between reinforcement and punishment

1.

a. positive reinforcement

b. negative reinforcement

c. positive punishment

d. positive punishment

e. negative reinforcement

f. positive punishment

g. negative punishment

h. positive punishment

2.

a. Explanation should demonstrate understanding that baseline data is information gathered early in an experiment/study (typically before the IV is manipulated) to serve as a 'basis' for comparison of subsequently collected 'data' e.g. in a 'before and after' study, it is the 'before' data against which the 'after' data is compared. The answer must include reference to the particular study e.g. measurements of teacher and student behaviours before the operant conditioning intervention.

b.

- Explanation may refer to:

  – failure to positively reinforce appropriate or more desirable behaviour, e.g. 'he was never observed to take notice of appropriate behaviour; for example give praise for not

talking'
– failure to positively reinforce alternative behaviour that is both constructive and incompatible with the undesirable behaviour
– ineffective punishment due to inconsistent application, e.g. 'responded to inappropriate talking about 25% of the time'; 'he continued trying to teach "over the top"'
– ineffective punishment due to inappropriateness of punisher, i.e. punishers such as general threats, 'shhh' and 'be quiet' do not actually provide an unpleasant consequence
– ineffective punishment or potential use of negative reinforcement through failure to target individuals, e.g. 'responses were directed at the whole class and rarely to offending individual students'
– ineffective punishment due to inappropriate timing, e.g. not implemented with minimal delay.

c.

- Suggestions may refer to:

– effective use of positive reinforcement to identify and strengthen/increase frequency of appropriate behaviours, e.g. consistent application of positive reinforcers such as praise, smiling, compliments etc. as soon as possible after desired responses are observed, while consistently ignoring or punishing unwanted responses
– effective use of negative reinforcement, e.g. providing opportunity and clarifying for avoiding an unpleasant homework task if accomplished during class time
– effective use of punishment.

4.4 LA 6: VCAA exam questions

1. being given compliments by her neighbours when she has a quiet party

2. immediately after the dog barks, every time.

3. positively reinforcing the tantrum and increasing the likelihood of them occurring in the future.

If Simran were to give Ava chocolate when she throws a tantrum, Simran would be positively reinforcing the tantrum and increasing the likelihood of them occurring in the future.

Operant conditioning is a learning process in which an organism will tend to repeat behaviour that has a desirable consequence (positive reinforcement, such as receiving a treat, or negative reinforcement, such as avoiding an unpleasant event) and tend not to repeat behaviour that has an undesirable consequence (punishment)

4. negative reinforcement.

5. cry more often when he is near his mother.

4.5 LA 1: Review

1.

Feature	Classical conditioning	Operant conditioning
how a response is acquired	a three-phase process (before conditioning, during conditioning and after conditioning) that results in the involuntary association between a NS and UCS to produce a CR	a three-phase process (antecedent, behaviour, consequence) involving reinforcers (positive and negative) and punishment that can be used to change voluntary behaviours
role of learner	passive e.g. learner does not have to do anything for the NS, CS or UCS to be presented	active e.g. must operate on the environment before reinforcement or punishment is received
timing of stimulus and response	response (e.g. CR) depends on stimulus (e.g. NS then UCS) occurring first	reinforcement or punishment after the response i.e. reinforcer or punisher (consequence) depends on response occurring first
nature of response (reflexive/voluntary)	reflexive, involuntary	voluntary and involuntary

2.

a.

- classical conditioning
- associated a dog's bark (initially NS, then a CS) with a dog bite (UCS), then CS alone results in crying (CR)

b.

- classical conditioning
- associated musk perfume (initially NS, then a CS) with unpleasant experience of ex-girlfriend (UCS), then CS alone results in cringing (CR)

c.

- operant conditioning
- A: borrow father's car → B: return car with near empty petrol tank → C: car cannot be borrowed

d.

- operant conditioning
- A: go out with friends → B: arrive home on time → C: not grounded

4.5 LA 2: VCAA exam questions

1. stimulus directly produces the response, antecedent does not directly produce the response.

2. operant, Orla progresses to higher levels in the video game than Anthony.

3. running away to avoid balloons

4. In operant conditioning learners control their response to a stimulus.

5. In classical conditioning learning is based on a reflexive response, while in operant conditioning learning is based on voluntary behaviour.

4.5 LA 3: Analysis and evaluation of research on the use of operant conditioning to change a student's behaviour

a. IV: teacher praise (praise/no praise conditions)

b.

i. days 1–4; days 12–16

ii. days 1–4 to establish baseline data against which IV effect can be compared; days 12–16 to check/compare IV effect

iii.

- Examples:

  – baseline

  – pre-intervention

  – pre-operant conditioning

  – pre-behaviour modification.

c. lowest: control/baseline

highest: praise (for interaction with children)

Answers should propose a case for success of the program with reference to the data/results in relation to the program's goals.

d.

i. Antecedent: school yard

Behaviour: stand with teachers

Consequence: peer avoidance/teacher attention

ii. Antecedent: school yard

Behaviour: play with peers

Consequence: praise

e.

– effective use of positive reinforcement, e.g. 'girl enjoyed teacher praise'

– consistently reinforcing desired responses and consistently not reinforcing/ignoring unwanted responses

4.6 LA: Review

1.

- Assumptions may include:

  – the real world social context in which learning occurs provides a rich source of behaviour and associated consequences for observational learning e.g. a source of observable behaviour and associated consequences that enables vicarious learning without having to actually perform behaviour

  – learning involves cognitive processes e.g. attention, expectations, memory, decision making ; a person does not simply 'see' and then automatically reproduce a behaviour without any intervening mental activity

  – learning does not necessarily involve performing actions and experiencing consequences — the learning can occur by watching others do something and experiencing the consequence

  – people are more likely learn and reproduce responses/behaviour observed to have desirable consequences

– social-cognitive/observational learning can involve conditioning e.g. vicarious conditioning

– observational learning involves cognitive processes e.g. attention, mentally representing what is observed, memory, processing consequences, decision making about imitation/reproduction;

– what is learnt though observation may remain latent/unexpressed/'hidden' without being reproduced simply because there is no motivation or need to do so e.g. distinction between acquisition and performance

2. Explanation should demonstrate understanding that it is a learning process in which the individual watches another person displaying behaviour that is either reinforced or punished, and then subsequently behaves in exactly the same way or in a modified way(or refrains from the behaviour as a result of what they have observed) i.e. no direct, 'personal' experience is required conditioning/learning— observation is adequate.

4.7 LA 1: Review

1. Example: After witnessing an older sibling being punished (i.e. the consequence) for taking a biscuit without asking (observed behaviour that initiated the consequence), the younger child does not take biscuits without permission.

2. Explanation should demonstrate understanding that observational learning is a process that involves observing/watching/attending to a model/s, the model's behaviour and the behaviour's consequence, then possibly reproducing/imitating/demonstrating (i.e. modelling) the behaviour (but not necessarily immediately).

3.

- live model: a real-life person who may be demonstrating, acting out and/or describing or explaining a behaviour e.g. a parent, teacher, tennis coach, etc.
- symbolic model: a real or fictional character displaying behaviour in books, movies, television programs, online and other media e.g. a rock star, comic book character

4.

- Example should be of other types of learning, such as:

– classical conditioning e.g. conditioned responses such as reflexive response to specific stimuli, conditioned emotional responses, taste aversion

– operant conditioning

– trial and error learning

– insight learning.

5. Explanation should describe the learner as having an active role, as per Figure 4.26 e.g. attend to/watch the modelled behaviour and consequences, interpret consequences, remember the model's behaviour, recall from memory to reproduce, decide whether to reproduce etc.

6. Description and explanation should include all processes in the correct sequence.

7. Discuss your example with another student of the teacher to check conceptual understanding.

8.

- Presentations should demonstrate understanding of each process, e.g.

  – Attention: OL theory proposes that the observer must attend to the model's behaviour and the consequence in order to recognise distinctive features of the observed behaviour and to notice the consequences. Similarly, Suzuki advises parents to teach violin information only when the child is actually looking at and watching what is being done. Parents are told to stop teaching and wait if the child rolls around on the floor, jumps up and down or talks about unrelated things.

  – Retention: OL theory proposes that the observer must remember the model's behaviour so that it can be retrieved and reproduced. Similarly, Suzuki advises parents that they should present information in ways a young child can understand, presumably because this will help ensure reproduction. Because a 3–4-year-old does not have fully developed verbal skills or memory, little time is spent giving verbal instructions. Instead, the young child is given violin information through games and exercises.

  – Reproduction: OL theory proposes that the observer must be able to reproduce/imitate what was observed (but must have the ability to do so). Similarly, Suzuki suggests that children start learning violin at about 3–4 years old, the earliest age when they can physically perform the required movements and imitate their parents and teachers e.g. hold the violin, hold the bow and press the strings. Girls can start earlier than boys because they physically mature earlier.

  – Motivation and reinforcement: OL theory proposes that the observer must have some reason, or incentive to perform the model's behaviour. Similarly, Suzuki emphasises that an important role of the parent is to constantly reward and reinforce the child for observing and 'doing what mummy or daddy is doing'.

4.7 LA 2: VCAA exam questions

1. attention, William idolises his brother

2. attention, retention, motivation, reinforcement

3. The stage of observational learning that most applies to Phoebe choosing the female captain as the model for her behaviour is attention.

VCAA comment:

Option A (attention) was correct because the question asked why Phoebe chose the female captain as the model for her behaviour. In the stage of attention, the learner is more likely to attend to a model who has similar characteristics to the learner or who the learner admires. The scenario stated that the model had blonde hair like Phoebe and that Phoebe admired the captain. The stage of motivation (option C) refers to the learner being motivated to perform the learned behaviour, which is not what the question was referring to.

4. Merran's praise of Patsy.

VCAA comment:

This question had a clear focus on observational/social learning and vicarious (that is, observed, and so indirectly experienced) reinforcement. Motivation is a component of observational learning that involves a willingness to reproduce a modelled behaviour that has been observed to be positively reinforced/rewarded. Max's observation of Merran's praise of Patsy's effort in completing the car served as a vicarious reinforcer for him to reproduce Patsy's behaviour. It is important to note that the scenario did not mention Max subsequently playing with the car, nor did it mention Patsy playing with the completed car, so these potential motivators are not answers that can be inferred from the scenario. Therefore, option B was the best response based on the information provided in the scenario.

5. observational learning and operant conditioning.

4.8 LA: Multiple-choice questions

1. multimodal oral communication; relationships

2. Country.

3. cultural practices.

4. observational learning.

5. oral narratives

5.1 LA: VCAA exam questions

1. encoded.

VCAA comment:

Students who chose option C, 'meaningful' showed a lack of understanding of levels of encoding. 'Structural encoding' (according to the physical characteristics of the item to be stored) and 'phonemic encoding' (according to the sound of the item to be stored) do not involve meaning, which is required for 'semantic encoding'

2. storage.

3. encoding.

4. encoding → storage → retrieval

5. VCAA comment:

This question was quite well answered with most students knowing that encoding involves *converting or transforming information into a meaningful form or code for storage* whereas retrieval is the *recovery or accessing of information or memories from storage.* Describing encoding as a deliberate reorganisation of information was not acceptable as this does not distinguish it from the more active memory strategies associated with elaborative rehearsal.

5.2 LA 1: Review

1. sensory memory: brief storage of information from each of the senses, in a relatively unprocessed form; the memory system in which incoming sensory information is received and temporarily retained in its original sensory form for a very brief period of time

2. Distinction should refer to sensory memory as the construct used to generally refer to the store for all types of incoming sensory information and to sensory register as the construct used to refer to the store for each specific type of sensory information. In addition, each register is considered to have other distinguishable features e.g. encoding process, storage duration.

3. Explanation should refer to sensory memory having a storage/retention function for incoming sensory information and holding the information in its raw form, whereas a perceptual system receives and processes incoming sensory information to interpret the raw information in a meaningful way.

4.

Sensory register	Type of sensory information	Storage duration	Storage capacity
iconic memory	visual	0.2–0.4 seconds	vast, potentially unlimited
echoic memory	auditory	3–4 seconds	vast, potentially unlimited

5. Explanation should demonstrate understanding that:

- Information in sensory memory is believed to be held in its raw sensory form and not subject to an encoding process, unless attended to.
- Following attention, information must be converted into a form enabling neurological representation and storage as memories.

6. Explanation should refer to the crucial role of attention to specific sensory information resulting in transfer to STM.

5.2 LA 2: VCAA exam questions

1. sensory memory, short-term memory, long-term memory

2.

Visual registration of problem	Storage of times tables	Storage of problem
sensory memory	long-term memory	short-term memory

3. iconic memory.

4. sensory memory; short-term memory; long-term memory

5. sensory memory.

5.2 LA 3: Review

1. Example: a memory system with limited storage capacity in which information is retained for up to about 30 seconds, unless renewed in some way.

2.

Similarities include:

– limited storage duration

– lost if not attended to or used in some way.

Differences include:

– not consciously aware of any information in sensory memory but consciously aware of all information in STM

– no encoding in/for sensory memory but encoding in/for STM

– unlimited storage capacity of sensory memory but limited storage capacity of STM

– information is stored as an exact replica in sensory memory but as an encoding of it in STM

– information cannot be manipulated in sensory memory but can be manipulated in STM

– information cannot be retrieved from LTM and stored in sensory memory but can be retrieved from LTM and stored in STM.

3.

- Explanation should refer to emphasis on the active part of memory (whereas sensory memory and LTM are considered passive) e.g. where information can be brought into conscious awareness and temporarily stored/held there so that it can be actively 'worked on'/manipulated in a variety of ways while we undertake everyday tasks, provision of a temporary storage facility and mental 'workspace' for information currently being used in some conscious cognitive activity etc.
- Example: Simultaneously integrating new information from sensory memory and retrieved information from LTM when problem-solving, liking in Facebook etc.

4.

- STM memory loss primarily occurs through:

– decay/fading — when lost through disuse; and

– displacement — when pushed out to make room for new information.

5. Example: renewal of information e.g. through continual repetition (repeating the information over and over again)/maintenance rehearsal

6.

- Generally, while thinking about something else, new information has entered STM and displaced the information in STM about what needed to be picked up, or, while thinking

about something else, the required information was lost or faded through disuse, lack of rehearsal etc.

– STM capacity: given that STM has a limited capacity of 7 ± 2 items of information, thinking must have comprised enough items (e.g. chunks of thoughts) to have exceeded the capacity or STM

– STM duration: given that STM has a storage duration of about 18 seconds/up to 30 seconds, the reason for going to the room would not have been thought about or rehearsed for at least this long and was lost or faded from STM through disuse.

5.2 LA 4: VCAA exam questions

1. 15–30 seconds

2.

Independent variable	Dependent variable
Repeat the number to himself out loud	The repeated auditory exposure will help with the transfer.

3. moved from long-term memory to short-term memory.

4.

Outcome	Why
Jonas remembers only the first few items.	Rehearsal transferred the first few items into long-term memory and the others were lost from short-term memory.

5. Short-term memory receives information from both sensory memory and long-term memory.

5.2 LA 5: Review

1. Example: a relatively permanent information storage system that enables a person to retain, retrieve, and make use of skills and knowledge hours, weeks, or even years after they were originally learned.

2.

a.

Explanation should demonstrate understanding that the information in LTM may be considered 'inactive' (or information that cannot be manipulated) because we are not consciously aware of LTM information unless it is retrieved to STM (or working memory).

b.

- sensory memory
- Explanation: we are not consciously aware of any information in sensory memory unless we direct attention to it so that it is transferred to STM or working memory (where we become aware of it).

3.

LTM	Definition	Features	Examples
implicit memory	LTM that does not require conscious or intentional retrieval	• 'memory without awareness' • remembering usually occurs effortlessly, e.g. not necessarily trying to remember or be aware of ever having remembered something you know you know or can do • existence of a specific memory can be 'implied' by (or inferred from) responses that can be observed, e.g. the memory for knowing how to tie shoe laces or ride a bicycle can be judged by watching the individual do it rather than by asking them to state how you do it • involves non-declarative memories, i.e. people often (but not always) find it difficult to state or describe in words ('declare') what is being remembered, but the memory can be expressed through behaviour	• procedural memories for the skills involved in particular tasks, e.g. motor skills like knowing how to kick an Australian Rules football using a drop punt, or knowing how to braid hair • simple classically conditioned responses, such as fears and taste aversions
explicit memory	LTM that can be consciously	• 'memory with awareness'	• an episodic memory of a personal experience

LTM	Definition	Features	Examples
	retrieved and stated	• when used, there is a deliberate and conscious attempt to retrieve previously stored information • involves non-declarative memories, i.e. can 'declare' (state) or 'explicitly' (openly) express information retrieved from memory	such as an incident last Christmas day • a semantic memory of the name of a fish type or that jet lag occurs through rapid travel across multiple time zones

4. Explanation should demonstrate understanding that:

– despite the inability to consciously recall the location of each key, the knowledge for the location of the letters (i.e. Z, X, C, V, B, N and M) is stored in the keyboarders' implicit memory

– implicit memories are non-declarative memories as people often find it difficult to 'declare' or 'state' the relevant information

– procedural memories (our memories for knowing how to perform various tasks) are implicit memories/included within implicit memory.

5.

- Examples:

– explicit semantic: knowledge of a fact e.g. the shortest route

– explicit episodic: knowledge of time and place of a prior experience with the customer e.g. when first encountered, a near-miss accident experienced enroute

– implicit procedural: how to safely operate the motor scooter, maintaining balance with a pillion passenger.

6. Points of difference should demonstrate understanding that episodic memories involve personally experienced events in our lives ('what') associated with a particular time ('when') and place ('where'); whereas semantic memories are objective knowledge that is typically

factual in nature but does not include the context (time and place) in which it was learned. Reference may also be made to separate storage and differences in specific brain areas supporting each memory type described in the next section.

7.

a. describing your first day in Year 7 at school: explicit; episodic (personal experience; can bring to conscious awareness and declare/state/articulate)

b. planning where to move your queen in a chess game: explicit; semantic (knowledge and conscious awareness of chess rules and steps in the move; can declare state the plan)

c. climbing stairs: implicit; procedural (how to perform the actions)

d. recalling the names of Santa's reindeer: explicit; semantic (factual information)

e. stating a lunch order in a fish-and-chip shop: explicit; semantic (recalling and stating order details)

f. feeling anxious at the sight of a mouse because of a traumatic previous encounter with a mouse: implicit; classically conditioned memory (conditioned emotional response involving fear or anxiety)

g. calculating a mean score: explicit; semantic (factual information)

h. giving directions to the principal's office: explicit; semantic (factual information)

i. writing up a prac. report: explicit; semantic (reporting conventions/factual information)

j. recalling a New Year's Eve party you attended at a friend's house: explicit; episodic

k. writing a computer program: explicit; semantic (using specific programming language/factual information)

l. becoming extremely anxious when stuck in a lift because of a fear of having been in an enclosed place at some time in the past: implicit; classically conditioned memory (conditioned emotional response involving fear or anxiety)

m. playing a car-racing video game: implicit; procedural, i.e. involves how game is played and how to operate controls

5.2 LA 6: VCAA exam questions

1. capacity of his short-term memory.

2. procedural memory.

3. declarative

4. declarative system.

5. semantic; episodic; procedural

5.3 LA 1: Review

1.

	Explicit memory		Implicit memory	
Brain region	**Semantic**	**Episodic**	**Procedural**	**Classical conditioning**
hippocampus	• formation/encoding	formation/encoding	• not directly involved	• not directly involved
	• consolidation/helps ensure memories are neurologically stable and long-lasting	• consolidation/helps ensure memories are neurologically stable and long-lasting		
	• temporarily stores when forming/processing/consolidating then	• temporarily stores when forming/processing/consolidating then		
	• transfers to neocortex for long-term storage	• transfers to neocortex for long-term storage		
	• interacts with cortex in integrating/linking new information with existing information	• interacts with cortex in integrating/linking new information with existing information		
	• assists retrieval	• assists retrieval		

	• interacts with amygdala in formation of emotional memories, especially explicit content	• interacts with amygdala in formation of emotional memories, especially explicit content		
	• spatial memory formation and retrieval	• spatial memory formation and retrieval		
	• does not permanently store	• does not permanently store		
	• crucial for reconsolidation following retrieval	• crucial for reconsolidation following retrieval		
amygdala	• formation and consolidation of emotional memories	• formation and consolidation of emotional memories	• not directly involved	• formation and consolidation of classically conditioned fear responses
	• does not permanently store semantic content (or any details) of emotional memories	• does not permanently store episodic content (or any details) of emotional memories	• does not permanently store	• does not permanently store
neocortex	• interacts with hippocampus in the formation,	• interacts with hippocampus in the formation,	• stores well-learned	• stores more

	consolidation, storage and retrieval	consolidation, storage and retrieval	motor responses /sequences	complex classically conditioned responses (e.g. not conditioned reflexes)
	• stores throughout	• stores throughout		
basal ganglia	• not directly involved	• not directly involved	• contributes to formation/ encoding and retrieval of motor skills involving voluntary movements • involved in procedural memories acquired through habituation/habit learning	• not directly involved
cerebellum	• not directly involved	• not directly involved	• involved in temporary storage	• stores simpl

			• but well-learned motor responses are believed to be stored in the cerebral cortex • contributes to coordination and execution of movements associated with spatial memory formation and retrieval (not semantic details)	e conditioned reflexes e.g. eye blink to a sound associated with a puff of air

5.3 LA 2: VCAA exam questions

1. amygdala

2. the amygdala was activated by adrenaline in the processing of his memory of this event.

3. amygdala.

4. basal ganglia

5. implicit memory.

5.3 LA 3: Analysis and evaluation of research on the role of the amygdala in the acquisition of a classically conditioned fear response

1.

a.

i. between subjects/independent groups

ii. Explanation should demonstrate understanding of the appropriateness of the design in relation to the purpose of the study when compared with other designs. Practically, access to participants with specific types of brain damage would be a consideration.

b.

- IV: type of medial temporal lobe brain damage (only amygdalae, only hippocampi or damage to amygdalae and hippocampi).
- DV: skin conductance response (as a measure of the implicit memory of a conditioned fear response); verbal report of contextual details during the experiment (as a measure of explicit memory involving conscious recollection of the experiment).

c. Examples:

− Amygdala damage will impair implicit learning and memory but not explicit learning and memory, whereas hippocampal damage will impair explicit learning and memory but not implicit learning and memory.

− If there is bilateral amygdala damage, then implicit learning and memory of a conditioned emotional response will not take place.

d.

- Tentative generalisations are possible when taking account of:

− the study involving a biological rather than a psychological characteristic that is much more prone to variation between individuals

− results of other studies of amygdala and hippocampal damage

− results are consistent with theoretical expectations.

e.

- NS: blue light
- UCS: horn
- CS: blue light

- UCR: fear response
- CR: fear response

f.

i. Callie is likely to experience a conditioned fear response (implicit memory) and recall details of yesterday's encounter with the dog (explicit memory). Her terror will probably exceed the level experienced yesterday.

ii. Callie is unlikely to be fearful/terrified on sighting of the dog as she is unlikely to experience fear due to amygdala damage, nor acquire a conditioned fear response due to the crucial role of the amygdala in acquiring and expressing a conditioned fear response.

Callie will, however, most likely be able to report details of yesterday's experience (e.g. remember the dog encounter) as her hippocampus may have formed this explicit episodic memory, but not that it was an emotionally arousing experience. There may be an emotional response but it is likely to be subdued and she may be uncertain about why she is uneasy about sighting the dog.

iii. Callie is likely to show a conditioned fear response on sighting the dog but not remember and therefore report yesterday's encounter.

5.4 LA: Multiple-choice questions

1. episodic

2. a disease that progressively destroys neurons in the brain, causing memory loss.

3. Alzheimer's disease can only be confirmed via an autopsy.

4. episodic

5. 'I can remember visual details when I think about an object, but I can't see them in my mind's eye'.

6. case study.

7. any disruption of or damage to the brain's normal structure.

8. episodic

9. aphantasia

10 .'relive' the past and use that information to imagine the future.

11. strong correlation with brain lesions

12. know or remember what the landmark looks like.

5.5 LA 1: Review

1.

Name of mnemonic	How it is used	Example of its use to assist memory
method of loci	(1) Convert items to be remembered into mental images and link with well-known locations. (2) Revisit each place in the sequence in its predetermined order, retrieving from each place the image associated with it.	To remember a shopping list, visualise each product and imagine its presence at a different location along a familiar street.
acronym	(1) Form a pronounceable word using the first letters of a sequence of words to be remembered. (2) Retrieval of the acronym enables retrieval of the letters that act as cues for the sequence of words (which may also serve as retrieval cues for other information).	The word ‘scare’ is constructed and used to assist memory of the sequential order of the GAS stages and sub-stages i.e. s = shock c = countershock a = alarm reaction r = resistance e = exhaustion (It will be remembered that shock and countershock are sub-stages of alarm reaction.)
acrostic	(1) Construct a phrase or sentence using the first letters of the information to be remembered. (2) Retrieve the acrostic and use the first letter of each word in the sentence/phrase as retrieval cue for the associated information.	The phrase 'Little Betty Boron chews nuts on Friday next', to assist memory of chemistry elements 3–10: lithium, beryllium, boron, carbon, nitrogen, oxygen, fluorine, neon
songline	(1) Like the method of loci, link information with a landscape (or skyscape) feature in an elaborate or enhanced way e.g. information is in rhyme, rhythm, in the form of a story, song, performance (e.g. a dance) and/or of cultural significance so extremely meaningful (together with possible use of a portable device such as message stick.	Learning and remembering a Dreamtime story, cultural practice, food source etc. by linking to a landscape feature when out ‘on Country’

	(2) Visit the location where the feature and/or location and/or portable devices serve as retrieval cues.	

2. Explanation should demonstrate understanding that mnemonics enhance encoding, storage and retrieval by (1) making information to be remembered more elaborate (e.g. more detail, use of rhythm, rhyme, imagery) and (2) linking new information to previously encoded information in LTM and thereby assisting how it is organised with that information (e.g. integrate to form a cohesive whole rather than isolated bits).

5.5 LA 2: VCAA exam questions

1. Criminals Hate Any Smelly Escapes.

2. CHASE.

3. elaborating the information and enhancing its organisation in long-term memory.

4. acronym and acrostic.

5. method of loci.

6.1 LA 1: Multiple-choice questions

1 awareness of an internal or external stimulus.

2 varying along a continuum of awareness.

3 a particular state or form of awareness with distinguishable psychological characteristics.

4 is significantly different from the experience of normal waking consciousness.

5 anaesthetised

6.1 LA 2: VCAA exam questions

1 individual and continuously changing.

2 normal waking consciousness.

3

Lucy	Xavier	Thomas
induced altered state of consciousness	normal waking consciousness	naturally occuring altered state of consciousness

4 consciousness.

5 awareness of the world around us and ourselves, including thoughts and feelings

6.2 LA: Multiple-choice questions

1 awareness

2 sleep state

3 normal waking state

4 directly observed.

5 research evidence

6.3 LA 1: Review

1

Name of device	Response/s measured	Qualitative or quantitative data	Objective or subjective measure

electroencephalography (EEG)	electrical activity spontaneously generated by the brain	quantitative data	objective
electromyography (EMG)	electrical activity of muscles	quantitative data	objective
electro-oculography (EOG)	electrical activity in eye muscles that control eye movements	quantitative data	objective
sleep diaries	sleep and waking time activities	both	subjective
video monitoring	externally observable physiological responses/sleep behaviour	both	both

2

a frequency: number of brain waves per second; a pattern of high frequency activity is faster and therefore has more brain waves per unit of time; a pattern of low-frequency activity is slower, and therefore has fewer brain waves per unit of time

amplitude: intensity of brain waves measured in microvolts; can be visually judged by the size of the peaks and troughs of the waves from a baseline of zero activity; high-amplitude brain waves have bigger peaks and troughs, while low-amplitude have smaller peaks and troughs

b fastest: beta

slowest: delta

3

a alpha

b beta

c delta

d delta

e theta

f alpha

6.3 LA 2: VCAA exam questions

1 video monitoring recording the time and duration of participants' awakenings

2 an electromyograph, which indicates changes in muscle tone

3

1	2	3
EEG	EOG	EMG

4

Qualitative measures	Quantitative measures
sleep diary	electromyograph (EMG)
video monitoring	electro-oculograph (EOG)

5 physiological measures recorded in a sleep laboratory and video monitoring on the same night.

6.4 LA 1: Review

1

a biological rhythm: a naturally occurring pattern of changes in physiological and psychological functions that repeats itself in a cyclical way

b Relationship should refer to a biological clock as an innate/internal timing device/mechanism or neural system that controls/regulates/the cycle/timing of one or more biological rhythms.

c No

Explanation should demonstrate understanding that a circadian rhythm is a type of biological rhythm that is regulated by a biological clock.

2 Criteria include:

- has a duration of about 24 hours
- must repeat about every 24 hours
- endogenous/persists in the absence of external cues, which distinguishes circadian rhythms from simple responses to daily external (exogenous) cues
- can be adjusted to match the new/different external cues (called entrainable) e.g. the rhythm can be reset by exposure to external stimuli (such as a clock or light)
- is controlled/regulated by a biological clock.

3 Distinction should refer to cyclical duration i.e.

circadian rhythm: changes in bodily functions or activities that occur as part of a cycle with a duration of about 24 hours

ultradian rhythm: changes in bodily functions or activities that occur as part of a cycle shorter than 24 hours

4 endogenous: originates within an organism/internal source or cause

exogenous: originates outside an organism/external source or cause

5

a SCN: a pair of nuclei/clusters of neurons/the biological clock that controls circadian rhythms

location: each nucleus is housed in the hypothalamus (above the optic chiasm)

b Explanation should demonstrate understanding that circadian rhythms/cyclical behaviours or processes, such as their sleep-wake cycles, are likely to become completely disorganised or dysfunctional.

6 Roles:

- SCN (suprachiasmatic nucleus): receives information about the amount of light from the eyes and adjusts the sleep–wake cycle by signalling the pineal gland to secrete more or less melatonin in relation to light intensity; may also adjust through feedback on melatonin level
- pineal gland: produces and secretes melatonin into the blood to influence alertness/arousal and help regulate the circadian sleep–wake cycle
- melatonin: a hormone secreted into the blood that is involved in the initiation of sleep and in the regulation of the sleep–wake cycle; the amount that is secreted varies with the amount of light that is detected e.g. higher at night time and lower in daytime; amount present in the blood is associated with alertness — higher melatonin levels are associated with greater drowsiness and vice versa
- light: the main environmental cue that influences the sleep–wake cycle i.e. directly influences SCN activity; intensity/'amount' (natural or artificial) promotes or inhibits melatonin secretion e.g. less light promotes and more inhibits
- other environmental cues: time cues other than light, such as clocks, TV programs, scheduled meal breaks etc. may influence onset, duration or entrainment of the sleep–wake cycle.

7 Explanation should demonstrate understanding that artificial lighting emitted by digital media such as laptops, tablets and mobile phones can be bright enough to inhibit/impede secretion of melatonin and consequently adversely influence alertness and sleep onset.

6.4 LA 2: VCAA exam questions

1 circadian rhythm, because the level of melatonin peaks during the night and returns to normal during the day

2 a rhythm within a circadian rhythm

3 room temperature.

4 experimenter effect.

5

a Marks were awarded for:

identifying the circadian rhythm/suprachiasmatic nucleus (SCN)

explaining that the circadian rhythm is the biological rhythm that governs the (approximately) 24-hour/sleep-wake cycle.

The following is a sample response.

The 'body clock' refers to the circadian rhythm, which regulates the sleep-wake cycle.

b Marks were awarded for:

- correctly defining the role of melatonin release in the onset of sleep/feeling drowsy
- outlining that the level of melatonin will indicate the current state of the doctor's/nurse's body clock
- stating that melatonin levels were used to verify the accuracy/validity of the data from the wrist-worn device for the model.

The following is a sample response.

Melatonin is a hormone that induces sleep. Measuring melatonin levels will tell the researchers when the doctors are likely to feel tired. The researchers can then compare the melatonin levels to the data from the wrist band device to determine whether the light and movement data from the device accurately predict the onset of tiredness.

6.5 LA 1: Review

1 sleep cycle: a sleep period/phase comprising NREM sleep and REM sleep that occurs during/within a sleep episode (and is normally repeated a number of times, depending on the duration of the sleep)

sleep episode: in the course of a typical night, a sleep period/event, starting with sleep onset and ending with a final awakening, that comprises one or more sleep cycles (but not necessarily complete cycles)

Note that a microsleep and nap would be considered sleep episodes as both are sleep events, but not necessarily involving a complete sleep cycle.

2 sleep cycle: onset may be voluntary (intentionally induced e.g. medication) or involuntary (e.g. tiredness, fatigue) but rhythmic, cyclical occurrence is involuntary (e.g. biologically driven)

nightly sleep episode: onset may be voluntary (intentionally induced e.g. medication) or involuntary (e.g. tiredness, fatigue)

Note that onset of either cannot be prevented (i.e. we will eventually fall asleep) and that both may be interrupted voluntarily (e.g. alarm clock) or involuntarily (e.g. arousal due to biological need for urination or an unplanned environmental intervention).

3 distinctive brain wave patterns associated and predominant in each stage

4

Characteristic	NREM sleep	REM sleep
proportion in a sleep episode	75–80%	20–25%
number of stages	3	0
eye movements	absent	active, rapid
change in brain wave pattern	progressive slowing to delta; slower and bigger	alert, wakeful type of pattern
change in muscle tone	progressive loss; overall partial loss; relaxed	complete loss; paralysed
change in heart rate	progressive slowing	rise in heart rate
change in respiration	progressive slowing; steady, regular	irregular
change in arousal threshold	progressive increase until high but more easily awoken than REM	variable
body movements	yes	no
occurrence of dreaming	yes	yes

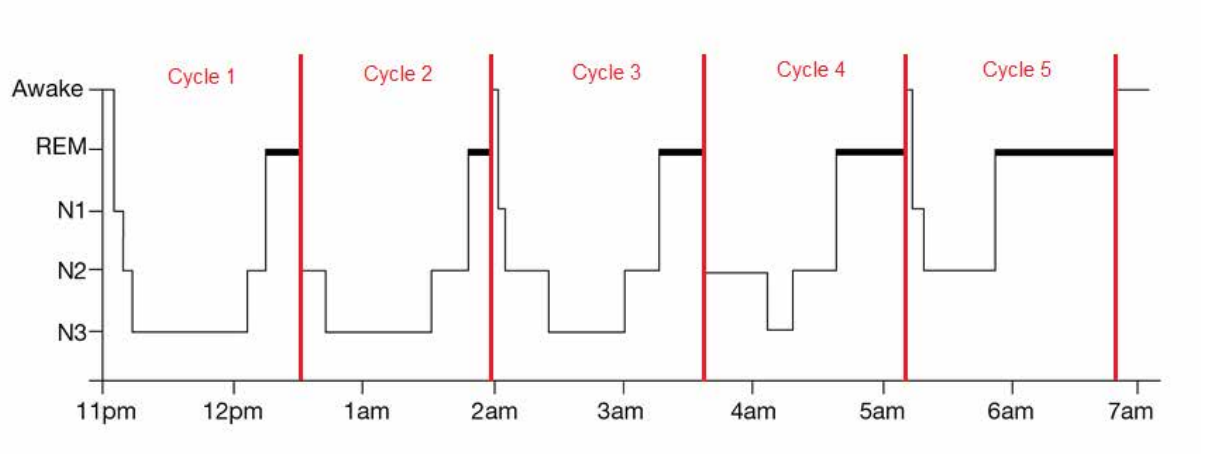
5

a NREM Stage 2

b REM sleep

c NREM Stage 3

6 a



b Comments should demonstrate understanding that the hypnogram quite accurately represents the pattern and proportions of a typical sleep episode e.g.

- alternating sequence of NREM and REM sleep periods
- recurrent sleep cycles
- shifting from light sleep to deep sleep after sleep onset
- each descent into deeper sleep followed by a climb back to a REM sleep period
- each cycle lasts about 90 mins or so
- about the correct number of cycles e.g. 4 or 5
- REM sleep periods progressively longer
- More REM sleep in the latter third/half of the episode
- more deep sleep in the first half and more lighter sleep in the second half
- brief episodes of wakefulness.

7 In the hypnogram, the REM duration becomes longer over the later sleep cycles, whereas NREM becomes shorter. [1 mark]

The NREM stages 3–4 are generally evident in the first couple of cycles, whereas REM occurs throughout the night. [1 mark]

Other responses are possible, as noted below.

VCAA comment:

Acceptable differences included, but were not limited to:

REM duration becomes longer over the later sleep cycles, whereas NREM becomes shorter.

NREM stages 3–4 are generally evident in first couple of cycles, whereas REM occurs throughout the night.

Overall time spent in NREM is greater than REM.

Non-REM sleep has four stages and REM has one.

8 Person 1 in Q6 had more sleep (i.e. a longer sleep episode of about 7h.45m) but it was fragmented with two awakenings during the sleep episode. Person 1 also had more deep sleep.

Person 2 in Q7 had less sleep (i.e. about 6h.30m) but no awakenings.

Sleep quality is a subjective judgment that may be influenced by such factors as sleep quantity, amount of deep sleep and disruptions due to awakenings.

9

a Explanation should refer to the contradictory observations/measures i.e. active brain in an apparently paralysed body — internally, brain and body are active; externally body appears calm and inactive/relaxed.

b Explanation should refer to either deep or light depending on the criteria i.e. 'REM sleep is clearly more like wakefulness than NREM sleep when brain wave activity is considered. However, if muscle tone is considered, then REM sleep can be called deep sleep due to muscle tone being at its lowest point. Therefore, psychologists tend to view REM sleep as sharing properties of both light and deep sleep'

10

a Initially, early in first half during NREM stage 1, then during the second half when stage 2 accounts for the majority of sleep and less time is spent in stage 3 deep sleep, if at all.

b First half as more time is spent in stage 3 deep sleep.

c Second half because (a) REM periods lengthen and occur closer together during a night's sleep and (b) dreaming is more common during REM sleep.

6.5 LA 2: VCAA exam questions

1

Duration (minutes)	Number of complete sleep cycles
90-120	4 or 5

2 stage 1 non-rapid eye movement (NREM) sleep.

3 it would be difficult to wake her as she is likely to be in NREM stage 3 sleep.

4 EEG recordings increase in amplitude and decrease in frequency.

5 awake, NREM stage 1, NREM stage 2, NREM stage 3, NREM stage 2, NREM stage 1, REM

6.6 LA 1: Review

1

Life span stage	Distinguishing features
newborns and infants	• total sleep time of about 16 hours in first month or so (but fragmented due to feeding and nurturing), reducing to about 12 to 13 hours by age 2 • about 50% REM sleep, reducing to about 25% by age 2 • sleep onset initially through REM sleep, then normalising (i.e. through NREM stage 1) at around 2 or 3 months with maturation (i.e. when circadian rhythms start to exert their influence) • by around 12 months, majority of sleep as a single episode in the evening • daytime napping common
children	• total sleep time continues to decrease with age (but sleep less than infants and more than adolescents) • proportion of REM sleep continues to decrease (e.g. from 50% to 20% or so) • within NREM sleep, about half is stages 3 and 4 deep sleep but amount decreases markedly from about age 10 • daytime napping decreases with increasing age, especially at school age
adolescents	• total sleep time continues to decrease with age • tendency to have less than the required amount of total sleep time due to the sleep–wake cycle shift that delays sleep onset time by 1 to 2 hours • proportion of REM sleep continues to decrease until mid-adolescence, then sleep episode resembles that of young adults • within NREM sleep, amount of stages 3 and 4 deep sleep progressively declines and the time spent in stage 2 increases • by late adolescence, the amount of deep sleep has decreased by nearly 40% since early childhood
adults	• total sleep time averages about 8 hours of sleep a night • NREM 75–80% and REM 20–25% • gradual age-related decline in total sleep time and time spent in NREM and REM • gradual loss of stages 3 and 4 NREM sleep with a severe reduction evident by about age 60 e.g. SWS declines at a rate of about 2% per decade
elderly	• total sleep time continues to decrease through old age (to about 6 hours)

	• time spent in NREM and REM continue to decrease • within NREM, by age 60 may spend only about half as much time in NREM stages 3 and 4 as they did at age 20, sometimes not at all; eventually, stages 3 and 4 may disappear by age 90 • tendency for more fragmented sleep with older age, including more night-time awakenings among older adults. • tendency to become sleepier in the early evening and wake earlier in the morning compared to younger adults • sleep disorders more common

2 Trends include:

- as people age, total sleep time decreases i.e. less sleep time in the 24 hour circadian cycle
- as people age, number of awakenings increases i.e. sleep becomes more fragmented
- REM proportion markedly decreases from about 50% between 0–2 years, then stabilises at about 20–25% through to very old age
- age-related increase in NREM sleep proportion through infancy and early childhood
- decrease in time spent in NREM and REM that persists through to a very old age, especially from birth for REM and early childhood for NREM
- decrease in proportion of NREM deep sleep, especially a marked decrease or disappearance in late adulthood/very old age (e.g. by age 90) i.e. less deep sleep and more light sleep
- in later adulthood, at around 60 or so, sleep is mostly stage 2 light sleep.

3

a Age-related changes that may be attributed to circadian rhythm changes include:

- newborns and infants: sleep onset initially through REM sleep, normalising (i.e. through N1) at around 2 or 3 months with maturation (i.e. when circadian rhythms start to exert their influence); sleep cycles and episodes gradually become less fragmented and more regular and longer during first 12 months (i.e. age/maturational changes)
- adolescents: tendency to have less than the required amount of total sleep time due to sleep–wake cycle shift that delays sleep onset time by 1 to 2 hours
- elderly: tendency to become sleepier in the early evening and wake earlier in the morning compared to younger adults due to forward sleep–wake cycle shift (i.e. advanced sleep phase syndrome possibly due to age-related deterioration in the biological clock (SCN)

b Examples:

- sleep–wake cycle shift in adolescence (that delays sleep onset), e.g. staying up late to exert need for independence, meet school or work demands, late night social outings, social media use, video gaming
- sleep–wake cycle shift in older age (that advances sleep onset), e.g. boredom, loneliness, bad sleep hygiene, psychological or medical conditions, use of medications.

4

Sleep pattern	Young adult	Elderly person
sleep onset	relatively shorter/almost immediate sleep onset	relatively longer/delayed sleep onset (about 15 mins)
time in REM sleep	relatively more time spent in REM i.e. about 110 mins in an approx. 7.5 hour sleep episode = about 24% of the sleep episode	relatively less time spent in REM i.e. about 70 mins in an approx. 7 hour sleep episode = about 17% of the sleep episode
time in NREM sleep and its stages	relatively less time spent in NREM sleep, especially deep sleep stages in the first third of the sleep episode and mostly stage 2 in the last third	relatively more time spent in NREM sleep, especially stages 1 and 2 throughout the sleep episode, minimal stage 3
awakenings — fragmented vs consolidated sleep across an episode	few (2) awakenings = generally consolidated sleep	frequent (15) and irregular awakenings = fragmented sleep (and possible sleep disorder e.g. sleep maintenance insomnia)

6.6 LA 2: VCAA exam questions

1 The proportion of time spent in REM sleep significantly decreases from infancy and then remains steady as we continue ageing.

2 the adult, because adults have four to five sleep cycles per night

VCAA comment:

Option B is the correct answer. Option A is incorrect because high sleep disturbance is typical of adolescent sleep patterns, which do not appear in the hypnogram. Option C is incorrect because the total sleep time for a child is expected to be between 11 and 13 hours, but this hypnogram shows a sleep time of eight hours. Option D is incorrect because it would be expected that an elderly person would have very little/no time spent in NREM Stage 3.

3

Ben	Charles
Graph III	Graph I

4 decreases, while the proportion of time spent in NREM sleep increases.

5 adolescent, elderly person

7.1 LA: Multiple-choice questions

1 any sleep-related problem that disrupts one's normal sleep–wake cycle

2 persistent disturbance of an individual's typical sleep pattern that impairs their daily functioning in unwanted ways.

3 secondary

4 primary

5 feeling drowsy, fatigued, and lacking concentration most days at work due to insufficient sleep

7.2 LA 1: Review

1 sleep deprivation: inadequate/insufficient sleep quantity and/or quality

2

a

- sleep quantity: amount of sleep e.g. how much sleep
- sleep quality: how well we feel we have slept e.g. how rested or recovered we feel on waking and throughout the day

b

- sleep quantity: objective measure such as amount of sleep time/duration of the sleep episode
- sleep quality: subjective self-report measures such as how rested or recovered the individual feels on waking and throughout the day

c Example: number of interruptions, arousals/awakenings (partial or full) during a sleep episode

3

- partial sleep deprivation: having less sleep (either quantity or quality) than what is normally required (periodically or persistently over the short term or long term)
- total sleep deprivation: not having any sleep at all over a short term or long term

Generally, the effects of partial sleep deprivation tend to be minor and temporary when they occur occasionally or on a short-term basis. If sleep deprivation persists and daily sleep requirements have not been met over a period of time, a sleep debt may build.

4

a sleep debt: the accumulated amount of sleep loss from insufficient sleep

b Generally, the difference between the amount of sleep that is needed to function at an optimal level and the amount a person actually gets e.g.

sleep debt = optimal sleep quantity per night – total sleep quantity per night

c 3.75 hours

d Explanation should refer to sleeping in for sleep debt recovery temporarily shifting the sleep cycle e.g. sleep in to make up sleep loss → go to bed even later as sleepier later → temporarily shift the major sleep episode forward → by Monday morning, getting out of bed to go to school or work is harder than on any other day

5

a

- sleep inertia: a temporary period of reduced alertness and performance impairment that occurs immediately after awakening
- when more likely: after a poor night's sleep, especially if abruptly awoken during deep sleep or when sleep quantity/duration is insufficient

b Explanation should demonstrate understanding that sleep inertia is a sleep-to-wake transition effect so the individual is considered to be waking, partly awake or awake until it dissipates or decays and the person reaches full alertness.

6

a

- microsleep: a sleep episode that lasts for a few seconds/a brief period/episode of sleep lasting up to a few seconds, usually unintended and involuntary
- when more likely: when in a sleep deprived state and experiencing fatigue, excessive sleepiness or a low level of alertness (that may also occur during boring/monotonous tasks).

b Explanation should demonstrate understanding that a microsleep is a true sleep state (as per the defining characteristics of sleep) and a sleep episode, but not a mini-version of a major sleep episode as a major episode is an ultradian biological rhythm that comprises alternating NREM/REM periods etc.

7 Possible effects of partial sleep deprivation include:

affective e.g.

– amplified emotional responses i.e. emotional reactions may be too quick and more intense or exaggerated, often out of proportion to how we would ordinarily react when not sleep deprived

– mood change e.g. irritable, short tempered

– poorer emotion perception e.g. inaccurate emotional judgments

behavioural e.g.

– sleep inertia

– excessive sleepiness during normal waking time

– fatigue

– microsleeps

– sleep disturbances

– slower reaction time

– impaired behaviour control

– reduced motor coordination, particularly eye–hand coordination

cognitive e.g.

– lapses in attention, inability to maintain prolonged concentration

– impaired problem solving, decision making, errors in judgment

– irrational thinking

– impaired learning and memory.

8

a Examples:

– Sara: Experienced successive nights of sleep deprivation with inadequate sleep quantity and quality, so she is highly likely to experience excessive sleepiness, fatigue and various other affective, behavioural and cognitive impairments. Microsleeps are also possible. Sara's job requires attributes such as sustained attention, prolonged concentration, situational awareness, quick reaction time, problem solving, logical/rational thinking and appropriate emotional responses to remain calm and help maintain self-control and to not unduly alarm others in an emergency. Research findings show that Sara's partial sleep deprivation will impact on tasks requiring vigilance, sustained attention, quick reaction time and calmness in an emergency. Consequently, her sleep deprivation is highly likely to impair her ability and reduce her efficiency in performing all significant job requirements.

– Adam: Experienced successive nights of sleep deprivation with inadequate sleep quantity and quality, so he is highly likely to experience excessive sleepiness, fatigue and various other affective, behavioural and cognitive impairments. His job involves more automatic

processing and well learnt motor skills (e.g. electronic scanning of tickets), generally requiring less vigilance, less sustained attention/concentration and less awareness of the environment than does Sara's and reaction time is not significant. However, efficiency is important and research findings indicate this his task efficiency will be impaired. Customer satisfaction is also important so the tendency for amplified emotional responses may impair customer management. The more monotonous, repetitive nature of his job will make him vulnerable to microsleeping on the job.

b Both experienced substantial loss of both NREM and REM sleep due to two consecutive nights of partying. Therefore, REM rebound is likely but not necessarily increased NREM sleep or total amount of sleep (as we do not need to fully compensate for sleep loss/recover all accrued sleep debt when next asleep). Consequently, it is likely that there will be alternating periods of NREM and REM sleep as per normal, but a higher proportion of REM sleep and a lower proportion of NREM sleep.

9

a Generally, the effects of partial sleep deprivation tend to be minor and temporary when they occur occasionally or on a short-term basis. When sufficient accrued sleep debt is repaid, the person will quickly recover from the sleep loss effects. But with successive nights of inadequate sleep, the sleep debt can accumulate and sleep deprivation effects can multiply.

b Factors include:

– the amount of total sleep loss/accrued sleep debt

– the nature of the sleep loss

– when sleep loss occurs

– why sleep loss occurs

– frequency of sleep loss

– the period of time over which the sleep deprivation occurs

– personal characteristics of the individual involved.

Note: There are considerable variations between individuals due to the complex interaction of a diverse range of biopsychosocial factors.

7.2 LA 2: VCAA exam questions

1 an inability to sit still while listening to the music

2 more short-tempered

3

Affective changes	Cognitive changes
increased irritability	reduced retention of information

4 an increased amount of sleep on one or more nights.

5 microsleep.

7.3 LA 1: Review

1

a Explanation should refer to similar impaired performance levels on cognitive and concentration tasks (such as computer-delivered activities requiring eye–hand coordination, selective attention, speed and accuracy, decision making etc.) i.e. the researchers equated performance impairment caused by a full day's sleep deprivation with a BAC of 0.05%.

b Example: Dawson and Reid (1997):

- within subjects/repeated measures design using 40 participants and counterbalancing

- Condition 1 (Wakefulness): Ps kept awake for 28 hours, assessed on cognitive and concentration tasks every 30 mins.

- Condition 2 (Alcohol): Ps consume alcohol until BAC of 0.10 is reached, assessed on cognitive and concentration tasks every 30 minutes.

- Compared performance at different BAC and wakefulness levels, especially up to and at 0.05% BAC/24 hours wakefulness.

- Results in Figure 7.8 show that performance on the tasks decreased significantly in both conditions and that cognitive ability following 17 hours of sustained wakefulness was equivalent to that of a person with a BAC of 0.05 % (the legal driving limit in many countries), while performance following 24 hours of wakefulness was equivalent to that with a BAC of 0.10 %.

2 sustained wakefulness for varying number of hours

3 a

- counterbalancing: systematically changing the order of treatments or tasks for participants in a 'balanced' way to 'counter' the unwanted effects on performance of any one order (such as practice, fatigue, boredom etc.)
- in the Dawson and Reid experiment:

- half the Ps exposed to the wakefulness condition then the alcohol condition (in separate sessions)

- half the Ps exposed to the alcohol condition then the wakefulness condition (in separate sessions)

b

- Advantage and limitation should refer to and make explicit its relevance to the particular experiment (and not simply be a generic statement).
- Advantages include:

− strict control of relevant participant variables such as mood and motivation that are known to influence cognitive performance

− a relatively smaller number of participants are required when compared with other experimental designs as the same participants are in all conditions; especially relevant as the participation involved significant imposition e.g. different sessions on consecutive days, including a sleepover and alcohol consumption over a prolonged period

- Limitations include:

− artificiality of the experimental conditions e.g. relatively simple tasks in an unrealistic and safe/non-threatening environment

− may not have adequately controlled all participant variables that could influence the results e.g. prior sleep or alcohol activity; alcohol condition may have exacerbated the effects of the wakefulness condition and vice versa, but not necessarily in counterbalancing ways

− isolating the effect of mood (which is a known co-variable in studies on effects of sleep deprivation and alcohol consumption).

7.3 LA 2: VCAA exam questions

1 the higher the BAC, the greater the reaction time.

2

Independent variable	Dependent variable
age	reaction time

3 estimated the study going for a shorter or longer time than it did.

4 quantitative and qualitative

5 the 0.10% BAC condition, cognition affected

7.3 LA 3: Analysis and evaluation of research on sleep deprivation, alcohol consumption and performance

1 Examples:

- Sleep deprivation and alcohol consumption will impair cognitive performance.

- Moderate sleep deprivation will decrease cognitive performance to a level similar to that of moderate alcohol consumption.

- The effects of 24 hours sleep deprivation on performance of cognitive performance will be similar or equivalent to BAC 0.05% alcohol consumption.

- 24 hours of sleep deprivation will produce similar levels of cognitive impairments as does BAC 0.10%.

- Sustained wakefulness for 24 hours will decrease cognitive performance to a level equivalent to that of BAC 0.05% or higher.

2 IV: number of hours of wakefulness, BAC level (%)

DV: number of errors on tracking task

3 repeated measures/within participants/within groups

4

- Condition 1 (Wakefulness): Ps kept awake for 28 hours, assessed on cognitive and concentration tasks every 30 minutes
- Condition 2 (Alcohol): Ps consume alcohol until BAC of 0.10 is reached, assessed on cognitive and concentration tasks every 30 minutes
- No control group. Instead, compared performance at different BAC and wakefulness levels, especially up to and at 0.05% BAC/24 hours wakefulness.

5 Examples:

- the effects of moderate sleep deprivation (i.e. 24 hours) on performance are similar to moderate alcohol intoxication (i.e. 0.10%)

- performance impairment effects of moderate sleep deprivation are equivalent to or greater than the level of alcohol that is deemed legally unacceptable for licensed private vehicle drivers throughout Australia and for working and/or operating dangerous machinery.

Note: In Australia, the legal maximum BAC is 0.05% for licenced drivers in private vehicles; and 0.00% for learner drivers, provisional or probationary drivers (regardless of age), truck and bus drivers, driving instructors and drivers convicted of 'driving under the influence' (DUI) in most Australian states or territories, including Victoria.

6 Limitations include:

- artificiality of the experimental conditions e.g. relatively simple tasks in an unrealistic and safe/non-threatening environment

- no information about participant sampling or allocation techniques and therefore potential sources of bias e.g. may not have adequately controlled all participant variables that could influence the results e.g. prior sleep or alcohol activity; alcohol condition may have exacerbated the effects of the wakefulness condition and vice versa, but not necessarily in counterbalancing ways

- possible confounding effect of mood (which is a known co-variable in studies on effects of sleep deprivation and alcohol consumption) e.g. Did mood or the IVs account for DV change showing cognitive impairments?

7 Example: The experiment involved relatively simple tasks in an unrealistic and safe, non-threatening laboratory environment (and therefore has relatively low ecological validity), but the findings may be tentatively applied to real-life situations such as driving, working and/or operating dangerous machinery when fatigued.

7.4 LA 1: Review

1 Explanation should refer to a shift/change/movement of the circadian sleep–wake cycle, forward or backward in time (thereby affecting an individual's normal/regular sleep onset time and biologically required waking time).

2 Explanation should refer to the shift involving a circadian rhythm sleep–wake phase disruption that results in a mismatch between an individual's sleep–wake pattern and the pattern that is desired or required e.g. a mismatch between an individual's sleep–wake cycle and the sleep–wake schedule required by their school, work and/or social schedule. The individual cannot sleep when sleep is desired, needed, or expected. As a result of sleep episodes occurring at inappropriate times, the corresponding wake periods may also occur at undesired times. In turn, this may cause personal distress and/or impairments in everyday functioning.

3

a phase delay (shift is to a later schedule/ later position of the 24- hour sleep-wake cycle)

b four-hour phase delay

4

Circadian rhythm sleep disorder	Key symptoms	Effects
Advanced Sleep Phase Disorder	• earlier sleep onset than desired • earlier awakening than desired	• mismatch/misalignment between sleep-wake cycle and environmental day-night cycle • compelling evening sleepiness • excessive daytime sleepiness • early morning insomnia after waking • other sleep deprivation effects
Delayed Sleep Phase Syndrome	• later sleep onset than desired/sleep-onset insomnia/difficulty falling asleep when desired • difficulty awakening when desired	• mismatch/misalignment between sleep-wake cycle and environmental day-night cycle • excessive daytime sleepiness • other sleep deprivation effects

7.4 LA 2: VCAA exam questions

1 sleep–wake shift, melatonin secretion peaking later in the day

2 *VCAA Examination Report* note:

The timing of melatonin secretion that induces sleep onset peaks later in the 24-hour cycle and makes the adolescent sleepier 1 to 2 hours later. Option A is incorrect as with increasing age, the amount of REM sleep also decreases. Option B is incorrect as increased sunlight reduces the secretion of melatonin, reducing feelings of drowsiness. Option D is incorrect as this is a social cause of shifts.

3 delayed release of the hormone melatonin.

4

a Adolescents under the age of 18 are likely to experience a delayed sleep phase disorder (sleep–wake cycle shift), (1 mark)

resulting in a delayed onset of sleep by about 1–2 hours (due to delayed melatonin release) and delayed wake-up time in the morning. (1 mark)

b If Steph's sample included the adolescents under the age of 18, it would be expected that, due to the delayed sleep phase disorder common in adolescents, the mean percentage of accurately identified letters in both conditions on the visual perception task would decrease. (1 mark)

Steph's visual perception test is run at 9 am, during which adolescents under 18 are sleepy and may be less perceptually alert. (1 mark)

5 During adolescence individuals experience a sleep-wake shift. This sleep-wake shift causes a delayed sleep onset of up to two hours compared with adult sleeping patterns and a delayed wake time compared with adult sleeping patterns.

Award 1 mark for a description of delayed onset of sleep in adolescents.

Award 1 mark for a comparison with adult sleep onset.

Award 1 mark for a description of delayed waking in adolescents or another difference between sleeping patterns of adolescents and adults (for example, increased sleep debt in adolescents or differences in the proportion of REM/NREM sleep).

Award 1 mark for a comparison of this difference with adult sleeping patterns.

VCAA Assessment Report note:

This question assessed students' knowledge of the delayed onset of sleep in adolescence (sleep-onset shift), which results in adolescents going to sleep later than adults and consequently tending to wake later. There is only a single shift of the sleep cycle that has two components: going to sleep later and waking later.

No marks were awarded if the crucial sleep-onset shift was not identified as part of the response.

7.4 LA 3: Review

1.Explanation should:

- demonstrate understanding of the concept of shift work

- refer to shift work times outside of normal/habitual sleep hours at night that are therefore not in-sync with a sleep–wake cycle that is biologically programmed for the individual to sleep best at night and to be awake and most alert during the day and early evening e.g. working at night is working against one's normal body clock — the person is required to work when they should be sleeping and to sleep when they should be working

- demonstrate understanding that roster changes may keep the sleep-wake cycle unstable/require re-adjustment of the sleep-wake cycle to a new schedule (and therefore environmental cues)

2 Symptoms of shift work disorder include:

- sleep-onset insomnia

- excessive sleepiness when needing to be awake and alert.

- excessive tiredness, fatigue

3 Examples include:

- sleep timing: e.g. shift work is scheduled outside normal/habitual sleep hours, thereby resulting in a change to sleep onset time

- sleep quantity and quality: a shift work roster that changes too quickly from one type of shift to another, especially 'backward in time' from a later shift to an earlier shift, or which mixes shifts during a work week, will impact on sleep quantity and quality (as well as timing) due to the lack of time for the biological sleep–wake cycle to adjust and align with the day–night cycle of the individual's environment and other external sleep–wake cues

Note that napping by the shift worker may impact on sleep timing (onset) and that permanent night shift workers tend to experience problems with sleep quantity and quality (more than people who do not do shift work).

4

- Example: During a weekend 'off work', an individual whose shift work is scheduled outside of normal/habitual sleep hours may revert to a typical night-time–sleep/daytime–awake schedule for family, social, lifestyle reasons etc. This may cause their sleep–wake cycle to shift again, thus requiring another adjustment when the night shift work week begins. Without a constant sleep–wake schedule during the entire week, the body's internal circadian rhythm may always remain out of sync with the external environment.
- Relatively few people seem to fully adapt to the night shift even after many years of night shift work, in part because of resumption of full daytime activities and night-time sleep during weekends and vacations.

5

a Features may refer to:

- a fixed schedule that requires employees to work the same shift on a regular, ongoing basis, ideally day shift (but not starting before 7 am or so due to a trough/low point in circadian alertness); if not day shift, then evening shift; if not day shift or evening shift, then night shift (although studies show that permanent night shift may be more detrimental than a well-designed rotating schedule)

- if a rotating schedule is used, then one that requires employees to change shifts after longer periods on each shift e.g. a schedule with three-week shifts is generally preferable to one-week or three-day rotations

- if a rotating schedule is used, then one that requires employees to work successively later shifts rather than successively earlier shifts (but without quick shift changes) e.g. a schedule that moves forward in time (clockwise) so the new shift begins later in the day, rather than moving backwards in time, such as from an 11 pm evening shift to a 7 am day shift.

b Generally, allowing for the demands of the work, individual differences and other variables affecting adaptivity, principles are:

- fixed shift schedule: constancy minimises adaptation unless a very early start or night shift

- if a rotating shift schedule: quick shift changes should be avoided (e.g. must allow adequate rest time between shifts, ideally, not < 12 hours), shifts should rotate forward (i.e. day to evening, evening to night) and schedules that involve a large number of consecutive shifts followed by several days off have been found to be a problem.

Therefore:

- a fixed schedule that requires employees to work the same shift on a regular, ongoing basis is best, ideally day shift; if not day shift, then evening shift; if not day shift or evening shift, then night shift: day shift — no mismatch between sleep–wake cycle and environmental cues, especially day–night cycle; evening shift — minimal adjustment, more than day shift but less than night shift; night shift — total mismatch/out-of-sync sleep–wake cycle and environmental cues and therefore longer-term disruption, but an ongoing fixed schedule better supports adaptation than does a rotating schedule and does not require adjustments/re-alignments as occurs with new shift times in a rotating schedule

- if a rotating schedule is used, then one that requires employees to change shifts after longer periods on each shift e.g. a schedule with three-week shifts is generally preferable to one-week or three-day rotations: the longer period of time on the same shift, the longer the adaptation period and the fewer the number of disruptions and consequential adjustments/re-alignments

- if a rotating schedule is used, then one that requires employees to work successively later shifts rather than successively earlier shifts (but without quick shift changes) e.g. a schedule that moves forward in time so the new shift begins later in the day, rather than moving backwards in time such as from an 11 pm evening shift to a 7 am day shift: workers tend to adapt more quickly when assigned to successively later shifts rather than to successively earlier shifts. It therefore tends to be best when the move from one shift to the next is a forward move so the new shift begins later in the day. Because our natural sleep–wake cycle is closer to 25 hours, by moving forwards through the shift rotation, the cycle is disrupted less than if a worker moved backwards through a shift rotation. Thus, workers will tend to adapt better and experience less disruption to their physiological and psychological functioning with a forward move rather than a backward move.

7.4 LA 4: VCAA exam questions

1 There is little change in a person's ability to complete complex tasks (option B) – simple tasks are more difficult to complete after sleep deprivation.

2 make more mistakes than usual in checking the fruit for marked skins.

3 quantitative only.

4 VCAA comment:

Students were required to state one physiological effect of long-term sleep deprivation and to indicate why this may increase the likelihood of Ernie being involved in an accident at work injuring himself or others. For full marks students needed to correctly state one physiological effect of long-term sleep deprivation and then clearly link this to the potential for Ernie to have an accident that relates specifically to his work context. Generic responses were not acceptable.

Marking protocol:

Award 1 mark for any one of the following effects and 1 mark for a consistent reason for why it may cause an accident (which was acceptable):

- decreased alertness – cannot respond quickly or move out of the way of danger in the factory setting
- cognitive impairment, poor concentration, memory impairment resulting in accident while operating machinery
- drowsiness or fatigue, microsleeps or droopy eyelids, resulting in errors in operating machinery
- slower reflexes – cannot operate machinery effectively
- poor hand-eye coordination/hand tremors – cannot operate machinery effectively
- headaches – may cause difficulty concentrating and errors in operating machinery
- blurred vision/difficulty focusing eyes – may have difficulty seeing and impair operation of machinery
- cardiovascular changes/increased blood pressure – increased likelihood of cardiac arrest while operating machinery

- increased activation of sympathetic nervous system – if he is highly stressed, this may impair his cognition/judgment when operating machinery
- hallucination – may cause interference with operating machinery.

5

- Driving a car is a controlled process requiring selective attention. Therefore, Bernie's ability to drive would be less impaired. (1 mark)
- A crossword is a simple task enabling divided attention. (1 mark)
- Therefore, Bernie's ability to complete a crossword would be more affected by his sleep deprivation. (1 mark)

Award 1 mark for identifying driving as being less affected.

Award 1 mark for each of two key points in a valid justification.

VCAA comment:

Students gained credit for identifying either driving or completing a crossword as a simple or complex task. The marks were gained for showing understanding that simple tasks are most affected and the ability to perform complex tasks would be relatively unchanged.

7.4 LA 5: Review

1

a bright light therapy: a technique for treating circadian rhythm sleep disorders that uses timed exposure of the eyes to certain intensities of light with the aim of shifting an individual's sleep–wake cycle to a desired schedule

b The light must be used at (1) the right intensity (2) at the required time (3) for the right amount of time.

c Explanation should demonstrate understanding that circadian phases are primarily influenced by light intensity and melatonin (light detection and melatonin regulation by the SCN biological clock), so light exposure (under the conditions referred to in 1(b) above) can be used to reset the biological clock (by inhibiting melatonin secretion at key times) and thereby gradually shift someone's circadian sleep–wake cycle to a more appropriate or conventional schedule.

d

Circadian rhythm sleep disorder	Example of people likely to experience and when	Features of desynchronised phase shift	Timing of light exposure to re-shift sleep–wake cycle

Delayed Sleep Phase Syndrome	sleep–wake cycle shift in adolescence	later sleep onset and waking times	early morning light exposure (e.g. between 6–8 am) to help advance the circadian rhythm to an earlier time (i.e. shift the phase forward) so that the person will be sleepier earlier and wake up earlier
Advanced Sleep Phase Disorder	sleep–wake cycle shift in older adults	earlier sleep onset and waking times	early evening light exposure to help delay the circadian rhythm to a later time (i.e. shift the phase backward) so that the person will be sleepier later and wake up later
Shift work disorder	all people with a regular work schedule, such as night shift, that takes place during the time when the body wants (is biologically predisposed) to sleep	for night shift, the person must work when they should sleep and try to sleep when they should be awake	for night shift workers, late evening light exposure towards the beginning of the shift to inhibit melatonin secretion and therefore sleepiness

7.4 LA 6: VCAA exam questions

1 early in the morning to advance her circadian rhythm forward.

2 Participants will show lower levels of sleepiness after wearing the bright light therapy glasses compared to before they started wearing the glasses.

3 the adolescents and their parent/guardian.

4 No, because despite an initial improvement in levels of sleepiness, participants' levels of sleepiness began to return to baseline levels.

5 Include a larger sample of adolescent boys from both suburban and rural schools.

Activity: 7.5 LA: Review

1 • entrainment: the process of adjusting or resetting a biological rhythm (e.g. phase or duration) to align/synchronise (or resynchronise) to external/environmental time cues (i.e. zeitgebers) or a cycle (e.g. natural dark–light cycle)

• entrainment in relation to a circadian sleep–wake cycle: adjusting or resetting the timing of the circadian sleep–wake cycle to match external time cues/stimuli or an environmental cycle e.g. adjusting to match the local time after rapid travel across multiple time zones in an easterly direction to minimise or prevent jet lag arising from desynchronisation between one's biological clock (which is tied to the day-night cycle of the departure time) and the day-night cycle of the destination.

2

Sleep hygiene education: providing information about practices that tend to improve and maintain good sleep and full daytime alertness

Practices of relevance to the sleep–wake cycle shift in adolescence may refer to:

- establishing a regular relaxing sleep schedule and bedtime routine
- associating the bed and bedroom with sleep
- avoiding activities that are stimulating in the hour before bed (including those that inhibit melatonin)
- getting up from bed when unable to sleep
- avoidance of long napping during the normal waking period, especially close to the major sleep episode
- avoiding stimulants too close to bedtime
- exercise
- food and eating.

3

a zeitgeber: an environmental time cue that helps keep internal circadian rhythms synchronised (entrained) with the 24 hour day/ an environmental time cue that can adjust/reset a circadian rhythm/ be used by the SCN/biological clock to maintain circadian rhythms in synchrony with the 24 hour day

b

i Examples may include: church bell, Muslim call to prayer, rooster crowing in the morning, music preceding a radio/TV news bulletin, familiar voice from a favourite TV program

ii Examples may include: family dinner, regular social activities, social media routines

iii Example may include: prescribed times for use

c Explanation should demonstrate understanding that zeitgebers are used by the SCN/biological clock to adjust circadian rhythms so that they are synchronised/aligned with the 24-hour day/day–night cycle of our external environment.

4

Zeitgeber	**Source in the environment**	**Example of how it may be used to adjust s/w patterns to a conventional schedule**	**Why this would have the desired effect**
daylight	sunlight	Seek exposure in daytime to promote daytime alertness and gradually reduce exposure from late afternoon/early evening prior to bedtime	Timing of light exposure will promote or suppress melatonin secretion and therefore alertness/drowsiness; sleep is more likely to occur when melatonin level rises
blue light	sunlight, electronic devices	Seek exposure in daytime to promote daytime alertness and gradually reduce exposure from late afternoon/early evening prior to bedtime	Timing of light exposure will promote or suppress melatonin secretion and therefore alertness/drowsiness; sleep is more likely to occur when melatonin level rises
temperature	atmosphere	Adjust air temperature to align with natural/circadian drop in core body temperature in the evening	Sleep is more likely to occur when core body temperature decreases in the evening and is aligned with other environmental and circadian changes (e.g. darkness, increased melatonin level)
eating and drinking patterns	meals, snacks and drinks from various sources	Maintain routine meal and drink times in sync- with desired s/w cycle and avoid erratic schedules and certain foods and drinks at certain times	Sleep is more likely to occur when eating and drinking patterns, sleep patterns, and the environmental day/night pattern and other zeitgebers are aligned.

5

a Features include:

- light type e.g. daylight/sunlight; blue light e.g. natural vs artificial from electronic devices
- intensity
- timing of exposure e.g. when exposed
- duration of exposure e.g. amount of time

b

Circadian rhythm phase disorder	Example	Features of desynchronised phase shift	Timing of light exposure to re-set sleep–wake cycle
Delayed Sleep Phase Syndrome	sleep–wake cycle shift in adolescence	later sleep onset and waking times	early morning light exposure (e.g. between 6-8am) to help advance the circadian rhythm to an earlier time (i.e. shift the phase forward) so that the person will be sleepier earlier and wake up earlier
Advanced Sleep Phase Disorder	sleep–wake cycle shift in older adults	earlier sleep onset and waking times	earlier evening light exposure to help delay the circadian rhythm to a later time (i.e. shift person will be sleepier later and wake up later
Shift work disorder	a work schedule, such as night shift, takes place during the time when the body wants to sleep	for night shift, the person must work when they should sleep and try to sleep when they should be awake	for night shift workers, late evening light exposure towards the beginning of the shift to inhibit melatonin secretion and therefore sleepiness
Time zone change syndrome (jet lag)	jet lag due to rapid travel across multiple time zones	sleeep-wake cycle remains aligned to the environmental time cues of the home time because there has been insufficient time to adjust to new time cues	when reavelling east, the sleep–wake cycle should be advanced, so light exposure in the morning at the destination; when travelling west, the sleep–wake cycle should be delayed,so light exposure in the evening at the destination

8.1 LA: Multiple-choice questions

1 a state of mental health.

2 A basketballer who is very disappointed when they lose their place on the team trains harder to improve their fitness and skills to make the team the next season.

3 using one's cognitive, emotional and social abilities effectively.

4 worked towards goals in the face of stressors and disappointments in his life.

8.2 LA 1: Multiple-choice questions

1 how well an individual independently operates in their environment.

2 adaptive

3 weak social wellbeing

4 successfully cope with and manage change and uncertainty.

5 restore positive functioning

6 access to quality social support

7 mental wellness

8 positive.

8.2 LA 2: Multiple-choice questions

1 a way of considering mental wellbeing.

2 holistic

3 cultural influences

4 multidimensional.

5 the strength of connections to all domains.

6 one of a number of parts of wellbeing.

7 7

8 overlapping.

9 Connection to body and behaviours

10 Connection to self

11 how a person experiences and expresses the various SEWB domains throughout their life.

12 determinants.

8.3 LA: VCAA exam questions

1 allows for early signs of mental health problems to be identified

2 Sasha is coping with the workload at university and is happy to have met someone she is interested in, but she is stressed about her decision to transfer to another course next year.

3 Successfully accomplishes tasks, shows respect for other people, manages stress reactions

4 worked towards goals in the face of stressors and disappointments in his life.

5 Students were required to make a correct statement of a potential position on the mental health continuum that is consistent with Shari's symptoms and then provide a valid and congruent justification based on the symptoms described in the scenario. Students could respond with any of: mental health problem, mental health disorder or mental illness.

Students suggesting that Shari might be placed as experiencing a mental health problem could have justified this on the grounds that the severity of her symptoms did not seem to significantly impact her work and/or be of significant duration.

Students suggesting that Shari might be experiencing either a mental health disorder or mental illness may have justified their response by noting that her symptoms seem to be worsening and that she is showing signs of distress, impacting on her social interactions (signs of paranoia in not trusting her colleagues), that she is distressed enough by her symptoms to have consulted a psychologist and that this has occurred over a significant period of time (4 weeks). Only one mark could be awarded if placement on the continuum did not match the justification.

8.4 LA 1: VCAA exam questions

1 The effect depends on the number and the nature of the external factors, growth can occur even though setbacks occur.

2 his behaviour is uncharacteristic and has had a negative impact on his wellbeing.

3 Emotional state, interactions with her boss

4 depending on internal and external factors.

5 Internal factors could be either psychological or biological factors, as long as they could plausibly be linked to the issues described in the scenario (i.e. 'relevant'). Acceptable internal factors included, but were not limited to: stress, poor self-efficacy, poor sleep, genetic predisposition, hormonal imbalance, substance use, responses to medication.

The following are examples of possible responses.

- Shari may be experiencing increased levels of stress since her company underwent restructure. Sustained stress can increase susceptibility to developing a mental health disorder by affecting the balance of neurotransmitters in the brain.
- Shari may have a genetic predisposition to develop a mental health disorder. Her underlying genetic predisposition could be exacerbated by the increased stressors at work since the restructure, increasing her susceptibility to develop a mental health disorder.

8.5 LA 1: Review

1 Characteristics may include distinguishing features described in Table 8.1.

Stress	Anxiety	Phobia
Considered 'normal' to experience stress in certain situations and everyone experiences it at some time	Considered 'normal' to experience anxiety in certain situations and everyone experiences it at some time	Not considered 'normal'
Potential contributory factor to mental health disorder	Potential contributory factor to mental health disorder	A diagnosable mental disorder
Can develop into a mental health disorder if not managed	Can develop into a mental health disorder if not managed	A diagnosable mental disorder
Can impact on a person's functioning if not managed	Can impact on a person's functioning if not managed	Significantly impacts on a person's functioning
Mild amounts can be adaptive and helpful	Mild amounts can be adaptive and helpful	Not considered adaptive or helpful
Can be experienced in response to a wide range of stimuli	Can be experienced in response to a wide range of stimuli	Typically only experienced in response to specific stimuli
Accompanied by physiological changes; may involve fight–flight–freeze	Accompanied by physiological changes; may involve fight–flight–freeze	Accompanied by physiological changes; may involve fight–flight–freeze
May be associated with avoidance of certain objects or situations	May be associated with avoidance of certain objects or situations	Characterised by avoidance of certain objects or situations
Source/cause of a stress response is usually present and known (e.g. a specific stressor)	Source/cause of an anxiety response is not always present or apparent	Source/cause of a phobic response is usually known (e.g. feared object or situation) but not always present (e.g. avoided but may be endured)

Influenced by biological, psychological and social factors	Influenced by biological, psychological and social factors	Influenced by biological, psychological and social factors

2 Discuss example with another student or the teacher to check conceptual understanding. Note relevant examples in the chapter.

3 The explanation should demonstrate an understanding that stress, anxiety and phobias vary in amount or degree within and between individuals at any point in time, so a continuum is considered a useful and appropriate representation as it does not require fixed, permanent, arbitrary dividing lines between categories or even end points.

4 The explanation should demonstrate an understanding that, despite sharing characteristics, stress, anxiety and phobia are different constructs/concepts that each vary in amount or degree within and between individuals at any point in time. Consequently, all three could not be mapped on a single 'mental health/wellbeing' continuum such as Figure 8.9a, e.g. each is more appropriately mapped on its own continuum of this type.

8.5 LA 2: VCAA exam questions

1 can be helpful in mild amounts.

2 stress.

3 stress occurs when a person perceives they cannot cope with a current stressor, whereas anxiety occurs when a person perceives they cannot cope with a stressor that may occur in the future.

4 Marks were awarded as follows:

- one mark for stating Ambreen is suffering from a phobia.
- two marks for accurately defining a phobia, relating this to an example relevant to Ambreen and contrasting this with anxiety.

The justification needed to include reference to an example of impaired functioning from the scenario. A maximum of two marks could be awarded if the response only gave accurate definitions of phobia.

Anxiety should not have been defined in terms of a disorder; responses naming anxiety as the likely experience of Ambreen received no marks.

The following is a sample response.

Ambreen has a phobia, rather than anxiety. Phobias are characterised by a persistent, intense and irrational fear of a specific event or situation that adversely impacts functioning. In Ambreen's case, she is specifically and intensely afraid of the dark to the extent that it

prevents her from socialising at night. In contrast, anxiety is a normal response to a perceived future threat.

9.1 LA 1: Review

1 Common characteristics may include:

- marked/excessive/high level of fear or anxiety about a specific object, activity or situation/ disproportionate fear/anxiety response in relation to real risk/actual threat
- persistent fear or anxiety e.g., lasting for 6 months or more
- phobic stimulus almost always provokes immediate fear or anxiety.
- phobic stimulus is actively avoided or endured with intense fear or anxiety
- irrational/unreasonable fear or anxiety
- disproportionate fear response
- fear or anxiety causing distress or impairment
- possible panic attacks
- both physiological and psychological components.

2 Explanation should demonstrate understanding that, unlike ordinary fear that can be rational, not necessarily excessive, variable in relation to different stimuli, and serve to protect us from actual harm, specific phobia involves fear that is often irrational/unreasonable and excessive/disproportional to the real risk involved and persistent in relation to a specific stimulus. Furthermore, ordinary fear may be considered part of good mental health (e.g. adaptive), whereas a diagnosable specific phobia is considered a mental health disorder.

3

a unreasonable, illogical, doesn't 'make sense'

b Any act or series of actions that enables an individual to avoid/keep away from any unpleasant/fearful/anxiety provoking stimuli

c panic attack: a period of sudden onset of intense fear or terror, often associated with feelings of impending doom and physiological responses such as shortness of breath, pounding heart, sweating, trembling, dizziness and nausea

d anticipatory anxiety: the worry or apprehension about the possibility being exposed to a phobic stimulus in the near future

4 It is likely that B.L. has a phobia of illness. Consistent with key characteristics/symptoms of specific phobia, he has marked excessive and persistent high level of fear (e.g. 'haunted by a fear of illness for as long as he can remember'), his fear is irrational/unreasonable; disproportionate in relation to the real risk (e.g. 'fear that he will have a heart attack or contract cancer or some seriously disabling illness at some time, especially when out alone'; his doctor has found him to be 'not actually suffering from any diagnosable physical illness') and he suffers symptoms of a panic attack (e.g. 'complaints of erratic heart activity, sudden attacks of breathlessness'). He also practices avoidance behaviour and had become

dysfunctional to the extent that fear of a heart attack often 'confines him to his home and also means that he cannot hold a job'.

Note that this question is intended to promote evaluation of key characteristics/symptoms of specific phobia, not diagnostic skills.

Note also that the terms nosophobia (i.e. illness phobia) and hypochondriasis are no longer commonly used in the diagnosis of people suffering from an excessive fear of illness, symptoms etc. Instead, someone with 'excessive fear of illness' symptoms may be diagnosed with a disorder called symptom somatic disorder or illness anxiety disorder

5 School phobia is a condition which involves more than a simple fear of school. J.M. does not seem to be avoiding school for fear/anxiety directly involving school in itself, rather separation from his mother and home. It is therefore more likely that he is currently experiencing separation anxiety rather than a school phobia. Note that the J.M. has been attending school for only 3 weeks.

Note that this question is intended to promote evaluation of key characteristics/symptoms of specific phobia, not diagnostic skills.

9.1 LA 2: VCAA exam questions

1 fight or flight or freeze response.

2 sympathetic nervous system

3 factors from several domains may combine to influence mental health.

4 genetics

5 VCAA comment:

This question was not well answered. For 1 mark, students had to state that a phobia is both an intense and irrational fear of a specific event or object. Many students failed to gain a mark by providing only one of the two key features of a phobia.

9.2 LA 1: Review

1

Biological factor	What is it?	How it may contribute
gamma-amino butyric acid (GABA) dysfunction	failure to produce, release or receive sufficient amount of GABA to regulate neuronal transmission in the brain, particularly to counterbalance the excitatory activity of glutamate	Cannot adequately counterbalance the excitatory effect of glutamate associated with anxiety e.g. GABA is believed to control the fear or anxiety experienced when neurons are overexcited

long-term potentiation	the long-lasting strengthening of synaptic connections through activity at the synapse, resulting in enhanced or more effective synaptic transmission	The more that the connection is activated through each encounter with a phobic stimulus, the more the connection is strengthened, increasing the efficiency in transferring fear information along the relevant neural pathway and decreasing the likelihood that the fear response can be forgotten

9.2 LA 2: VCAA exam questions

1

Released into bloodstream	Function
adrenaline	Activate various organs in the body for 'fight-flight-freeze' response.

2 The neural signals representing the connection between the seaweed and her fear of it have been strengthened.

3 a deficiency of this inhibitory neurotransmitter.

4 Only the researcher knew who would receive the placebo.

Option A, 'only the researcher knew who would receive the placebo', was the best response. The research assistant, whose role is to interact with the participants and administer the treatments, is blind to the allocation of the GABA agonist and placebo to participants. This aspect of a double-blind procedure is used to avoid the influence of any bias or unconscious demand characteristics by the person interacting with the participants on how participants respond to the substance or how the research assistant handles the data. The lead researcher overseeing the study knows which participants have been randomly allocated to each group, and provides the research assistant with the treatment and control substances in containers labelled neutrally as conditions A and B (for example) to give to two groups who are also referred to neutrally as A and B. To make the procedure double-blind, the participants also do not know if they are in the experimental or control group, but most of the response options focused only on the administrative side of the double-blind procedure.

9.3 LA 1: VCAA exam questions

1 loud noise, red balloon.

2 neutral stimulus, unconditioned response.

3 the red balloon, the startle reflex.

4 a VCAA comment:

The most common error was to identify this as 'one-trial learning'. In the Psychology VCE Study Design, the relevant dot point on page 27 states 'one-trial learning with reference to taste aversion'.

b

i Elise's favourite song

ii Elise crying and shaking/being upset **at the sound of the song**

VCAA comment:

The additional information highlighted in bold was essential for an entirely correct answer.

iii Near-accident with the bus/bus just missing Elise

iv Elise crying and shaking/being upset **because of the near-miss**

VCAA comment:

The additional information highlighted in bold was essential for an entirely correct answer.

9.3 LA 2: Review

1

Psychological factor	What is it?	How it may contribute
Behavioural models • classical conditioning	A type of learning that occurs through involuntary association of two (or more) different stimuli	A specific phobia may be precipitated (i.e. acquired, onset hastened) through the three-phase learning process e.g. a stimulus with no particular significance (i.e. a neutral or UCS) becomes, by association, a sign of impending threat, danger or some other unpleasant event (i.e. a CS); the innate, involuntary fear response (UCR) eventually becomes a conditioned fear response (CR)
• operant conditioning	A type of learning for which the consequences (e.g. reward or punishment) of a behaviour (e.g. response to a phobic stimulus) determine the likelihood that it will be performed again in the future	Avoidance behaviour for a phobic stimulus may be perpetuated/ maintained through negative reinforcement
Cognitive biases	The distorting influences of present knowledge, beliefs and feelings on the	Tendency to recall the fearful or negative experiences relating to the phobic stimulus while minimising or

• memory bias	recollection of previous experiences, often resulting in selective memory	even forgetting more positive or contradictory information that might challenge the fear
• catastrophic thinking	A thinking style which involves overestimating, exaggerating or magnifying an object or situation and imagining the worst possible outcome	Tendency to believe/expect the worst possible outcome when exposed to a phobic stimulus, thereby promoting avoidance behaviour (and perpetuating the phobia through negative reinforcement)

9.3 LA 3: VCAA exam questions

1 Each time Eleanor thinks of the events, they seem more threatening than they actually were.

2 catastrophic thinking.

3 a phobia of performing in public that involved precipitation by classical conditioning and perpetuation by operant conditioning.

4 classical conditioning

5

a Marks were awarded for:

- correctly identifying that Maxine's parents' behaviour positively reinforced Maxine's avoidance of the red box
- correct identification of the reinforcer as playing with/comforting Maxine
- demonstrating knowledge of the effect of the reinforcement as making it more likely that Maxine would respond with a phobic response to similar red boxes in future (that is, perpetuating the phobia).

This question specifically asked how the parents' behaviour made it more likely that Maxine's avoidance response would be perpetuated. Negative reinforcement was not correct as the punishing stimulus (the clown box) was not removed, rather Maxine's voluntary avoidance behaviour was rewarded by providing (adding) comfort.

The following is a sample response.

Maxine's parents positively reinforced Maxine's running away from (avoidance of) the red box by playing with her and comforting her. This reward increases the likelihood that Maxine will persist in avoiding similar red boxes into the future.

b Marks were awarded for:

- demonstrating knowledge that people with a specific phobia have a tendency to focus on recalling the threat-related/negative content of their experiences with their phobic stimulus more than their positive or neutral memories associated with it

- stating that this bias will cause Maxine to have more negative memories of boxes, similar to the one that caused the fear response, than positive memories OR that these memories will be strengthened/be more readily recalled/retrieved/activated.

The following is a sample response.

People with a specific phobia have a bias to recall the negative content of experiences with their phobic stimulus more than positive or neutral memories associated with it. Consequently, Maxine's negative memories of red boxes similar to the one that caused her extreme fear response are strengthened and/or are more likely to be recalled again in future.

6 classical conditioning and is maintained by operant conditioning.

7 1 mark was awarded for each of the following:

- naming negative reinforcement as the relevant form of reinforcement
- explaining how use of the night light reduces the fear associated with an unpleasant stimulus
- explaining how reduction of an unpleasant stimulus serves to make the behaviour more likely to persist in future.

'Positive reinforcement' was not accepted because the rewarding consequence of the behaviour of using the night light is to reduce the effect of an unpleasant stimulus.

The following is a sample response.

The use of the night light has been negatively reinforced because of its effect in reducing Ambreen's extreme fear response to the dark. The reduction of fear response acts to increase the likelihood that the behaviour of using a night light will continue in the future.

8 The question required students to demonstrate knowledge of the role of attention in the vicarious learning of a phobic response.

Students were awarded 1 mark for each of the following:

- a description of attention as involving active focusing of observation/concentration on the mother's (role model) responses to the cockroach
- demonstrating knowledge that what was learned related to (storing/encoding/retention of) the antecedent-behaviour-consequence relationships in the scenario, not mere imitation of 'screaming and running away'. For example, students needed to note that the mother's fear response was relieved when she moved away from the cockroach, so David learned through observation (vicarious learning) that avoidance of cockroaches is (negatively) reinforced/rewarded.

9 The correct answer was negative reinforcement. No other response was accepted.

10

i the mother's screaming/fainting/fear

Many students did not indicate that the unconditioned stimulus was the mother's fear.

ii the spider(s)

11

i pain from the needle (pain)

ii approach of nurse (nurse/sight of approaching nurse)

iii fear of pain from injection (scream because of pain)

iv fear of nurse (scream at approach of nurse)

VCAA comment:

In previous assessment reports it has been emphasised that it is necessary to distinguish between the unconditioned response and the conditioned response. Therefore, in parts iii. and iv., responses were required to be differentiated by identifying the origin as in 'fear from the pain of the injection' and 'fear due to the approach of the nurse'.

12 VCAA comment:

This question was quite well answered. As the scenario contained features of classical and operant conditioning as well as one-trial learning any of these three types of conditioning was acceptable for 1 mark. A further 2 marks were awarded for correctly identifying the conditioned stimulus as the dog, and the conditioned response as fear and/or avoidance of dogs. A common error was naming the conditioned response as fear rather than fear of dogs. As fear can be an unconditioned response it was not acceptable in this context.

9.4 LA 1: Review

1

Social factor	What is it?	How it may contribute
specific environmental trigger	An environmental object, situation or circumstance that produces a fear response and becomes a phobic stimulus	Acts as a specific cue for a phobic response (e.g. stress response, avoidance behaviour)

stigma surrounding treatment	Negative attitude by self or others towards accessing treatment for a specific phobia	Concern over seeking treatment can contribute to the development (or perpetuation) of a specific phobia as many phobias develop when a phobic stimulus continues to be avoided; professional support early in the course of the disorder and undergoing treatment that challenges irrational thoughts can minimise or inhibit development of the disorder

9.4 LA 2: VCAA exam questions

1 People with a specific phobia perceive themselves as different.

VCAA comment:

A, C, and D were all social risk factors related to stigma associated with mental health issues that increase the likelihood of the development and progression of specific phobia. Option B was the best response because although people with specific phobia may perceive themselves differently from others, this does not necessarily relate to stigmatisation.

2

Contributing factor	Evidence-based intervention
catastrophic thinking (psychological)	psychoeducation (social)

3 VCAA comment:

High-scoring responses identified a possible source of stigma and gave a reason why this could prevent Zac from seeking help. For example, Zac could feel ashamed about seeing a psychologist because people may see this as a sign of weakness, which could prevent him from continuing his sessions.

Many students referenced Zac 'being male' and not wanting to appear to be 'weak'. Answers similar to this often did not receive both marks as it was not possible to identify the 'source' of the stigma. A response that suggested 'Society has certain views about males being strong and not needing to seek help for problems, therefore Zac is embarrassed about seeking treatment' was awarded full marks.

9.5 LA 1: Review

1

a evidence-based intervention: a treatment that has been found to be effective on the basis of scientific evidence/valid and reliable, peer reviewed, research studies

b Reasons include:

- the treatment has been found to be effective on the basis of scientific evidence so a greater likelihood of beneficial outcomes
- greater likelihood of minimal side-effects or harm, whereas a non-evidenced based treatment may be harmful or even dangerous
- typically supplied by professionally qualified and competent people e.g. qualified and trained to properly administer, monitor progress, recognise adverse effects etc
- more likely to be of an acceptable cost/cost-effective e.g. more likely to 'work' and therefore be value for money, as compared to 'wasting money' on a treatment with little or no empirical basis.

2

a benzodiazepines: a group of drugs that work on the central nervous system, acting selectively on GABA receptors in the brain to increase GABA's inhibitory effects and make postsynaptic neurons resistant to excitation; may be used in the treatment of phobic anxiety; commonly referred to as sedatives, tranquilisers or depressants

b Explanation should demonstrate understanding that benzodiazepines stimulate activity of targeted neurotransmitter and are therefore agonists, whereas antagonists inhibit neurotransmitter activity e.g. benzodiazepines are agonists that imitate GABA's effects and therefore stimulate the inhibitory action of GABA at GABA receptor sites on postsynaptic neurons.

c Explanation should demonstrate understanding that:

- when a person with a specific phobia is exposed to a phobic stimulus, their sympathetic nervous system is activated, resulting in a highly aroused physiological state e.g. stress/fight–flight–freeze response
- benzodiazepines are GABA agonists i.e. they mimic GABA's inhibitory effects, thereby reducing the excitability of neurons, so overall brain function becomes slower and calmer, reducing the arousing effects of anxiety/physiological arousal and promoting calming effects.

Example: Benzodiazepines work by stimulating the activity at the site of the postsynaptic neuron where GABA is received from the presynaptic neuron. This reduces the symptoms of anxiety by amplifying the influence of GABA's inhibitory effects on the postsynaptic neuron. By reducing the excitability of neurons, overall brain function becomes slower and calmer, reducing the arousing effects of anxiety.

d Short-acting means that benzodiazepine remains in the bloodstream and is cleared from the body in a short period of time; whereas a long-acting benzodiazepine may accumulate in the bloodstream or take a much longer period of time to leave the body.

e Advantages include:

- tend to be highly effective in minimising symptoms
- tend to have very few side effects
- alleviate symptoms so that root causes of the phobia can be more effectively treated with a psychotherapy (such as CBT) or a relaxation technique
- a short-acting variant with rapid onset may be used intermittently to cope with an occasional, unavoidable encounter with a phobic stimulus e.g. used by someone with a dental phobia to endure a dental appointment for a persistent toothache.

Limitations include:

- can promote dependency over the long term, highly addictive
- only treats symptoms, not underlying causes (so not a long-term 'solution')
- do not teach any non-drug dependent coping skills for the phobia
- reduced alertness, drowsiness, slower reaction times etc. which can be dangerous when driving, operating machinery etc
- can lower inhibitions and increase impulsiveness or risk-taking behaviour
- dangerous when mixed with alcohol or other depressants.

3

a breathing retraining (breathing training): an anxiety management technique that involves teaching correct breathing habits

b Aims include:

- help people maintain correct breathing or correct abnormal breathing patterns when anticipate or exposed to a phobic stimulus, so it may help to reduce anxiety or alleviate some of its symptoms
- help people gain control over their breathing and therefore feel that they also have some control over their fear or anxiety e.g. adopt a correct breathing strategy to help prevent a panic attack that may be triggered by a phobic stimulus.

c Examples include:

- shallow 'chest breathing' (not taking in sufficient volume of air)
- rapid breathing where the number of breaths taken is unnecessarily increased
- deep breathing, where deeper, larger breaths are taken.

Explanation: All of these require breathing retraining to normalise breathing when encountering phobic stimuli and thereby maintain correct oxygen and carbon dioxide balance in the blood.
d Example: slow, regular breaths, in through the nose and out the mouth at a controlled rate (as opposed to fast, and/or irregular, shallow 'chest breathing' or the rapid deep breathing of hyperventilation).

9.5 LA 2: VCAA exam questions

1

Contributing factor	Evidence-based intervention
catastrophic thinking (psychological)	psychoeducation (social)

2 biological, psychological and social factors equally as important, and interacting to influence mental health.

3 biological approaches because they reduce physiological arousal.

4 increases the efficiency of the inhibiting action of GABA.

5 Marks were awarded for:

- demonstrating understanding that benzodiazepines act to promote GABA (they are GABA agonists), which is the primary inhibitory neurotransmitter
- noting that people with a phobia may have lower levels of GABA
- stating the effect of the benzodiazepine agent as reducing anxiety (anxiolytic) to help treat phobia.

The following is a sample response.

A benzodiazepine agent acts as a GABA agonist in the brain, promoting GABA's inhibitory effect, and so helps to calm physiological arousal. People with a phobia may have dysfunctional levels of GABA. Prescribing a benzodiazepine agent for Maxine would help reduce the extreme anxiety she experiences due to her phobia.

9.5 LA 3: Review

1

a CBT: cognitive behaviour therapy, which is based on the premise that cognitions influence feelings and behaviours, and that subsequent behaviours and emotions can influence cognitions

b Explanation should demonstrate understanding that avoidance and safety behaviours may prevent a feared outcome or reduce anxiety, but the individual can become reliant on them and they perpetuate the phobia. Consequently, they are considered maladaptive and are targeted for treatment.

c Goals should refer to:

- changing thoughts and behaviour that perpetuate the phobia e.g. assisting the individual to develop a new understanding that their feared stimuli are not (or unlikely to be) dangerous, so their avoidance and safety behaviours are unnecessary and unhelpful in the long-term
- improving coping skills.

2

a systematic desensitisation: a kind of behaviour therapy that aims to replace an anxiety response with a relaxation response when an individual with a specific phobia anticipates or encounters a fear-inducing phobic stimulus

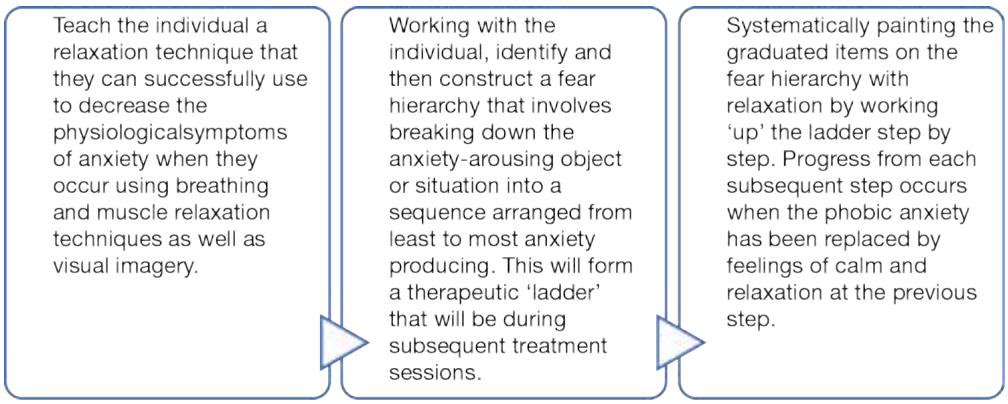
b fear hierarchy: a list of feared objects or situations associated with dogs, ranked from lowest to highest in terms of how much anxiety they produce; also called anxiety hierarchy

Example:

Phase 1: construct a fear hierarchy – therapist helps the individual identify 10–15 different phobic stimuli and organise them hierarchically, from least anxiety-producing (e.g. looking at a photo of a dog) to most anxiety-producing (hand-feeding a dog).

Phase 2: graduated pairing of each item with a relaxation response – starting from least anxiety, the therapist works upward through the hierarchy with the client, to pair each item with a relaxation response; includes gradual exposure to each item e.g. via visual imagery, real-life, or through technology; no movement up through the hierarchy until graduated pairing has been successfully achieved and the individual can respond to the most anxiety-producing item with relaxation.

c Example:



d Explanation should demonstrate understanding that systematic desensitisation involves associative learning of fear/anxiety producing stimuli and a relaxation response.

e Example:

Anxiety-producing ranking	Helena's fear of flying hierarchy
Highest	Taking off
	The plane taxiing on the runway
	Watching the flight attendants demonstrate the safety drill
	Being asked to fasten her seatbelt
	The plane doors closing
	Boarding the plane
	Going to the departure lounge
	Checking in
	Arriving at the airport
	Travelling to the airport in a taxi
	Packing her luggage
	Booking her plane ticket on the internet
Lowest	Thinking about travelling by plane

9.5 LA 4: VCAA exam questions

1 (C) is the correct option. (A) is incorrect because cognitive behaviour therapy does not require development of a hierarchy. (B) is incorrect because cognitive behaviour therapy does not use classical conditioning. (D) is incorrect because breathing retraining is likely to be involved in systematic desensitisation.

2

strategy 1	strategy 2
Provide evidence of times Eleanor enjoyed the beach.	Assist Eleanor in replacing negative thoughts with positive thoughts.

VCAA comment:

Option C was the best response because both strategies clearly addressed cognitive rather than behavioural responses.

3 systematic desensitisation.

4 cognitive behavioural therapy (CBT).

5 This question required students to analyse the results of a research study that compared the effects of two interventions – one biological and one psychological – to determine their

effectiveness in decreasing self-reported symptoms of anxiety in patients with dental phobias.

This involved comparing the similarities and differences in the participants' symptoms of anxiety, as well as discussing how each intervention acted to reduce these symptoms. The provided scenario and graph enabled the students to evaluate the most effective condition of treatment.

With regards to the scenario and the question posed, the analysis could include:

- biopsychosocial classification of the two treatment conditions – systematic desensitisation (as a psychological intervention) and benzodiazepine administration (as a biological intervention)
- an accurate description of each type of evidence-based intervention and linking these to the change in the level of anxiety shown by patients with dental phobic symptoms
- the comparison between the lasting effects of the biological and psychological evidence-based interventions
- the implications of the study with comparison between the two evidence-based interventions in reducing anxiety symptoms in people with dental phobias.

Students needed to refer to the graph and/or the information provided in the scenario to analyse the overall results of the study, including both similarities and differences in symptoms of anxiety. They also needed to accurately describe how both systematic desensitisation and benzodiazepines work to reduce the anxiety symptoms in these patients. Higher-scoring responses included implications of the comparison between the two interventions.

In analysing the results and accurately describing the evidence-based interventions used in the study, the responses could include (but were not limited to) the following aspects:

• Similarities in the study's results and how each condition acted to reduce the participants' symptoms of anxiety. For example:

- Condition 1 and Condition 2 had similar self-reported symptoms of anxiety during the dental appointment (close to 6), which were both lower than those of the control (baseline) Condition 3. This established a short-term reduction in anxiety symptoms among people with dental phobias using both benzodiazepines and systematic desensitisation in a self-report ranking.
- Conditions 2 and 3 had very similar (high) self-reported symptoms of anxiety (~8.8 and 9, respectively) at the end of the study, (two months) after the initial dental appointment, showing that Condition 2 returned to a relatively high level of symptoms of anxiety – very close to the baseline group.

• Differences in the study's results and how each condition acted to reduce the participants' symptoms of anxiety. For example:

- The systematic desensitisation evidence-based intervention (Condition 1) observed longer-lasting effects with a reduction in symptoms of anxiety (from 5.8 down to 5) after one month and a further reduction (from 5 to 3) after two months. Conversely, the results show that people in Condition 2 (the benzodiazepine condition) had a return (increase from 6 to 8.8) of symptoms of anxiety one month after treatment. This suggests that benzodiazepines are short-acting because they only remain in the bloodstream for a short period of time (and the phobic anxiety would likely return hours after the drug has cleared from the bloodstream). After two months, Condition 2 still showed an overall increase from the initial symptoms of anxiety and only a slight decrease (8.2 from 8.8) after two months from the one-month measurement.
- The control group (Condition 3) had a slight decrease in symptoms of anxiety from an initial high level (9.9 to 9 over the two-month period) but levels of the symptoms of anxiety were still the highest of all three conditions.
- The systematic desensitisation group (Condition 1) observed longer-lasting effects with a reduction in symptoms of anxiety after two months, compared to the benzodiazepine group (Condition 2) that increased in symptoms after one month and essentially returned to a similar anxiety level as the control Condition 3 after two months. Of the 29 participants in each group, there were 21 in Condition 1 who experienced minimal anxiety during future dental appointments; seven in Condition 2; and only one participant in the control Condition 3.
- These results reflect systematic desensitisation acting as a psychological protective factor allowing the patient to cope with the fear-producing stimulus rather than avoid it, despite only having one session of systematic desensitisation.

Discussion of how each of Condition 1 and Condition 2 acted to reduce the participants' symptoms of anxiety could include:

- Systematic desensitisation (Condition 1) – Psychological evidence-based intervention: Using classical conditioning principles, systematic desensitisation aims to reduce and replace the anxiety response to the stimulus with feelings of calm and relaxation. Firstly, the phobic patient would be taught a relaxation technique such as a slow breathing technique, then asked to create a sequential hierarchical list of feared objects/situations relating to their dental phobia that increased their anxiety, such as seeing a picture of a dentist's chair increasing the anxiety to the experience of sitting in the chair. The patient would apply the relaxation technique to each stimulus, starting at the lowest level, and only moving up to the next level in hierarchy once the specific dental phobic stimulus did not lead to the conditioned response of fear.
- Benzodiazepines (Condition 2) – Biological evidence-based intervention: Benzodiazepines are gamma-amino butyric acid (GABA) agonists. People with phobias may have GABA dysfunction, so the benzodiazepines can mimic the effects of GABA in the central nervous system. Benzodiazepines target the central nervous system to increase GABA's inhibitory effects making the postsynaptic neurons less likely to fire. They may share the same chemical shape and size as GABA to allow for the binding to occur to GABA receptors on the postsynaptic neuron, to decrease the likelihood of the postsynaptic neuron from firing uncontrollably. This results in

reduced transmission of neural messages relating to fear and calms the person down.

Overall conclusion and implications may have included:

- Though both conditions helped reduce the symptoms of anxiety in people with a dental phobia, the effect of systematic desensitisation was longer lasting.
- While benzodiazepines are short-acting and may be taken occasionally when required, for example to attend dentist appointments, the long-term effects of reduced awareness and dependency on the drug can be potentially damaging. Therefore, the results suggest that the psychological intervention may be more effective in treating the phobic anxiety in the long term, especially if the patient is required to attend regular dentist appointments and encounter the phobic stimulus frequently, which may interfere with the person's functioning.

The response may also have included (but was not limited to) the following aspects of the results of the study:

- Role of independent-groups design that does not control for participant-related extraneous variables, especially the inability to establish a pre-treatment baseline for Conditions 1 and 2 before the initial dental appointment.
- Issues related to self-reporting as a subjective measure and whether an objective measure of anxiety symptoms should be considered for future studies.
- The effect of ignoring the social intervention of psychoeducation (biopsychosocial factors are all relevant to phobias) could also be considered in future studies.

The highest-scoring responses provided a balanced analysis of the results along with an accurate description of the evidence-based interventions, and an overall conclusion and evaluation of the best treatment condition. They not only provided an analysis of results from the research that compared both similarities and differences between all conditions, but also accurately identified the importance of the evidence-based interventions, with the overall conclusion that systematic desensitisation was the best long-lasting effect of reduction of anxiety-producing symptoms in patients with a dental phobia.

A number of students provided excellent descriptions of one aspect of the question, such as drawing out the similarities and differences between the results gathered in the research study, but did not mention or discuss the evidence-based interventions (or vice versa).

The following is an example of a high-scoring response.

The results in this research study highlight that while both a single session of systematic desensitisation and the administration of benzodiazepine before the dental appointment reduce symptoms of anxiety, systematic desensitisation had longer-lasting effects with continued improvement one month later and even more improvement two months later. While the participants that took part in systematic desensitisation showed improvement, participants that were administrated benzodiazepine show more symptoms of anxiety one month later and almost showed similar symptoms to those in the control group. The

research study also highlighted that 21 participants out of the 29 that took part in systematic desensitisation attended future dental appointments with minimal symptoms of anxiety while this only applied to 7 of the 29 participants that took the benzodiazepine and only 1 in the control group. The study concludes that both systematic desensitisation and benzodiazepine results in fewer symptoms of anxiety for individuals with a phobia of the dentist, but systematic desensitisation has much more long-lasting effects. Benzodiazepine is a type of anxiety agonist that mimics the role of the main inhibitory neurotransmitter GABA. People with a specific phobia tend to have lower levels of GABA, which is why they experience high levels of anxiety because their post-synaptic neurons continue firing. Benzodiazepine acts as GABA in inhibiting the post-synaptic neuron from firing. Systematic desensitisation involves ordering the phobic stimulus in a hierarchy from least feared to most feared. For example, in this research study, participants taking part in systematic desensitisation may have placed thinking about the dentist on the bottom of the hierarchy, and attending a dentist appointment at the top of the hierarchy. Before the hierarchy is made however, patients would need to learn a calming method such as breathing retraining, that they could practice when faced with their specific phobia. Once they have learnt this, they will go through the hierarchy and expose themselves to each stimuli, but can only move through the hierarchy once they have successfully completed the stage prior, using their coping strategy and experiencing lower or no symptoms of anxiety. Once participants have experienced every stimulus in the hierarchy successfully, their phobia will be distinguished. The study also highlights that one dose of benzodiazepine is not enough to eliminate a phobia in the long-term, while one session of systematic desensitisation is effective.

9.5 LA 5: Review

1

a psychoeducation for specific phobia: provision and explanation of information to individuals about their phobia to assist their understanding of its characteristics and treatment

b key assumption: increased understanding of symptoms, treatment options, services available and recovery patterns enables individuals to cope more effectively and live more productive and fulfilled lives

c

i

Psychoeducation program for:	Topics that might be included:
an individual with a phobia	Causes, symptoms, medications, treatment options, organisations and places to seek support services, support networks, useful websites, effects on family members, work-related issues, signs of recovery etc.

ii

Psychoeducation program for:	Topics that might be included:
family and supporters of someone with a phobia	Causes, symptoms, medications, treatment options, how to challenge unrealistic thoughts and avoidance behaviour, support services and networks, effects on family members, work-related issues, signs of recovery etc.

2

a Reasons include:

- prevents the individual from facing what is feared and learning through this experience that their phobic stimuli may not be as dangerous or overwhelming as they think (thereby perpetuating the phobia)
- denies opportunity to learn how to cope with fears (e.g. with a relaxation response) and experience control over fearful situations (thereby perpetuating the phobia)
- comforting rather than challenging may unintentionally encourage or reinforce avoidance behaviour (thereby perpetuating their phobia).

b

- appropriate e.g. encouragement to not engage in avoidance behaviour, support to not engage in avoidance behaviour, praise/positive reinforcement when a stimulus is not avoided, praise/positive reinforcement when daily functioning is improved through non-avoidance, challenging avoidance behaviour in an appropriate way etc.
- inappropriate e.g. forcing exposure to a phobic stimulus, ridicule, belittling, sarcasm, anger, impatience, raised voices or aggression.

3

a Explanation should demonstrate understanding that:

- unrealistic thoughts (or 'self-talk') can trigger anxious thoughts/lead to feelings of anxiety, thereby perpetuating the phobia (rather than minimising affects/symptoms, helping the individual overcome the disorder)
- challenges by family members (or others) may assist the individual to become better able to recognise their unrealistic thoughts are unrealistic and replace them with more rational appraisals
- challenges by family members (or others) may assist the individual to test or evaluate their irrational thoughts, thereby exposing faulty reasoning they might be applying and providing a basis for change.

b

- appropriate: e.g. calmly acknowledge the concern and reassure the individual about lack/absence of real danger but gently/respectfully challenge their avoidance behaviour and associated thinking with questions such as: What is making you feel scared? What are you worried will happen? What bad thing do you expect to happen? Is there any evidence that contradicts your thought? Could you do anything to resolve this situation if it does occur? Are you making a thinking error? What would you say to a friend who has this fear? Are you under-estimating how much control you have in this situation?
- inappropriate: e.g. attitudes and actions that are the opposite of the above or which may fuel or perpetuate fear/anxiety being experienced e.g. no acknowledgement or reassurance; stigmatising comments such as: 'Don't be stupid', 'Get real' etc; 'Let's get out of here', ridicule, belittling, sarcasm, anger, impatience, raised voice etc.

9.5 LA 6: VCAA exam questions

1 breathing retraining, CBT and psychoeducation for family

2 cognitive behavioural therapy (CBT).

3 systematic desensitisation.

4 not be given any psychoeducation at all.

5 The relevant evidence-based social intervention consistent with the Study Design is psychoeducation. For full marks students needed to explain psychoeducation and how it can be used to manage specific phobia, related to the scenario:

- identification of psychoeducation as the relevant evidence-based social intervention
- definition of psychoeducation in terms of involving family/friend/social networks of David in treatment by providing them with information about David's phobia, how it is triggered and how they can assist David to manage it
- explanation of what family/friends/social network could do to assist David, such as strategies for challenging unrealistic thoughts about cockroaches, discouraging avoidance behaviours, reminding him of his breathing retraining, etc.

10.1 LA: Multiple-choice questions

1. decreases the risk or impact of a problem that may adversely affect mental wellbeing.

2. good quality sleep

3. mindfulness meditation

4. helps to create mental health problems and illnesses.

5. cultural continuity

10.2 LA: Multiple-choice questions

1. internal

2. eating a variety of different foods to maintain good physical health.

3. drinking enough water to maintain good physical health.

4. drink lots of water

5. regularly getting the right amount of sleep, and enough good quality sleep.

10.3 LA: Multiple-choice questions

1. internal

2. negative thoughts that underlie maladaptive feelings and behaviour.

3. negative, irrational thoughts.

4. relaxation training

5. focussing on what is being immediately experienced without distraction from negative thoughts whilst in relaxed state

10.4 LA 1: Review

1.

Protective factor	What is it?	How it may influence mental wellbeing	Example
Biological			
• adequate nutritional intake and hydration	Eating a good amount of a variety of different foods and drinking	• Interrelationship between physical and mental health so important to ensure body and brain have	Nutritional strategies that can help maintain mental health include: eat a variety of foods,

	enough water to maintain good physical health (and feel mentally well as a result).	• nutritional needs met and function well through adequate det and hydration. • Can help improve sleep, energy levels, mood, cognitive function, cardiovascular fitness, circulation and overall sense of wellbeing.	drink lots of water, eat regular meals, limit heavily processed foods, salt, sugar and alcohol.
• adequate sleep	Right amount of sleep time and enough good quality sleep to awaken feeling refreshed and rested	Improves affective, behavioural and cognitive functioning and overall sense of mental wellbeing/enhances enjoyment in life; chronic poor sleep quantity or quality a risk factor for mental health issues.	Adequate sleep varies for individuals but should be regular; generally, for children about 10hours, teenagers 9 hours, adults 8 hours and older people less.
Psychological • Cognitive behavioural strategies			
– cognitive strategy	A CBT technique to identify, assess and correct faulty patterns of thinking that adversely impact on mental health.	Positive thinking patterns (rather than negative) and having the ability to question and change cognitive distortions/erroneous, maladaptive or unrealistic thoughts and expectations are an important means of maintaining mental health.	Cognitive restructuring — identify, challenge, and modify or replace negative, irrational thoughts (or *cognitive distortions*) with more reasonable and helpful ways of thinking. In turn, this can help reduce maladaptive ways of feeling and/or behaving that are influenced by such thinking and adversely affecting mental wellbeing
– behavioural strategy	A CBT technique to protect,	Mood elevating activities that are positively reinforcing and adaptive behaviour are a vital	Behaviour activation/ activity scheduling –

	maintain or improve mental wellbeing through behaviour change.	part of mental wellbeing and maintaining a positive and productive state.	identifying and scheduling activities that promote enjoyment or reduce stress.
• mindfulness meditation	A type of meditation in which a person focuses attention on their breathing and thoughts, feelings, and sensations are experienced freely as they arise.	Achieve a state of mindfulness which is associated with mental wellbeing/enables individuals to become highly attentive to sensory information and to focus on each moment as it occurs in the present moment e.g. slow down racing thoughts, avoid negative/unhelpful thinking, and calm both their mind and body.	Use anywhere and anytime, even if only for a couple of minutes e.g. when brushing teeth, on the bus to school or work, lying back on a chair and a taking a break from studying.
Social			
• Support from family, friends and community that is authentic and energising	Assistance, care or comfort provided by people to each other, typically to help them cope with a stressor or mental health issue.	Access to social support that is authentic and energising is associated with mental wellbeing e.g. importance of maintaining social contact with others (vs isolation), opportunity to discuss/share problems, access to emotional support (e.g. can help the individual feel cared for, loved and valued), access to informational support and advice etc. in the community.	Support from parents and siblings, extended family, friends, peer groups, social/shared interest groups (e.g. new mother's groups), alcoholic anonymous, mental health support groups, men's shed, online support groups (e.g. ReachOut, Kids Helpline) school counsellors, professionals in the community (e.g. psychologists, doctors and psychiatrists etc.).

10.4 LA 2: VCAA exam questions

1. biological protective factor.

2.

Biological protective factors	Psychological protective factors
good diet, adequate hydration and sleep	cognitive behavioural strategies and mindfulness

3. A catastrophic event can be a risk factor but is not likely to be a protective factor.

4. it is based on her belief about the outcome.

5. mindfulness meditation, adequate sleep and accessing social support

10.5 LA: Multiple-choice questions

1. is diverse.

2. a way of life.

3. self-determination

4. cultural preservation across time

5. allowing freedom to make own choices