

Student Number



Pymble Ladies' College

2023 HIGHER SCHOOL CERTIFICATE
TRIAL EXAMINATION

BIOLOGY

General Instructions

- Reading time – 5 minutes
- Working time – 3 hours
- Write using black pen
- Draw diagrams using pencil
- Board-approved calculators may be used

Total marks – 100

This paper has two parts, Part A and Part B

Part A – 20 marks

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

Part B – 80 marks

- Attempt Questions 21–35
- Allow about 2 hours and 25 minutes for this part

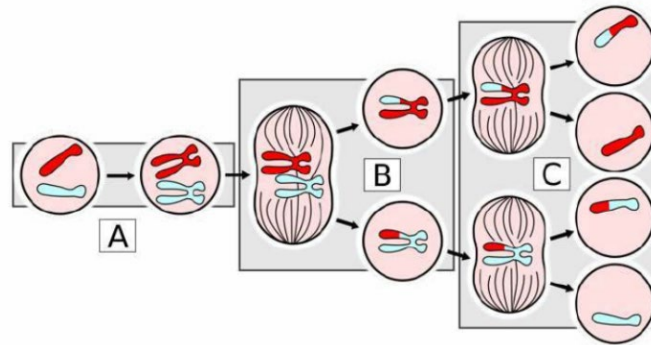
Part A – 20 marks

Attempt Questions 1–20

Allow about 35 minutes for this part

Use the separate multiple-choice answer sheet for Questions 1–20.

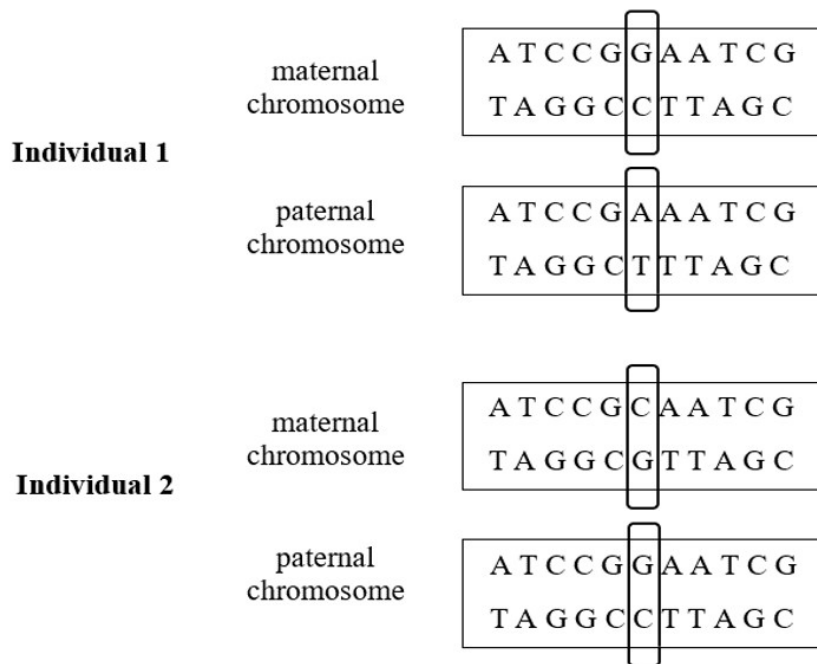
1. Observe the following diagram.



Identify where genetic variation can occur.

- A. A and B
 - B. B and C
 - C. A and C
 - D. A, B and C
2. In animals, gametes can join via either external or internal fertilisation.
Which of the following statements about fertilisation is correct?
- A. External and internal fertilisation are asexual processes.
 - B. Internal fertilisation produces offspring that develop outside the parent.
 - C. External fertilisation produces fewer gametes than internal fertilisation.
 - D. External fertilisation is most appropriate for animals in aquatic environments.
3. Scrapie, a disease which causes severe brain damage in sheep, is caused by prions.
What type of macromolecule are prions?
- A. Carbohydrate
 - B. Lipid
 - C. Nucleic acid
 - D. Protein

4. The diagram below shows the sequence of bases in a section of a gene (ribose and phosphate groups are not shown).



Which one of the following statements about such individual variations is true?

- A. They only occur in sex chromosomes.
 - B. They are unlikely to occur in non-coding sections of DNA.
 - C. If they occurred in coding sections, they might affect the phenotype.
 - D. If they occurred in coding sections, they would definitely affect the phenotype.
5. Mallard ducks have a unique colour pattern that is controlled by multiple alleles – the mallard allele (M), the restricted allele (M^R) and the dusky allele (m^d).

The alleles display the following hierarchy of dominance $M^R > M > m^d$

A male duck with the genotype $M^R m^d$ is mated with a female with the genotype $M m^d$. What will be the most likely genotypic and phenotypic result of this cross?

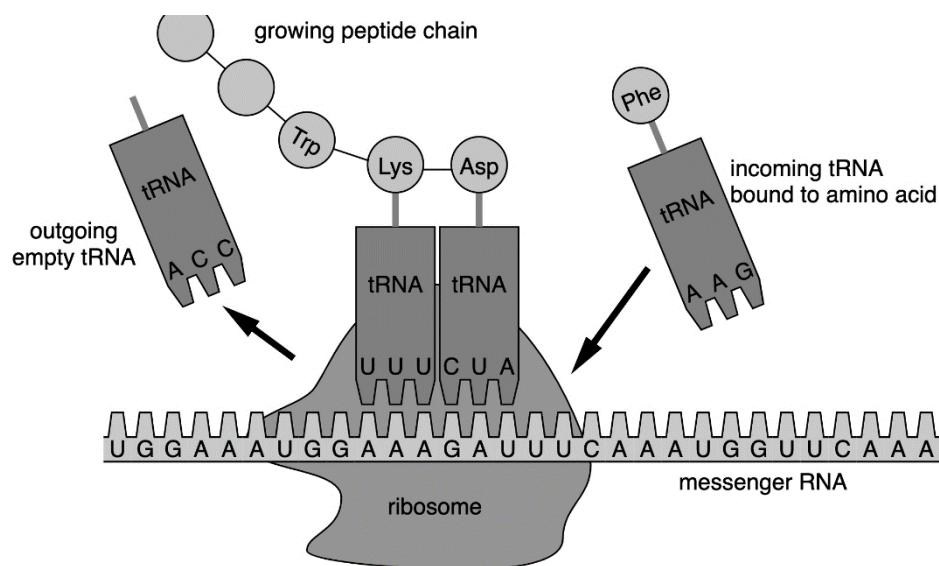
- A. 3 genotypes and 2 phenotypes.
- B. 3 genotypes and 3 phenotypes.
- C. 4 genotypes and 3 phenotypes.
- D. 4 genotypes and 4 phenotypes.

6. Himalayan rabbits are normally white with black ears, nose, feet and tail. The ears, nose, feet and tail have a lower temperature than the rest of the body. However, if a patch of fur is plucked from its back, and an ice pack is kept on the plucked patch, the new fur that grows there will be black too.



What is the reason for this?

- A. Genotype of the white fur is affected by the lower temperatures.
 - B. Codominant alleles are both expressed in these cooler areas.
 - C. Genes for black pigment production are switched off at lower temperatures.
 - D. Lower temperatures cause mutations in cells which then produce black pigment.
7. Below is a diagram of a process during protein synthesis.



Boumphreyfr vector conversion by Glrx, CC BY-SA 3.0 <<https://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons

Determine the DNA sequence on the template (non-coding) strand for the amino acid “Asp”.

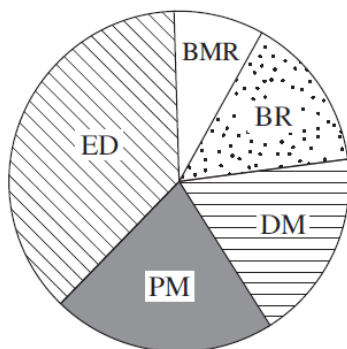
- A. CUA
- B. CTA
- C. GAT
- D. GAU

8. Comparing the blood of sheep that had died of anthrax with the blood of healthy sheep, Robert Koch found that the blood of the diseased sheep contained small rod-shaped organisms. This discovery became the first step in Koch's postulates. What is this first step in Koch's postulates?
- The organism must be grown in pure culture.
 - The organism must be seen under the microscope in all organisms.
 - The microbe causing the disease must be found in each diseased organism.
 - The microbe causing the disease must be isolated and grown in pure culture.
9. A study was conducted to investigate the incidence of pathogens on vineyard grapes. The passage represents an extract of the results.

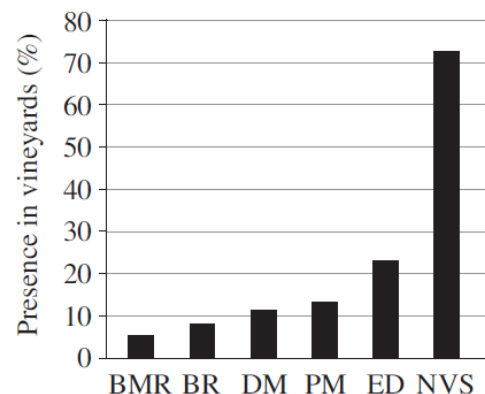
Of the vineyards studied, we found that 5% had some cases of blue mould rot (BMR), 9% had black rot (BR), 11% had downy mildew (DM), 13% had powdery mildew (PM) and 23% showed eutypa dieback (ED). There were no visible signs (NVS) of pathogens in 72% of the vineyards studied.

Which of the following graphs best represents these results?

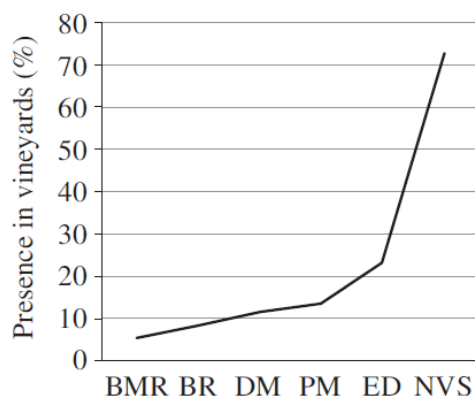
A. *Presence in vineyards (%)*



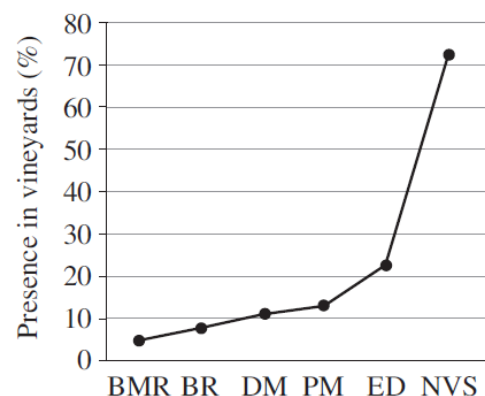
B.



C.



D.



10. The table shows the mortality rates resulting from the major causes of death in Australia in 2021. The data was gathered and averaged from a range of sources and the numbers have been rounded to the nearest hundred.

<i>Females</i>		<i>Males</i>	
<i>Disease</i>	<i>Number of deaths</i>	<i>Disease</i>	<i>Number of deaths</i>
dementia/Alzheimer's disease	9500	coronary heart disease	11 000
coronary heart disease	6700	dementia/Alzheimer's disease	5600
cardiovascular disease	5800	lung cancer	4600
lung cancer	3400	cardiovascular disease	4100
breast cancer	3200	prostate cancer	3700

Which statement could be made about the data?

- A. The data is not useful because it is not current.
 - B. Overall, coronary heart disease was the leading cause of death in 2021.
 - C. The data is not useful because it was gathered from a range of sources.
 - D. It is useful to compare the mortality rates of men and women separately.
11. Yellow fever is a viral disease that is transmitted primarily by mosquitoes. An outbreak of yellow fever was reported to have occurred in an area of Brazil in January 2017. This outbreak was reported to be spreading to other areas within Brazil.

Which one of the following is a correct statement about this outbreak of yellow fever?

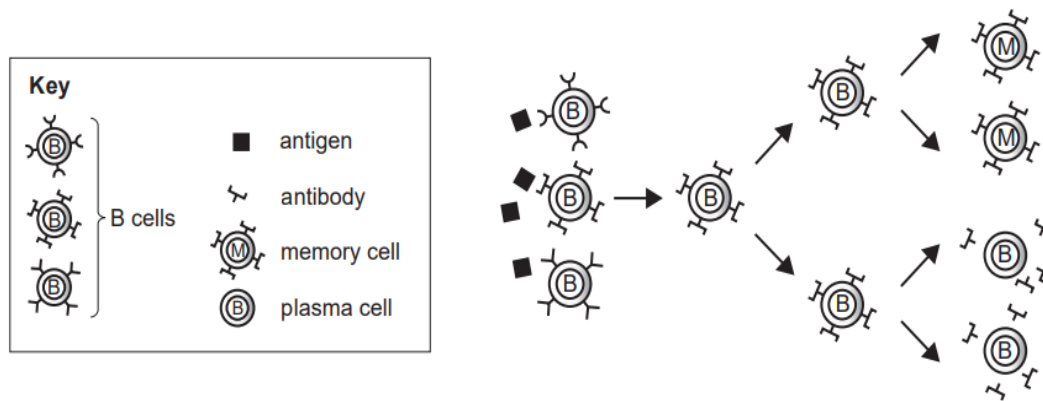
- A. This outbreak of yellow fever is considered to be a pandemic.
- B. Infected individuals who travel to other areas of Brazil will not increase the spread of the disease.
- C. This outbreak of yellow fever is occurring in populations with high vaccination rates for yellow fever.
- D. Elimination of mosquito breeding sites in areas with yellow fever will reduce the number of individuals affected.

12. *Taenia saginata* is the beef tapeworm which spends the adult part of its life cycle in the intestine of humans. Identify an adaptation of the adult beef tapeworm that aids in its transmission.
- A. Body shape with a high volume to surface area ratio.
 - B. Hooks and suckers to hold tightly to intestinal walls.
 - C. A digestive system with specialised regions for digesting different foods.
 - D. Has both male and female gametes and can produce large number of eggs.
13. After exercising in extremely hot conditions, a decrease in the level of sodium ions in the blood will occur. Which of the following will return the sodium levels back to normal?

	Aldosterone secretion	Reabsorption of sodium ions	Blood pressure
A.	increase	increase	increase
B.	decrease	increase	increase
C.	increase	decrease	decrease
D.	decrease	decrease	increase

14. Which of the following is a disadvantage of asexual reproduction?
- A. No need to find a mate.
 - B. Energy used to care for offspring.
 - C. Greater vulnerability to disease.
 - D. Decreased competition within the population.

15. Consider the diagram below of clonal selection in B cells.



Source: adapted from Tang Zheng et al., 'An Improved Clonal Selection Algorithm and its Application to Traveling Salesman Problems', in *IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences*, vol. E90-A, no. 12, December 2007, p. 2931

In adaptive immunity, which part of this process allows long-term (sometimes lifetime) protection against pathogens?

- A. Production of plasma cells.
- B. Generation of memory cells.
- C. Production of specific antibodies.
- D. Recognition of one antigen by one B cell clone.

16. One of the main studies conducted in an epidemiological investigation is a descriptive study.

Identify the main goal of a descriptive study.

- A. Identifying the associations between disease and causes.
- B. Intervention to change exposure to the factor being studied.
- C. Developing strategies to establish measures to prevent the disease.
- D. Examining the incidence of disease in relation to person, place and time.

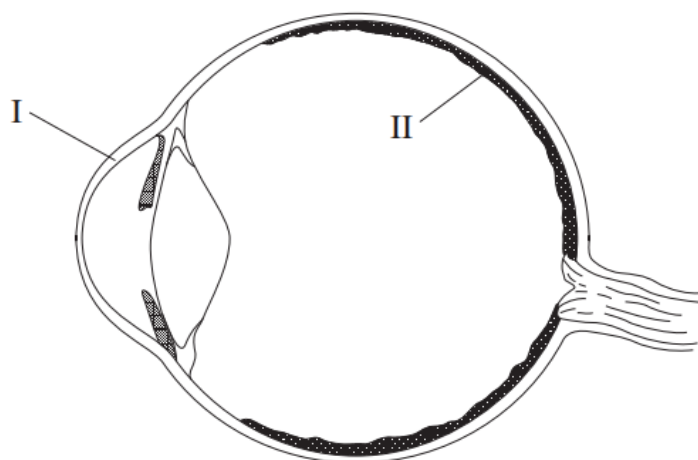
17. A public education campaign was developed with the aim of adopting healthy eating practices. The campaign was adopted by NSW Early Childhood Education and Care Services and is illustrated in the poster below.



Healthy Kids NSW government

Which is the best method to measure the effectiveness of the campaign?

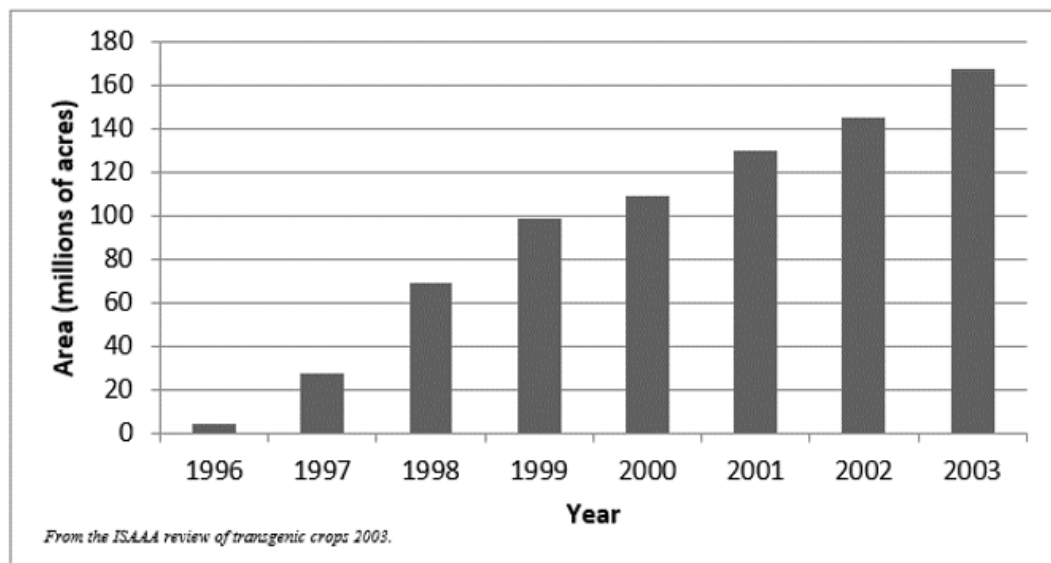
- A. Comparing childhood obesity incidence before and after the campaign.
 - B. Counting the number of early childhood and care services participating.
 - C. Surveying children and parents and asking if they remember the campaign goals.
 - D. Surveying children and parents and checking if they have changed eating practices.
18. Laser Assisted In-Situ Keratomileusis (LASIK) is a procedure that uses a laser beam to correct vision.



Identify the part of the eye and function that LASIK is used to correct.

	<i>Label</i>	<i>Name</i>	<i>Function</i>
A.	I	Cornea	Refract light
B.	I	Retina	Transmit light
C.	II	Retina	Focus light
D.	II	Cornea	Absorb light

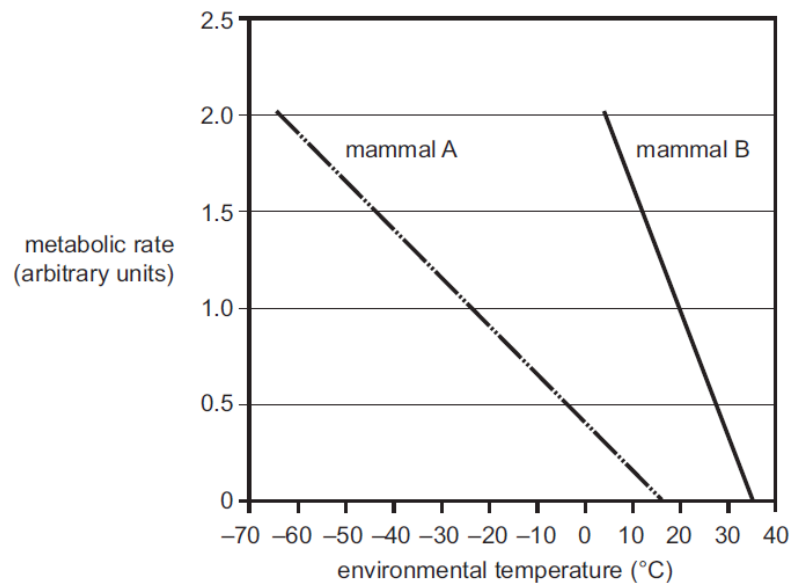
19. The graph below shows how the total area of land planted with transgenic crops worldwide increased between 1996 and 2003.



Between which two years was the greatest *percentage* increase in the area planted with transgenic crops?

- A. 1996 – 1997
- B. 1997 – 1998
- C. 2001 – 2002
- D. 2002 – 2003

20. The graph below shows the effect of environmental temperature on the metabolic rate of two mammals. The zero rate of metabolism represents the basal metabolic rate (the amount of energy used when resting) for each mammal.



What conclusion could be drawn from this information?

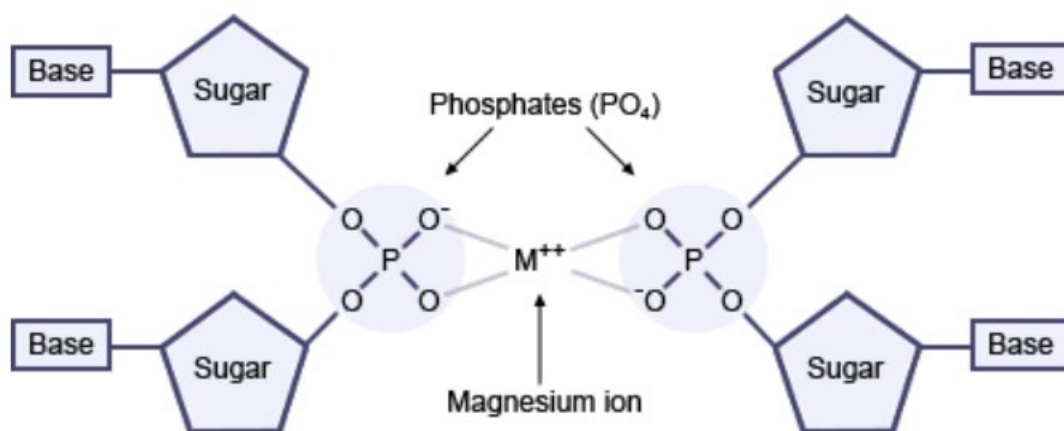
- A. Mammal B would be sweating when the air temperature is 20°C.
- B. Mammal A would be shivering when the air temperature is -50°C.
- C. Mammal B would have a thicker insulating layer of fat than mammal A.
- D. Vasodilation of skin blood vessels of mammal A would occur when air temperature is -10°C.

Part B – 80 marks**Attempt Questions 21–35****Allow about 2 hours and 25 minutes for this part.**

Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.

Question 21 (4 marks)

Watson and Crick used model building as a method to determine the double helix structure of DNA. The image below shows one of their earlier proposed structures, which proved to be incorrect.



- a) Identify the major error in this model.

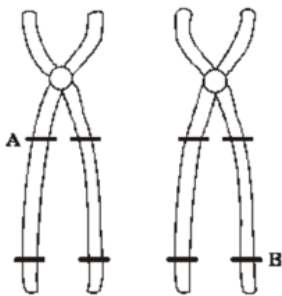
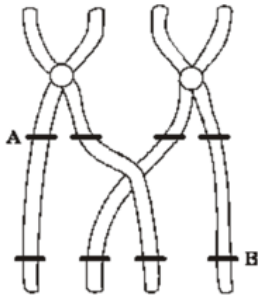
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- b) Once they had the model correct, they were able to deduce the mechanism by which DNA replicates, ensuring that genetic material is copied exactly every time. Assess the importance of accurate DNA replication for continuity of species.

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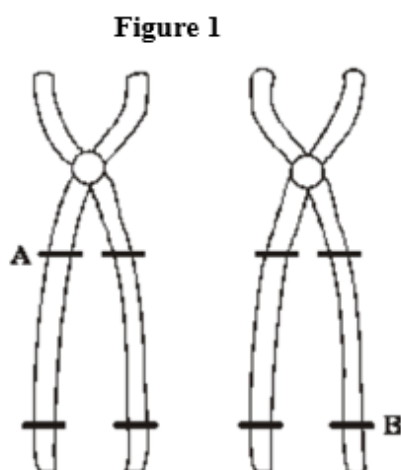
Question 22 (3 marks)

Two pairs of alleles A and a, and B and b are found on one pair of homologous chromosomes. A person has the genotype AaBb.

Figure 1 	Figure 2 
Figure 1. The chromosomes at an early stage of meiosis. The position of two of the alleles is shown.	Figure 2. The process of crossing over is occurring

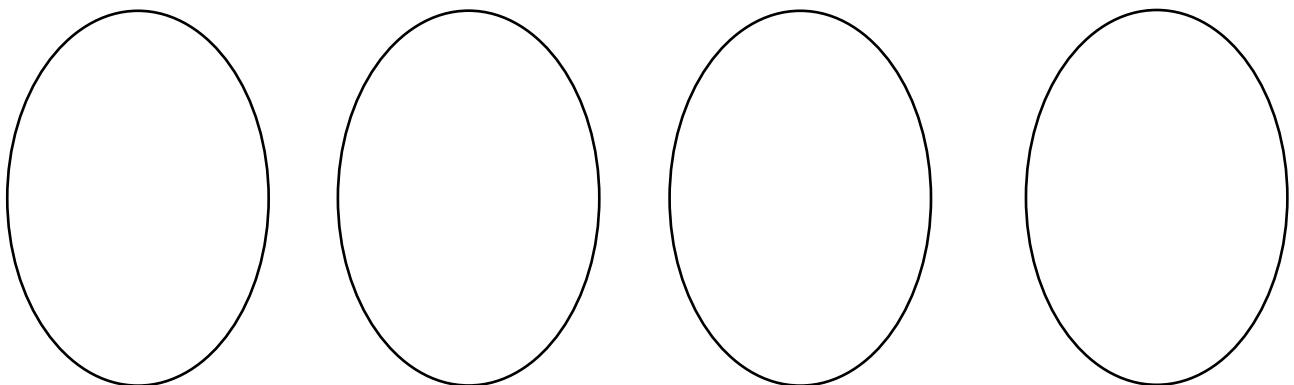
- a) Complete Figure 1 below to show the alleles present at the other marked positions.

1



- b) From Figure 2, draw the chromosomes in each of the four gametes produced, showing the genotype of each.

2



Question 23 (4 marks)

Scientists were investigating if a bacteria caused a specific disease in cattle. They named the bacteria LMG and the disease OLV.

During the first stage of their investigation, they tested for OLV in 100 cattle from 5 different farms. Three farms were in hot, dry areas (Tamworth, Cessnock and Dubbo) and two farms were in hot, humid areas (Lake Macquarie and Gosford).

From this sample, 70 cattle were healthy and 30 were sick with the disease.

In the second stage of the investigation, they took tissue from the sick cattle and incubated the samples on agar plates in conditions similar to the cattle's body (same temperature and pH). They returned to the farms to inject the LMG bacteria into 40 healthy cattle on each farm. After a few days, they returned to re-test these cattle for the presence of OLV. Below is a table of their findings.

FARM	HEALTHY CATTLE	CATTLE WITH OLV
Tamworth	28	12
Cessnock	25	15
Dubbo	32	8
Lake Macquarie	0	40
Gosford	0	40

a) Write a hypothesis for the investigation.

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b) With reference to the data, what conclusion could the scientist make?

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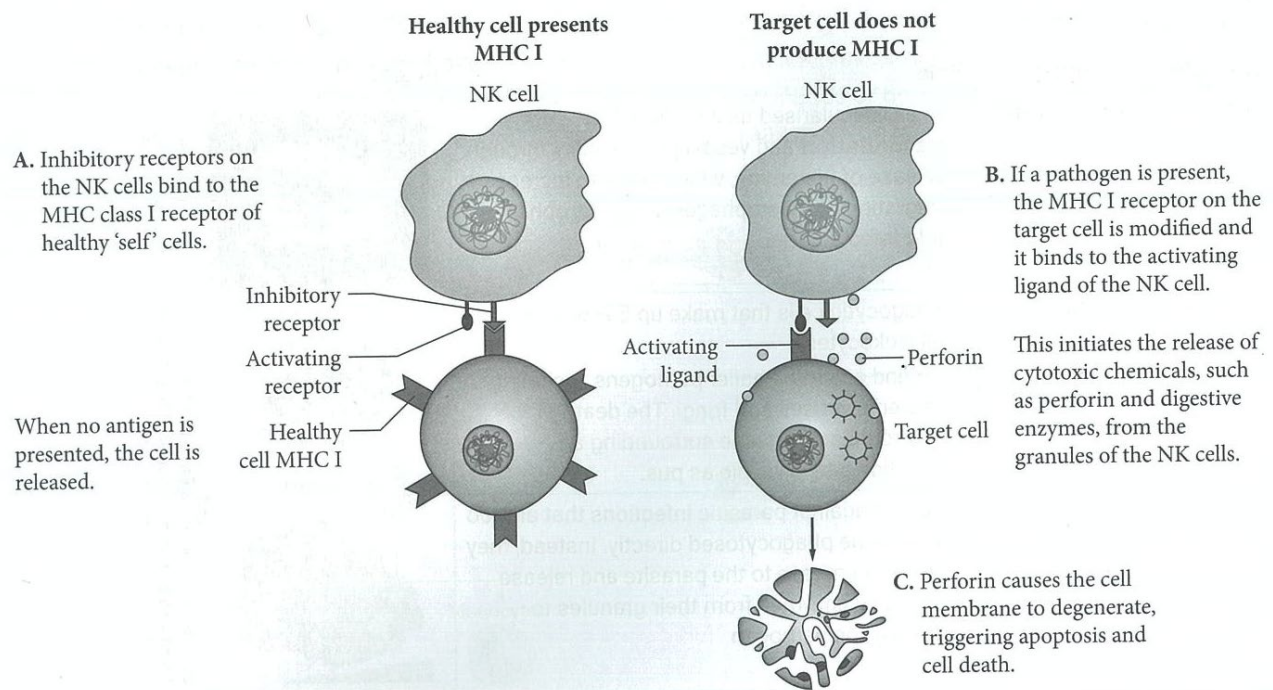
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Question 24 (4 marks)

Natural killer (NK) cells are an essential part of the innate immune system. They belong to a group of cytotoxic white blood cells and are important for early and effective immune responses against cancer and virus-infected cells. The action of natural killer cells on healthy versus infected body cells is outlined in the diagram below.



In a recent study, a correlation has been found between the presence of stress and anxiety, and lower numbers of natural killer cells in the body.

- a) Identify TWO cells that natural killer (NK) cells would produce an immune response towards. **1**

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- b) Justify the need to reduce stress and anxiety to improve an individual's immune response. **3**

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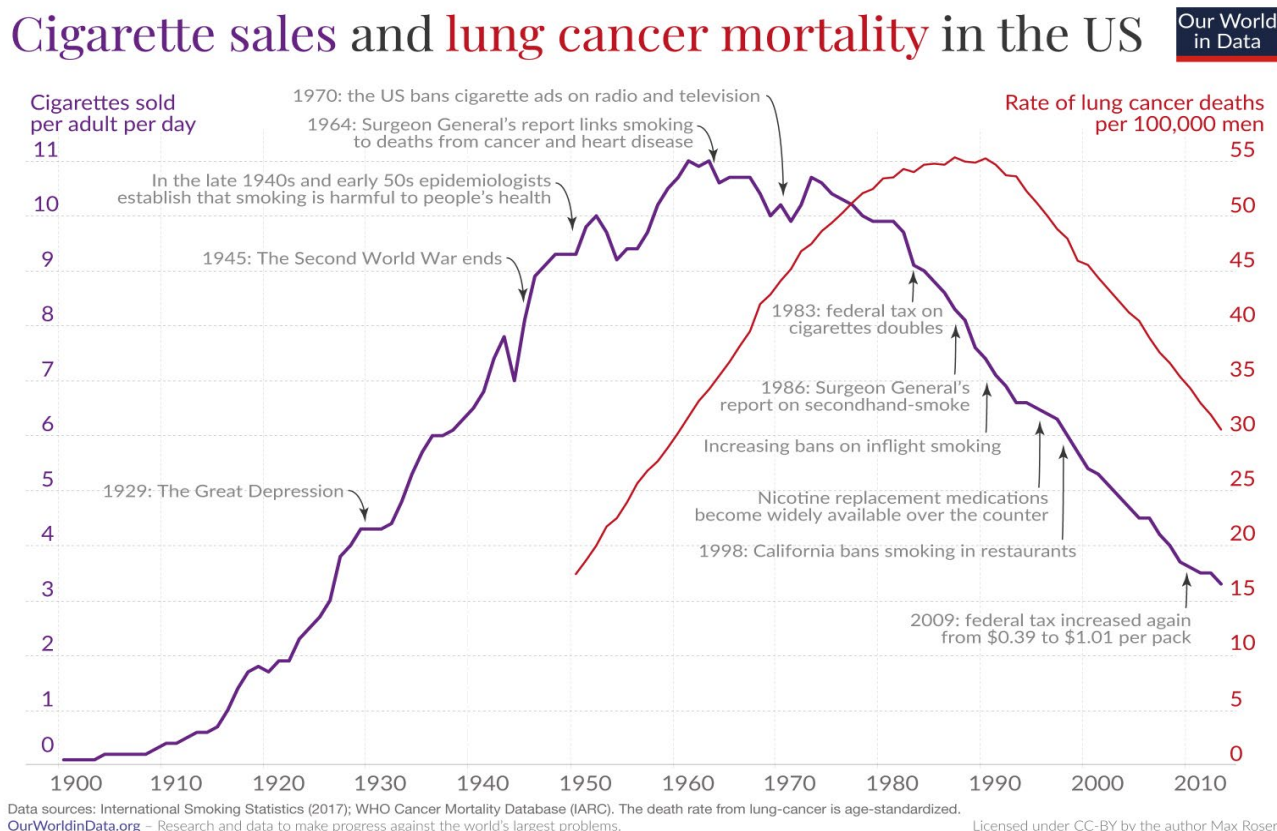
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Question 25 (5 marks)

The graph below outlines some data on smoking and lung cancer deaths amongst men in the US.



Assess the impact of anti-smoking initiatives on the lung cancer death rates of men in the US.

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[illegible]

Question 26 (4 marks)

Many Australian plants have developed adaptations that allow them to maintain adequate water levels despite the hot and dry climate in which they grow.

Explain how TWO mechanisms in plants allow for water balance to be maintained in such a climate. **4**

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Question 27 (7 marks)

Glucose-6-phosphate dehydrogenase deficiency (G6PDD) is a genetic disorder that occurs almost exclusively in males. This condition affects red blood cells, which carry oxygen from the lungs to tissues throughout the body. In affected individuals, a defect in an enzyme causes red blood cells to break down prematurely.

Greg comes from a family that has no record of G6PDD. He is married to Salma who has two brothers (Ali and Hamza) who are affected by G6PDD, as well as another brother, Omar, who is not affected. Their sister, Rania, has had genetic testing and knows that she does not possess an affected allele. Salma's father, Hussein, is not affected by G6PDD but her mother, Angela, is a carrier of the condition. Greg and Salma have recently had a son named Adam.

a) Construct a pedigree to show the occurrence of G6PDD in the family. **3**

b) Analyse the likelihood that Adam will be affected by G6PDD. You may use Punnett squares to support your response. **4**

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Question 28 (5 marks)

Pharmaceutical companies are constantly developing new medicines to help treat diseases. These include antivirals and antibiotics. This process is vitally important to combat new strains of a pathogen or pathogens that have developed resistance to current treatments. A new antibiotic called Albicidin is being investigated to determine the types of bacteria on which it will be most effective.

Design a safe and valid method that could be used to determine if Albicidin is effective on four specific bacterium *Escherichia coli* (Ec), *Klebsiella pneumoniae* (Kp), *Pseudomonas aeruginosa* (Pa) and *Salmonella typhimurium* (St).

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Question 29 (5 marks)

Patrick is a 45-year-old Australian man who has been treated for many skin cancers. He was a landscape gardener for 20 years, working mostly outdoors. He is now a teacher, working indoors. Patrick's heritage is northern European, with all of his grandparents coming from Ireland. Both of Patrick's parents, who have lived most of their lives in Australia, have also had many skin cancers. His cousins, who live in Ireland, do not get skin cancers. They have told Patrick that it is a rare disease in northern Europe.

- a) Skin cancer is a non-infectious disease caused by environmental exposure. Justify this using information from the passage above.

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- b) Identify ONE other cause of non-infectious disease and explain why skin cancer can NOT be classified into that category.

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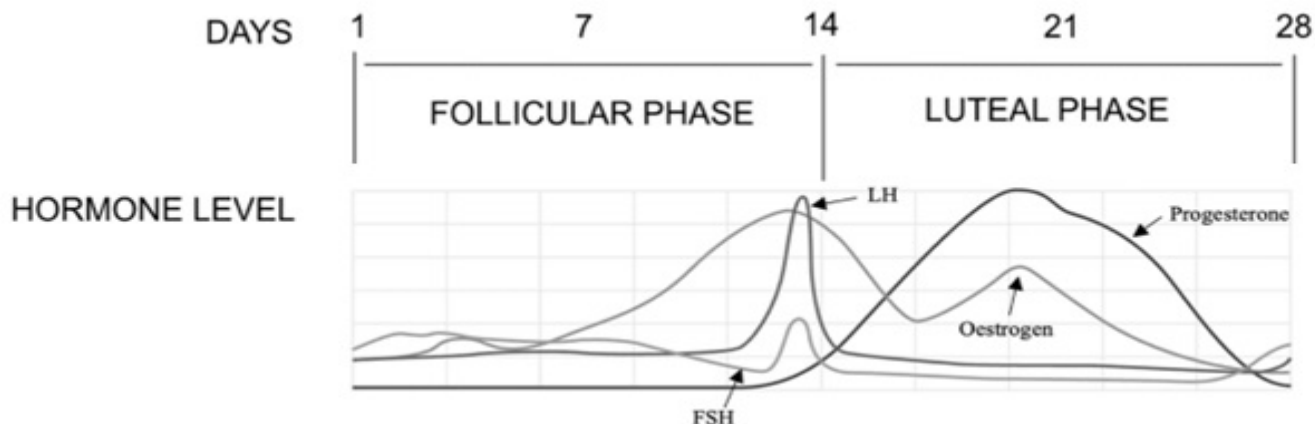
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Question 30 (7 marks)

The graph below shows the levels of pituitary hormones (FSH and LH) and ovarian hormones (oestrogen and progesterone) present in the blood at various points in the menstrual cycle.



Isometrik, CC BY-SA 3.0 <<https://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons

- a) Describe the roles of FSH and LH in bringing about ovulation. Include reference to the shape of the graph. 4

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- b) Explain the change in levels of oestrogen and progesterone during the luteal phase that would occur if the egg is fertilised following ovulation. 3

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Question 31 (7 marks)

Whitefly are sap sucking insects that reduce plant growth, cause distortion, discoloration, yellowing or silvering of leaves in fruit trees, ornamentals, and vegetables. Whiteflies produce a sticky substance known as honeydew, on which sooty mould can develop. They also commonly transmit plant viruses. Virus symptoms include irregular ripening in tomatoes and blanching (loss of colour) in carrots and broccoli.



Australian researchers have developed an RNA-based pesticide called BioClay which targets Whitefly. It involves a spray of nano-sized degradable clay carrying pieces of specific double-stranded RNA. If the whitefly eats the BioClay it dies. The RNA in BioClay stops the expression of genes in the Whitefly, that control respiration, reproductive cycle and mobility. The technology reduces the use of toxic chemical pesticides, does not alter the genome of the plant, naturally degrades, and provides protection for up to 20 days.

Evaluate the impact BioClay will have on the Agriculture industry with reference to food production, environment impact and economy.

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Question 31 continued on next page

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Question 32 (4 marks)

Polio is a disease which has now almost been eradicated worldwide through vaccination. The virus mainly infects cells in the lining of the intestinal tract but can sometimes infect nervous tissues. The vaccination schedule for polio recommends four doses of the vaccine for children. The first is given at 2 months of age and the others are spaced out until the age of 6 years.

- a) Explain why multiple doses of the vaccine might create a more effective immunity than a single dose. 2

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- b) Vaccination provides individual protection from a disease. Explain how it can also provide protection to a whole community. 2

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Question 33 (6 marks)

A marathon runner competed in a race on a summer day with a temperature of 32°C. When she completed the race, she immediately immersed herself in an ice bath to reduce muscle soreness. The temperature of the ice bath was 10°C.

Construct a negative feedback loop to show the changes that would occur in the marathon runner's body in response to the changes in temperature experienced both during the race and when in the ice bath. **6**

Question 34 (7 marks)

The health of a person depends on their kidneys working correctly.

a) Identify TWO functions of the kidneys.

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b) Describe ONE way that kidney function can be reduced.

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c) Evaluate the effectiveness of dialysis, or any other example of technology, in managing the effects of kidney disorders.

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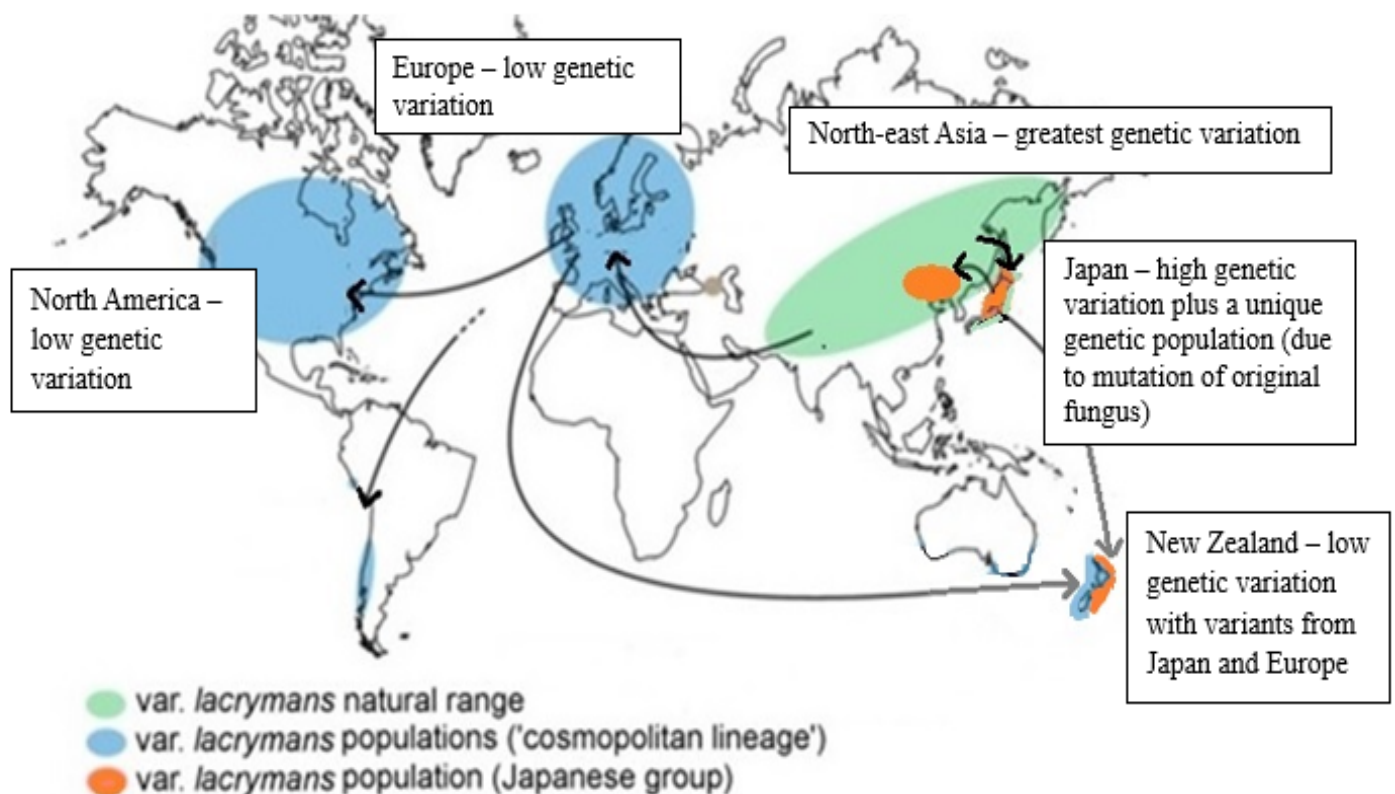
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Question 35 (8 marks)

Globalisation and international trade have impacted organisms around the world leading to a considerable number of fungal species establishing in new geographic areas. One such species is the dry rot fungus *Serpula lacrymans* which is the most aggressive wood-decay fungus in indoor environments. The fungus is found in only a few natural environments in north-east Asia but is now established in buildings throughout Japan, Europe, North America and New Zealand. Despite Australia's proximity to known populations, preventative strategies have stopped the fungus from becoming established here.

As well as potentially being transported in timber products and by human vectors, it is also spread via spores (the fungus can reproduce both sexually and asexually). A recent study was undertaken on the evolutionary origin and spread of this species using genetic analysis of the different variations of the fungus.

The map shows the location and level of genetic variation of the major populations of the fungus world-wide.



Source: Kauserud, H., Knudsen, H., Högberg, N., Skrede, I., 2012. Evolutionary origin, worldwide dispersal, and population genetics of the dry rot fungus *Serpula lacrymans*. *Fungal Biol. Rev.* 26, 84–93.

Question 35 continued on next page

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Page 27 of 31

This image shows a full page of white paper with horizontal dashed lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.



Pymble Ladies' College

Student Number

2023 HIGHER SCHOOL CERTIFICATE TRIAL EXAMINATION

BIOLOGY

ANSWER SHEET

General Instructions

- Write your Student Number at the top of this page.
- Answer ALL multiple choice questions on this Answer Sheet.
- Use a pencil to fill in the circle indicating your answer.

PART A

Start Here	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	☐

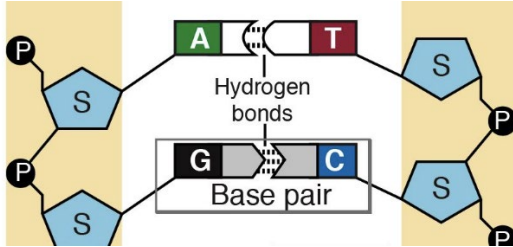
Yr 12 Biology 2023 Task 4 – Trial Marking Guidelines with Markers Comments

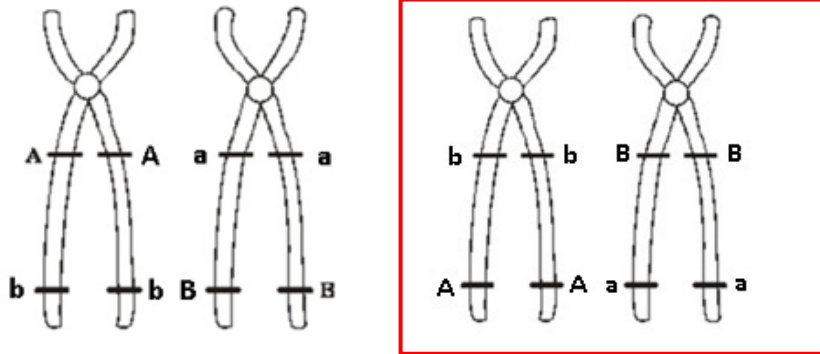
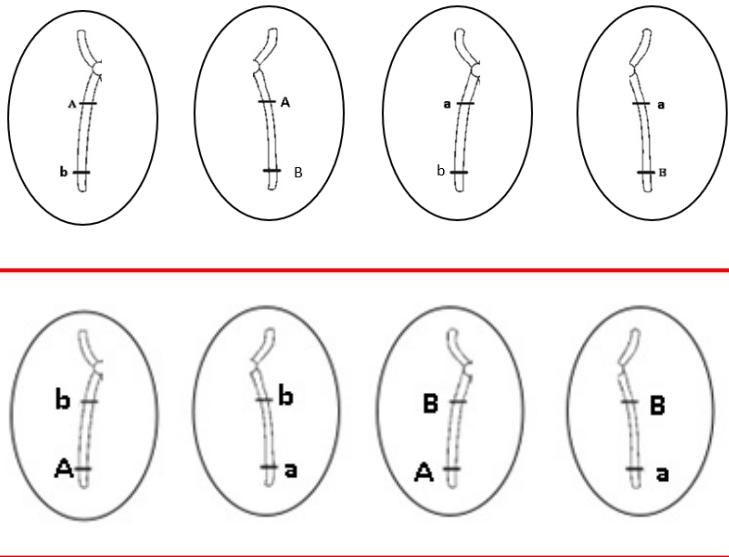
Catch up paper in Red

Part A – Multiple Choice

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
B	D	D	C	C	---	B	C	B	B/D	D	D	A	C	B	D	D	A	A	B
D		A		C		A				B									

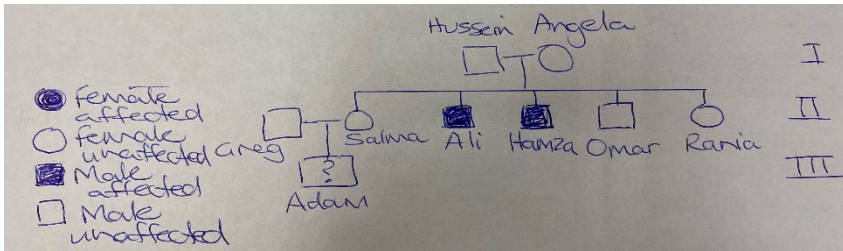
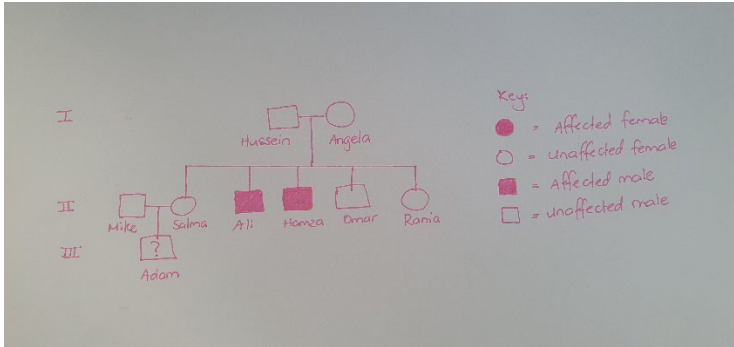
Part B

	Marking Guidelines		Sample Answer	Markers Comments
21a	Criteria	Mark	The bases are on the outside of the double helix, rather than the inside 	Not overly well done. The magnesium ion is not the major error.
	Identifies that bases are on the outside of the double helix	1		
21b	Criteria	Mark	DNA replication is essential for continuity of species due to characteristics being passed down through the generations through reproduction. It provides genetic stability with daughter cells produced by mitosis and gametes via meiosis having accurate copies of the genetic code on DNA so offspring can function and survive (genetic stability). The correct genetic code is vital for gene expression so the necessary proteins for functioning are produced.	Quite well answered. The best answers concentrated on why correct DNA replication is essential, rather than talking about mutations.
	Makes a judgment supported with clearly described criteria linked to continuity of species	3		
	Makes a judgment supported with one criteria described or linked	2		
	Provides some relevant information	1		

22a	<table><tr><th>Criteria</th><th>Mark</th></tr><tr><td>Alleles correct</td><td>1</td></tr></table>	Criteria	Mark	Alleles correct	1		Very poorly answered. Please review what genes and alleles are. Genes code for proteins. Alleles are different versions of the gene and are in the same place on the chromosome. Gametes should be receiving one of each type of allele for each gene (A or a and B or b)		
Criteria	Mark								
Alleles correct	1								
22b	<table><tr><th>Criteria</th><th>Mark</th></tr><tr><td>All gametes correct</td><td>2</td></tr><tr><td>Some gametes correct</td><td>1</td></tr></table>	Criteria	Mark	All gametes correct	2	Some gametes correct	1		Mainly error carried forward (e.c.f) A big clue for the previous question was that gametes should not be receiving two alleles for the same gene (i.e. should not get A and a).
Criteria	Mark								
All gametes correct	2								
Some gametes correct	1								
23a	<table><tr><td>Writes an appropriate hypothesis that could be supported or rejected by the method outlined.</td><td>1</td></tr></table>	Writes an appropriate hypothesis that could be supported or rejected by the method outlined.	1	OLV is caused by the LMG bacteria. The higher the temperature the more fungi will grow	A hypothesis is a prediction of what you expect to occur. Many students wrote an aim which was given to you as ‘scientists were investigating if a bacteria (LMG) caused a specific disease in cattle (OLV)’. The hypothesis needed to be based on the aim provided and so must include reference to both LMG and OLV.				
Writes an appropriate hypothesis that could be supported or rejected by the method outlined.	1								

23b	Draws an appropriate conclusion from the data Uses the data to provide a justification for the validity of the conclusion	3	The scientists could conclude that OLV is not caused by the LMG bacteria or the data is inconclusive. While all cattle on farms in hot humid areas developed OLV disease when injected with LMG bacteria, more than half the cattle from Tamworth, Cessnock and Dubbo did not develop the disease even when given the bacteria directly. While this may indicate that susceptibility to LMG is affected by environmental conditions of the cattle it is more likely that OLV disease is the result of a cause other than LMG. Our results showed that 25°C has the most growth of fungi. The data shows that at this temperature that it had 60% coverage which is 3 times higher than 15°C. Therefore the hypothesis is supported	This question was poorly answered. The key to this experiment was Koch’s postulates and the appropriate conclusion was that the data did not support LMG as the cause of OLV as not all cattle inoculated with LMG developed the disease. We marked more holistically with acceptance of a wider range of ‘appropriate’ conclusions. However, as the bacteria was injected directly into cattle, the external environmental conditions did not directly affect growth of bacteria. We allowed that the environmental conditions may have affected how the cattle responded to exposure.
	Draws a relevant conclusion Uses the data to provide a reason for the for the conclusion	2		
	Provides some relevant information about the data	1		
24a	Correctly identifies two cells.	1	Cells infected by a virus. Cancer cells.	Not overly well done. Its important to read the information provided above the stimulus diagram. Only accepted virus-infected cell and cancer cell (or example of each ie. influenza-infected cell / melanoma).
24b	Explains the negative impact of stress and anxiety on immune response. AND Provides a strong supporting statement with evidence.	3	Natural killer cells target cancer cells or cells infected by viruses. They release perforin that will breakdown the cell membrane of these cells resulting in the death of these types of cells. If stress and anxiety reduce the number of natural killer cells in the body then the speed at which infected or cancerous cells are eliminated will be reduce resulting in increase in viral infections or cancer cells increasing in number.	Many responses did not include any information about the relationship between natural killer cells and stress / anxiety at all. Please note that stress is a feeling, not a cell or pathogen. Also, the natural killer cells themselves weren’t stressed; the person is stressed.
	Judgement and identifies a reason. OR Describes a reason for reduced immune response.	2		
	Any relevant information.	1		

25	<table><tr><td>Provide an extensive assessment of the impact of anti-smoking campaigns Uses data from the graph Provides a well-informed judgement</td><td>5</td></tr><tr><td>Provides a thorough assessment of the impact of anti-smoking campaigns Uses data from the graph Provides a judgement</td><td>4</td></tr><tr><td>Provides a sound assessment of the impact of anti-smoking campaigns Attempts to reference the stimulus. Does not provide a judgement.</td><td>3</td></tr><tr><td>Provides some information about the effectiveness of anti-smoking campaigns</td><td>2</td></tr><tr><td>Provides some relevant information</td><td>1</td></tr></table>	Provide an extensive assessment of the impact of anti-smoking campaigns Uses data from the graph Provides a well-informed judgement	5	Provides a thorough assessment of the impact of anti-smoking campaigns Uses data from the graph Provides a judgement	4	Provides a sound assessment of the impact of anti-smoking campaigns Attempts to reference the stimulus. Does not provide a judgement.	3	Provides some information about the effectiveness of anti-smoking campaigns	2	Provides some relevant information	1	Anti-smoking campaigns have lowered the prevalence of daily smokers and have lowered the overall total number of lung cancer deaths. Daily smoking has decreased from 11 cigarettes sold per adult per day in 1960 to just over 3 in 2010 and total lung cancer deaths of men have decreased from 55 per 100,000 in 1990 to 33 per 100,000 in 2010. Cigarette sales were increasing from 1900 to 1960 until the Surgeon General’s report linking smoking to deaths from cancer and heart disease. After this date, there were campaigns such as cigarette ads banned on TV and radio in 1970, the doubling of the federal tax on cigarettes in 1983 and Californian ban on smoking in restaurants in 1998. Over these years the rate of lung cancer deaths continually decreased. This would suggest that these anti-smoking initiatives have worked for men in the US. Overall, anti-smoking campaigns have had a positive impact on death rates of lung cancer, as they have contributed to the lower death rates of men due to lung cancer from 1990 to 2010.	Well-answered. Students still received 4 marks if there was no judgement, but data from both cigarette sales and lung cancer mortality in males /100 000 was referenced correctly. Please ensure you are referencing the axes correctly ie. it was lung cancer mortality in males <i>per 100 000</i> and overall cigarette sales (not male specific cigarette sales).
Provide an extensive assessment of the impact of anti-smoking campaigns Uses data from the graph Provides a well-informed judgement	5												
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Provides some relevant information	1												
26	<table><tr><td>Explains correctly how TWO mechanisms in plants allow for water balance in a hot dry climate</td><td>4</td></tr><tr><td>Explains how ONE mechanism in plants allows for water balance in a hot dry climate and identifies/describes a second mechanism</td><td>3</td></tr><tr><td>Identifies/describes how TWO mechanisms in plants allow for water balance in a hot dry climate OR explains ONE mechanism</td><td>2</td></tr><tr><td>Provides some relevant information</td><td>1</td></tr></table>	Explains correctly how TWO mechanisms in plants allow for water balance in a hot dry climate	4	Explains how ONE mechanism in plants allows for water balance in a hot dry climate and identifies/describes a second mechanism	3	Identifies/describes how TWO mechanisms in plants allow for water balance in a hot dry climate OR explains ONE mechanism	2	Provides some relevant information	1	Banksias have woody fruits rather than fleshy fruits (1 mark). This prevents loss of water when the fruits fall to the ground (1 mark). Eucalypts have leaves that hang vertically (1 mark). This reduces exposure to direct sunlight, which would cause loss of water by evaporation (1 mark). There are many possible answers to this question. To gain full marks, two examples must be provided and clearly explained. For each explanation, the mechanism must be clearly described (cause), along with a clear indication of how this prevents water loss (effect).	Moderately well-answered. Verb is <i>explain</i> so cause and effect needed – many responses were described only. Please note that plants do NOT absorb water through their leaves (water enters plants via the roots) but lose water via transpiration from stomates in leaves. Closing stomates may reduce water loss but will also stop necessary gas exchange. Need to specify they are closed during the hottest part of the day to reduce transpiration.		
Explains correctly how TWO mechanisms in plants allow for water balance in a hot dry climate	4												
Explains how ONE mechanism in plants allows for water balance in a hot dry climate and identifies/describes a second mechanism	3												
Identifies/describes how TWO mechanisms in plants allow for water balance in a hot dry climate OR explains ONE mechanism	2												
Provides some relevant information	1												

27a	<table><tr><th>Criteria</th><th>Mark</th></tr><tr><td>Provides a pedigree showing THREE generations, includes a key OR uses a common structure, clearly shows sufferers</td><td>3</td></tr><tr><td>Provides a clear pedigree showing sufferers</td><td>2</td></tr><tr><td>Provides some relevant information</td><td>1</td></tr></table>	Criteria	Mark	Provides a pedigree showing THREE generations, includes a key OR uses a common structure, clearly shows sufferers	3	Provides a clear pedigree showing sufferers	2	Provides some relevant information	1	 	No marks lost but good habits are important: - Label the generations. - When names are given in the stimulus put them into your pedigree. This is a sex-linked recessive disease. Males cannot be a carrier and should not be included in your key. Carrier females have 1 copy of the G6PDD allele but do not “have” the disease. They should not be coloured the same as affected males. Mostly answered well. Marks tended to be lost for lack of key																				
Criteria	Mark																														
Provides a pedigree showing THREE generations, includes a key OR uses a common structure, clearly shows sufferers	3																														
Provides a clear pedigree showing sufferers	2																														
Provides some relevant information	1																														
27b	<table><tr><th>Criteria</th><th>Mark</th></tr><tr><td>Provides evidence that Salma may be a carrier with 50% chance of Adam being affected OR not a carrier with no chance that Adam will be affected</td><td>4</td></tr><tr><td>Provides evidence that Salma may or may not be a carrier AND that Adam may or may not be affected but % chance not clear</td><td>3</td></tr><tr><td>Provides some evidence that Adam may OR may not be affected with % chance stated</td><td>2</td></tr><tr><td>Provides some relevant information</td><td>1</td></tr></table>	Criteria	Mark	Provides evidence that Salma may be a carrier with 50% chance of Adam being affected OR not a carrier with no chance that Adam will be affected	4	Provides evidence that Salma may or may not be a carrier AND that Adam may or may not be affected but % chance not clear	3	Provides some evidence that Adam may OR may not be affected with % chance stated	2	Provides some relevant information	1	Salma may be a carrier if she inherited the affected X-chromosome from her mother. If this is the case, Adam has a 50% chance of inheriting this X-chromosome and therefore being affected with G6PDD. However, Salma may have inherited an unaffected X-chromosome in which case she is not a carrier and there is no chance that Adam will be affected with the disease. (May include punnett squares in response as below.) <table><tr><td></td><td>X^G</td><td>X^g</td></tr><tr><td>X^G</td><td></td><td></td></tr><tr><td>Y</td><td>X^GY</td><td>X^gY</td></tr></table><table><tr><td></td><td>X^G</td><td>X^G</td></tr><tr><td>X^G</td><td></td><td></td></tr><tr><td>Y</td><td>X^GY</td><td>X^GY</td></tr></table>		X ^G	X ^g	X ^G			Y	X ^G Y	X ^g Y		X ^G	X ^G	X ^G			Y	X ^G Y	X ^G Y	This is not an autosomal recessive disease. However, a fully explained response with both Adam’s % chance of being affected linked to whether Salma was heterozygous or homozygous dominant could still get you 3 out of 4 marks. Note: % chance of Adam being affected should not be a combined % for both the scenarios of Salma being a carrier and non-carrier. If you provided the % chance for each scenario separately then combined them, the combined % was ignored.
Criteria	Mark																														
Provides evidence that Salma may be a carrier with 50% chance of Adam being affected OR not a carrier with no chance that Adam will be affected	4																														
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	X ^G	X ^g																													
X ^G																															
Y	X ^G Y	X ^g Y																													
	X ^G	X ^G																													
X ^G																															
Y	X ^G Y	X ^G Y																													

	- Logically sequenced and reliable method that could be used to test the effectiveness of albicidin on the 4 bacteria in the question. - Most features of a valid investigation such as independent, dependent, and controlled variables and the use of a control included. - Some safety considerations included.	4	- Repeat steps 3-4 with bacteria Kp, Pa and St on the other three plates. - Incubate the plates at 25°C for 48 hours. - Remove plates from the incubator. Be sure to keep plates sealed at all times. - Check the control plate and observe if there is any contamination. - Use a ruler to measure the diameter of the zone of inhibition surrounding the disc of Albicidin on each plate to the nearest millimetre. Record results - Repeat the experiment three times and calculate an average for each bacteria tested. The plate with the largest zone of inhibition will indicate the bacterium on which Albicidin is most effective. Wash hands and dispose of used plates using an autoclave.	I = Independent variable implemented (4 bacterium) D = Dependent variable included (needs to be specific E.g. zone of inhibition around the antibiotic disc) C = Control (could be either plate with no bacteria and no antibiotic OR a plate with bacteria only) L = Logical procedure (step by step, no steps needed clarifying, in an order that made sense) A = The aim could be answered using your method. 7 ticks = 5 marks 5-6 ticks = 4 marks 3-4 ticks = 3 marks 2 ticks = 2 marks 1 tick = 1 mark. Many students included the application of the 4 bacterium to agar plates all in one step. This often made it unclear whether they were all put on the same plate or different plates. Include more shorter steps for clarity. Pure culture – a pure culture is a sample that contains a single species of microorganism. It is not a medium on which we grow bacteria. This term was used incorrectly in some responses. Note: The aim of this experiment was not to find out the bacterium
	- A method that could be used to test the effectiveness of albicidin on the 4 bacteria in the question. - Some aspects of a valid investigation included.	3		
	Some steps that could be used in an investigation included.	2		
	Any relevant information provided.	1		

			that this antibiotic is most effective on.										
29a	<table><tr><td>Provides a justification for why this is a non-infectious disease and caused by an environmental factor. Link to stimulus.</td><td>3</td></tr><tr><td>Provides two of the above</td><td>2</td></tr><tr><td>Provides some relevant information</td><td>1</td></tr></table>	Provides a justification for why this is a non-infectious disease and caused by an environmental factor. Link to stimulus.	3	Provides two of the above	2	Provides some relevant information	1	Patrick was exposed to UV radiation while working outdoors for many years. This would have caused the damage to DNA that now results in skin cancer. Skin cancer is a non-infectious disease as it is not caused by a pathogen. Patrick was exposed to asbestos while working in the building industry for many years. This would have caused the damage to lung tissue ‘s cells that now results in mesothelioma. Mesothelioma (Lung cancer) is a non-infectious disease as it is not caused by a pathogen.	1 – not caused by a pathogen or host to host transmission Did not accept ‘transmitted’ 1 – UV radiation or radiation from the sun Did not accept ‘Sun’ or ‘environmental factor’ as its given in the question 1 – link to stimulus - working mostly outdoors as a landscape gardener for 20 years				
Provides a justification for why this is a non-infectious disease and caused by an environmental factor. Link to stimulus.	3												
Provides two of the above	2												
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29b	<table><tr><td>Identifies ONE other classification of a non-infectious disease AND describes why skin cancer does not fit the classification</td><td>2</td></tr><tr><td>Identifies ONE other classification of a non-infectious disease OR Describes why skin cancer does not fit the classification</td><td>1</td></tr></table>	Identifies ONE other classification of a non-infectious disease AND describes why skin cancer does not fit the classification	2	Identifies ONE other classification of a non-infectious disease OR Describes why skin cancer does not fit the classification	1	Another type of non-infectious disease is genetic disease. Skin cancer cannot be classified as genetic; while genes may increase the likelihood of a person getting skin cancer in Australia, they do not cause the disease. This is evident in the passage, as Patrick’s cousins in Ireland do not have the disease. Another type of non-infectious disease is genetic disease. Mesothelioma cannot be classified as genetic; while genes may increase the likelihood of a person getting Mesothelioma , they do not cause the disease. This is evident in the passage, as Patrick’s co workers who worked in the office do not have the disease.							
Identifies ONE other classification of a non-infectious disease AND describes why skin cancer does not fit the classification	2												
Identifies ONE other classification of a non-infectious disease OR Describes why skin cancer does not fit the classification	1												
30a	<table><tr><td>Criteria</td><td>Mark</td></tr><tr><td>Describes role of both hormones related to change in levels in graph</td><td>4</td></tr><tr><td>Outlines role of both hormones with some reference to change in levels in graph</td><td>3</td></tr><tr><td>Outlines role of one hormone with reference to change in levels in graph</td><td>2</td></tr><tr><td>Provides some relevant information</td><td>1</td></tr></table>	Criteria	Mark	Describes role of both hormones related to change in levels in graph	4	Outlines role of both hormones with some reference to change in levels in graph	3	Outlines role of one hormone with reference to change in levels in graph	2	Provides some relevant information	1	The rise in the levels of follicle stimulating hormone (FSH) from the start of the cycle stimulates the growth of the follicle in the ovary. The follicle secretes oestrogen which causes a rapid rise in luteinizing hormone (LH), peaking at day 14 and triggering the release of the egg from the follicle (ovulation).	Marks were lost in either not providing the role of the hormones or not describing the change in levels in either of the hormones. No reference to estrogen needed
Criteria	Mark												
Describes role of both hormones related to change in levels in graph	4												
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30b	<table><tr><th>Criteria</th><th>Mark</th></tr><tr><td>Relates fertilisation to maintenance of corpus luteum and high levels of both hormones to maintain endometrium for implantation and development of embryo</td><td>3</td></tr><tr><td>Outlines most aspects that keep hormone levels high</td><td>2</td></tr><tr><td>Provides some relevant information</td><td>1</td></tr></table>	Criteria	Mark	Relates fertilisation to maintenance of corpus luteum and high levels of both hormones to maintain endometrium for implantation and development of embryo	3	Outlines most aspects that keep hormone levels high	2	Provides some relevant information	1	If fertilisation of the egg occurs, the corpus luteum continues to secrete progesterone and oestrogen, keeping levels of both hormones high. This maintains the endometrium for the fertilised egg to be implanted shortly after fertilisation. Once implantation occurs, the hormones maintain the endometrium for the developing embryo.	1 – levels remain high for both hormones 1 – correct reference of corpus luteum 1 – specific explanation of why - stabilises/maintains the thickening of the endometrium				
Criteria	Mark														
Relates fertilisation to maintenance of corpus luteum and high levels of both hormones to maintain endometrium for implantation and development of embryo	3														
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31	<table><tr><th>Criteria</th><th>Mark</th></tr><tr><td>Judgement on the impact of BioClay Multiple explained statements supporting the judgement. At least one from each of the categories; food production, environment impact and economy</td><td>7</td></tr><tr><td>Judgement on the impact of BioClay. THREE explained statements supporting the judgement from two categories. Limited support from one category. OR weak judgment</td><td>6</td></tr><tr><td>Judgement on the impact of BioClay. TWO explained supporting statements OR THREE explained statements but limited in two categories.</td><td>5</td></tr><tr><td>Judgement on the impact of BioClay AND two or more supporting statements from different categories but only one explained. OR TWO explained statements and weak judgment</td><td>4</td></tr><tr><td>TWO supporting statements with one explained OR THREE identified benefits OR A judgement and some identified or described supporting statements</td><td>3</td></tr></table>	Criteria	Mark	Judgement on the impact of BioClay Multiple explained statements supporting the judgement. At least one from each of the categories; food production, environment impact and economy	7	Judgement on the impact of BioClay. THREE explained statements supporting the judgement from two categories. Limited support from one category. OR weak judgment	6	Judgement on the impact of BioClay. TWO explained supporting statements OR THREE explained statements but limited in two categories.	5	Judgement on the impact of BioClay AND two or more supporting statements from different categories but only one explained. OR TWO explained statements and weak judgment	4	TWO supporting statements with one explained OR THREE identified benefits OR A judgement and some identified or described supporting statements	3	With a focus on environmental safety, food security and benefits to the economy, BioClay will have a hugely positive impact on the industry of Agriculture. In relation to food production and security, the technology will kill whitefly reducing the damage it inflicts on food crops. This will increase the quality and quantity of food available to communities. It also reduces the amount of food wasted as the whitefly damage to the crops would render it unsellable and increase costs for production. Reducing the cost of production will have a flow on to lower cost of food for individuals and increased income for the farmer. In addition, agriculture is a vital part of the wider Australian economy and reducing loss of fruit and vegetables due to whitefly will be beneficial. BioClay only provide protection for 20 days so regular spraying would be required which could be costly. However, it does not change the DNA of the plant therefore posing no ethical concerns related to genetic changes within an organism. It also decays naturally over time so will not building up in the ecosystem. It reduces the need for chemical pesticides which can build up to toxic levels causing damage to the environment and disease in humans.	Key: J = judgment FP = food production supporting statement EI = environmental impact supporting statement E = economic supporting statement ✓ = described ✓ ✓ = explained Judgment needs to be strong and explicit. Focus on the positive impacts of BioClay rather than the negative impacts of whitefly. Do NOT repeat what is in the stimulus – you need to add to what you are already given. Better responses explained the potential positive impacts of BioClay on the three areas, rather than repeating the negatives of whitefly in the stimulus. Better responses used sub-headings or new paragraphs for each of the three aspects to be evaluated.
Criteria	Mark														
Judgement on the impact of BioClay Multiple explained statements supporting the judgement. At least one from each of the categories; food production, environment impact and economy	7														
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	<table><tr><td>A judgement and identified reason that supports the judgement OR TWO identified reasons OR One described reason</td><td>2</td></tr><tr><td>Some relevant information.</td><td>1</td></tr></table>	A judgement and identified reason that supports the judgement OR TWO identified reasons OR One described reason	2	Some relevant information.	1								
A judgement and identified reason that supports the judgement OR TWO identified reasons OR One described reason	2												
Some relevant information.	1												
32a	<table><tr><td>Correctly explains the link between multiple doses and greater immunity.</td><td>2</td></tr><tr><td>Any relevant information</td><td>1</td></tr></table>	Correctly explains the link between multiple doses and greater immunity.	2	Any relevant information	1	A vaccine gives the body the experience of polio infection so that memory B and T cells and antibodies are produced. Over time these cells and proteins can decrease in number. Therefore, multiple doses will increase the number of memory cells and antibodies in the body to then produce an even larger immune response when the individual is actually exposed to the polio virus.							
Correctly explains the link between multiple doses and greater immunity.	2												
Any relevant information	1												
32b	<table><tr><td>Explains how high number of vaccination lead to herd immunity.</td><td>2</td></tr><tr><td>Identifies herd immunity.</td><td>1</td></tr></table>	Explains how high number of vaccination lead to herd immunity.	2	Identifies herd immunity.	1	When there are large enough numbers of people vaccinated against a particular disease it reduces the prevalence of the disease in the community therefore decreasing its ability to spread. This is called herd immunity. Little to no disease in the community will protect those that are more vulnerable to infection or who cannot be vaccinated.							
Explains how high number of vaccination lead to herd immunity.	2												
Identifies herd immunity.	1												
33	<table><tr><td>Detailed negative feedback diagram correctly formatted with arrows and text including stimulus, receptors, co-ordinator, 2 detailed effectors and responses and return-back to normal for both increase and decrease in temperature.</td><td>6</td></tr><tr><td>Detailed negative feedback diagram correctly formatted with arrows and text including stimulus, receptors, co-ordinator, 1 detailed effectors and responses (or 2 responses without effectors) and return-back to normal for both increase and decrease in temperature</td><td>5</td></tr><tr><td>Basic negative feedback diagram correctly formatted with arrows and text including stimulus, receptors, co-ordinator, 1 effector and response (or 2 effectors) for both increase and decrease in temperature, including the return to normal</td><td>4</td></tr><tr><td>Missing one of the above</td><td>3</td></tr><tr><td>Limited negative feedback diagram with outline of stimulus, receptors, 1 effector or</td><td>2</td></tr></table>	Detailed negative feedback diagram correctly formatted with arrows and text including stimulus, receptors, co-ordinator, 2 detailed effectors and responses and return-back to normal for both increase and decrease in temperature.	6	Detailed negative feedback diagram correctly formatted with arrows and text including stimulus, receptors, co-ordinator, 1 detailed effectors and responses (or 2 responses without effectors) and return-back to normal for both increase and decrease in temperature	5	Basic negative feedback diagram correctly formatted with arrows and text including stimulus, receptors, co-ordinator, 1 effector and response (or 2 effectors) for both increase and decrease in temperature, including the return to normal	4	Missing one of the above	3	Limited negative feedback diagram with outline of stimulus, receptors, 1 effector or	2	Effector + response Sweat glands - release sweat (evaporative cooling) Vasodilation - heat loss from skin Coordinator hypothalamus Detected by receptors in hypothalamus Decrease in body temp Stimulus - increase in body temp Ideal body temp Stimulus - decrease in body temp (ie bath) Increase	Well answered. Please ensure you say how the response changes the body temp, i.e. sweating cools the body by evaporative cooling.
Detailed negative feedback diagram correctly formatted with arrows and text including stimulus, receptors, co-ordinator, 2 detailed effectors and responses and return-back to normal for both increase and decrease in temperature.	6												
Detailed negative feedback diagram correctly formatted with arrows and text including stimulus, receptors, co-ordinator, 1 detailed effectors and responses (or 2 responses without effectors) and return-back to normal for both increase and decrease in temperature	5												
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Missing one of the above	3												
Limited negative feedback diagram with outline of stimulus, receptors, 1 effector or	2												
			Two responses needed.										
			Also, many students did not write the effector e.g. sweat glands, blood vessel muscular walls										

	<table><tr><td>response for either increase or decrease in temperature.</td><td></td></tr><tr><td>Limited negative feedback diagram with outline of stimulus and effector for increase or decrease in temperature</td><td>1</td></tr></table>	response for either increase or decrease in temperature.		Limited negative feedback diagram with outline of stimulus and effector for increase or decrease in temperature	1		
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34a	<table><tr><td>Identifies TWO functions of the kidneys</td><td>2</td></tr><tr><td>Identifies ONE function of the kidneys</td><td>1</td></tr></table>	Identifies TWO functions of the kidneys	2	Identifies ONE function of the kidneys	1	Kidneys regulate the salt and water concentration of blood and filter the blood to remove harmful substances.	Did not accept non-specific roles, e.g. ‘filtration’ (needed to state what was being filtered). Please note that filtration, reabsorption and secretion are the three roles involved in the excretion function of the kidney. Some misunderstanding of osmoregulation and where hormones are produced.
Identifies TWO functions of the kidneys	2						
Identifies ONE function of the kidneys	1						
34b	<table><tr><td>Identifies ONE type of kidney disease AND Describes the type of kidney disease identified</td><td>2</td></tr><tr><td>Identifies ONE type of kidney disease</td><td>1</td></tr></table>	Identifies ONE type of kidney disease AND Describes the type of kidney disease identified	2	Identifies ONE type of kidney disease	1	Diabetes can interfere with kidney function. Large substances including proteins and blood cells can leave the blood in the Bowman’s capsule. This means that important substances that should be retained in the blood leave the body in urine.	Well-answered. Accepted a description of a disease (ie. high blood pressure) and its impact on function if no disease was named. Many students identified a disease but did not provide any further information on the disease.
Identifies ONE type of kidney disease AND Describes the type of kidney disease identified	2						
Identifies ONE type of kidney disease	1						
34c	<table><tr><td>Evaluates the effectiveness of a technology AND Provides TWO supporting arguments for the evaluation</td><td>3</td></tr><tr><td>Evaluates the effectiveness of a technology</td><td>2</td></tr></table>	Evaluates the effectiveness of a technology AND Provides TWO supporting arguments for the evaluation	3	Evaluates the effectiveness of a technology	2	Dialysis is a very effective in managing effects of kidney disorders by filtering waste products. Blood passes from the body into the dialysis equipment, where it is filtered. It is then passed back into normal circulation. It keeps the patient alive when the only other treatment	This question is an <i>evaluate</i> – many students provided a highly effective judgement with only negative
Evaluates the effectiveness of a technology AND Provides TWO supporting arguments for the evaluation	3						
Evaluates the effectiveness of a technology	2						

	<table><tr><td>AND Provides ONE supporting argument for the evaluation</td><td></td></tr><tr><td>Evaluates the effectiveness of a technology</td><td>1</td></tr></table>	AND Provides ONE supporting argument for the evaluation		Evaluates the effectiveness of a technology	1	option is a kidney transplant. There are problems with dialysis, such as the risk of infection and blood clots, but it can be considered successful due to the maintenance of life.	arguments; this does not support your judgement. Accepted that dialysis is an effective short term solution, however not a long term solution with supporting points. Also accepted that it is effective at managing the effects of kidney disorders e.g. filtering wastes, however has limitations regarding quality of life – this must be very clear and stated in the judgement.						
AND Provides ONE supporting argument for the evaluation													
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35	<table><tr><td>Demonstrates extensive understanding of the processes of gene flow and genetic drift. Makes a clear judgement on how these processes have impacted the gene pool in most regions, using the stimulus to support judgement. Describes a reason to prevent entry of fungus into Australia.</td><td>8</td></tr><tr><td>Demonstrates good understanding of the processes of gene flow and genetic drift. Makes a judgement on how these processes have impacted the gene pool in some regions, with reference to the stimulus. Outlines a reason to prevent entry into Australia.</td><td>7-6</td></tr><tr><td>Demonstrates sound understanding of gene flow and/or genetic drift. Identifies some impacts of these processes with reference to the stimulus AND/OR Identifies a reason to prevent entry into Australia.</td><td>5-4</td></tr><tr><td>Provides reason/s for the distribution of the fungus</td><td>3-2</td></tr><tr><td>Provides some relevant information</td><td>1</td></tr></table>	Demonstrates extensive understanding of the processes of gene flow and genetic drift. Makes a clear judgement on how these processes have impacted the gene pool in most regions, using the stimulus to support judgement. Describes a reason to prevent entry of fungus into Australia.	8	Demonstrates good understanding of the processes of gene flow and genetic drift. Makes a judgement on how these processes have impacted the gene pool in some regions, with reference to the stimulus. Outlines a reason to prevent entry into Australia.	7-6	Demonstrates sound understanding of gene flow and/or genetic drift. Identifies some impacts of these processes with reference to the stimulus AND/OR Identifies a reason to prevent entry into Australia.	5-4	Provides reason/s for the distribution of the fungus	3-2	Provides some relevant information	1	The gene pool is the total number of genes and alleles in a population and is a measure of genetic variation within species. The gene pool can be impacted by processes including gene flow and genetic drift, as shown in the different levels of genetic variation of <i>Serpula lacrymans</i> in different regions throughout the world. Gene flow is the change in allele frequency as result of movement of organisms (or alleles) in and out of populations. This may be the mechanism demonstrated in the case of <i>Serpula lacrymans</i> in the movement between the population in north-east Asia (with the highest genetic variation) and Japan, where the genetic variation is still high. This could have resulted from spores (containing the full genetic information) being moved by a variety of methods between these neighbouring regions. In addition, mutation has resulted in a new unique variation of the fungus (referred to as Japanese group). This Japanese mutation is now present in China, again possibly due to gene flow from the population in Japan. Genetic drift is a change in the gene pool as a result of random events. The low genetic variation of the fungus in Europe and North America suggests the founder effect, with these new populations showing only a limited representation of the original population. These founder populations may be the result of human vectors or timber transportation between north-east China and other countries. Founder populations are also seen in New Zealand, although there appear to be two sources, with the Japanese variant seen alongside the European variant.	The judgement can be implicit in the explanation of how the different processes have impacted the gene pool. Impact of gene flow is high genetic variation & impact of genetic drift is low genetic variation. These links needed to be shown clearly. Many students discussed the impact of sexual and asexual reproduction on the genetic variation. Although, sexual reproduction results in high genetic variation & asexual reproduction results in low genetic variation, are both correct, it is not what the question was asking.
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		The absence of the fungus in Australia may be the result of effective quarantine measures such as banning the entry of timber products from known areas of fungal invasion such as China. In addition, spraying with suitable fungicides of any existing buildings showing evidence of fungal spores would prevent establishment of fungal colonies in Australia.	If gene flow and genetic drift mixed up – no higher than 5-4 bracket. Need to know that genetic drift was founder effect specifically to get 8.
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