



**2021**  
**TRIAL HIGHER SCHOOL CERTIFICATE**  
**EXAMINATION**

**MARKING GUIDELINES**

# Biology

**Section I**  
**20 marks**

**Questions 1-20 (1 mark each)**

<b>Question</b>	<b>Answer</b>	<b>Outcomes Assessed</b>	<b>Targeted Performance Bands</b>
1	A	BIO12-12, BIO12-6	2-4
2	B	BIO12-14	2-4
3	D	BIO12-12, BIO12-6	2-4
4	D	BIO12-15	2-4
5	D	BIO12-15, BIO12-5	2-4
6	A	BIO12-12	3-5
7	C	BIO12-13	3-5
8	C	BIO12-15	3-5
9	A	BIO12-14, BIO12-6	3-5
10	C	BIO12-14, BIO12- 5	3-5
11	D	BIO12-12, BIO12-6	3-5
12	C	BIO12-12, BIO12-6	3-6
13	B	BIO12-12, BIO12-6	3-6
14	C	BIO12-13, BIO12- 4	3-6
15	B	BIO12-12, BIO12- 6	3-6
16	A	BIO12-15, BIO12-6	3-6
17	D	BIO12-15, BIO12-4, BIO12-5	3-6
18	A	BIO12-12, BIO12-4, BIO12-6	3-6
19	B	BIO12-14, BIO12-4, BIO12-5	4-6
20	B	BIO12-13, BIO12-5, BIO12-6	4-6

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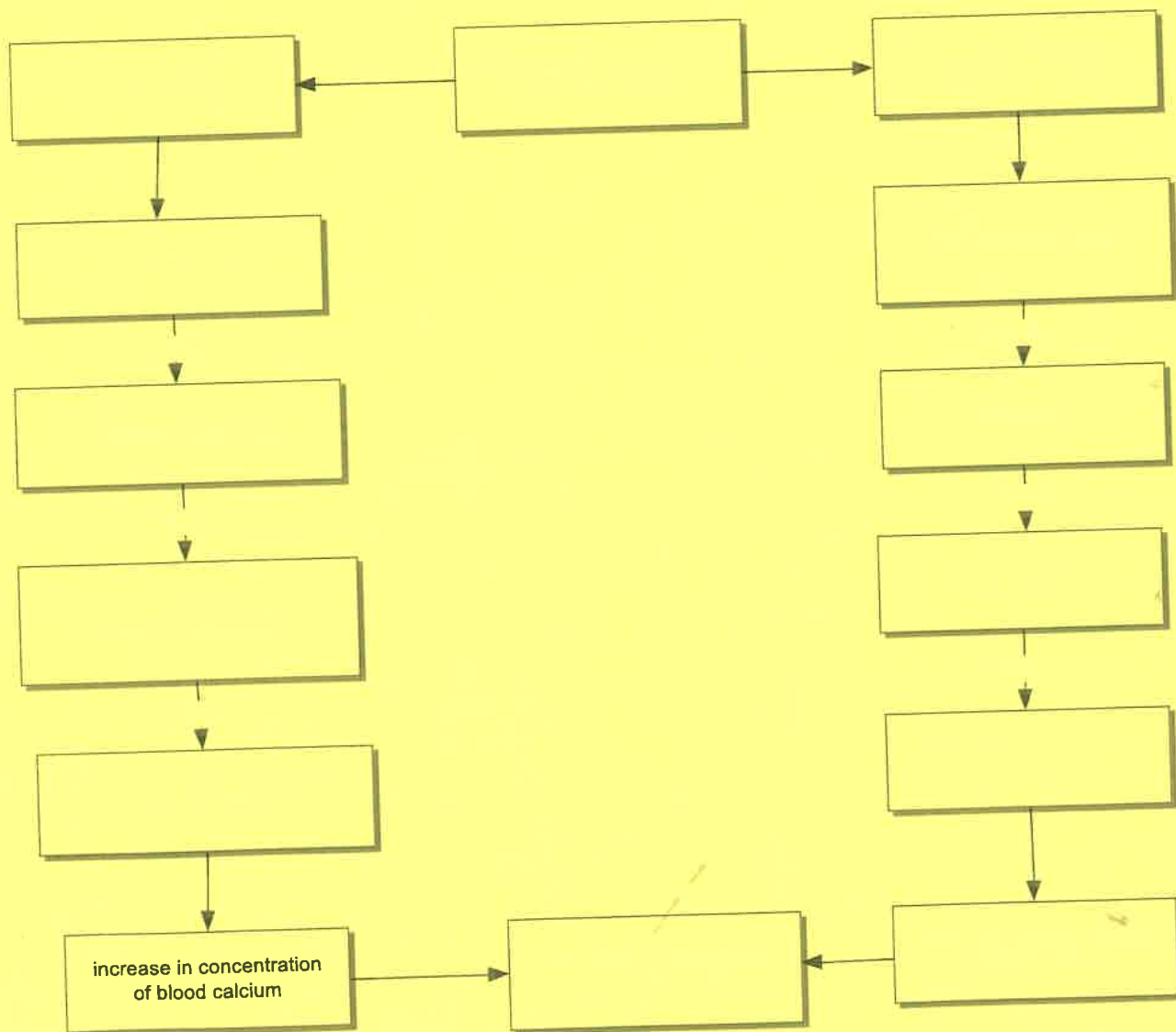
**Section II**  
80 marks

(3 marks)  
Assessed: BI

**Targeted Performance**

Criteria		
• Completes	the flow	
• Demonstrates	of	1

**Sample Answer:**



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**Question 22 (6 marks)****Outcomes Assessed:** BIO12-14, BIO12-1, BIO12-2, BIO12.3**Targeted Performance Bands:** 2-5

Criteria	Marks
<ul style="list-style-type: none"> <li>Provides a plausible hypothesis, a logical, valid and reliable procedure that includes all variables, reference to safe work practices, sterile technique and incubation</li> </ul>	6
<ul style="list-style-type: none"> <li>Provides a plausible hypothesis, reference to safe work practices and a valid and reliable procedure that includes most components</li> </ul>	5
<ul style="list-style-type: none"> <li>Provides a hypothesis, reference to safety and a procedure that includes some components</li> </ul>	3-4
<ul style="list-style-type: none"> <li>Provides a hypothesis OR refers to safety AND</li> <li>Outlines a procedure OR identifies any TWO variables</li> </ul>	2
<ul style="list-style-type: none"> <li>Some relevant information</li> </ul>	1

**Sample Answer:****Hypothesis:** Plates with milk that has passed the “use by date” will have the most microbial growth.**Safe work practices:**

Material/Procedure	Risk + Assess	How to control the risk
Bunsen burner or Inoculation loop	Burns- moderate risk	Only use blue flame to sterilize the inoculating loop and immediately turn Bunsen burner to yellow safety flame to make it less hot and more visible. Tie long hair back to avoid burns. Do not touch the barrel of the Bunsen burner after it is used. Hold by the stand only if the stand is heat-proof. Do not touch the wire end of the inoculating loop after it is heated. Hold it by the heat-proof handle.
Milk samples	Exposure to potential microbes in the milk samples – moderate risk	Wear gloves and sterilise all equipment; disinfect working area before and after inoculation and wash hands well.
Incubated plates	Exposure to microbial colonies could cause disease- high risk	Tape the plates and do not open during the examination; wash hands after examination and sterilise working surface to avoid future contaminations. Dispose plates using an autoclave.

**Method:**

1. Prepare 15 sterilised nutrient agar plates and store inverted in a fridge. (i.e agar in upper dish, cover on bottom).
2. Sterilise lab bench to avoid future contaminations.
3. Label 5 plates 'old milk', 5 'fresh milk' and 5 'control'.
4. Use sterile technique and a sterile inoculating loop to inoculate plates labelled 'old milk' with milk that is past its 'use by date'.

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5. Use sterile technique and a sterile inoculating loop to inoculate plates labelled 'fresh milk' with milk that has not reached its 'use by date'.
6. 5 plates labelled 'control' are not exposed to air or inoculated with anything. This is the experimental control used to ensure that the experiment is valid.
7. Tape all plates around the rim with masking tape making sure a centimetre is left un-taped to allow for condensation to escape.
8. Incubate all plates inverted in an incubator at a temperature of 30 degrees Celsius.
9. Observe these plates after the incubation period ie 4 days
10. Without opening the plates, count and record the approximate number of microbial colonies in each plate and record these results.

NOTE: (1) Numbered steps are not mandatory. (2) Risk assessment in the sample answer is detailed. Details are not mandatory.

### Question 23 (6 marks)

(a) (3 marks)

**Outcomes Assessed:** BIO12-15, BIO12-4, BIO12-5, BIO12-7

**Targeted Performance Bands:** 2-5

Criteria	Marks
<ul style="list-style-type: none"> <li>• Outlines a similarity and a difference in the results</li> </ul>	2-3
<ul style="list-style-type: none"> <li>• Uses data to support reason for difference</li> </ul>	1
<ul style="list-style-type: none"> <li>• Identifies any trend in the graph</li> </ul>	

#### Sample Answer:

Both studies show an increase in risk with an increase in alcohol consumption for women. Study A shows that the risk is higher than Study B. The risk increases notably at 30 g/day for women in Study A but at 40 g/day for the women in Study B.

Differences could be due to age / diet / medication / other drug abuse / liver size/ smoking/ nationality /ethnicity / genetics / body mass / activity levels / metabolism/existing medical conditions / study method / sample size

### Question 23

(b) (3 marks)

**Outcomes Assessed:** BIO12-15, BIO12-4, BIO12-5, BIO12-7

**Targeted Performance Bands:** 2-5

Criteria	Marks
<ul style="list-style-type: none"> <li>• Identifies evidence for males and females from the graph and describes clearly and accurately how it shows that the risk is linked to gender</li> </ul>	3
<ul style="list-style-type: none"> <li>• Identifies one piece of evidence from the graph and outlines how it shows that the risk is linked to gender</li> </ul>	2
<ul style="list-style-type: none"> <li>• Some relevant information about the risk being linked to gender</li> </ul>	1

#### Sample Answer:

Yes, risk of developing cirrhosis is linked to gender. Each study found women to have a greater risk than men with the increase in alcohol consumption. In Study A, the relative risk for women is above

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4 at a 30g/day compared to a risk of below 4 at the same consumption rate. The same pattern is observed in Study B.

Study A and Study B show that the risk increases notably at 50 g/day for men but at 30 and 40 g/day respectively for women.

In both studies the gradient of increased risk is smaller for men than women which means that risk increases more rapidly for women than for men.

**Question 24 (5 marks)**

**Outcomes Assessed:** BIO12-12, BIO12-7

**Targeted Performance Bands:** 2-5

Criteria	Marks
<ul style="list-style-type: none"> <li>Demonstrates a thorough understanding of both asexual and sexual plant reproduction</li> </ul>	4-5
<ul style="list-style-type: none"> <li>Demonstrates a thorough understanding of either asexual or sexual plant reproduction with some knowledge of the other</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>Demonstrates knowledge of both types of reproduction with limited knowledge of advantages</li> </ul>	2-3
<ul style="list-style-type: none"> <li>Demonstrates some knowledge of either asexual or sexual reproduction</li> </ul>	1

**Sample Answer:**

Type of reproduction	Asexual	Sexual
Definition	Involves only one parent and gives rise to offspring that are genetically identical to each other and to the original parent.	During sexual reproduction, a combination of genetic material from two parents is passed on to offspring so offspring differ from each other and their parents.
Description	Vegetative propagation can take a variety of forms. Underground stems called rhizomes, suckers, or above ground runners result in the growth of a new plant.	Involves the production of flowers with male and female parts. The male sex cells are inside pollen grains and fertilise the ova which are inside the ovary of the flower. After fertilisation the ovary forms a fruit with seeds inside. Seeds germinate to form new plants.
Advantages	Allows rapid colonisation of a new area.	Produces greater genetic diversity in offspring, and thus a greater chance of species survival in a changing environment.

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**Question 25 (4 marks)****Outcomes Assessed:** BIO12-12, BIO12-4, BIO12-7**Targeted Performance Bands:** 3-5

Criteria	Marks
<ul style="list-style-type: none"> <li>• Demonstrates a thorough knowledge of genetic diversity</li> <li>• Explains clearly the link between genetic diversity and variations to environmental changes</li> <li>• Uses data from the graph</li> </ul>	4
<ul style="list-style-type: none"> <li>• Demonstrates a thorough knowledge of genetic diversity</li> <li>• Outlines the link between genetic diversity and variations to environmental changes</li> <li>• Uses data from the graph</li> </ul>	3
<ul style="list-style-type: none"> <li>• Outlines genetic diversity and makes a link between genetic diversity and variation to environmental changes</li> </ul>	2
<ul style="list-style-type: none"> <li>• Some relevant information</li> </ul>	1

**Sample Answer:**

Genetic diversity is the sum of all the genetic characteristics in the genetic makeup of a species. It is dependent on the tendency of individual genetic traits in a population to vary. Species that have a greater degree of genetic diversity have a greater potential to adapt and survive.

As shown in the graph, cheetah has the lowest genetic diversity of the listed cats as its frequency of polymorphic loci is only 4% compared to that of each of the tiger (10%), ocelot (21%) and domestic cat (23%).

The lack of genetic variation results in a lack of variations in traits that have a selective advantage/survival value under changing environmental selection pressures. Hence the cheetah is less likely to survive when the environment changes compared to the other types of cats, and therefore more at risk of extinction.

**Question 26 (4 marks)****Outcomes Assessed:** BIO12-13, BIO12-7**Targeted Performance Bands:** 3-5

Criteria	Marks
<ul style="list-style-type: none"> <li>• Names an appropriate genetic technology</li> <li>• Explains benefits for society of research into this technology</li> <li>• Makes a judgment about the benefits of the named technology</li> </ul>	4
<ul style="list-style-type: none"> <li>• Names an appropriate genetic technology.</li> <li>• Outlines a potential benefit of the technology for society</li> <li>• Makes a judgement about the benefits of the named technology.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Names an appropriate genetic technology and outlines its use.</li> <li>• Describes a potential benefit of the technology for society</li> </ul>	2-3
<ul style="list-style-type: none"> <li>• Provides some relevant information</li> </ul>	1

**Sample Answer with two examples:**

Recombinant DNA technology makes it possible to insert a gene from one species into the genome of another species to produce new genetic combinations.

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Example 1: Hepatitis B (Hep B) is a disease which has caused major loss of life over the years. Treatment for the disease is very expensive and recovery rate is low. Vaccines have been produced against Hep B but its high cost has limited its use in developing countries. In recent years edible vaccines which are cheap compared to the traditional vaccines are being researched and developed. Researchers are using recombinant DNA technology to engineer a banana to produce an antigen found in the outer coat of the Hep B virus. When consumed it causes an immune response that builds antibodies just as a vaccine would. In this way recombinant DNA technology could provide much benefit for society as the method of immunisation.

Example 2: Malaria is a disease that kills thousands of people each year but the only current existing vaccine for malaria is Mosquirix which was produced in 2015. It requires four injections and only has a low efficacy of 50% in lab trials. Further research is required to produce a vaccine that is safe, has a much higher efficacy in preventing malaria as well as a dose that can be injected once or twice to ensure the whole vaccination program is taken. This vaccine is still not licenced for use due to the problems. The use of recombinant DNA technology could be used to produce a human vaccine to interrupt the life cycle of the parasite so that when the human host is infected, the immune system can be triggered to destroy the parasite before it starts multiplying the human cells.

**Question 27 (4 marks)**

**Outcomes Assessed:** BIO12-2, BIO12-4, BIO12-5

**Targeted Performance Bands:** 3-5

Criteria	Marks
<ul style="list-style-type: none"> <li>Makes a judgement about the quality of the methodology with supporting statements relating to positive aspects and at least one negative aspect of the method.</li> <li>Makes a judgement about the announcement made by the company with a supporting statement outlining the type of further study required.</li> </ul>	4
<ul style="list-style-type: none"> <li>Identifies one positive and one negative aspect of the method AND provides some information about a further study that could be carried out. OR</li> <li>Identifies two positive aspects of the method AND provides some information about a further study that could be carried out.</li> </ul>	2-3
<ul style="list-style-type: none"> <li>Identifies one positive or one negative aspect of the method OR provides some information about a further study that could be carried out.</li> </ul>	1

**Sample Answer:**

The planned method appears to be valid because it included a large sample size and a control group. By monitoring for COVID-19 symptoms and carrying out COVID-19 testing, the researchers had a valid way of identifying which participants contracted COVID-19. This was a positive aspect of the study. Another positive aspect is that the test subjects involved in the study were diverse. However there is no information with regard to whether the researchers were careful to ensure the control group matched the test group in terms diversity e.g. age groups, gender etc. This would be required for the investigation to be valid. The procedure that was planned was not carried out exactly because a group of people receive the wrong dose of vaccine. One major issue with this aspect of the investigation is that the group which received the lower dose did not include any people aged 55+. Although the results indicate a higher efficacy in this group, since they do not have the same characteristics as the control group (which we assume to be made up of people of a variety of ages), we cannot determine whether the difference in efficacy is linked to the lower dosage or the

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difference in age. Also, the group that received the lower dosage consists of only 1,367 subjects. So while the planned methodology was sound, the actual procedure had a major flaw.

The company's statement is thus justified. The results need to be validated by carrying out a further study that includes a larger group of people of a range of age groups to ensure the lower first dosage is more effective for all, not just the under 55s.

**Question 28 (7 marks)**

(a) (3 marks)

**Outcomes Assessed:** BIO12-12, BIO12-6, BIO12-7

**Targeted Performance Bands:** 3-5

Criteria	Marks
<ul style="list-style-type: none"> <li>• Draws a Punnett square using accurate conventions and parent genotypes and includes a key</li> <li>• States the phenotypes of the offspring accurately</li> </ul>	2-3
<ul style="list-style-type: none"> <li>• Provides some relevant information</li> </ul>	1

**Sample Answer:**

Key:

A- agouti hair colour

a - black hair colour

Female genotype: Aa

Male genotype must be AA if all offspring in the litter are only ever agouti.

	A	A
A	AA	AA
a	Aa	Aa

**Question 28**

(b) (4 marks)

**Outcomes Assessed:** BIO12-12, BIO12-6, BIO12-7

**Targeted Performance Bands:** 3-5

Criteria	Marks
<ul style="list-style-type: none"> <li>• Identifies the technology used (DNA profiling or DNA sequencing)</li> <li>• Demonstrates thorough knowledge of the technology</li> </ul>	3-4
<ul style="list-style-type: none"> <li>• Identifies the technology AND</li> <li>• Identifies that DNA has to be extracted from female rabbit, the male rabbit and all the offspring OR</li> <li>• Describes the technology</li> </ul>	1-2

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**Sample Answer:**

DNA profiling can be used to determine the father of the litter. It is a scientific technique used to identify individuals by characteristics such as STRs (short tandem repeats) in their DNA. Breeder first collects the DNA from the female rabbit, both male rabbits and DNA from all the offspring in the litter. All DNA samples are then cut using the same restriction enzyme. Polymerase chain reaction (PCR) is used to increase, or amplify, the amount of DNA of the sequence under study. The samples are loaded onto electrophoresis gel. Electric current is run through the gel to separate the DNA samples into bands. Shorter fragments of DNA move through the gel more quickly and further than the larger fragments in the same time. This results in the fragments being separated by order of size. The breeder can then compare profiles of each rabbit. Offspring will match the bands from female and one of the male rabbits (father).

**Question 29 (2 marks)**

**Outcomes Assessed:** BIO12-13, BIO12-4, BIO12-6

**Targeted Performance Bands:** 4-6

Criteria	Marks
• Correctly identifies ALL three cats	2
• Correctly identifies two cats	1

**Sample Answer:**

Description	Cat
cat with functional tyrosinase	C
cat with defective tyrosinase living in a hot country	A
cat with defective tyrosinase living in a cold country	B

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**Question 30 (17 marks)**

(a) (3 marks)

**Outcomes Assessed:** BIO12-12, BIO12-7**Targeted Performance Bands:** 2-4

Criteria	Marks
<ul style="list-style-type: none"> <li>Correctly identifies hormone involved in pregnancy and uses cause and effect language to demonstrate knowledge of its importance</li> </ul>	2-3
<ul style="list-style-type: none"> <li>Correctly identifies hormone OR one relevant statement</li> </ul>	1

**Sample Answer:**

The hormone, progesterone, prepares the endometrium for implantation of the fertilised egg and then maintains a healthy pregnancy by inhibiting further ovulation, thus ensuring undisturbed foetal development throughout pregnancy.

**Question 30**

(b) (4 marks)

**Outcomes Assessed:** BIO12-14, BIO12-7**Targeted Performance Bands:** 2-5

Criteria	Marks
<ul style="list-style-type: none"> <li>Demonstrates thorough knowledge of two chemical changes in body cells and tissues</li> </ul>	3-4
<ul style="list-style-type: none"> <li>Names two chemical changes OR</li> <li>Demonstrates thorough knowledge of one chemical change</li> </ul>	1-2

**Sample Answer:**

Mast cells (that are found at the boundaries between tissues and the external environment, for example, at epithelial cells of the nasal passage) when stimulated by the cold virus, release chemical substances such as histamine that cause dilation and permeability of blood vessels and activates most other steps in inflammation response.

Cytokines like interferons are produced by virus-infected cells and inhibit viral replication. Other cytokines like chemokines attract white blood cells to the site of infection ie nasal passage.

**Question 30**

(c) (4 marks)

**Outcomes Assessed:** BIO12-13, BIO12-7**Targeted Performance Bands:** 4-5

Criteria	Marks
<ul style="list-style-type: none"> <li>Defines point mutation and uses cause and effect language to link the mutation with resultant polypeptide structure and its effect</li> </ul>	3-4
<ul style="list-style-type: none"> <li>Define point mutation OR</li> <li>Demonstrates an understanding about how a protein is responsible for human anatomy.</li> </ul>	1-2

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**Sample Answer:**

Point mutations are changes to a single base pair (C-G or A-T) of DNA and affect only a single gene. It occurs by substitution, deletion or insertion and can have one of three effects. The altered codon could correspond to the same amino acid, or it could be a missense mutation where the altered codon corresponds to a different amino acid, or it could be a nonsense mutation where the altered codon corresponds to a stop signal. If the point mutation results in a change an amino acid or a stop codon, there will be a very noticeable effect on the resulting protein which could be non-functional and this will have a major phenotypic effect. The mutation in the base pair causes an error in the translation of polypeptides and the proteins responsible for making tissue and organs in the foetus for example abnormality in the ears.

**Question 30**

(d) (6 marks)

**Outcomes Assessed:** BIO12-15, BIO12- 7

**Targeted Performance Bands:** 2-5

Criteria	Marks
<ul style="list-style-type: none"><li>• Demonstrates thorough knowledge of a named technology used for reduced kidney function or hearing loss</li><li>• Shows clearly how hearing difficulties are overcome using the technology</li><li>• Provides benefits or limitations for the named technology that is linked to a judgement about the effectiveness of this technology</li><li>• Demonstrates coherence and logical progression and includes correct use of biological terms</li></ul>	6
<ul style="list-style-type: none"><li>• Demonstrates a sound knowledge of a named technology used for reduced kidney function or hearing loss</li><li>• Provides benefits or limitations for the named technology that is linked to a judgement about the effectiveness of this technology</li><li>• Communicates using clear written expression and uses some biological terms</li></ul>	4-5
<ul style="list-style-type: none"><li>• Demonstrates a basic understanding of a named technology used for reduced kidney function or hearing loss</li><li>• Provides benefits/or limitations for the named technology</li><li>• Communicates in a basic manner and uses some general terms</li></ul>	2-3
<ul style="list-style-type: none"><li>• Provides some relevant information about a technology used for reduced kidney function or hearing loss</li></ul>	1

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**Sample Answer:**

Technology	Cochlea implant
Description	Sound waves are sent to the speech processor, which is usually behind the ear. The speech processor converts sound waves into <b>electrical</b> signals. The electrical signals are sent to a transmitter, which is located on the outside of the ear. The transmitter turns the electrical signal into <b>radio waves</b> . The transmitter sends radio waves to the implanted receiver. The receiver picks up the radio waves and turns them back into <b>electrical</b> signals. The electrical signals go to the electrodes fitted to the cochlea; then these electrodes excite the auditory nerve. In this way, sound bypasses the inner ear which is not functioning.
Effectiveness	<p>Benefits:</p> <ul style="list-style-type: none"> <li>• Directly stimulates the auditory nerve therefore bypassing the middle ear and hair cells. In this way it can be used when hearing aids do not help</li> <li>• It enables the person to hear conversations more effectively.</li> <li>• The user has the ability to hear potential dangers or alerts such as sirens and other important sounds.</li> <li>• The user can learn rhythms and spoken language and does not have to depend on sign languages or lip reading so they can integrate in society.</li> <li>• The user has more control over their daily activities, which improves the quality of their personal, social and professional life.</li> <li>• Users can communicate using some telephones and mobile phones</li> <li>• Increased career opportunities</li> </ul> <p>Limitations:</p> <ul style="list-style-type: none"> <li>• Risks associated with the surgery that requires a general anaesthetic including risks to the facial nerves and the chance of infection.</li> <li>• Hearing sounds with a cochlear implant is different from normal hearing. Recipients need to learn to interpret sounds that they may hear. It may take some time and experience before sound recognition improves.</li> <li>• Ongoing costs for updating</li> </ul>
Judgement	After examining points for and against the technology it is clear that cochlea implants can significantly improve the life of profoundly deaf people.

**Question 31 (8 marks)**

(a) (2 marks)

**Outcomes Assessed:** BIO12-14, BIO12-7

**Targeted Performance Bands:** 2-4

Criteria	Marks
• Provides a valid explanation of the ineffectiveness of antibiotics in controlling the flu epidemic, using cause and effect language	2
• Provides a reason why antibiotics would be ineffective	1

**Sample Answer:**

No, antibiotics would not have brought the pandemic under control because the Spanish flu is a viral disease. Antibiotics are only effective against bacteria, so they would have had no effect on the flu virus and it would have continued to spread.

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**Question 31**

(b) (6 marks)

**Outcomes Assessed:** BIO12-14, BIO12-7**Targeted Performance Bands:** 2-6

Criteria	Mark
• Makes a judgement which is supported by at least 2 examples where the mode of transmission is clearly linked to the disease control measures	5-6
• Explains using at least 2 examples how an understanding of mode of transmission of disease is linked to disease control	3-4
• Identifies the mode of transmission for two diseases OR • Identifies the mode of transmission and a control measure for a disease	2
• Some relevant information	1

**Sample Answer:**

Understanding the mode of transmission of an infectious disease is critical to controlling its spread. This can be illustrated with the examples below.

Disease	Mode of transmission	How the spread of this disease is controlled.
Cholera	Oral faecal route	Since the disease can be passed on by drinking water contaminated with sewage, sanitation can reduce the spread of cholera. Providing hand washing facilities in public bathrooms and education campaigns reminding people to wash their hands after using the bathroom can also play an important role in reducing the spread of cholera.
AIDS	HIV, the virus that causes AIDS is transmitted via body fluids during sexual intercourse, or when infected blood enters the body (eg: during a medical procedure such as an injection or via a wound).	Knowing how the disease is transmitted means that people who are HIV positive can take steps to ensure they do not transfer the virus to other people, by not having unprotected sex or sharing any items like needles that may come in contact with their blood. Additionally, health professionals can take steps to reduce the risk of transmitting HIV and other blood borne pathogens by ensuring that all medical equipment is properly sterilised between patients.

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**Question 32 (7 marks)**

(a) (3 marks)

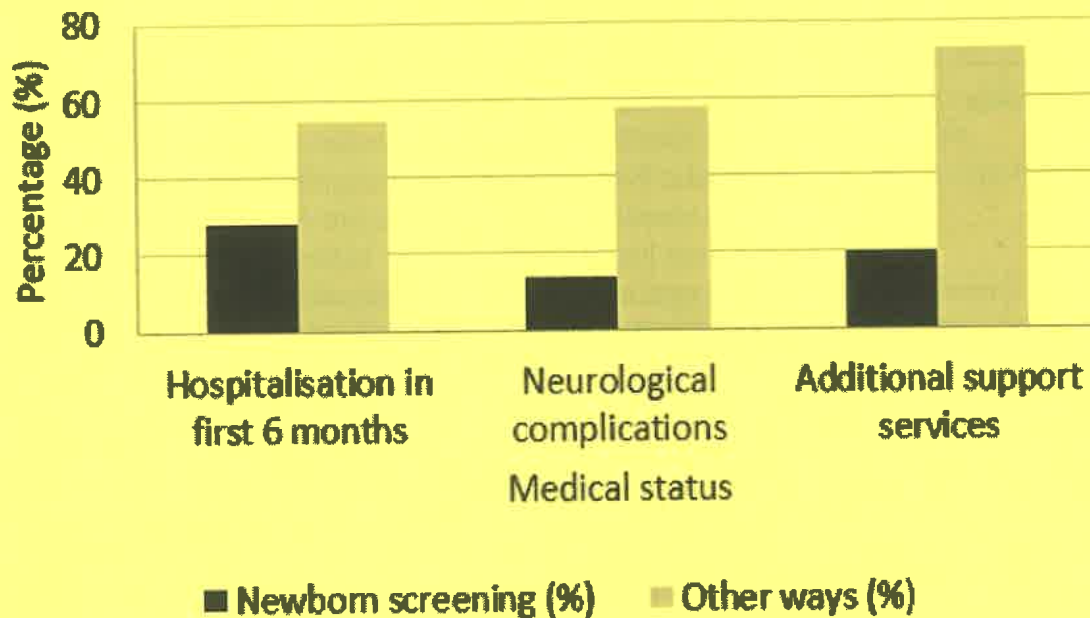
**Outcomes Assessed:** BIO12-13, BIO12-15, BIO12-4, BIO12-7

**Targeted Performance Bands:** 2-6

Criteria	Marks
<ul style="list-style-type: none"> <li>• Constructs an appropriate graph that includes a key with:                             <ul style="list-style-type: none"> <li>○ x and y axes labelled correctly</li> <li>○ y-axis scaled correctly</li> <li>○ data plotted accurately</li> </ul> </li> </ul>	3
<ul style="list-style-type: none"> <li>• Constructs a substantially correct graph</li> </ul>	2
<ul style="list-style-type: none"> <li>• Provides some relevant information</li> </ul>	1

**Sample Answer:**

**Medical status of children whose genetic condition was diagnosed through newborn screening versus other ways**



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**Question 32**

(b) (4 marks)

**Outcomes Assessed:** BIO12-13, BIO12-15, BIO12-4, BIO12-7**Targeted Performance Bands:** 2-6

Criteria	Marks
<ul style="list-style-type: none"> <li>• Uses cause and effect language to explain the social implications associated with newborn screening for genetic diseases</li> <li>• Demonstrates coherence and logical expression</li> </ul>	4
<ul style="list-style-type: none"> <li>• Describes social implications associated with newborn screening for genetic diseases</li> <li>• Communicates using clear written expression</li> </ul>	3
<ul style="list-style-type: none"> <li>• Outlines a social implication associated with newborn screening for genetic diseases</li> <li>• Communicates in a basic manner</li> </ul>	2
<ul style="list-style-type: none"> <li>• Provides some relevant information about a social implication associated with newborn screening for genetic diseases</li> </ul>	1

Social implications of newborn screening for genetic diseases:

- Early diagnosis of a genetic disease because of newborn testing may lower health care burden since the genetic disease could be managed or treated before symptoms become more severe. This would result in a reduced cost for the family and lower the burden on the health care system.
- Early diagnosis of a genetic disease because of newborn testing may increase survival rates and improve quality of life for the infant and its parents/family
- Early diagnosis of a genetic disease because of newborn testing may could prepare the family for complications so symptoms could be monitored more vigilantly, and appropriate health care professionals consulted. Early diagnosis would allow the family time to consider various treatment options and seek counselling regarding gene therapy.

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**Question 33 (7 marks)**

**Outcomes assessed:** BIO12-14, BIO12-5, BIO12-7

**Targeted Performance Bands:** 2-6

Criteria	Marks
<ul style="list-style-type: none"> <li>Compares the two named processes including a thorough description of each process</li> <li>Makes a judgement about the effectiveness of both models supported by a thorough understanding of the aspects of the model that are effective and those that could be improved</li> <li>Constructs a logical table and includes correct use of biological terms</li> </ul>	7
<ul style="list-style-type: none"> <li>Compares the two named processes including a sound description of each process</li> <li>Makes a judgement about the effectiveness of both models supported by a sound understanding of the aspects of the model that are effective and those that could be improved</li> <li>Constructs a table and includes correct use of some biological terms</li> </ul>	5-6
<ul style="list-style-type: none"> <li>Compares some aspects of the processes modelled in the diagrams</li> <li>Attempts to make a judgement about the effectiveness of the models</li> </ul>	3-4
<ul style="list-style-type: none"> <li>Compares some aspects of the processes modelled in the diagrams</li> </ul>	1-2

**Sample Answer:**

Model	1	2
<b>Process represented</b>	Phagocytosis	Production of antibodies by plasma cells
<b>Description</b>	The process by which phagocytes (WBCs) change shape and engulf a foreign particle, releasing enzymes to destroy it. The main types of phagocytes are neutrophils, macrophages and natural killer cells.	Helper T cells activate the production of many clones of B cells that are specific for the antigen. These B cells differentiate into plasma cells which produce antibodies that are specific to the pathogen. Antibodies work in a variety of ways to inactivate or destroy the pathogen.
<b>Specific/ Non-specific</b>	Non-specific	Specific
<b>Line of defence</b>	2 <sup>nd</sup>	3 <sup>rd</sup>
<b>Effectiveness of model</b>	The model effectively represents the phagocyte engulfing the bacterium, but it does not provide any information about how the white blood cells are attracted to the area and leak out of blood vessels. It also does not show what happens next, how the white blood cells display fragments of the pathogen, which in turns activate other parts of the immune system.	The model effectively shows the production of antibodies and how they attach to the virus. It does not provide any information about the activation of B cells, how antibodies work, the fact that antibodies are specific, or the production of memory B cells.
<b>Judgement</b>	This model is suitable for high school students. The model is only for phagocytosis and not for the second line of defence. So, it is an effective model.	This model is suitable to demonstrate the production of antibodies and their action on a virus for high school students. It is an effective model for antibody production only.

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