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Student Number

2024
Higher School Certificate
Trial Examination

Year 12

Biology

General Instructions

- Reading time – 5 minutes
- Working time – 3 hours
- Write using black pen
- Draw diagrams using pencil
- Show all relevant working in questions involving calculations
- NESA approved calculators may be used
- Use the Multiple Choice Answer Sheet provided
- Write your Student Number in the space provided and where indicated

Total marks – 100

Section I 20 marks

- Attempt Questions 1-20
- Allow about 35 minutes for this part

Section II 80 marks

- Attempt Questions 21-33
- Each question is followed by lines which give an indication of the length of answer required
- Allow about 2 hours and 25 minutes for this section

Section I

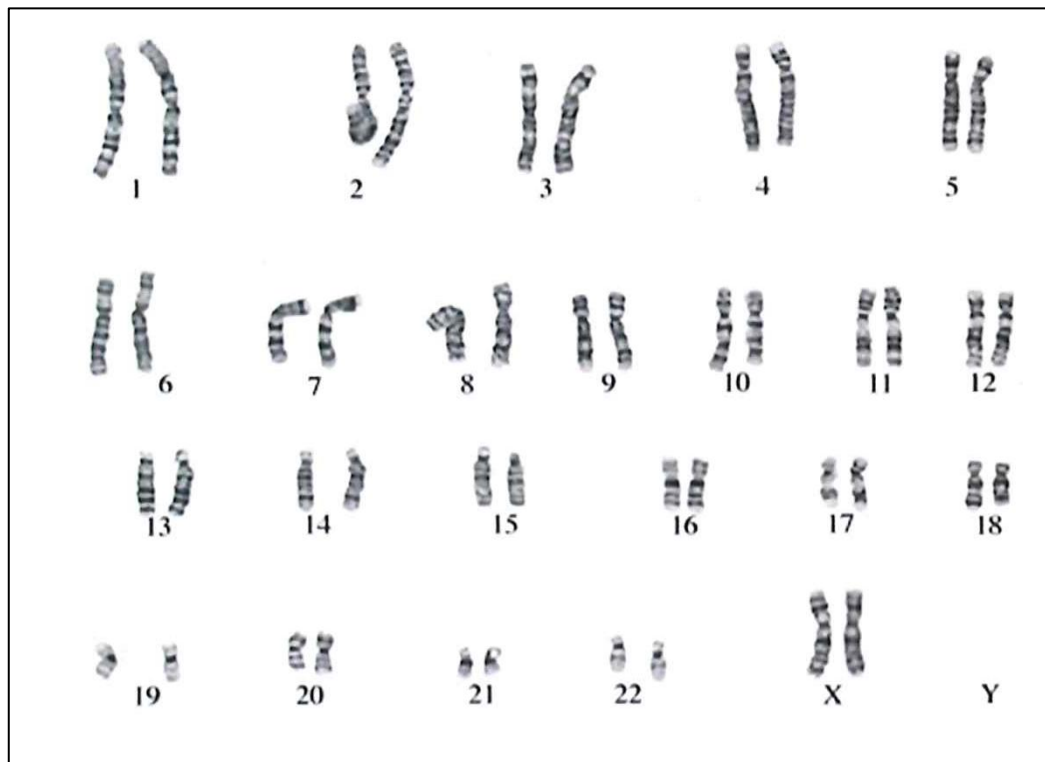
20 marks

Attempt Questions 1–20

Allow about 35 minutes for this part

Use the Multiple Choice answer sheet provided

- 1 The karyotype below shows the chromosomes present in the nucleus of a human cell.



The cell must be a:

- A. sperm cell
- B. egg cell
- C. adult female cell
- D. adult male cell

- 2 The image depicts a human pathogen.



Adapted from <https://commons.wikimedia.org>

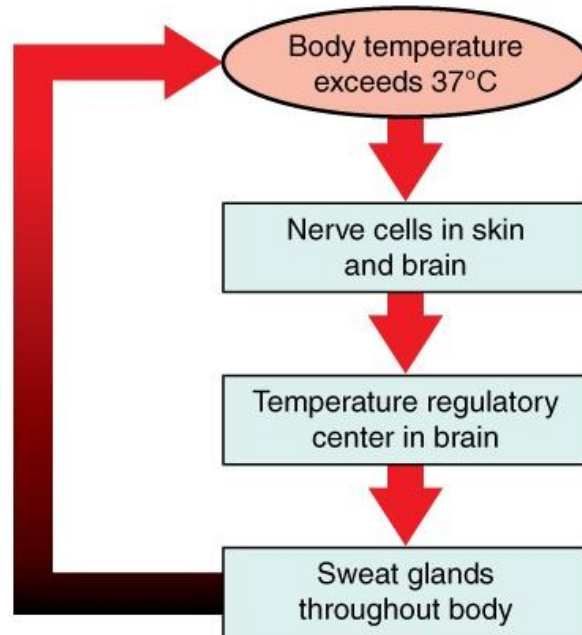
Which is the best classification of this pathogen?

- A. Prion
 - B. Bacteria
 - C. Non-cellular
 - D. Macroparasite
- 3 The hydrangea flower turns pink in alkaline soil and blue in acidic soil.

Which of the following best summarises this characteristic of hydrangea flowers?

- A. Genes affect genotypic expression
- B. Genes affect phenotypic expression
- C. Environment affects phenotypic expression
- D. Environment affects genotypic expression

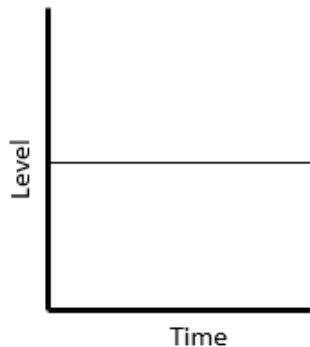
Refer to the diagram for Questions 4 and 5.



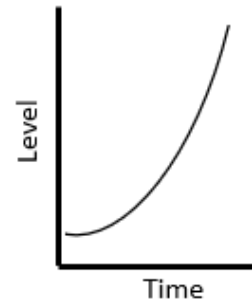
- 4 Identify the effector in the feedback loop.
- A. Body temperature exceeds 37°C
 - B. Nerve cells in skin and brain
 - C. Temperature regulatory centre in brain
 - D. Sweat glands throughout the body
- 5 In addition to the physiological response described in the feedback loop, which behavioural response might be observed in an endotherm?
- A. Long limbs
 - B. Seeking shade
 - C. Vasodilation
 - D. Huddling together

6 Which graph best represents oxytocin levels during later pregnancy and labour?

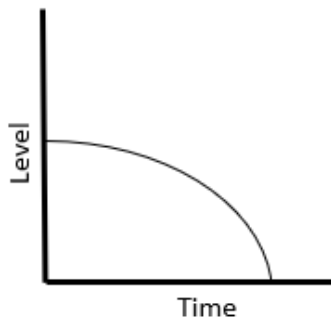
A.



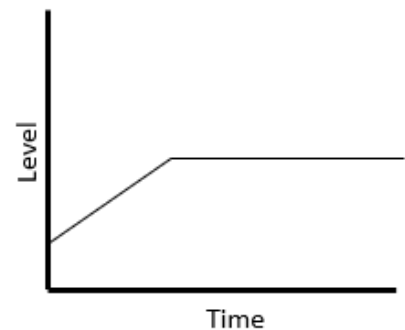
B.



C.



D.



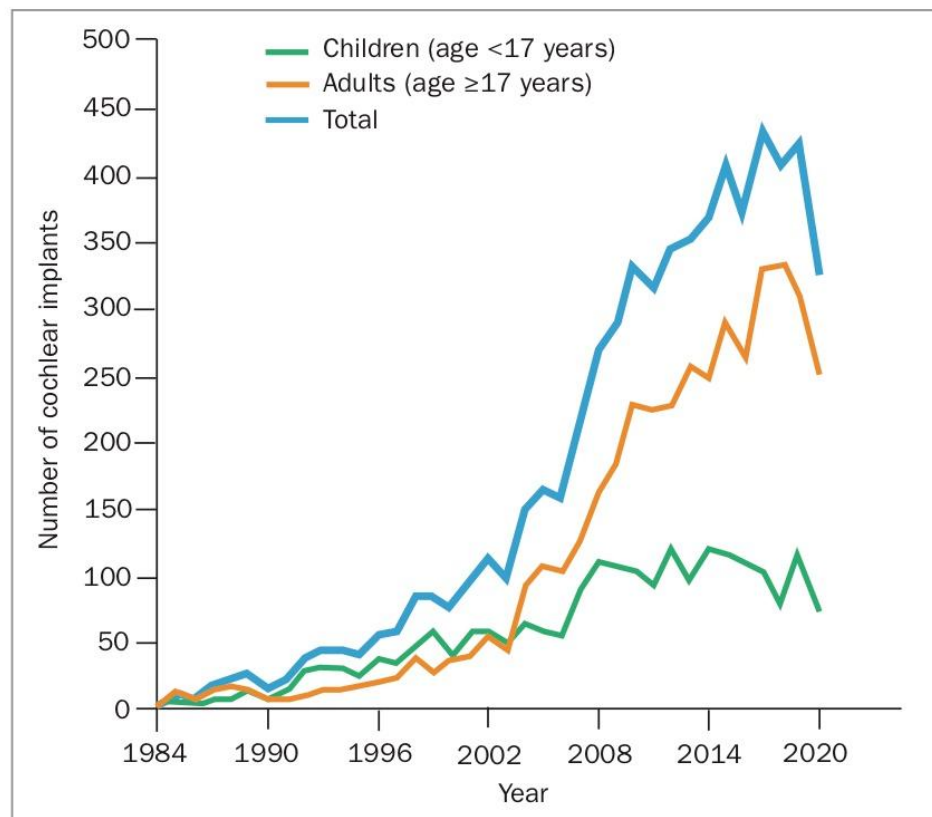
7 One of the roles of progesterone during the menstrual cycle is to

- A. cause the release of the ovum from the follicle.
- B. maintain the endometrium to help ensure pregnancy.
- C. stimulate FSH production during the follicular phase.
- D. initiate ovulation.

8 What statement accurately compares the forms in which DNA exists in eukaryotes and prokaryotes?

- A. In both eukaryotes and prokaryotes, DNA exists in linear form and is contained within the nucleus.
- B. In eukaryotes, DNA is circular and found in the cytoplasm, while in prokaryotes, DNA is linear and contained within the nucleus.
- C. Both eukaryotes and prokaryotes have circular DNA, but in eukaryotes it is found in the nucleus, while in prokaryotes it is dispersed in the cytoplasm.
- D. In eukaryotes, DNA is linear and contained within the nucleus, while in prokaryotes, DNA is circular and located in the cytoplasm.

- 9 The graph shows numbers of child and adult patients receiving cochlear implants from a leading service provider between 1984 and 2020.

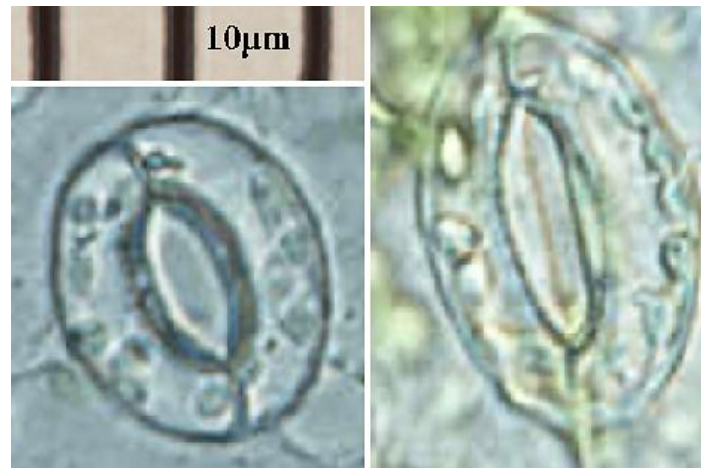


With special thanks to NextSense
Data courtesy of NextSense Cochlear Implant Services database

Which statement best describes a major trend shown in the graph?

- A. Children have lower rates of receiving cochlear implants than adults.
- B. Cochlear implants for all patients have increased in the years after 2018.
- C. 2019-2020 saw the greatest jump in people receiving cochlear implants.
- D. Cochlear implants have more than doubled between 2004 and 2009.

- 10 The image shows a plant adaptation to prevent water loss.



Adapted from <https://commons.wikimedia.org>

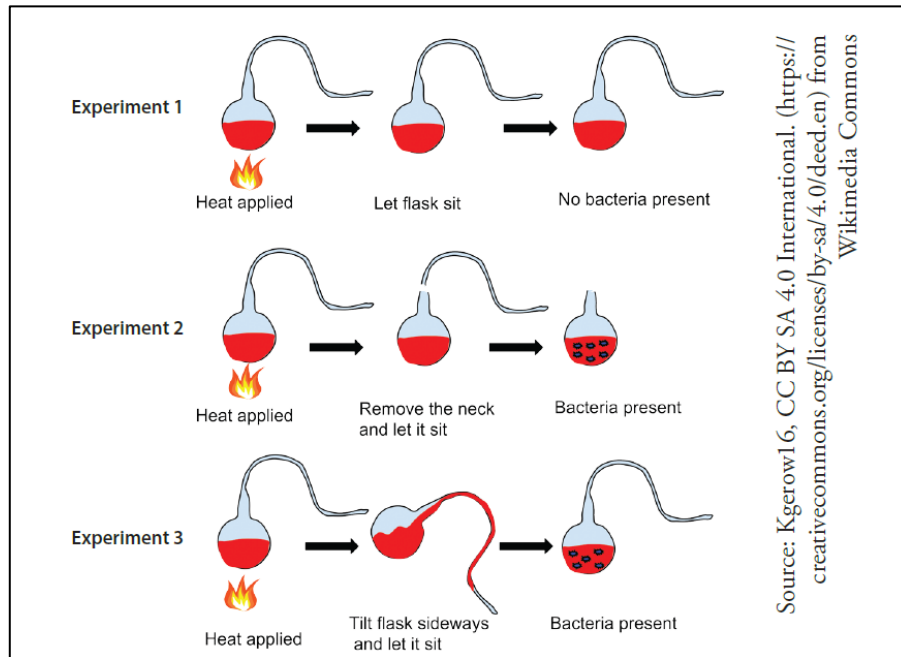
What is the plant adaptation?

- A. Spongy
- B. Waxy cuticle
- C. Open stomata
- D. Closed stomata

- 11 Which row lists the functions of mitosis?

A.	Asexual reproduction	Embryonic development	Maintenance of tissues
B.	Introducing genetic variation	Asexual reproduction	Embryonic development
C.	Maintenance of tissues	Introducing genetic variation	Asexual reproduction
D.	Embryonic development	Maintenance of tissues	Introducing genetic variation

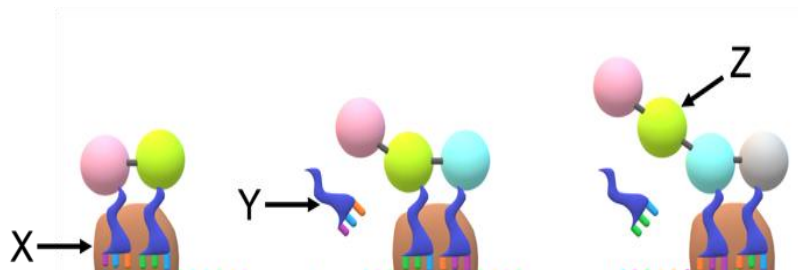
12 The Figure below depicts three of Pasteur's swan neck flask experiments.



The independent variable being tested was:

- A. the presence of decay in the flasks.
- B. the presence of bacteria in the flasks.
- C. the type of liquid in the flasks.
- D. conditions the liquid was exposed to in the flask.

- 13 The diagram represents translation in polypeptide synthesis.



Adapted from <https://commons.wikimedia.org>

Which row of the table provides the correct labels for the diagram?

	X	Y	Z
A.	Ribosome	tRNA	amino acid
B.	Ribosome	tRNA	mRNA
C.	Ribosome	mRNA	amino acid
D.	Nucleus	m RNA	DNA

- 14 A student described the structure of haemoglobin as follows:

“The haemoglobin molecule is made up of several polypeptides and each polypeptide is made up of a chain of amino acids.”

Which levels of protein structure has the student described?

- A. primary and secondary
- B. primary and tertiary
- C. primary and quaternary
- D. secondary and tertiary

- 15 Dengue fever is caused by a mosquito biting a person infected with the dengue virus and then transmitting the virus by biting another uninfected individual.

Which of the following best describes this mode of transmission?

- A. Airborne
 - B. Faeco-oral
 - C. Vector-borne
 - D. Water-borne
- 16 The hormones insulin and glucagon are produced by the pancreas and act in different ways to control blood glucose concentration and the storage of glucose (as glycogen) in muscle and liver. Which of the following correctly describes the production and action of one of these hormones?

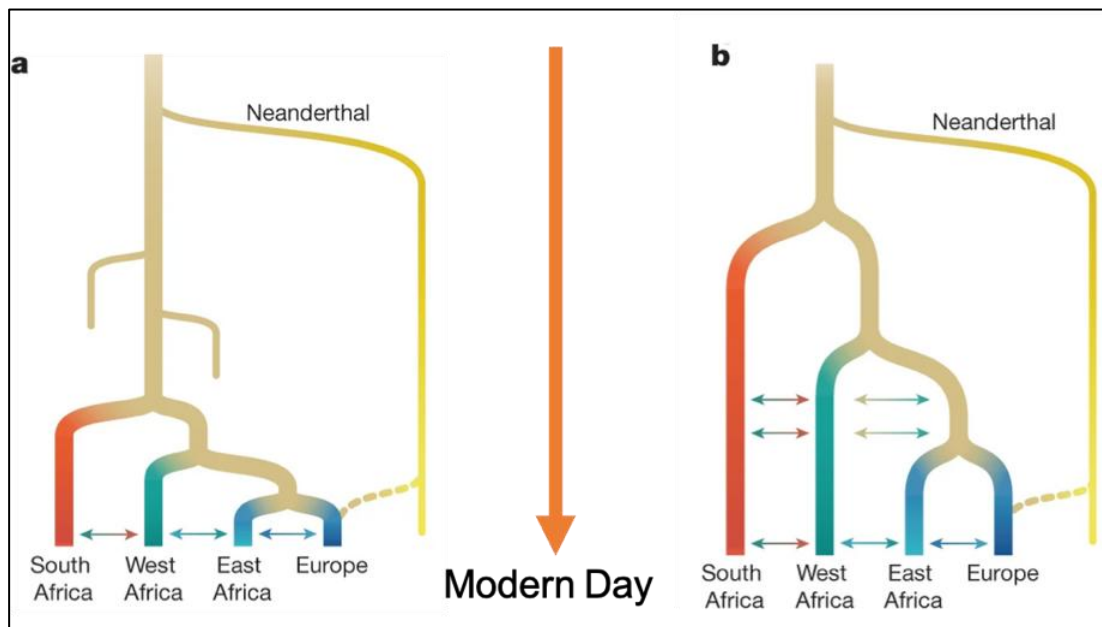
		Produced in response to:	Production inhibited by:	Effect on glycogen concentration in liver
A.	insulin	decrease in blood glucose concentration	increase in blood glucose concentration	decrease
B.	insulin	increase in blood glucose concentration	decrease in blood glucose concentration	decrease
C.	glucagon	decrease in blood glucose concentration	increase in blood glucose concentration	decrease
D.	glucagon	increase in blood glucose concentration	decrease in blood glucose concentration	decrease

- 17 LASIK surgery involves:
- A. changing the shape of eyeball so that the image falls onto the retina.
 - B. cutting the cornea to change the focus so that the image falls onto the retina.
 - C. replacing the lens so that the image falls onto the retina.
 - D. extending the eye muscles to adjust the focusing power of the lens.

- 18 A team of epidemiologists selected a group of individuals *with* a particular disease and compared them with a similar group of individuals *without* the disease to determine whether they differed in their exposure to a range of potential risk factors.

What is this an example of?

- A. A descriptive, observational study
 - B. An analytical, case-control study
 - C. A double blind, experimental study
 - D. A biased study likely to produce predetermined results
- 19 Population genetics on human evolution have generated two main human migration theories: The Out of Africa and Multiregional Hypotheses. These theories are depicted on the evolutionary trees shown.



Adapted from <https://commons.wikimedia.org>

Which trend and corresponding tree supports the multiregional hypothesis, where there was gene flow between neighbouring populations?

- A. Tree **a** as it shows gene flow in modern day
- B. Tree **a** as it shows gene flow in early history
- C. Tree **b** as it shows gene flow in modern day
- D. Tree **b** as it shows gene flow in early history

- 20 Data for the rate of hospitalisation for osteoporosis in males and females across a Range of age groups is shown in the table below.

Table 3.1: Rate of hospitalisations for osteoporosis, people aged 50 and over, by sex and age, 2016-2017

Age group	Males			Females			Persons		
	Number	Per cent	Rate ^(a)	Number	Per cent	Rate ^(a)	Number	Per cent	Rate ^(a)
50–54	85	5.0	11	159	2.8	20	244	3.3	16
55–59	118	7.0	16	324	5.7	43	442	6.0	30
60–64	187	11.1	29	391	6.9	58	578	7.8	44
65–69	224	13.3	38	536	9.4	89	760	10.3	64
70–74	222	13.2	49	680	11.9	144	902	12.2	98
75–79	224	13.3	71	794	13.9	227	1,018	13.8	153
80–84	274	16.2	133	987	17.3	386	1,261	17.1	273
85+	353	20.9	193	1,824	32.0	598	2,177	29.5	447
All ages^(b)	1,687	100	43	5,695	100	135	7,382	100	91

(a) Rate is per 100,000 population. For each sex, the age-specific rates are obtained by dividing the number of hospitalisations for each of the age groups by the population for that age group in December 2015.

(b) Age-standardised to the 2001 Australian population.

Which of the following is a correct observation from the data?

- A. Males are more susceptible to osteoporosis than females.
- B. Females are more willing to receive hospital treatment than males.
- C. Male participants make up about 77.15% of all individuals involved in the study.
- D. Female participants make up about 77.15% of all individuals involved in the study.

End of Section I

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Student Number

Section II

80 marks

Attempt Questions 21-33

Allow about 2 hours and 25 minutes for this section.

- Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.
- Show all relevant working in questions involving calculations.
- Extra writing space is provided at the back of this booklet. If you use this space, clearly indicate which question you are answering.

Question 21 (3 marks)

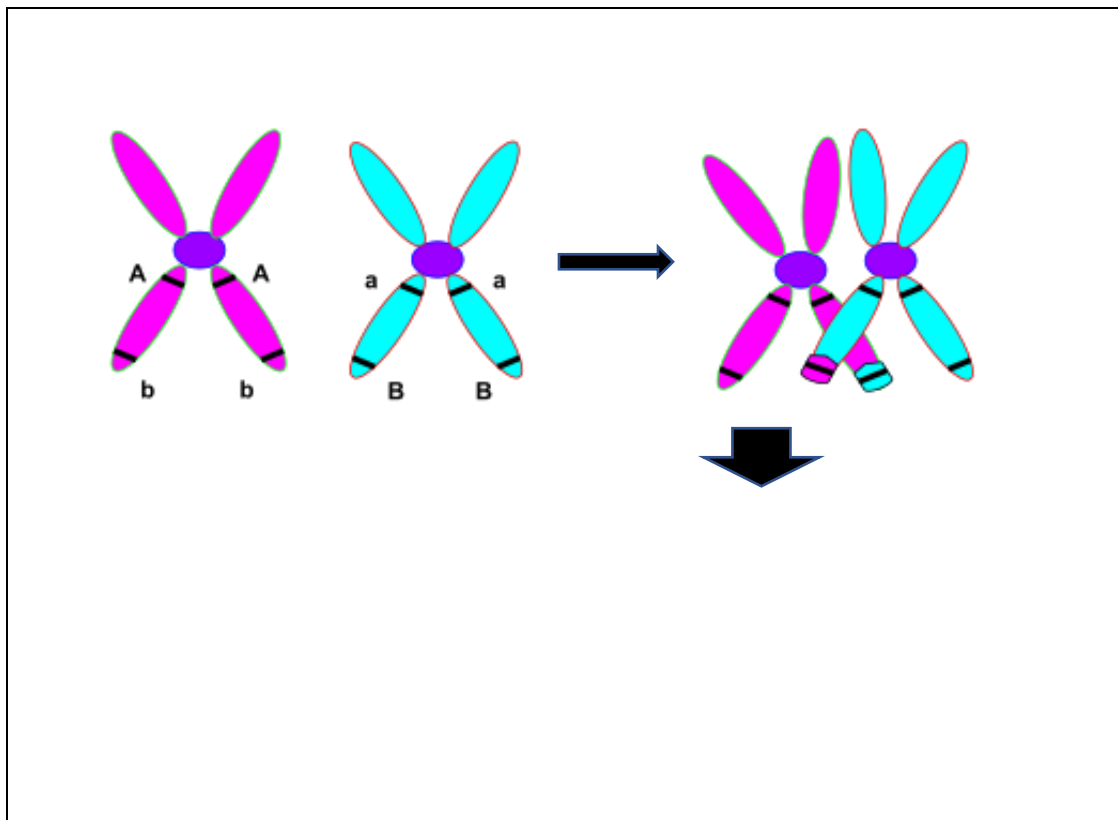
(a) Identify TWO sources of genetic variation.

1

(b) This is a partially complete representation of genetic recombination.

2

Complete the diagram, including labels for alleles.



adapted from <https://commons.wikimedia.org>

Question 22 (6 marks)

Large companies, including pharmaceutical businesses, are increasingly using Aboriginal knowledge and resources, including bush medicines in their products.

- (a) Describe a current use of biological materials used by Aboriginal people. **2**

- (b) Provide a reason why protection and recognition of traditional Aboriginal methods is important to science. **2**

- (c) Gunditjmara peoples have used banksia cones to filter water. The cone could be placed to the mouth like a straw and used to filter impurities to provide clean water. **2**

Explain how this protocol could prevent the spread of a named pathogen.

Question 23 (8 marks)

- (a) Describe the process of fertilisation.

2

- (b) Individuals who are homozygous for a particular allele will develop pancreatic cancer later in life.
Calculate, using a punnet square, the likelihood of the offspring of two heterozygous individuals developing pancreatic cancer.

3

- (c) Recent research suggests that during the process of fertilisation, an egg can be selective about the sperm it accepts. For example, sperm carrying cancerous or other 'undesirable' genes can be rejected. The precise mechanism by which the egg 'decides' is yet unknown

3

Explain how an egg 'selecting' sperm casts doubt on the function of the punnet square as a genetic tool.

Question 24 (6 marks)

- (a) Describe the process of binary fission and identify organisms that reproduce using this method.

2

- (b) Complete the table to list TWO advantages of external and TWO advantages of internal fertilisation.

4

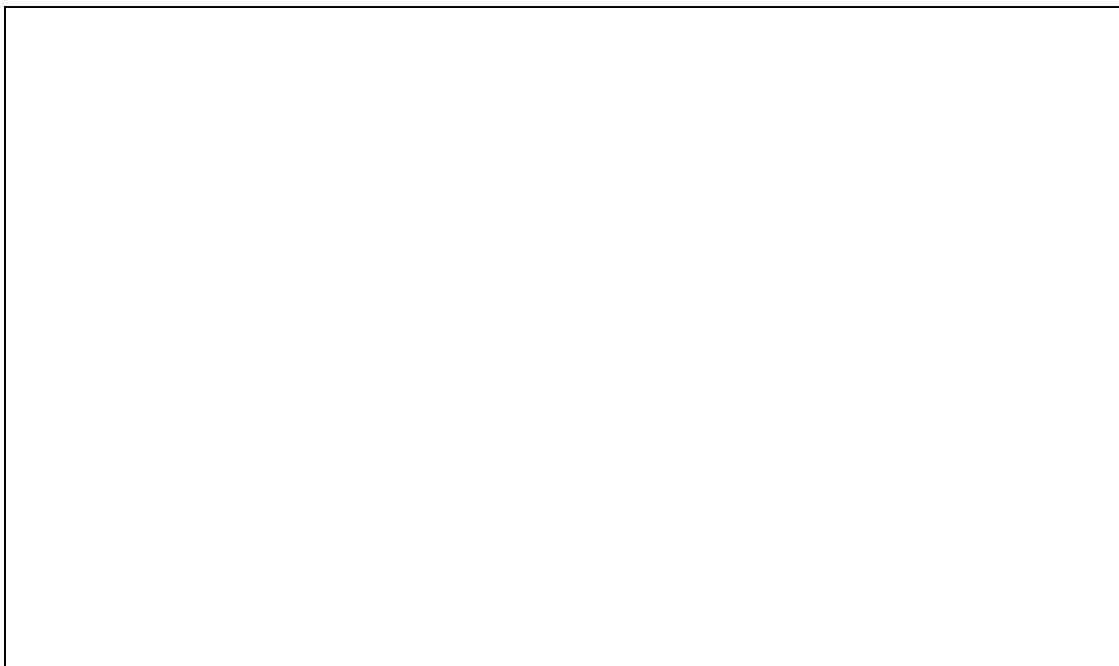
<i>Fertilisation</i>	<i>Advantages</i>
<i>External</i>	1.
	2.
<i>Internal</i>	1.
	2.

Question 25 (6 marks)

Myopia or short-sightedness rates are increasing globally. Approximately 50% of the world's population are projected to be myopic by 2050. In addition to genetic predisposition, an increasing cause of childhood myopia is linked to too little outdoor and increased 'near work' such as computer or screen time.

- (a) Why is myopia considered to be both a genetic and an environmentally developed disorder? **2**

- (b) Explain the cause of myopia, or another disorder you have studied, and how assistive technologies can decrease its effects. Use a diagram or flowchart to assist in your explanation. **4**



Question 26 (5 marks)

Students conducted a secondary source investigation and collected the following data. They researched two 'smaller genomes', two 'medium genomes' and two 'larger genomes'.

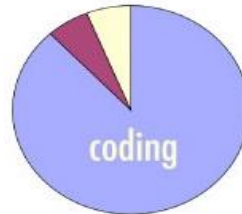
1 Mb – 1 million base pairs

1 Gb – 1 billion base pairs

S.cerevisiae

14 Mb

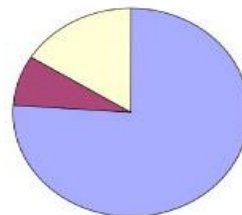
~6,000 genes (16 chr.)



S.pombe

13.8 Mb

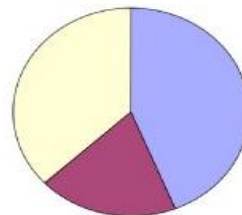
~5,000 genes (3 chr.)



A.thaliana

125 Mb

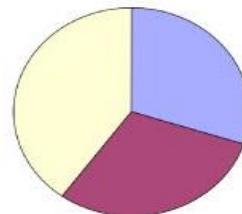
>25,000 genes (5 chr.)



D.melanogaster

180 Mb

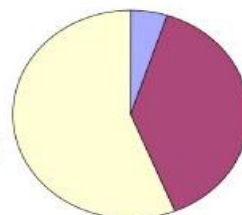
>14,000 genes (4 chr.)



M.musculus

2.4 Gb

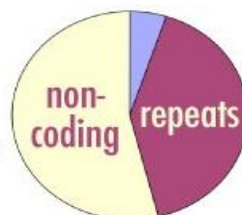
>25,000 genes (20 chr.)



H.sapiens

3.2 Gb

>25,000 genes (23 chr.)



<https://commons.wikimedia.org>

Question 26 continues on page 19

Question 26 (continued)

- (a) Provide an appropriate aim for this investigation.

2

- (b) Identify a limitation in the students' secondary investigation. Suggest an improvement and how it would affect the investigation.

2

- (c) Propose a new experimental question based on the students' line of inquiry.

1

Question 27 (7 marks)

In humans, there are four different blood groups, A, B, AB and O, which arise from combinations of the 3 unique alleles responsible, I^A , I^B and i .

A family has three children, the eldest son with A type blood, a daughter with A type blood, and a younger son with the AB blood type. The mother and father have A type blood and B type blood respectively. The maternal grandmother has A type blood and the maternal grandfather has the AB blood type. The mother is an only child. The father has an older brother with O blood which matches the paternal grandmother, however the paternal grandfather has B type blood.

- (a) Construct a pedigree chart for the blood types in this family using the information. 4
Include an appropriate key in your response.

- (b) A genetic test was performed on the mother, and it was found that the couple would not be able to have children with B type blood. Explain this outcome with reference to the mother's genotype. Support your response with a Punnett square. 3

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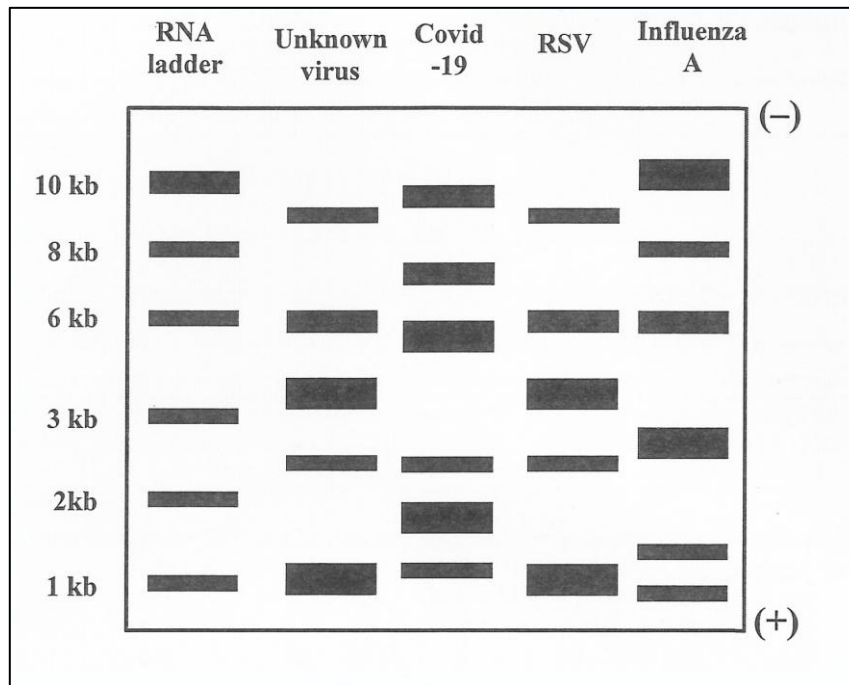
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Question 28 (5 marks)

A pathologist is seeking to identify the cause of a patient's respiratory infection. They obtain genetic samples of three common respiratory viruses and electrophorese these along with the virus sample from the patient. Their experiment produces the following results:



- (a) What virus does the patient have? Justify your response.

2

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Question 28 continues on page 22

Question 28 (continued)

- (b) Gel electrophoresis is just one technology that can be used in the study of genetic material.

Explain the role of a named technology in examining inheritance patterns in a population.

3

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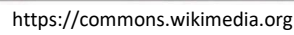
.....

Question 29 (3 marks)

Construct a Watson and Crick model of DNA, including nucleotide composition, pairing and bonding.

3

The diagram represents the inflammatory process involved when the skin is broken.



DAMPS- Damage-associated molecular patterns

- 3

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

24

Question 30 (continued)

- (b) The diagram depicts aspects of the human body's innate immune system. **2**

What is the innate immune system? Use an example from the diagram in your answer.

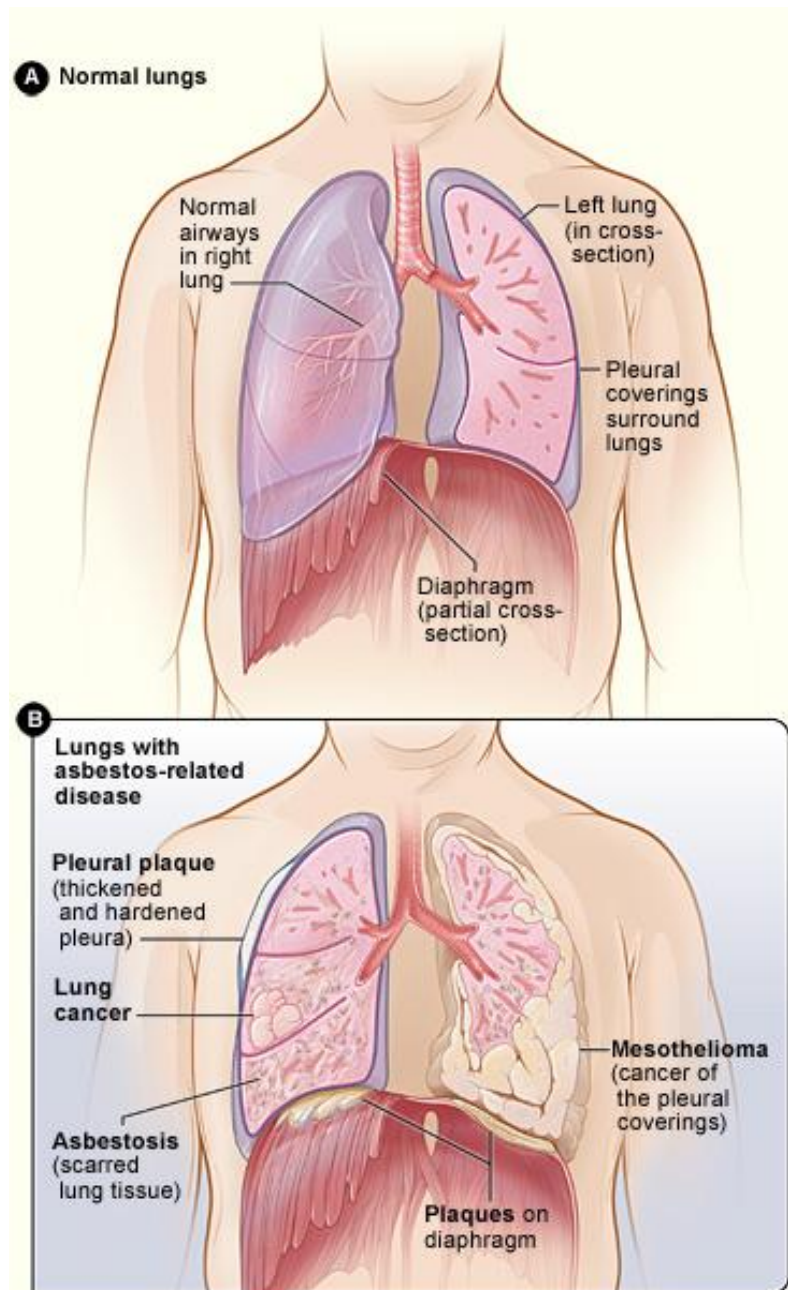
- (c) Consider the case where the innate immune system fails to contain the pathogen. **3**

Describe what happens next if the body has encountered this pathogen before.

Question 31 (13 marks)

Asbestos is a group of fibrous minerals used to strengthen and fireproof building materials.

Fibres from asbestos can become lodged in the lungs and subsequently cause a range of diseases. Australia, and many other countries around the world have banned the use of asbestos in building materials.



<https://commons.wikimedia.org>

Question 31 continues on page 27

Question 31 (continued)

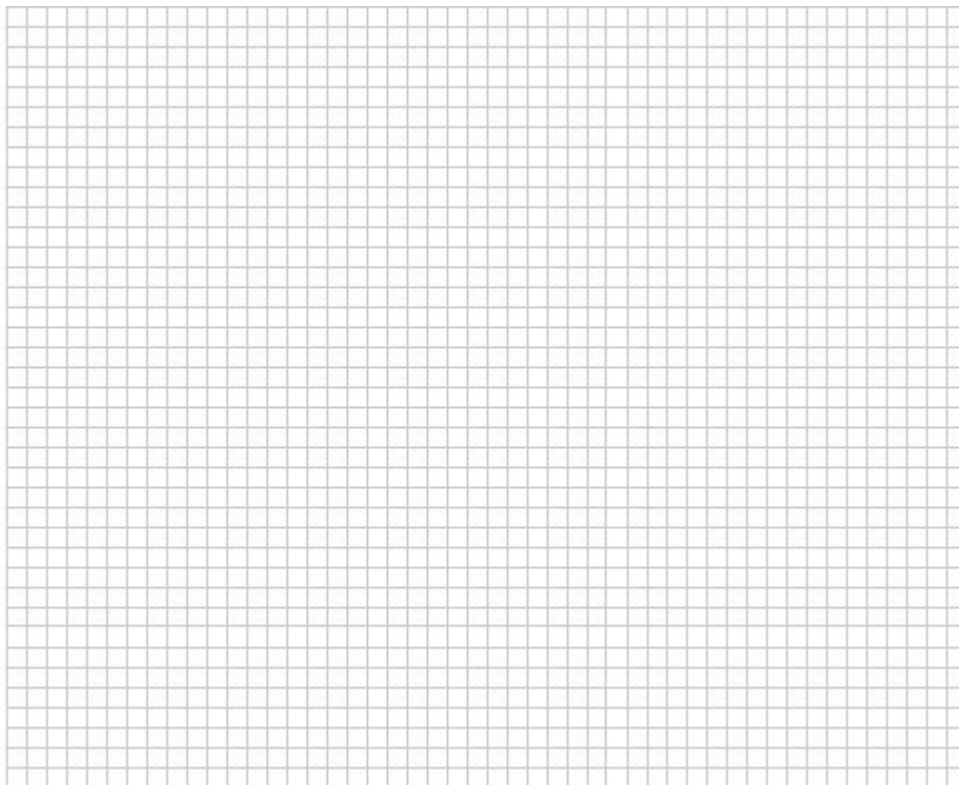
- (a) Using the diagram, categorise the types of disease caused by asbestos.

3

- (b) Graph the incidence of mesothelioma using the data in the table and the grid below.

4

<i>Year of Diagnosis</i>	<i>Males</i>	<i>Females</i>
2011	595	105
2012	605	126
2013	561	131
2014	593	139
2015	505	145



Question 31 continues on page 28

Question 31 (continued)

(c) Analyse the results presented in your graph.

3

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Question 31 continues on page 29

Question 31 (continued)

- (d) The increasing popularity of Do It Yourself (DIY) home renovations, combined with a lack of awareness regarding asbestos risk and poor regulation, has health authorities worried there could be a resurgence in asbestos related disease.

3

Propose a public health campaign for raising asbestos awareness among DIY renovators.

Question 32 (6 marks)

A student wanted to test the '5 second rule' to see if food dropped on the ground spoiled after being on the ground after 5 seconds.

She decided on her experimental aim: to test the effect of time spent on the ground on microbial growth.

Design a valid and safe procedure to test the student's experimental aim.

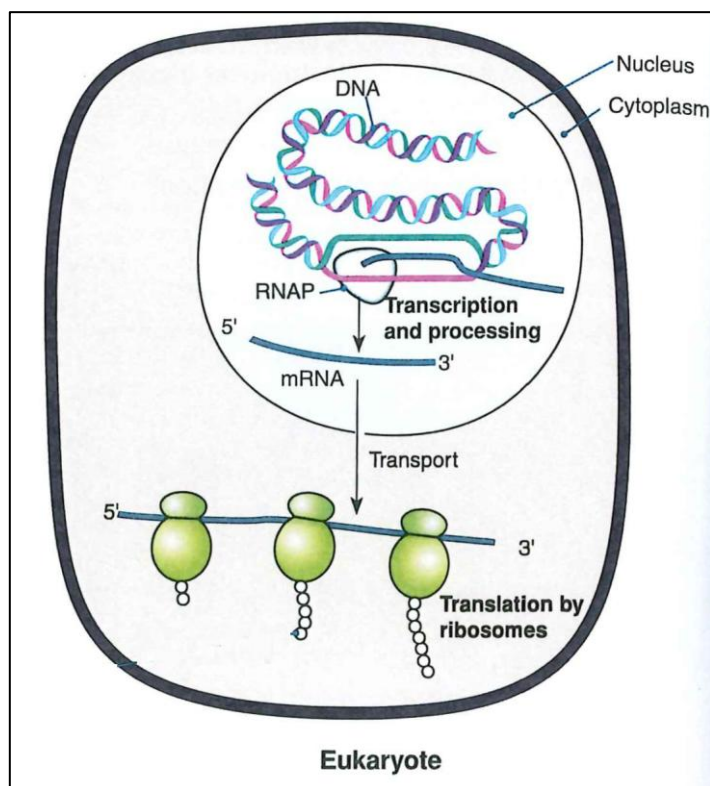
6

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Question 33 (4 marks)

Assess the effectiveness of the model of protein synthesis shown below.

4



End of paper

Section II extra writing space

If you use this space, clearly indicate which question you are answering.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Section II extra writing space

If you use this space, clearly indicate which question you are answering.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



Ravenswood

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Student Number

HSC Trial Biology

Multiple Choice Answer Sheet

Questions 1 – 20

Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

Sample $2 + 4 =$ (A) 2 (B) 6 (C) 8 (D) 9
 A ☐ B ☒ C ☐ D ☐

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

A ☒ B ☒ C ☐ D ☐

If you change your mind and have crossed out what you consider to be the correct answer, then indicate this by writing the word correct and drawing an arrow as follows: correct

A ☒ B ☒ ^{correct} C ☐ D ☐

1. A ☐ B ☐ C ☐ D ☐

2. A ☐ B ☐ C ☐ D ☐

3. A ☐ B ☐ C ☐ D ☐

4. A ☐ B ☐ C ☐ D ☐

5. A ☐ B ☐ C ☐ D ☐

6. A ☐ B ☐ C ☐ D ☐

7. A ☐ B ☐ C ☐ D ☐

8. A ☐ B ☐ C ☐ D ☐

9. A ☐ B ☐ C ☐ D ☐

10. A ☐ B ☐ C ☐ D ☐

11. A ☐ B ☐ C ☐ D ☐

12. A ☐ B ☐ C ☐ D ☐

13. A ☐ B ☐ C ☐ D ☐

14. A ☐ B ☐ C ☐ D ☐

15. A ☐ B ☐ C ☐ D ☐

16. A ☐ B ☐ C ☐ D ☐

17. A ☐ B ☐ C ☐ D ☐

18. A ☐ B ☐ C ☐ D ☐

19. A ☐ B ☐ C ☐ D ☐

20. A ☐ B ☐ C ☐ D ☐



Ravenswood

Year 12 Biology AT4 MARKING GUIDELINES (STAGE 6)

Question	Outcome	Marking Criteria and sample answer			Level of Differentiation	Mark
	Knowledge (BIO11/12 - 8 to 15) 59 marks Planning & Conducting (BIO11/12 - 1 to 3) 13 marks Processing & Problem solving (BIO11/12 - 4 to 7) 28 marks				BAND 6 – extensive Band 5 - Thorough Band 4 – sound Band 3 – basic Band 2 - low	
Question		Answer	Explanation	Band	Mark	
1	(BIO11/12 - 12)	C	A is incorrect as a sperm cell only has one copy of each chromosome. B is incorrect as an egg cell only has one copy of each chromosome. C is correct as the karyotype shows 2 X- chromosomes and homologous pairs of each autosome. indicating a female D is incorrect as a male adult cell has and X & Y chromosome.	3	1	

2	(BIO11/12 – 14)	D	A is incorrect as a prion is a malformed protein which is not depicted. B is incorrect as bacteria are microorganisms. C is incorrect as the picture is a cellular organism. D is correct as the picture is a parasite worm that can be seen without a microscope= macro.	4	1
3	(BIO11/12 - 12)	C	C is correct as the question blurb describes an environmental change-soil acidity, acting upon flower colour- a physical characteristic, and therefore, phenotypic. A and B are incorrect as the question describes environmental changes. D is incorrect as we do not have enough information to know if the environment is affecting genes.	4	1
4	(BIO11/12 -15)	D	A is incorrect as it is a stimulus. B is incorrect and it is sensor. C is incorrect as it is the control centre. D is correct as effectors are muscles or glands and initiate the response.	4	1
5	(BIO11/12 -15)	B	A is incorrect as it is a structural adaptation. B is correct as it is behavioural for decreasing body temp. C is incorrect as it is another physiological response. D is incorrect as it is behavioural for increasing/maintaining body temp.	3	1
6	(BIO11/12 - 12)	B	Pregnancy, labour and birth affects these levels. Levels of oxytocin increase significantly in later pregnancy and labour as shown in Graph B. They are not constant as indicated in Graph A. Nor are they decreasing (Graph C) or plateauing (Graph D).	4	1
7	(BIO11/12 – 12)	B	A is incorrect as LH causes the release of an ovum, not progesterone. B is correct because progesterone main function is to maintain the lining of the uterus. C is incorrect because FSH is stimulated by GnRH, not progesterone. D is incorrect – same reason as A	4	1

8	(BIO11/12 - 12)	D	A is incorrect as DNA exists in different forms in both prokaryotic and eukaryotic cells. B is incorrect as DNA is not in a circular form in eukaryotic cells. C is incorrect as DNA exists in different forms in both prokaryotic and eukaryotic cells. D is correct as DNA exists in a linear form in eukaryotic cells and a circular for in prokaryotic cells.	4	1	
9	(BIO11/12 -15)	D	A is incorrect as children have higher rates of receiving an implant between 1990 -2002. B is incorrect as implants have decreases for children and adults between 2018-2020. Cis incorrect as implants have decrease after 2018, not increased. D is correct.	5	1	
10	(BIO11/12 -15)	D	A is incorrect as spongy mesophyll is not depicted but also not necessarily an adaptation for water loss. B is incorrect as waxy cuticle is not visible. C is incorrect as open stomata allows for water loss. D is correct because closed stomata stop water loss via evaporation.	4	1	
11	(BIO11/12 - 12)	A	A are all functions of mitosis. B, C and D are incorrect as introducing genetic variation is a function of meiosis.	3	1	
12	(BIO11/12 - 2)	D	A is incorrect as this was the purpose of the experiment. B is incorrect as this describes the results. C is incorrect as the same liquid is used in each flask D is correct as the conditions of flask are changed by experimenter.	3	1	

13	(BIO11/12 - 12)	A	A is correct. B and C are a mixture of incorrectly labelled translation components. D's labels are incorrectly using components of transcription.	4	1
14	(BIO11/12 - 12)	C	A is incorrect as B is incorrect as t C is correct D is incorrect as i	4	1
15	(BIO11/12 - 14)	C	A is incorrect as airborne involves particles being suspended in air. B is incorrect as it does not involve the faeces of organisms. C is correct as the mosquito acts as a vector for the dengue virus. D is incorrect as it does not involve contaminated drinking water.	3	1
16	(BIO11/12 - 15)	C	A is incorrect as insulin is not produces in response to a decrease in blood glucose B is incorrect as production of insulin would not result in a decrease in glycogen in the liver, it may result in an increase of glycogen. C is correct as glucagon is produced in response to a decrease in blood glucose and causes glycogen to be converted to glucose D is incorrect as glucagon is not produced in response to an increase in blood glucose, but instead a decrease.	5	1

17	(BIO11/12 – 15)	B	A is incorrect as the shape of the eyeball can't be changes. B is correct as LASIK surgery uses a laser to cut and re-shape the cornea. C is incorrect as IOL is the technology involved in replacing the lens. D is incorrect as eye muscles are not involved in LASIK surgery.	4	1	
18	(BIO11/12 - 2)	B	A is incorrect as a descriptive study would be done more broadly to determine patterns of the disease in the community. B is correct as study has a case group with the disease and a control group without the disease. C is incorrect as it is not a blind study as a group with the disease has been identified. D is incorrect as no factor in the information provided suggests that bias has affected the data being collected.	5	1	
19	(BIO11/12 – 5)	D	A is incorrect as this isn't evidence to support the multiregional hypothesis. B is incorrect as the tree does not show gene flow before modern day. C is incorrect because although it does show gene flow in modern day it does not the multiregional hypothesis. D is correct as the tree shows gene flow before modern day.	5	1	

20	(BIO11/12 – 5)	D	A is incorrect as total of females is higher than total of males B is correct as “willing” is a word that we don’t have data for C is correct as 1687 of total of 7382 is not 77.15% D is correct as 5695 of total of 7382 is 77.15%		5	1								
21a	(BIO11/12 - 12)		<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td>• Identifies two correct sources of genetic variation</td><td>1</td></tr></table> Sample answer: Mutation and recombination	Criteria	Marks	• Identifies two correct sources of genetic variation	1		BAND 3	1				
Criteria	Marks													
• Identifies two correct sources of genetic variation	1													
21b	(BIO11/12 - 12)		<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td>• Demonstrates switching of genetic material from maternal to paternal chromatids.</td><td>2</td></tr><tr><td>• Provides correct allele labels</td><td></td></tr><tr><td>• Draws chromatids to show switching of genetic material but doesn’t show correct labels</td><td>1</td></tr></table> Sample answer:	Criteria	Marks	• Demonstrates switching of genetic material from maternal to paternal chromatids.	2	• Provides correct allele labels		• Draws chromatids to show switching of genetic material but doesn’t show correct labels	1		BAND 4-5	2
Criteria	Marks													
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• Draws chromatids to show switching of genetic material but doesn’t show correct labels	1													

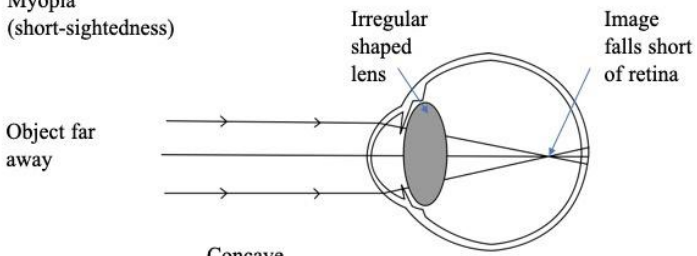
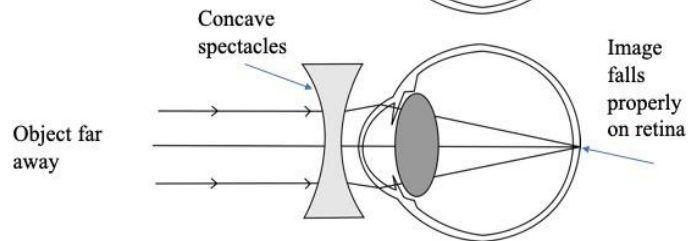
		Markers comments: Many students did not copy chromosomes accurately.									
22a	(BIO11/12 - 14)	<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td> - Identifies a plant and describes the current use of biological material used by Aboriginal people </td><td>2</td></tr><tr><td> - Provides some relevant information </td><td>1</td></tr></table> Sample answer: Smoke bush - yellow wood can be steeped and used for a fever reducer and eye ailments as well a general healing. Markers comments: - Use must be for aboriginal people (HIV not accepted) - Many students did not give a specific answer – say “tea tree oil” is used for its antimicrobial properties.	Criteria	Marks	Identifies a plant and describes the current use of biological material used by Aboriginal people	2	Provides some relevant information	1		BAND 2-3	2
Criteria	Marks										
Identifies a plant and describes the current use of biological material used by Aboriginal people	2										
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22b	(BIO11/12 - 14)	<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td> - Provides a reason why protection and recognition of tradition Aboriginal methods is important to science </td><td>2</td></tr><tr><td>OR - Describes protection and recognition of Aboriginal methods of treating medicine but doesn't link to importance to science. - Provides a reason why protection or recognition of traditional Aboriginal methods are important to science </td><td>1</td></tr></table> Sample answer: Recognition of traditional Aboriginal methods in medicine is essential in order to give credit where credit is due and preserve these methods for future generations and for scientists to learn from aboriginals. Student sample answer:	Criteria	Marks	Provides a reason why protection and recognition of tradition Aboriginal methods is important to science	2	OR - Describes protection and recognition of Aboriginal methods of treating medicine but doesn't link to importance to science. - Provides a reason why protection or recognition of traditional Aboriginal methods are important to science	1		BAND 4-5	2
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OR - Describes protection and recognition of Aboriginal methods of treating medicine but doesn't link to importance to science. - Provides a reason why protection or recognition of traditional Aboriginal methods are important to science	1										

		Traditional aboriginal methods have been used for many generations and if scientists build on their knowledge, they need recognition for their intellectual property as it is their knowledge. This is important to science as they have helped advance the uses of natural medicines thus need recognition for it.									
22c	(BIO11/12 - 14)	<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td> - Provides a cause and effect statement explaining how to prevent the spread of the named pathogen. </td><td>2</td></tr><tr><td> - Provides information about the protocol but doesn't link it to the spread of the pathogen </td><td>1</td></tr></table> Sample answer: The filtering of water is a hygiene practice that can remove pathogens eg. Guardia protozoan from drinking water before ingesting. Markers comments: - When referring to pathogen, must use eg. bacteria that causes cholera (name of the disease ONLY not accepted)	Criteria	Marks	Provides a cause and effect statement explaining how to prevent the spread of the named pathogen.	2	Provides information about the protocol but doesn't link it to the spread of the pathogen	1		BAND 4-5	2
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Provides information about the protocol but doesn't link it to the spread of the pathogen	1										
23a	(BIO11/12 -12)	<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td> - Provides features of fertilisation including fusion of gametes and production of a zygote. </td><td>2</td></tr><tr><td> - Provides some relevant information </td><td>1</td></tr></table> Sample answer: Fertilisation is a process in sexual reproduction whereby a sperm cell fuses with an egg cell (ovum) to form a zygote. The two haploid cells fuse to create a diploid cell. Markers Comments: - Many students made the assumption that fertilisation was implying internal. The answer should be general enough to cover both internal and external.	Criteria	Marks	Provides features of fertilisation including fusion of gametes and production of a zygote.	2	Provides some relevant information	1		BAND 3- 4	2
Criteria	Marks										
Provides features of fertilisation including fusion of gametes and production of a zygote.	2										
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23b	(BIO11/12 -6)	<table><thead><tr><th>Criteria</th><th>Marks</th></tr></thead><tbody><tr><td> - Identifies the correct genotype of gametes in a Punnett square - Names the correct genotype of offspring - Determines the correct probability </td><td>3</td></tr><tr><td>OR - Identifies the correct genotype of gametes and offspring in a Punnett square - Names the correct genotype of offspring based on incorrect gametes. </td><td>2</td></tr><tr><td> - Provides some relevant information </td><td>1</td></tr></tbody></table> Sample answer: <table><tbody><tr><td>X</td><td>H</td><td>h</td></tr><tr><td>H</td><td>HH</td><td>Hh</td></tr><tr><td>h</td><td>Hh</td><td>hh</td></tr></tbody></table> HH : Hh : hh = 1 : 2 : 1 P(hh) = ¼ = 25% chance of developing pancreatic cancer	Criteria	Marks	- Identifies the correct genotype of gametes in a Punnett square - Names the correct genotype of offspring - Determines the correct probability	3	OR - Identifies the correct genotype of gametes and offspring in a Punnett square - Names the correct genotype of offspring based on incorrect gametes.	2	Provides some relevant information	1	X	H	h	H	HH	Hh	h	Hh	hh		BAND 4-5	3
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H	HH	Hh																				
h	Hh	hh																				
23c	(BIO11/12 -12)	<table><thead><tr><th>Criteria</th><th>Marks</th></tr></thead><tbody><tr><td> - Provides a causes and effect relationship that links selection of egg to the ineffectiveness of Punnet squares as a genetic tool. - Includes the purpose of Punnet square as a predictor of probabilities. </td><td>3</td></tr><tr><td> - Provides a causes and effect relationship that links selection of egg to the ineffectiveness of Punnet squares as a genetic tool. </td><td>2</td></tr><tr><td> - Provides some relevant information </td><td>1</td></tr></tbody></table> Sample answer:	Criteria	Marks	- Provides a causes and effect relationship that links selection of egg to the ineffectiveness of Punnet squares as a genetic tool. - Includes the purpose of Punnet square as a predictor of probabilities.	3	Provides a causes and effect relationship that links selection of egg to the ineffectiveness of Punnet squares as a genetic tool.	2	Provides some relevant information	1		BAND 4-5	3									
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Provides some relevant information	1																					

		Punnet squares use probability where each allele present in the parents' genotype has an equal chance of being expressed in the offspring. However, if the egg is selecting for specific alleles then it is no longer an equal chance so the punnet square no longer gives an accurate representation.														
24a	(BIO11/12 -12)		<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td> - Provides features of binary fission including replication of genetic material and splitting into two cells. - Identifies appropriate examples </td><td>2</td></tr><tr><td> OR - Provides features of binary fission including replication of genetic material and splitting into two cells. - Identifies appropriate examples </td><td>1</td></tr></table>	Criteria	Marks	- Provides features of binary fission including replication of genetic material and splitting into two cells. - Identifies appropriate examples	2	OR - Provides features of binary fission including replication of genetic material and splitting into two cells. - Identifies appropriate examples	1		BAND 3	2				
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			OR - Provides features of binary fission including replication of genetic material and splitting into two cells. - Identifies appropriate examples	1												
			Sample answer: Binary is fission is where a cell replicates its DNA and then splits to form two genetically identical daughter cells. Bacteria and protists reproduce this way.													
24b	(BIO11/12 -12)		<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td> - Explains TWO advantages of external and TWO advantages of internal sexual fertilisation </td><td>4</td></tr><tr><td> - Describes TWO advantages of external and TWO advantages of internal sexual fertilisation </td><td>3</td></tr><tr><td> - Identifies advantages of external and/or internal sexual fertilisation by providing THREE advantages across both </td><td>2</td></tr><tr><td> - Provides ONE advantage of either internal or external sexual fertilisation </td><td>1</td></tr></table>	Criteria	Marks	Explains TWO advantages of external and TWO advantages of internal sexual fertilisation	4	Describes TWO advantages of external and TWO advantages of internal sexual fertilisation	3	Identifies advantages of external and/or internal sexual fertilisation by providing THREE advantages across both	2	Provides ONE advantage of either internal or external sexual fertilisation	1		BAND 4-5	4
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			Sample answer: <table><tr><td>Fertilisation</td><td>Advantages</td></tr></table>				Fertilisation	Advantages								
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		<table><tr><td><i>External</i></td><td>* Large number of offspring produced when conditions are suitable * less energy invested to produce specialised reproductive organs eg. uterus</td></tr><tr><td><i>Internal</i></td><td>* less energy is invested to produce fewer gametes * Growing embryo at less risk of predation</td></tr></table> Markers comments: • A lot of incorrect information – refer to BIF p.42 • Most acceptable advantage of internal fertilisation is a higher survival rate of offspring (this was contradicted by advantages of external fertilisation) • Many students said “less energy” as an advantage of external fertilisation (effort not accepted either) but not qualified with more information. Not accepted because a large amount of energy is used to produce thousands of male and female gametes. • Genetic variation was not accepted for either external or external.	<i>External</i>	* Large number of offspring produced when conditions are suitable * less energy invested to produce specialised reproductive organs eg. uterus	<i>Internal</i>	* less energy is invested to produce fewer gametes * Growing embryo at less risk of predation					
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25a	(BIO11/12 -15)	<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td> • Demonstrates understanding of why myopia can be considered both a genetic and an environmentally developed disorder </td><td>2</td></tr><tr><td> • Demonstrates understanding of why myopia can be considered a genetic disease OR an environmental disease </td><td>1</td></tr></table> Sample answer: If your parents are myopic, you are more likely to have myopia- this would be attributed to your genes. However, someone who has no ‘genetic predisposition’ can also develop myopia as a result of decreased outdoor time and increased screen time- this is environmentally attributed.	Criteria	Marks	• Demonstrates understanding of why myopia can be considered both a genetic and an environmentally developed disorder	2	• Demonstrates understanding of why myopia can be considered a genetic disease OR an environmental disease	1		BAND 4	2
Criteria	Marks										
• Demonstrates understanding of why myopia can be considered both a genetic and an environmentally developed disorder	2										
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25b	(BIO11/12 -7)	<table><tr><th>Criteria</th><th>Marks</th></tr></table>	Criteria	Marks		BAND 4	4				
Criteria	Marks										

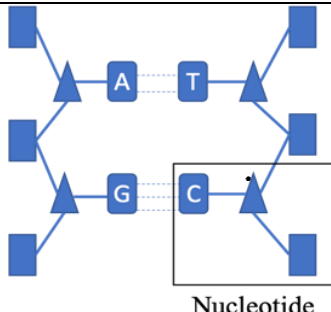
		<table><tr><td> - Provides a cause and effect statement linking the disorder to the assistive technology. </td><td>4</td></tr><tr><td> - Includes annotated diagram or flow chart format </td><td></td></tr><tr><td> - Describes the disorder and the assistive technology - Includes annotated diagram or flow chart format </td><td>3</td></tr><tr><td> - Describes the disorder and the assistive technology - Includes diagram or flow chart with limited labels </td><td>2</td></tr><tr><td>OR - Describes the disorder and the assistive technology </td><td>1</td></tr><tr><td> - Includes diagram or flow chart with limited labels </td><td></td></tr></table>	Provides a cause and effect statement linking the disorder to the assistive technology.	4	Includes annotated diagram or flow chart format		- Describes the disorder and the assistive technology - Includes annotated diagram or flow chart format	3	- Describes the disorder and the assistive technology - Includes diagram or flow chart with limited labels	2	OR Describes the disorder and the assistive technology	1	Includes diagram or flow chart with limited labels			
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- Describes the disorder and the assistive technology - Includes diagram or flow chart with limited labels	2															
OR Describes the disorder and the assistive technology	1															
Includes diagram or flow chart with limited labels																
Sample answer: Myopia (short-sightedness)  Myopia is short-sightedness caused by an irregular shaped eye lens as shown in the diagram. Concave spectacles  Concave eyeglasses are the technology which can diverge light rays																
26a	(BIO11/12 -1)		Criteria	Marks	BAND 4	2										

		<table><tr><td> - Provides a relevant aim including independent and dependent variables based on the data from the stimulus </td><td>2</td></tr><tr><td> - Provides an aim that doesn't have a clear relationship between independent and dependent variables. </td><td>1</td></tr></table>	Provides a relevant aim including independent and dependent variables based on the data from the stimulus	2	Provides an aim that doesn't have a clear relationship between independent and dependent variables.	1							
Provides a relevant aim including independent and dependent variables based on the data from the stimulus	2												
Provides an aim that doesn't have a clear relationship between independent and dependent variables.	1												
Sample answer: To compare how the total number of genes in an organism affects the proportion of non-coding regions. Marker comments: Many students did not express their AIM in a way that showed a relationship between the independent and dependent variables. "Affect" should have been used when writing the AIM.													
26b	(BIO11/12 -2)	<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td> - Identifies an appropriate limitation and how it affects the investigation - Identifies a relevant improvement </td><td>2</td></tr><tr><td>OR</td><td></td></tr><tr><td> - Identifies a limitation and improvement - Identifies a limitations and how it affects the investigation. </td><td>1</td></tr></table>	Criteria	Marks	- Identifies an appropriate limitation and how it affects the investigation - Identifies a relevant improvement	2	OR		- Identifies a limitation and improvement - Identifies a limitations and how it affects the investigation.	1		BAND 6	2
Criteria	Marks												
- Identifies an appropriate limitation and how it affects the investigation - Identifies a relevant improvement	2												
OR													
- Identifies a limitation and improvement - Identifies a limitations and how it affects the investigation.	1												
Sample answer: Only six organisms were examined. Increasing the number of different organisms examined can increase reliability.													
26c	(BIO11/12 -1)	<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td> Proposes a relevant experimental question </td><td>1</td></tr></table>	Criteria	Marks	Proposes a relevant experimental question	1		BAND 5	1				
Criteria	Marks												
Proposes a relevant experimental question	1												
Sample answer:													

		How does the size of the genome affect the number of genes in an organism? Markers comments: Many students had a similar inquiry question to the AIM in 26a												
27a	(BIO11/12 - 6)	<table border="1"><thead><tr><th>Criteria</th><th>Mark</th></tr></thead><tbody><tr><td> - Provides a correct pedigree chart including blood type labels with alternatives and key </td><td>4</td></tr><tr><td> - Provides a substantially correct pedigree chart with at least one blood type labels </td><td>3</td></tr><tr><td> - Provides a partially correct pedigree chart </td><td>2</td></tr><tr><td> - Provides some features of a pedigree chart </td><td>1</td></tr></tbody></table> Sample answer: Key - A A type blood - B B type blood - AB AB type blood - O O type blood ○ Female □ Male	Criteria	Mark	Provides a correct pedigree chart including blood type labels with alternatives and key	4	Provides a substantially correct pedigree chart with at least one blood type labels	3	Provides a partially correct pedigree chart	2	Provides some features of a pedigree chart	1	BAND 3-6	4
Criteria	Mark													
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27b	(BIO11/12 - 6)	<table border="1"><thead><tr><th>Criteria</th><th>Mark</th></tr></thead><tbody><tr><td> - Correctly identifies the mother's genotype. - Provides an explanation supported with a Punnett square. </td><td>3</td></tr></tbody></table>	Criteria	Mark	- Correctly identifies the mother's genotype. - Provides an explanation supported with a Punnett square.	3	BAND 6	3						
Criteria	Mark													
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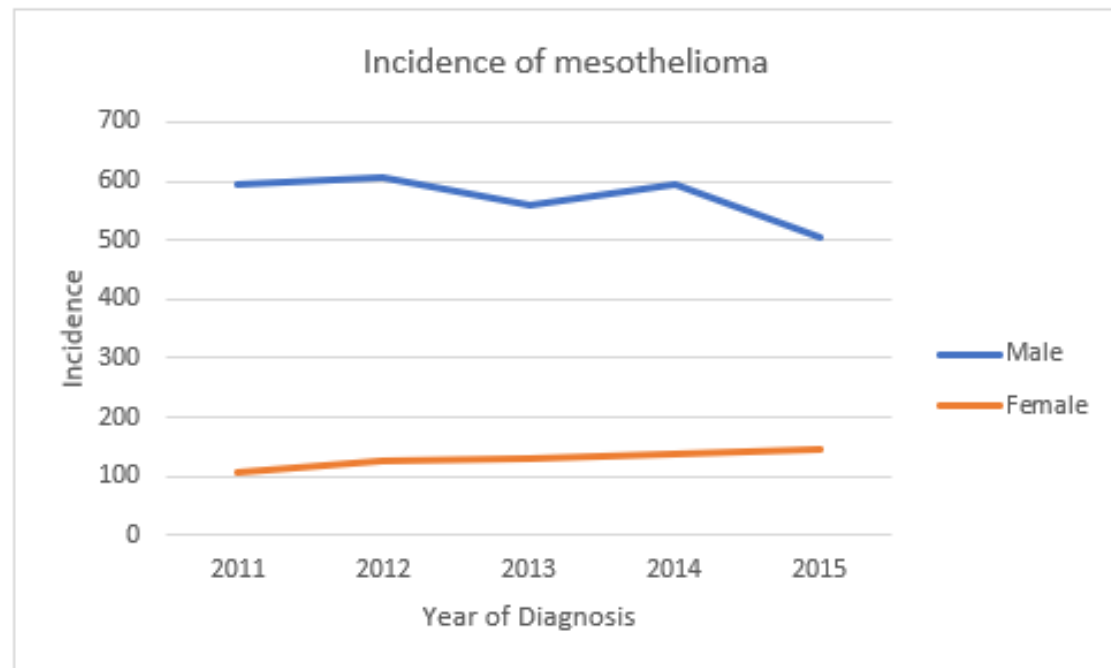
		<table><tr><td> - Identifies possible genotypes for the mother. </td><td>2</td></tr><tr><td> - Uses a Punnett square to provide a reason for the outcome. </td><td></td></tr><tr><td> - Identifies possible genotype of mother </td><td>1</td></tr></table> Sample answer: The mother's genotype could be either $I^A I^A$ or $I^A i$. This can be confirmed given that their children have the AB and A blood types with the $I^A I^B$ and $I^A i$ genotypes respectively. Since the father has B type blood, his genotype must be $I^B i$, not $I^B I^B$ otherwise it would not be possible for this couple to have children with the A type blood. Using a Punnett square, if the mother had the $I^A i$ genotype then it would be possible for the couple to have a child with the B blood type from an $I^B i$ genotype, however since the genetic testing indicates that this is not possible, then her genotype must be $I^A I^A$. <table><tr><td></td><td>I^B</td><td>i</td></tr><tr><td>I^A</td><td>$I^A I^B$</td><td>$I^A i$</td></tr><tr><td>i</td><td>$I^B i$</td><td>ii</td></tr></table>	Identifies possible genotypes for the mother.	2	Uses a Punnett square to provide a reason for the outcome.		Identifies possible genotype of mother	1		I^B	i	I^A	$I^A I^B$	$I^A i$	i	$I^B i$	ii		
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i	$I^B i$	ii																	
28a	(BIO11/12 - 5)	<table><tr><th>Criteria</th><th>Mark</th></tr><tr><td> - Correctly identifies the virus AND provides a reason from the stimulus to justify their response. </td><td>2</td></tr><tr><td> - Correctly identifies the virus </td><td>1</td></tr></table> Sample answer:	Criteria	Mark	Correctly identifies the virus AND provides a reason from the stimulus to justify their response.	2	Correctly identifies the virus	1	BAND 4	2									
Criteria	Mark																		
Correctly identifies the virus AND provides a reason from the stimulus to justify their response.	2																		
Correctly identifies the virus	1																		

		The patient has RSV, because their virus sample has the same bands as RSV – at 9kb, 6kb,4kb,2.5kb and 1 kb, indicating that the two samples have the same length fragments of RNA and hence, are likely from the same pathogen.										
28b	(BIO11/12 - 12)	<table border="1"><thead><tr><th>Criteria</th><th>Mark</th></tr></thead><tbody><tr><td> - Provides a description of a DNA technology and its application to inheritance patterns with example. </td><td>3</td></tr><tr><td> - Outlines the role of a DNA technology and mention its application to inheritance patterns. </td><td>2</td></tr><tr><td> - Outline the role of DNA technology </td><td>1</td></tr></tbody></table> Sample answer: DNA analysis technologies such as sequencing can be used to analyse different elements of DNA including SNP's and haplotypes when studying populations of animals and plants that are under threat of extinction. By analysing the variations between individuals, predictions can be made about relatedness and tailor made breeding programs can be designed to increase the genetic diversity and resilience of endangered species.	Criteria	Mark	Provides a description of a DNA technology and its application to inheritance patterns with example.	3	Outlines the role of a DNA technology and mention its application to inheritance patterns.	2	Outline the role of DNA technology	1	BAND 5	3
Criteria	Mark											
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29	(BIO11/12 - 12)	<table border="1"><thead><tr><th>Criteria</th><th>Marks</th></tr></thead><tbody><tr><td> - Constructs a model of DNA structure including base pairing and bonding - Correctly identifies a nucleotide </td><td>3</td></tr><tr><td>OR - Constructs a model of DNA structure including base pairing and bonding - Constructs a model of DNA structure and correctly identifies a nucleotide. </td><td>2</td></tr><tr><td> - Constructs a model of DNA </td><td>1</td></tr></tbody></table> Sample answer:	Criteria	Marks	- Constructs a model of DNA structure including base pairing and bonding - Correctly identifies a nucleotide	3	OR - Constructs a model of DNA structure including base pairing and bonding - Constructs a model of DNA structure and correctly identifies a nucleotide.	2	Constructs a model of DNA	1	BAND 4	3
Criteria	Marks											
- Constructs a model of DNA structure including base pairing and bonding - Correctly identifies a nucleotide	3											
OR - Constructs a model of DNA structure including base pairing and bonding - Constructs a model of DNA structure and correctly identifies a nucleotide.	2											
Constructs a model of DNA	1											

		 ▲ - Sugar ■ - Phosphate - Hydrogen Bonds A - Adenine T - Thymine G - Guanine C - Cytosine Nucleotide Markers comments Many students went beyond what was needed for this question and doing so lost marks eg showed DNA replication or Protein synthesis. There was a common misconception of “nitrogenous base” being called a “nucleotide base” <td></td> <td></td>										
30a	(BIO11/12 - 14)	<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td> - Identifies and explains both chemical and physical changes occurring in response to pathogens in the stimulus. </td><td>3</td></tr><tr><td> - Identifies and explains chemical OR physical changes occurring in response to pathogens in the stimulus. </td><td>2</td></tr><tr><td> - Provides some relevant information. </td><td>1</td></tr></table> Sample answer: Chemical signalling is occurring in the form of Mast cells detecting PAMPS and DAMPS, as well as Mols telling blood vessels to open. This allows for essential communication between parts of the body’s immune system so they can coordinate a response. Physical changes in the body such as increased blood flow and fluid (swelling) allows for phagocytes to be distributed and pathogen to be destroyed. Furthermore, clotting from platelets block the entry of further pathogen by sealing the site. Markers comments	Criteria	Marks	Identifies and explains both chemical and physical changes occurring in response to pathogens in the stimulus.	3	Identifies and explains chemical OR physical changes occurring in response to pathogens in the stimulus.	2	Provides some relevant information.	1	BAND 3-5	3
Criteria	Marks											
Identifies and explains both chemical and physical changes occurring in response to pathogens in the stimulus.	3											
Identifies and explains chemical OR physical changes occurring in response to pathogens in the stimulus.	2											
Provides some relevant information.	1											

		The most common mistake for this was doing a brain dump about inflammation rather than incorporating the specific stimulus material.												
30b	(BIO11/12 - 14)		<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td> - Describes the innate immune system - Uses an example from the diagram </td><td>2</td></tr><tr><td>OR - Describes the innate immune system - Identifies an example from the diagram </td><td>1</td></tr></table>	Criteria	Marks	- Describes the innate immune system - Uses an example from the diagram	2	OR - Describes the innate immune system - Identifies an example from the diagram	1		BAND 4-5	2		
Criteria	Marks													
- Describes the innate immune system - Uses an example from the diagram	2													
OR - Describes the innate immune system - Identifies an example from the diagram	1													
Sample answer: The innate immune system is the component of the bodies defence system which is genetically inherited and non-specific. Physical and chemical barriers, and the inflammation response (depicted in the diagram) are all components of the innate immune system. Markers comments: Common mistakes were not saying “non specific”														
30c	(BIO11/12 - 14)		<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td> - Provides points related to the immune response including role of macrophage, helper T-cells, memory cells and plasma cells </td><td>3</td></tr><tr><td> - Provides points related to the immune response including the role of 2 WBC </td><td>2</td></tr><tr><td> - Provides some relevant information </td><td>1</td></tr></table>	Criteria	Marks	Provides points related to the immune response including role of macrophage, helper T-cells, memory cells and plasma cells	3	Provides points related to the immune response including the role of 2 WBC	2	Provides some relevant information	1		BAND 4-5	3
Criteria	Marks													
Provides points related to the immune response including role of macrophage, helper T-cells, memory cells and plasma cells	3													
Provides points related to the immune response including the role of 2 WBC	2													
Provides some relevant information	1													
Sample answer: The pathogen enters the blood stream and is distributed around the body. - The adaptive immune system recognises the foreign antigen then responds <u>rapidly</u> by engaging memory B-cells/memory t cells. - Antibodies are rapidly produced in large amounts by plasma B cells, effectively neutralising the pathogen. Memory T cells effect cell mediated death.														

31a	(BIO11/12 -15)	<table><thead><tr><th>Criteria</th><th>Marks</th></tr></thead><tbody><tr><td> - Correctly identifies 4 diseases and 2 disease categorises caused by asbestosis - Correctly identifies all as non infectious </td><td>3</td></tr><tr><td> - Correctly identifies 2 diseases and 2 categories caused by asbestosis </td><td>2</td></tr><tr><td> - Provides some relevant information </td><td>1</td></tr></tbody></table> Sample answer: Non infectious <table><tr><td>Disease</td><td>Category of Disease</td></tr><tr><td>Plaques</td><td rowspan="2">Environmental</td></tr><tr><td>Asbestosis</td></tr><tr><td>Mesothelioma</td><td rowspan="2">Cancer</td></tr><tr><td>Lung cancer</td></tr></table> Markers comments: Non infectious		Criteria	Marks	- Correctly identifies 4 diseases and 2 disease categorises caused by asbestosis - Correctly identifies all as non infectious	3	Correctly identifies 2 diseases and 2 categories caused by asbestosis	2	Provides some relevant information	1	Disease	Category of Disease	Plaques	Environmental	Asbestosis	Mesothelioma	Cancer	Lung cancer	BAND 4	3
Criteria	Marks																				
- Correctly identifies 4 diseases and 2 disease categorises caused by asbestosis - Correctly identifies all as non infectious	3																				
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Disease	Category of Disease																				
Plaques	Environmental																				
Asbestosis																					
Mesothelioma	Cancer																				
Lung cancer																					
31b	(BIO11/12 - 4)	<table><thead><tr><th>Criteria</th><th>Marks</th></tr></thead><tbody><tr><td> - Provides a line or column graph that is correctly drawn including axes labels, scale for axes, points plotted correctly and key </td><td>4</td></tr><tr><td> - Provides a line or column graph with 3 of the above </td><td>3</td></tr><tr><td> - Provides a line or column graph with 2 of the above </td><td>2</td></tr><tr><td> - Provides a graph with 1 of the above </td><td>1</td></tr></tbody></table> Sample answer:		Criteria	Marks	Provides a line or column graph that is correctly drawn including axes labels, scale for axes, points plotted correctly and key	4	Provides a line or column graph with 3 of the above	3	Provides a line or column graph with 2 of the above	2	Provides a graph with 1 of the above	1	BAND 4	4						
Criteria	Marks																				
Provides a line or column graph that is correctly drawn including axes labels, scale for axes, points plotted correctly and key	4																				
Provides a line or column graph with 3 of the above	3																				
Provides a line or column graph with 2 of the above	2																				
Provides a graph with 1 of the above	1																				



Done well

31c	(BIO11/12 - 7)		Criteria	Marks		BAND 5	3
			Analyses graph by including: - Comparison of incidence of mesothelioma in females - Comparison of incidence of mesothelioma in males - Comparison of incidence of mesothelioma between females and males. - Includes data	3			
			Comparison of incidence of mesothelioma between females and males with data	2			

		OR • Comparison of incidence of mesothelioma in females • Comparison of incidence of mesothelioma in males • Includes data											
		• General analysis of graph, with or without data	1										
		Sample answer: Female incidence of mesothelioma has slowly increased from 105 to 145 in the years from 2011 to 2015. Female incidence was significantly lower than males in all year from 2011 to 2015. Male incidence has fluctuated between 505-605 from 2011 to 2015. Markers comments No speculation, all data needed!											
31d	(BIO11/12 - 7)	<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td> • Proposes a public health campaign including suitability for target audience, evidence based, public and government by in, examples of interventions, communication of accurate information </td><td>3</td></tr><tr><td> • Proposes a public health campaign including 3 of the above criteria. </td><td>2</td></tr><tr><td> • Provides some relevant information </td><td>1</td></tr></table> Sample answer: A public service campaign could be run, with promotional materials being show in posters/ ads running in hardware stores. DIY home renovators would visit before/during renovations and this could raise awareness specifically to them.	Criteria	Marks	• Proposes a public health campaign including suitability for target audience, evidence based, public and government by in, examples of interventions, communication of accurate information	3	• Proposes a public health campaign including 3 of the above criteria.	2	• Provides some relevant information	1		BAND 4-5	3
Criteria	Marks												
• Proposes a public health campaign including suitability for target audience, evidence based, public and government by in, examples of interventions, communication of accurate information	3												
• Proposes a public health campaign including 3 of the above criteria.	2												
• Provides some relevant information	1												
32	(BIO11/12 - 2)	<table><tr><th>Criteria</th><th>Marks</th></tr><tr><td> • Provides the features of a suitable procedure to test the effect of times spent on the ground on microbial growth including: – <i>How the independent variable is changed</i> – <i>How the dependent variable is measured</i> – <i>Variables kept constant</i> – <i>Repetition</i> </td><td>6</td></tr></table>	Criteria	Marks	• Provides the features of a suitable procedure to test the effect of times spent on the ground on microbial growth including: – <i>How the independent variable is changed</i> – <i>How the dependent variable is measured</i> – <i>Variables kept constant</i> – <i>Repetition</i>	6		BAND 3-6	6				
Criteria	Marks												
• Provides the features of a suitable procedure to test the effect of times spent on the ground on microbial growth including: – <i>How the independent variable is changed</i> – <i>How the dependent variable is measured</i> – <i>Variables kept constant</i> – <i>Repetition</i>	6												

			– Logical sequence – Appropriate safety considerations				
			• Provides most features of a suitable procedure suitable procedure to test the effect of times spent on the ground on microbial growth (features above)	5			
			• Provides basic features of a suitable procedure suitable procedure to test the effect of times spent on the ground on microbial growth, including how the independent variable is changed and how the dependent variable is measured and a feature for accuracy/validity	3–4			
			• Provides features of a relevant investigation	2			
			• Provides some relevant information	1			
Sample answer: Materials distilled water, zip lock bags, tape, spray bottle, loaf of bread-unopened or touched, stopwatch, new set of medical gloves, transparent grid sheet Method 1. Take 3 pieces of bread and spray each once with distilled water. Seal immediately in zip lock bags. These are the Time zero/ control group. 2. Spray a new piece of bread once and place on the ground and time for 5 seconds. Seal immediately after in a zip lock bag. Repeat twice more. 3. Repeat step 2 with 10 seconds spent on the ground. 4. Repeat step 2 with 15 seconds spent on the ground. 5. Using a transparent grid sheet, record the percentage cover of microbial growth daily, for two weeks.							
33	(BIO11/12 - 12)		Criteria	Marks		BAND 4-6	4
• Gives points (3 total) for and against the effectiveness of the model with a clear judgement including examples from the model			4				
• Gives points (2 total) for and against the effectiveness of the model with a clear judgement.			3				

		• Gives points (2 total) for and/or against effectiveness of model.	2		
		• Provides some relevant information	1		

Sample answer:

Points for:

- The model shows the correct sites of transcription and translation as the nucleus and cytoplasm respectively.
- The model shows some of the molecules involved in transcription including mRNA and RNA polymerase and ribosomes and polypeptides used in translation.

Points against:

- The model doesn't show details of how the genetic code can be converted into a specific chain of amino acids using the complementary base pairing rule.
- The model lacks tRNA molecules and doesn't show how they attach by temporarily pairing the bases of the anticodon with the complementary triplets (codon) on the mRNA.

Judgement:

Therefore the model is effective at conveying an accurate understanding of many of the steps in the process of protein synthesis.