



Trial Examination 2021

HSC Year 12 Biology

Solutions and marking guidelines

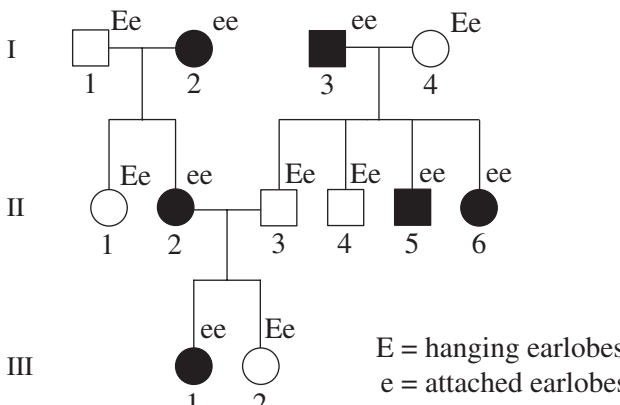
Answer and explanation	Syllabus content, outcomes and targeted performance bands
<p>Question 6 A</p> <p>A is correct. There are two possible outcomes for male offspring using the Punnett square. Both male offspring are X^bY and would be colour blind (100% chance of being colour blind). B is incorrect. Male offspring have a 100% chance of being colour blind. C is incorrect. The allele must be recessive, as shown by X^bX being a carrier without exhibiting symptoms. D is incorrect. Both possibilities for female offspring are X^bX, which is heterozygous.</p> <p><i>Note: Homozygous means that there are two of the same types of alleles for a characteristic, while heterozygous means that there are two different alleles for a characteristic.</i></p>	<p>Mod 6 Genetic Variation BIO12–6, 12–12 Band 4</p>
<p>Question 7 C</p> <p>C is correct. Using mainly one variety of potato (especially clones of that variety) creates a lack of biodiversity. A is incorrect. Genetic drift describes the random fluctuations in a gene pool over time; this gene pool was artificially kept stable. B is incorrect. Propagation was used, which does not involve pollination of any sort. D is incorrect. This is an example of whole organism cloning, not individual gene cloning.</p>	<p>Mod 6 Biotechnology Mod 6 Genetic Technologies BIO12–6, 12–12 Band 3</p>
<p>Question 8 B</p> <p>B is correct. A point mutation occurs when a single nucleotide base is changed, inserted or deleted from a DNA or RNA sequence of an organism’s genome. In this option, a G (guanine) nucleotide is changed to an A (adenine) nucleotide (base 9). A is incorrect. This option shows DNA replication of complementary bases. C is incorrect. This option shows chromosomal mutation with the inversion of an AGG sequence (bases 8, 9 and 10) to a GGA sequence. D is incorrect. This option shows a chromosomal mutation with the translocation of the base sequences AAC (bases 2, 3 and 4) and GGT (bases 9, 10 and 11).</p>	<p>Mod 6 Mutation BIO12–6, 12–12 Band 4</p>
<p>Question 9 C</p> <p>C is correct. Although often called ‘junk’ DNA and previously thought to have no role, research has shown that some of these non-coding DNA segments play a role in how some genes are expressed. For example, non-coding DNA segments can switch transcription on or off or regulate the degree of transcription. A is incorrect. Non-coding DNA segments make up around 98% of all human DNA. B is incorrect. Non-coding DNA segments can mutate, but the effects of mutations are not always apparent as mutations in coding DNA segments. D is incorrect. This option describes coding DNA segments.</p>	<p>Mod 6 Mutation BIO12–12 Bands 3–4</p>

Answer and explanation	Syllabus content, outcomes and targeted performance bands
<p>Question 10 D</p> <p>D is correct. The diagram shows how likely a cow is to conceive relative to the time after it comes into heat. A is incorrect. There is no information given on quality of calves. B is incorrect. Artificial insemination has an 18-hour ‘window’ in which to conceive, whereas natural mating has a 15-hour window. C is incorrect. There is no information given regarding success rate.</p>	<p>Mod 6 Reproduction Mod 6 Genetic Technologies BIO12–6, 12–13 Band 4</p>
<p>Question 11 A</p> <p>A is correct. Pathogens that are proteins are prions and all prions are non-cellular. B and D are incorrect. The pathogen that causes Kuru is not a virus. C is incorrect. Prions are non-cellular.</p>	<p>Mod 7 Causes of Infectious Disease BIO12–14 Band 2</p>
<p>Question 12 D</p> <p>D is correct. HIV and conjunctivitis both need direct contact, either through person-to-person contact or through droplets of body fluid. SARS and measles can be transmitted by indirect contact. A, B and C are incorrect. HIV and conjunctivitis need direct contact to be transmitted.</p>	<p>Mod 7 Causes of Infectious Disease BIO12–14 Band 3</p>
<p>Question 13 B</p> <p>B is correct. As the purpose of the experiment is to test for the presence of microbes in water, any microbes on the workbench could contaminate the water sample. A is incorrect. This option is about personal safety, not the steps of the experiment. The student is not likely to contract an infection from the microbes on the workbench. C is incorrect. The teacher may demand a tidy work area but that is not necessarily related to the outcome of the experiment. D is incorrect. Microbes in the water may contaminate the workbench, but this would not affect the results of the experiment.</p>	<p>Mod 7 Causes of Infectious Disease BIO12–14 Band 4</p>
<p>Question 14 B</p> <p>B is correct. The lymphocytes are memory B and T cells that remain in the body as memory cells. A is incorrect. The central nervous system does not destroy pathogens. C is incorrect. B cells release antibodies, but they are specific and are not effective over the entire lifetime of an individual. D is incorrect. This option is true but it does not explain the statement, as it does not explain the memory aspect of immunity.</p>	<p>Mod 7 Immunity BIO12–14 Band 4</p>

Answer and explanation	Syllabus content, outcomes and targeted performance bands
<p>Question 20 B</p> <p>B is correct. Mortality is the rate of deaths in a population and must be measured over a specific time. A and C are incorrect. The number of people diagnosed with the disease is known as the incidence. D is incorrect. People who are infected with the pathogen but do not exhibit any symptoms have not died due to the pathogen and therefore cannot be included in the definition of mortality.</p>	<p>Mod 8 Causes and Effects BIO12–15 Bands 1–2</p>

SECTION II

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>Question 21</p> <p>Eukaryotic cells have a membrane-bound nucleus that holds genetic material. A species is made up of related individuals with observable physical characteristics that resemble one another and can breed among themselves to produce viable offspring. Cell replication must take place for new organisms to arise from parents and to maintain life once created. Eukaryotic cells can replicate using mitosis and meiosis.</p> <p>Mitosis is concerned with growth and repair, and keeping the genetic mix the same. Mitosis occurs in somatic (body) cells and produces new identical cells. Exact chromosome duplication occurs and twin daughter cells are formed. These cells are diploid, meaning they have two paired sets of chromosomes in a cell (human somatic cells have 23 pairs of chromosomes). Mitosis helps to retain the organism's characteristics because, unless mutation occurs, this type of cell division usually minimises genetic diversity. Mitosis provides the cells that allow an organism to reach its full size and the features that enable it to survive in its environment. Mitosis assists in replacing the millions of cells that die every day and in regenerating new tissues. Single-celled organisms tend to reproduce by mitosis.</p> <p>Meiosis introduces some genetic variation by mixing genes from a parent before passing them on to offspring. Meiosis occurs when gametes (male or female sex cells) are produced. Meiosis produces four daughter cells. Each of these has half the number of chromosomes (n) of the original parent cell (the haploid number). Because of the type of division and the 'crossing-over' of genetic material between chromatids, the four daughter cells are all genetically different and can introduce new characteristics into organisms. When haploid gametes formed by meiosis fuse, they form zygotes (such as when a sperm fertilises an ovum). The resulting zygote possesses 50% of the traits from the mother and 50% from the father. This restores the diploid number of chromosomes.</p> <p>For the continuity of eukaryotic species, both mitosis and meiosis need to occur.</p>	<p>Mod 5 Cell Replication</p> <p>BIO12–12 Bands 2–6</p> <ul style="list-style-type: none"> Gives a detailed description of mitosis AND meiosis. <p>AND</p> <ul style="list-style-type: none"> Assesses how mitosis AND meiosis can affect the continuity of a species. 5–6 <hr/> <ul style="list-style-type: none"> Describes mitosis AND meiosis. <p>AND</p> <ul style="list-style-type: none"> Identifies how mitosis AND meiosis can affect the continuity of a species. 3–4 <hr/> <ul style="list-style-type: none"> Describes mitosis AND meiosis. <p>OR</p> <ul style="list-style-type: none"> Identifies how mitosis AND meiosis can affect the continuity of a species. 2 <hr/> <ul style="list-style-type: none"> Provides some relevant information. 1

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>Question 22</p> <p>The investigation ensures that the two hydrangea plants have identical genes because vegetative propagation produces plants that are genetically identical to the original plant from which the cuttings were taken.</p> <p>Care was taken to ensure that variables (potting mix, position, lighting, water) were controlled and the only change to the environment was the addition of different types of fertiliser that affected soil pH.</p> <p>The effect of environment on phenotypic expression is investigated here, so the investigation is appropriate. However, there is no investigation of how genes affect phenotypic expression, so, in this way, the investigation is not appropriate.</p> <p><i>Note: The colour change in hydrangeas also involves the presence of aluminium in the soil. However, full marks can be gained without including this in the response.</i></p>	<p>Mod 5 DNA and Polypeptide Synthesis BIO12–2, 12–12 Bands 3–6</p> <ul style="list-style-type: none"> • Gives a reasoned discussion detailing how well the experiment assesses how genes AND the environment affect phenotypic expression 4 <hr/> <ul style="list-style-type: none"> • Gives a discussion that outlines how well the experiment assesses how genes AND the environment affect phenotypic expression 3 <hr/> <ul style="list-style-type: none"> • Gives an outline of how well the experiment assesses how genes AND the environment affect phenotypic expression 2 <hr/> <ul style="list-style-type: none"> • Provides some relevant information 1
<p>Question 23</p> <p>If you assign, for example, E to hanging earlobes and e to attached earlobes, then individuals 1 and 4 in generation I must be Ee and individuals 2 and 3 must be either EE or ee.</p> <p>As both individuals 1 and 4 are heterozygous (Ee) and have hanging earlobes, E must be the dominant allele and result in hanging earlobes, and e must be the recessive allele and result in attached earlobes.</p> <p>Hence, individuals 2 and 3 are ee, as only homozygous alleles will express the recessive gene. Subsequent offspring shown in later generations can only be Ee or ee. There is no indication that there is any sex-linkage involved. Therefore, inheritance is autosomal and dominant/recessive.</p>  <p><i>Note: Response does not require a pedigree to obtain full marks.</i></p>	<p>Mod 5 Genetic Variation BIO12–6, 12–12 Bands 5–6</p> <ul style="list-style-type: none"> • Gives a detailed discussion that includes references to the alleles involved using standard notation 4 <hr/> <ul style="list-style-type: none"> • Gives a discussion that includes references to the alleles involved using standard notation 3 <hr/> <ul style="list-style-type: none"> • Gives an outline that mentions the alleles involved 2 <hr/> <ul style="list-style-type: none"> • Provides some relevant information 1

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>Question 24</p> <p>Both DNA sequencing and DNA profiling are technologies used in molecular biology to help determine the inheritance patterns of a population.</p> <p>Every organism has a unique arrangement of nucleotides within their DNA. DNA sequencing is the process of determining the arrangement of the four nucleotide bases (adenine, guanine, cytosine, and thymine) within a length of DNA. It is now possible to analyse every nucleotide within a person’s genome (all of their genetic material). Certain sequences of nucleotides give genetic variants that have been linked to certain medical conditions. DNA sequencing can help find out if a person has these variants and indicate possible treatments. DNA sequencing can help understand the effect of particular genes. Scientists can also compare the DNA of different organisms, which can indicate how they are related.</p> <p>Over 99% of an individual’s DNA is identical to other people’s DNA. However, there are regions of DNA that vary highly between people. These differences are called polymorphisms. Every person has a unique combination of polymorphisms and these can be analysed to give a DNA profile.</p> <p>DNA profiling is used in forensic investigations to identify human remains and reveal family relationships.</p>	<p>Mod 5 Inheritance Patterns in a Population BIO12–7, 12–12 Bands 4–6</p> <ul style="list-style-type: none"> • Gives a detailed description of the uses of DNA sequencing. <p>AND</p> <ul style="list-style-type: none"> • Gives a detailed description of the uses of DNA profiling 5 <hr/> <ul style="list-style-type: none"> • Describes some of the uses of DNA sequencing. <p>AND</p> <ul style="list-style-type: none"> • Describes some of the uses of DNA profiling 4 <hr/> <ul style="list-style-type: none"> • Describes at least ONE use of DNA sequencing. <p>AND</p> <ul style="list-style-type: none"> • Describes at least ONE use of DNA profiling 3 <hr/> <ul style="list-style-type: none"> • Describes at least ONE use of DNA sequencing. <p>OR</p> <ul style="list-style-type: none"> • Describes at least ONE use of DNA profiling 2 <hr/> <ul style="list-style-type: none"> • Provides some relevant information. 1

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>Question 25</p> <p>(a) Individuals affected by mutations can introduce new genes into a population and increase the size of the gene pool.</p> <p>Some of the changes caused by mutations in an individual’s genotype are expressed in the phenotype. These changes can be beneficial or detrimental. Natural selection will tend to favour those individuals with advantageous changes to their phenotype. The increase in the gene pool will give a wider range of characteristics and give a population a greater chance of their numbers surviving if there is a change in the environment.</p>	<p>Mod 6 Mutation BIO12–13 Bands 3–4</p> <ul style="list-style-type: none"> • Gives a detailed outline. <p>AND</p> <ul style="list-style-type: none"> • Explains that mutations can be beneficial. <p>AND</p> <ul style="list-style-type: none"> • Explains that mutations can be harmful 3 <hr/> <ul style="list-style-type: none"> • Gives a detailed outline. <p>AND</p> <ul style="list-style-type: none"> • Explains that mutations can be beneficial. <p>OR</p> <ul style="list-style-type: none"> • Explains that mutations can be harmful 2 <hr/> <ul style="list-style-type: none"> • Provides some relevant information 1

Sample answer			Syllabus content, outcomes, targeted performance bands and marking guide
(b)			Mod 6 Mutation BIO12–13 Bands 4–5
<i>Mutagen</i>	<i>Description of operation</i>	<i>Effects of mutagen</i>	<ul style="list-style-type: none"> • Draws a table with appropriate headings. <p>AND</p> <ul style="list-style-type: none"> • Identifies THREE appropriate mutagens. <p>AND</p> <ul style="list-style-type: none"> • Describes how the THREE named mutagens operate. <p>AND</p> <ul style="list-style-type: none"> • Identifies the effects of the THREE named mutagens 6 <hr/> <ul style="list-style-type: none"> • Draws a table with all FOUR of the above points, with limited detail. <p>OR</p> <ul style="list-style-type: none"> • Provides information with equivalent merit 5 <hr/> <ul style="list-style-type: none"> • Draws a table with at least THREE of the above points, with limited detail. <p>OR</p> <ul style="list-style-type: none"> • Provides information with equivalent merit 4 <hr/> <ul style="list-style-type: none"> • Draws a table with at least TWO of the above points. <p>OR</p> <ul style="list-style-type: none"> • Provides information with equivalent merit 3 <hr/> <ul style="list-style-type: none"> • Provides some relevant information 1–2
Electro-magnetic radiation and ionising radiation	High energy can cause free-radicals and damage the DNA structure, causing bases to be deleted or DNA strands to be broken.	<p>Ultra-violet (UV) radiation can affect normal replication and transcription in cells. The structure of DNA can also be distorted.</p> <p>Ionising radiation (gamma (γ) rays, X-rays, alpha (α) particles and beta (β) particles) have higher energy levels and can cause more damage than UV radiation.</p>	
Chemicals	These chemicals can resemble some bases in DNA and replace them.	This replacement causes a change in DNA, which alters the function of proteins and hence cellular processes.	
Naturally occurring mutagens	<p>Virus DNA can be inserted into the genome of another organism.</p> <p>Bacteria can cause damage to DNA.</p> <p>Transposons can move into the genome of another organism.</p>	<p>These can affect the genetic material in cells.</p> <p>These can modify the function of an existing gene.</p>	

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
Question 26	
<p>(a) The value in 2009 is 131×10^6 hectares and the value in 2018 is 192×10^6 hectares.</p> <p>Hence, the increase = $(192 - 131) \times 10^6$ $= 61 \times 10^6$ hectares.</p> <p>The percentage increase overall is $\frac{61}{131} \times 100 = 46.6\%$</p> <p>The percentage increase yearly is $\frac{46.6}{9} = 5.18\%$ (to 3 significant figures).</p>	<p>Mod 6 Biotechnology Mod 6 Genetic Technology BIO12–6, 12–13 Bands 3–4</p> <ul style="list-style-type: none"> Calculates the correct figure. <p>AND</p> <ul style="list-style-type: none"> Shows appropriate working 2 <hr/> <ul style="list-style-type: none"> Calculates the correct figure. <p>OR</p> <ul style="list-style-type: none"> Shows appropriate working 1
<p>(b) <i>For example, any two of the following benefits:</i></p> <ul style="list-style-type: none"> Genetically modified crops can be made more resistant to pests, diseases and specific herbicides. Genetically modified crops can be altered to mature more quickly and increase yield per hectare (the yield of food). Genetically modified crops can be modified to include additional nutrients such as vitamins, minerals and omega-3 oils. <p><i>For example, any two of the following drawbacks:</i></p> <ul style="list-style-type: none"> Modified genes could spread into the greater environment and confer unwanted traits to other organisms. An example of this is a type of canola plant that is not killed by a herbicide (glyphosate). If the gene giving the canola crop resistance to the weedkiller is taken in by weeds, then these weeds will no longer be able to be killed by conventional weedkillers. Consumer resistance can be an issue as some consumers see genetically modified foods as ‘not natural’ and are reluctant to buy them. Traditional (‘heirloom’) varieties of crops may no longer be used, giving less choice to consumers and creating problems with ‘monocultures’. 	<p>Mod 6 Genetic Technology BIO12–7, 12–13 Bands 3–4</p> <ul style="list-style-type: none"> Gives a detailed outline of TWO possible benefits AND TWO possible drawbacks 5 <hr/> <ul style="list-style-type: none"> Gives a detailed outline of ONE possible benefit AND ONE possible drawback. <p>OR</p> <ul style="list-style-type: none"> Identifies TWO possible benefits AND TWO possible drawbacks 3–4 <hr/> <ul style="list-style-type: none"> Identifies TWO possible benefits OR TWO possible drawbacks 2 <hr/> <ul style="list-style-type: none"> Provides some relevant information 1

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>Question 27</p> <p>Any five of:</p> <ul style="list-style-type: none"> Though the statistics given in the graphs may indicate that artificial pollination gives generally inferior results compared to natural pollination, the results could be atypical. For example, only data for one year is collected and there would need be to data collected over several years for confidence in the results to be justified. Artificial pollination removes some of the uncertainties that exist in natural pollination. There is less chance of pollination from plants outside the farm's location. The desired genetic line (and the characteristics associated with this) can be maintained by using artificial pollination. If desired, controlled crosses can be carried out to bring in new characteristics. Artificial pollination may be used if there is a lack of bees and other insects to carry out pollination around the farm. The percentage success rate of artificial pollination may be greater than other means of pollination, due to a shorter required timespan over which seeds may be pollinated. The appearance of fruit produced by artificial pollination may be more attractive. 	<p>Mod 6 Genetic Technologies BIO12–6, 12–13 Bands 4–5</p> <ul style="list-style-type: none"> Gives FIVE probable reasons 5 <hr/> Gives FOUR probable reasons 4 <hr/> Gives THREE probable reasons 3 <hr/> Gives TWO probable reasons 2 <hr/> Gives ONE probable reason 1
<p>Question 28</p> <p>(a) <i>For example:</i> COVID-19</p> <p>(b) a period of quarantine for people who have travelled between countries <i>Note: Consequential on answer to Question 28 part (a).</i></p> <p>(c) Where travel between countries occurs, travellers are placed in quarantine to allow time for symptoms to appear, or for the virus to be detected. If quarantine does not occur, an infected individual ('patient zero') could travel to one or more regions and be the source of infection in different populations. Therefore, quarantine can reduce the risk of an individual infecting populations in regions or at a local level. <i>Note: Consequential on answer to Question 28 part (b).</i></p>	<p>Mod 7 Prevention, Treatment and Control BIO12–14 Band 1</p> <ul style="list-style-type: none"> Names an infectious disease 1 <hr/> <p>Mod 7 Prevention, Treatment and Control BIO12–14 Band 3</p> <ul style="list-style-type: none"> States ONE strategy used on a global level. 1 <hr/> <p>Mod 7 Prevention, Treatment and Control BIO12–14 Bands 3–4</p> <ul style="list-style-type: none"> Analyses the strategy. <p>AND</p> <ul style="list-style-type: none"> Clearly links the strategy to impacts on regional and local areas 2 <hr/> <ul style="list-style-type: none"> Analyses the strategy. <p>OR</p> <ul style="list-style-type: none"> Gives some information about regional or local area transmission. 1

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>Question 29</p> <p><i>For example:</i></p> <p>Plant and animal diseases can have a devastating impact on agriculture, including the loss of exports and reduced employment.</p> <p>An example of a plant product is the carrot. Carrot virus Y (CarVY) is a disease that affects the roots and leaves of carrots and other plants in the same family, such as coriander and dill.</p> <p>Aphids act as a vector for the virus, spreading the virus by picking it up when eating a carrot plant and then depositing it on the next plant they eat. The virus causes the death of leaf tissue, or excessive feathering of leaves. If the virus is transferred to the plant in the first six weeks of growth, it results in shorter roots with irregular shapes. As the roots are the edible part of the plant, this makes the product unsellable. Infections after six weeks are not as damaging but still result in a loss of 30% of the crop.</p> <p>An example of an animal product is animals with hooves. Foot-and-mouth disease affects animals with hooves, such as sheep, goats and cattle. The disease is caused by viruses in the <i>Enterovirus</i> genus, most of them coxsackieviruses. The pathogens are easily spread through wool, hair, grass or straw. They can also be spread on footwear or clothing. The viruses are spread very quickly as animals may be infectious before they have symptoms, as well as after they have recovered from the disease.</p> <p>The pathogens causes lesions in the mouth and on the hooves. They also affects milk production. The pathogens may also cause death of the infected animal, even before symptoms are evident.</p>	<p>Mod 7 Cause of Infectious Diseases BIO12–14 Bands 2–5</p> <ul style="list-style-type: none"> • Gives a discussion assessing the effects of disease on agriculture. <p>AND</p> <ul style="list-style-type: none"> • Gives an example of a plant product. <p>AND</p> <ul style="list-style-type: none"> • Assesses the cause of infectious disease on a plant product. <p>AND</p> <ul style="list-style-type: none"> • Assesses the effect of infectious disease on a plant product. <p>AND</p> <ul style="list-style-type: none"> • Gives an example of an animal product. <p>AND</p> <ul style="list-style-type: none"> • Assesses the cause of infectious disease on an animal product. <p>AND</p> <ul style="list-style-type: none"> • Assesses the effect of infectious disease on an animal product. 7 <hr/> <ul style="list-style-type: none"> • Gives a discussion with at least SIX of the above points, with limited detail. <p>OR</p> <ul style="list-style-type: none"> • Provides information with equivalent merit 6 <hr/> <ul style="list-style-type: none"> • Gives a discussion with at least FIVE of the above points, with limited detail. <p>OR</p> <ul style="list-style-type: none"> • Provides information with equivalent merit 5 <hr/> <ul style="list-style-type: none"> • Gives a discussion with at least FOUR of the above points, with limited detail. <p>OR</p> <ul style="list-style-type: none"> • Provides information with equivalent merit 4

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
Question 29 (continued)	
	<ul style="list-style-type: none"> • Gives a discussion with at least THREE of the above points, with limited detail. <p>OR</p> <ul style="list-style-type: none"> • Provides information of equivalent merit 3 <hr/> <ul style="list-style-type: none"> • Gives a discussion with at least TWO of the above points, with limited detail. <p>OR</p> <ul style="list-style-type: none"> • Provides information of equivalent merit 2 <hr/> <ul style="list-style-type: none"> • Provides some relevant information 1
Question 30	
<p>(a) <i>For example:</i> <i>Phytophthora cinnamomi</i> is a mould that infects Australian plants, including <i>Lomandra longifolia</i>.</p>	<p>Module 7 Responses to Pathogens BIO12–14 Band 3</p> <ul style="list-style-type: none"> • Names a fungal or viral pathogen AND the Australian plant it infects 1
<p>(b) The plant delivers a hypersensitive response. It recognises the elicitors produced by the pathogen and responds in several ways, including increasing the production of lignin. Increased lignin in the plant cell walls prevents further infection in the remaining healthy cells, increasing the likelihood that the plant will survive the infection.</p> <p><i>Note: Consequential on answer to Question 30 part (a).</i></p>	<p>Module 7 Responses to Pathogens BIO12–14 Band 3</p> <ul style="list-style-type: none"> • Gives a detailed description of how the plant responds to the infection 2 <hr/> <ul style="list-style-type: none"> • Gives a limited description of how the plant responds to the infection 1

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>Question 31</p> <p><i>For example:</i></p> <p>Contact tracing using Quick Response (QR) codes has been an effective measure to predict and control the spread of COVID-19.</p> <p>QR codes stimulate the collection of data when a person enters a public place. If a person who has visited that space tests positive for COVID-19, all other contacts can be quickly notified. The tool is effective as it predicts the increased risk of contracting the disease.</p> <p>It also works as a control, as people who are contacted can self-isolate and, if needed, be tested for the disease, which further reduces the spread of the disease.</p>	<p>Mod 7 Treatment and Control BIO12–14 Bands 4–5</p> <ul style="list-style-type: none"> Evaluates the effectiveness of the strategy. <p>AND</p> <ul style="list-style-type: none"> Explains how the strategy is used to predict the disease. <p>AND</p> <ul style="list-style-type: none"> Explains how the strategy is used to control the disease 3 <hr/> <ul style="list-style-type: none"> Evaluates the effectiveness of the strategy. <p>AND</p> <ul style="list-style-type: none"> Explains how the strategy is used to predict the disease. <p>OR</p> <ul style="list-style-type: none"> Explains how the strategy is used to control the disease 2 <hr/> <ul style="list-style-type: none"> Evaluates the effectiveness of the strategy. <p>OR</p> <ul style="list-style-type: none"> Explains how the strategy is used to predict the disease. <p>OR</p> <ul style="list-style-type: none"> Explains how the strategy is used to control the disease 1
<p>Question 32</p> <p>(a) <i>Any one of:</i></p> <ul style="list-style-type: none"> The infection causing the symptoms in the child is most likely viral (such as a rhinovirus), not bacterial. In this case, antibiotics would not be effective. The doctor may be restricting the use of antibiotics for mild infections to reduce the development of antibiotic-resistant bacteria. 	<p>Mod 7 Prevention, Treatment and Control BIO12–14 Bands 4–5</p> <ul style="list-style-type: none"> Gives ONE valid reason why antibiotics were not prescribed 1

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>(b) Antibiotics have been overused in Australia, resulting in the evolution of antibiotic-resistant bacteria. Antibiotic-resistant bacteria, such as MRSA, may be difficult or impossible to treat.</p>	<p>Mod 7 Prevention, Treatment and Control BIO12–14 Bands 4–5</p> <ul style="list-style-type: none"> • Makes a judgement about the use of antibiotics AND provides a supporting argument 2 <hr/> <ul style="list-style-type: none"> • Makes a judgement about the use of antibiotics 1
Question 33	
<p>(a) <i>For example, any two of:</i></p> <ul style="list-style-type: none"> • What types of foods are served in the school canteen? • What percentage of the school’s students walk to school? • How many students participate in weekly sporting activities? 	<p>Mod 8 Epidemiology BIO12–15 Bands 2–3</p> <ul style="list-style-type: none"> • Proposes TWO relevant questions 2 <hr/> <ul style="list-style-type: none"> • Proposes ONE relevant question 1
<p>(b) <i>For example (How many students participate in weekly sporting activities?):</i></p> <p>An educational program could create posters for the school promoting the benefits of regular sport. Representatives and players from local sporting activities could be invited to talk at school assemblies. A short video could be created to encourage students who do not play a sport to try a new sport.</p> <p><i>Note: Consequential on answer to Question 33 part (a).</i></p>	<p>Mod 8 Epidemiology BIO12–15 Bands 3–4</p> <ul style="list-style-type: none"> • Develops an educational program with at least TWO relevant strategies 2 <hr/> <ul style="list-style-type: none"> • Develops an educational program with at least ONE relevant strategy. 1
Question 34	
<p>(a) <i>For example:</i></p> <p>Deafness is a disorder that can result from different types of damage to the ear. A cochlear implant is a device that bypasses the damaged cochlea (the part of the ear that transforms vibrations into nerve impulses). A sound processor, with a microphone to capture signals, is worn outside the ear. An implant is inserted into the inner ear which picks up signals from the processor and simulates nerves in the inner ear. From this point, normal function returns, with the nerves sending the signal to the brain to be interpreted.</p>	<p>Mod 8 Technologies and Disorders BIO12–15 Bands 2–4</p> <ul style="list-style-type: none"> • Names a disorder. <p>AND</p> <ul style="list-style-type: none"> • Gives a detailed description of technology used to assist people with the named disorder. . . . 3 <hr/> <ul style="list-style-type: none"> • Names a disorder. <p>OR</p> <ul style="list-style-type: none"> • Gives a description of technology used to assist people with a disorder 2 <hr/> <ul style="list-style-type: none"> • Provides some relevant information 1

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide								
<p>(b) <i>For example:</i></p> <p>Cochlear implants are a technology that has improved the lives of many people. Individuals with damaged cochleas can hear sounds as soon as the implant is in position and their ability to distinguish sounds improves over time. They can also usually interpret speech without the need for lipreading and those who continue to lipread use the implants to assist them. The implants also provide a clearer sound than conventional hearing aids, as hearing aids only amplify sound.</p> <p>The technology effectively assists individuals in many ways. For example, many individuals with cochlear implants can participate in auditory-based recreational activities such as listening to music. Another reason the technology is effective is that the improvement in communication can enable individuals with cochlear implants to participate in a wider range of employment opportunities.</p> <p><i>Note: Consequential on answer to Question 34 part (a).</i></p>	<p>Mod 8 Technologies and Disorders BIO12–15 Bands 3–5</p> <ul style="list-style-type: none"> Evaluates the effectiveness of the technology. <p>AND</p> <ul style="list-style-type: none"> Gives at least TWO supporting reasons 3 <hr/> <ul style="list-style-type: none"> Evaluates the effectiveness of the technology. <p>AND</p> <ul style="list-style-type: none"> Gives at least ONE supporting reason 2 <hr/> <ul style="list-style-type: none"> Evaluates the effectiveness of the technology 1 								
<p>Question 35</p> <p><i>For example:</i></p> <table border="1" style="width: 100%;"> <tr> <td style="width: 20%;"><i>Disease name</i></td> <td>Skin cancer</td> </tr> <tr> <td><i>Cause</i></td> <td>Skin cancer is a disease caused by exposure to UV radiation from the Sun.</td> </tr> <tr> <td><i>Treatment</i></td> <td>A current therapy for some skin cancers is immunotherapy, where chemicals stimulate the patient’s T cells to recognise the cancer cells as foreign and destroy them. Immunotherapy only works on some melanomas and some advanced squamous cell carcinomas. Other squamous cell carcinomas and basal cell carcinomas are not suitable for immunotherapy.</td> </tr> <tr> <td><i>Area of possible research</i></td> <td>An area of future research would be to explore immunotherapy that would stimulate T cells to attach to these types of cancer cells.</td> </tr> </table>	<i>Disease name</i>	Skin cancer	<i>Cause</i>	Skin cancer is a disease caused by exposure to UV radiation from the Sun.	<i>Treatment</i>	A current therapy for some skin cancers is immunotherapy, where chemicals stimulate the patient’s T cells to recognise the cancer cells as foreign and destroy them. Immunotherapy only works on some melanomas and some advanced squamous cell carcinomas. Other squamous cell carcinomas and basal cell carcinomas are not suitable for immunotherapy.	<i>Area of possible research</i>	An area of future research would be to explore immunotherapy that would stimulate T cells to attach to these types of cancer cells.	<p>Mod 8 Causes and Effects BIO12–15 Band 5</p> <ul style="list-style-type: none"> Names a nutritional OR environmental disease. <p>AND</p> <ul style="list-style-type: none"> Describes the cause of the disease. <p>AND</p> <ul style="list-style-type: none"> Describes the treatment for the disease. <p>AND</p> <ul style="list-style-type: none"> Outlines an area of possible research for the disease 4 <hr/> <ul style="list-style-type: none"> Gives any THREE of the above points. 3 <hr/> <ul style="list-style-type: none"> Gives any TWO of the above points. 2 <hr/> <ul style="list-style-type: none"> Provides some relevant information 1
<i>Disease name</i>	Skin cancer								
<i>Cause</i>	Skin cancer is a disease caused by exposure to UV radiation from the Sun.								
<i>Treatment</i>	A current therapy for some skin cancers is immunotherapy, where chemicals stimulate the patient’s T cells to recognise the cancer cells as foreign and destroy them. Immunotherapy only works on some melanomas and some advanced squamous cell carcinomas. Other squamous cell carcinomas and basal cell carcinomas are not suitable for immunotherapy.								
<i>Area of possible research</i>	An area of future research would be to explore immunotherapy that would stimulate T cells to attach to these types of cancer cells.								

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>Question 36</p> <pre> graph TD A[blood glucose levels fall] --> B[pancreas releases glucagon which acts on liver] B --> C[liver breaks down glycogen to glucose and releases glucose] C --> D[blood glucose levels return to normal] D --> E[blood glucose levels rise] E --> F[pancreas releases insulin] F --> G[body cells take up more glucose] G --> D </pre> <p>The diagram is a flowchart illustrating the homeostatic response to low blood glucose. It begins with a box labeled 'blood glucose levels fall'. An arrow points to a box 'pancreas releases glucagon which acts on liver'. From there, an arrow points to 'liver breaks down glycogen to glucose and releases glucose'. This leads to 'blood glucose levels return to normal'. From this central 'normal' box, two arrows branch out: one to 'blood glucose levels rise' and another to 'blood glucose at normal level'. From 'blood glucose levels rise', an arrow points to 'pancreas releases insulin', which then leads to 'body cells take up more glucose'. Finally, an arrow from 'body cells take up more glucose' points back to 'blood glucose levels return to normal'. The labels 'student B' and 'student A' are placed near the arrows between 'pancreas releases glucagon...' and 'liver...', and between 'pancreas releases insulin' and 'body cells take up more glucose' respectively.</p>	<p>Mod 8 Homeostasis BIO12–15 Bands 3–6</p> <ul style="list-style-type: none"> • Correctly places student A in the diagram. <p>AND</p> <ul style="list-style-type: none"> • Correctly places student B in the diagram. <p>AND</p> <ul style="list-style-type: none"> • Shows the correct fall and rise in blood sugar. <p>AND</p> <ul style="list-style-type: none"> • Shows the pancreas releasing the correct hormone. <p>AND</p> <ul style="list-style-type: none"> • Shows the correct response of body tissues. <p>AND</p> <ul style="list-style-type: none"> • Shows the correct corresponding change in blood glucose levels 6 <hr/> <ul style="list-style-type: none"> • Draws a diagram with at least FIVE of the above points. <p>OR</p> <ul style="list-style-type: none"> • Provides information with equivalent merit 5 <hr/> <ul style="list-style-type: none"> • Draws a diagram with at least FOUR of the above points. <p>OR</p> <ul style="list-style-type: none"> • Provides information with equivalent merit 4 <hr/> <ul style="list-style-type: none"> • Draws a diagram with at least THREE of the above points. <p>OR</p> <ul style="list-style-type: none"> • Provides information with equivalent merit 3

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
Question 36 (continued)	
	<ul style="list-style-type: none"> • Draws a diagram with at least TWO of the above points. <p>OR</p> <ul style="list-style-type: none"> • Provides information with equivalent merit 2 <hr style="width: 100%;"/> <ul style="list-style-type: none"> • Provides some relevant information 1