



# Western Australian Certificate of Education Examination, 2010

## Question/Answer Booklet

### BIOLOGICAL SCIENCES

#### Stage 2

Please place your student identification label in this box

Student Number: In figures

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In words

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#### Time allowed for this paper

Reading time before commencing work: ten minutes  
Working time for paper: three hours

#### Materials required/recommended for this paper

##### *To be provided by the supervisor*

This Question/Answer Booklet  
Multiple-choice Answer Sheet

##### *To be provided by the candidate*

Standard items: pens, pencils, eraser, correction fluid/tape, ruler, highlighters

Special items: non-programmable calculators satisfying the conditions set by the Curriculum Council for this course

#### Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

## Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of exam
Section One: Multiple-choice	30	30	40	30	30
Section Two: Short answer	6	6	110	120	60
Section Three: Extended answer	4	2	30	20	10
<b>Total</b>					100

## Instructions to candidates

- The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2010*. Sitting this examination implies that you agree to abide by these rules.
- Answer the questions according to the following instructions.

**Section One:** Answer all questions on the separate Multiple-choice Answer Sheet provided. For each question shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, do not erase or use correction fluid, and shade your new answer. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

**Section Two:** Write your answers in the space provided in this Question/Answer Booklet. Wherever possible, confine your answers to the line spaces provided. Use a blue or black pen (**not** pencil) for this section.

Spare answer pages are provided at the end of this booklet. If you need to use these, indicate in the original answer space where the answer is continued, e.g. write 'continued on page 36'. Fill in the number of the question that you are continuing at the top of that page.

The space provided for each question is an indication of the length of answer required.

**Section Three:** Write your answers in this Question/Answer Booklet. Use a blue or black pen (**not** pencil) for this section. Tick the box next to the question you are answering; write the number of each question in the margin. Do **not** copy the questions when answering.

If your answer exceeds the three pages provided for each question, continue writing on the spare pages at the end of the booklet. Indicate at the end of the page that the answer is continued. E.g. write 'continued on page 36'. Fill in the number of the question that you are continuing at the top of that page.

## Section One: Multiple-choice

30% (30 Marks)

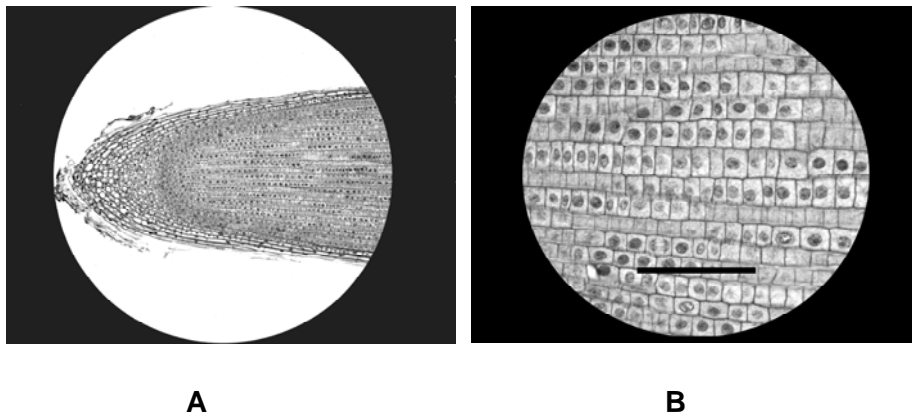
This section has **30** questions. Answer **all** questions on the separate Multiple-choice Answer Sheet provided. For each question shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, do not erase or use correction fluid, and shade your new answer. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time: 40 minutes.

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1. The ultimate fate of solar energy added to an ecosystem is to be
  - (a) bound in chemical bonds in the bodies of decomposers.
  - (b) recycled through food chains and food webs.
  - (c) removed as food for humans.
  - (d) lost from the ecosystem.
  
2. Which of the following processes removes carbon dioxide from the atmosphere?
  - (a) photosynthesis
  - (b) anaerobic respiration
  - (c) aerobic respiration
  - (d) decomposition
  
3. Sealed jars, all the same size, were set up in the light. Each contained the same number of grasshoppers. The grasshoppers would live longest in a jar with
  - (a) grasshoppers only.
  - (b) potted plants.
  - (c) a spider.
  - (d) potted plants and a spider.
  
4. Xylem does **not**
  - (a) transport water.
  - (b) support the plant.
  - (c) respire.
  - (d) occur in vascular bundles.

Questions 5 – 6 relate to the following diagrams, which show cells in the root tip of a growing onion plant, viewed under a compound microscope. Diagram A and Diagram B are views of the same specimen using different adjustments of the microscope.



5. Diagram A was the view seen when using an ocular of 10X and an objective of 10X. How was the view in Diagram B produced?
- (a) Objective increased to 20X and ocular decreased to 5X.
  - (b) Objective increased to 40X and ocular decreased to 5X.
  - (c) The slide was irrigated with a stain to highlight the nuclei.
  - (d) The light intensity was decreased to improve contrast.
6. The scale bar in Diagram B is 100  $\mu\text{m}$ . On that basis, what is the approximate width of the total field of view in Diagram B?
- (a) 0.1 mm.
  - (b) 0.3 mm.
  - (c) 0.6 mm.
  - (d) 0.8 mm
7. Phloem moves
- (a) starches down from the leaves.
  - (b) minerals from the leaves to the roots.
  - (c) water upward to create a transpiration stream.
  - (d) sugars throughout the plant.
8. Despite the fact that a horse and a donkey can interbreed, they are not regarded as being of the same species because their
- (a) structures are quite different.
  - (b) offspring have a low survival rate.
  - (c) offspring are infertile.
  - (d) chromosome numbers are different.

Questions 9 – 11 relate to the following information.

Modern biologists believe that all living organisms arise from the reproduction of other living organisms. A biologist tested this hypothesis using the following experiment. Three jars were prepared.

Jar 1 contained a piece of fresh meat and was open.

Jar 2 contained a piece of fresh meat and was sealed with a glass lid, keeping it airtight and excluding insects.

Jar 3 contained a piece of fresh meat and was sealed with fine mesh, allowing air to circulate but excluding insects.

The jars were left for one week and the meat then checked for the presence of fly maggots.

9. Is this experiment replicated?
- (a) No, because there is only one jar in each treatment.
  - (b) No, because the experiment is not done under different conditions.
  - (c) Yes, because there are three jars.
  - (d) Yes, because there is meat in all three jars.
10. What is the dependent variable in this experiment?
- (a) Jar 2
  - (b) presence of fly maggots
  - (c) Jar 3
  - (d) the type of meat used
11. Which of the following results of the experiment would **not** support the hypothesis? The maggots
- (a) appeared in all jars.
  - (b) appeared in Jar 1 only.
  - (c) appeared in Jar 3 only.
  - (d) did not appear in any jars.
12. Leaf cells performing photosynthesis will most likely
- (a) lack mitochondria but have chloroplasts.
  - (b) lack chloroplasts but have mitochondria.
  - (c) have both chloroplasts and mitochondria.
  - (d) have neither chloroplasts nor mitochondria.

The following table contains classification details of seven Western Australian fish, all from the order Perciformes.

	<b>Order</b>	<b>Family</b>	<b>Genus</b>	<b>Species</b>
Sand whiting	Perciformes	-	<i>Sillago</i>	<i>ciliata</i>
Trumpeter whiting	Perciformes	Sillaginidae	<i>Sillago</i>	<i>maculata</i>
Black trevally	Perciformes	Siganidae	<i>Caranx</i>	<i>lugubris</i>
Diamond trevally	Perciformes	-	<i>Alectes</i>	<i>Indicus</i>
Pennant fish	Perciformes	Carangidae	<i>Alectes</i>	<i>ciliaris</i>
Moon fish	Perciformes	Menidae	<i>Mene</i>	<i>maculata</i>
Papuan trevally	Perciformes	Carangidae	<i>Caranx</i>	<i>papuensis</i>

13. To which families do the diamond trevally and the sand whiting belong to respectively?
- (a) Carangidae and Sillaginidae
  - (b) Menidae and Carangidae
  - (c) Sillaginidae and Siganiidae
  - (d) Menidae and Sillaginidae
14. Which two fish are most closely related?
- (a) sand whiting and diamond trevally
  - (b) pennant fish and moon fish
  - (c) trumpeter whiting and moon fish
  - (d) diamond trevally and pennant fish
15. The anemone fish is immune to an anemone's stinging tentacles. By living among the tentacles, the anemone fish is protected from its predators. It also lures other unprotected fish into the anemone's stinging tentacles, where they are killed and consumed by the anemone. The relationship between the anemone and the anemone fish is an example of
- (a) mutualism.
  - (b) commensalism.
  - (c) predation.
  - (d) parasitism.
16. In a parasitic relationship
- (a) the parasite is weakened but the host is unharmed.
  - (b) the host inevitably dies as a result of the parasitism.
  - (c) the parasite benefits while the host does not.
  - (d) each parasite has several hosts.

17. An animal has 88 chromosomes in its body cells. How many chromosomes would you find in one of its sperm cells?
- (a) 22
  - (b) 44
  - (c) 88
  - (d) 176
18. Radioactive sugars were injected into the stem of a 2m tall tree, approximately 1m above the ground. After a few hours, you would expect to detect radioactive sugars in **only** the
- (a) living parts of the plant.
  - (b) stem above the injection and in the leaves.
  - (c) stem below the injection and in the roots.
  - (d) parts of the plant with chloroplasts.
19. A scientist hypothesised that phosphate from fertiliser runoff causes algal blooms in lakes. Which of the following would be a valid test of this hypothesis?
- (a) Ban phosphate-based fertilisers and test to determine whether water quality in a lake improved.
  - (b) Pump freshwater into a lake and test to determine whether water quality of that lake improved.
  - (c) Compare water quality in lakes where phosphate-based fertilisers are banned with that in lakes where they are not.
  - (d) Plant trees around a lake to absorb the phosphate before fertiliser runoff reaches the water.
20. Compared to asexual reproduction, sexual reproduction
- (a) is a more efficient process.
  - (b) increases the population size more rapidly.
  - (c) increases variation in the offspring.
  - (d) improves the survival rate of young.
21. A cell's enzymes consist of
- (a) proteins.
  - (b) carbohydrates.
  - (c) lipids.
  - (d) nucleic acids.
22. Binomial nomenclature means that each species has two
- (a) copies of each chromosome.
  - (b) sexes.
  - (c) alleles of each gene.
  - (d) names.

23. Which of the following is the chemical composition of a gene?
- (a) carbohydrate
  - (b) lipid
  - (c) DNA
  - (d) protein
24. Which of the following organisms would have the largest surface area to volume ratio?
- (a) elephant
  - (b) human
  - (c) ant
  - (d) mouse
25. The structure drawn in the figure below is a



- (a) chromatid.
  - (b) centriole.
  - (c) nucleotide.
  - (d) chromosome.
26. The domestic dog has an XY system of sex determination, like humans. The total number of chromosomes in a general body cell of dog is 78. What is the total number of autosomes that occur in a general body cell in a male dog?
- (a) 39
  - (b) 76
  - (c) 78
  - (d) 156
27. Which of the following animals is most likely to have its sex determined by the environment?
- (a) an echidna
  - (b) a sea turtle
  - (c) a whale
  - (d) an elephant



28. What is the best definition of osmosis? Osmosis is
- (a) diffusion of a solute across a semi-permeable membrane.
  - (b) random movement of solute molecules.
  - (c) active uptake of water molecules.
  - (d) diffusion of water across a semi-permeable membrane.
29. A biology student made an artificial cell using a balloon that was permeable to water but not to sucrose. The student filled the balloon with 10% sucrose solution and placed it in a tank of 5% sucrose solution. The apparatus was then left overnight. A likely outcome the next day would be that the balloon would
- (a) gain water.
  - (b) lose water.
  - (c) gain sucrose.
  - (d) lose sucrose.
30. Why are sex-linked conditions more common in men than in women?
- (a) Men receive two copies of each recessive gene at fertilisation.
  - (b) Women cannot express sex-linked characteristics.
  - (c) Men need to inherit only one copy of the recessive gene to express it.
  - (d) Women inherit only dominant alleles.

**End of Section One**

**See next page**

Section Two: Short answer

60% (120 Marks)

This section has **six (6)** questions. Answer **all** questions. Write your answers in the spaces provided in this Question/Answer Booklet. Wherever possible, confine your answers to the line spaces provided. Use a blue or black pen (**not** pencil) for this section.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

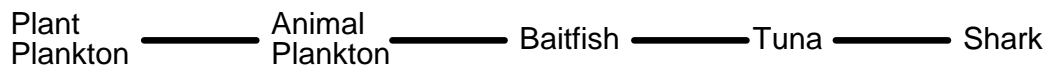
- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

Suggested working time: 110 minutes.

Question 31

(20 marks)

The diagram below shows a food chain for a marine community, but it does not indicate the direction of the flow of energy through the chain.



- (a) (i) Place arrowheads in the diagram to indicate the direction of the flow of energy through the chain. (1 mark)

- (ii) Name one example of the following organisms from the food chain:

A tertiary consumer \_\_\_\_\_ (1 mark)

A herbivore \_\_\_\_\_ (1 mark)

A carnivore \_\_\_\_\_ (1 mark)

- (b) (i) Which group of organisms in the above food chain would have the lowest total biomass? Explain your answer. (2 marks)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (ii) If the total biomass of baitfish is 100 000 000 kg, what is the total biomass of the tuna? Explain your answer. (2 marks)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(c) (i) Distinguish between the terms *autotroph* and *heterotroph*. (2 marks)

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(ii) Distinguish between the terms *food chain* and *food web*. (2 marks)

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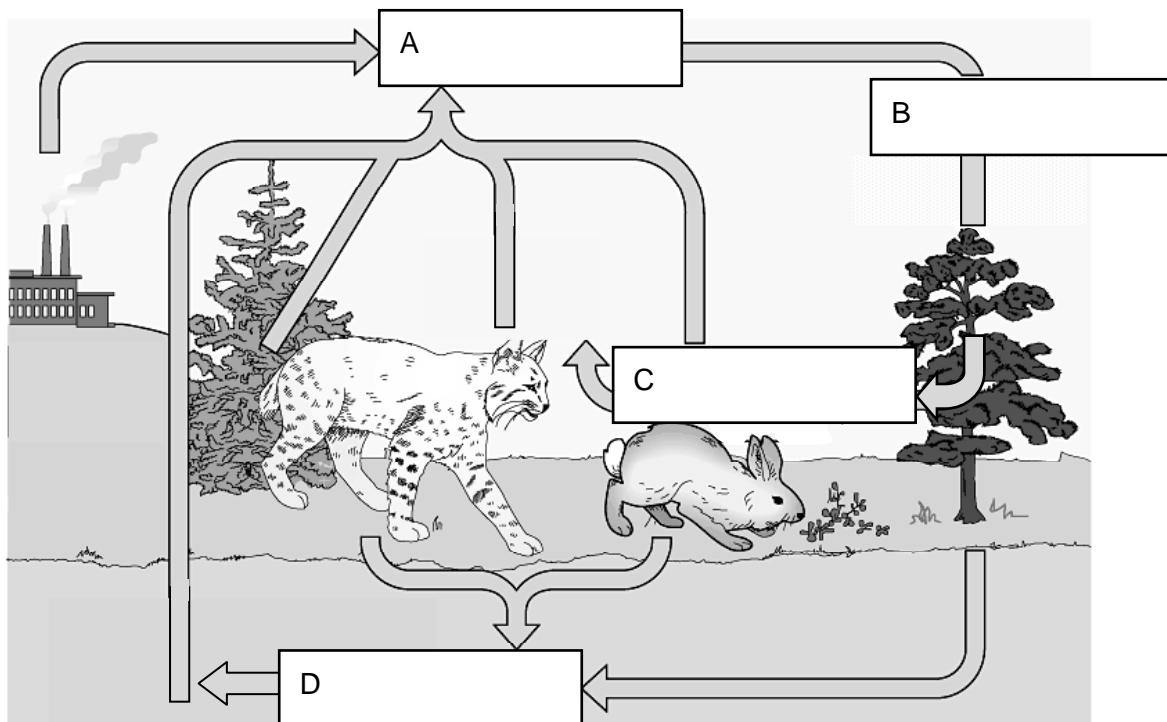
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(d) The following figure depicts the carbon cycle in a terrestrial environment. Write your answers in the corresponding boxes. (4 marks)

- A What chemical compound is being released into the atmosphere?
- B What process is occurring here?
- C What group of organisms is located here?
- D What group of organisms is located here?



(e) How does each of the following types of organisms obtain its carbon-based compounds?

Decomposer \_\_\_\_\_ (1 mark)

Omnivore \_\_\_\_\_ (1 mark)

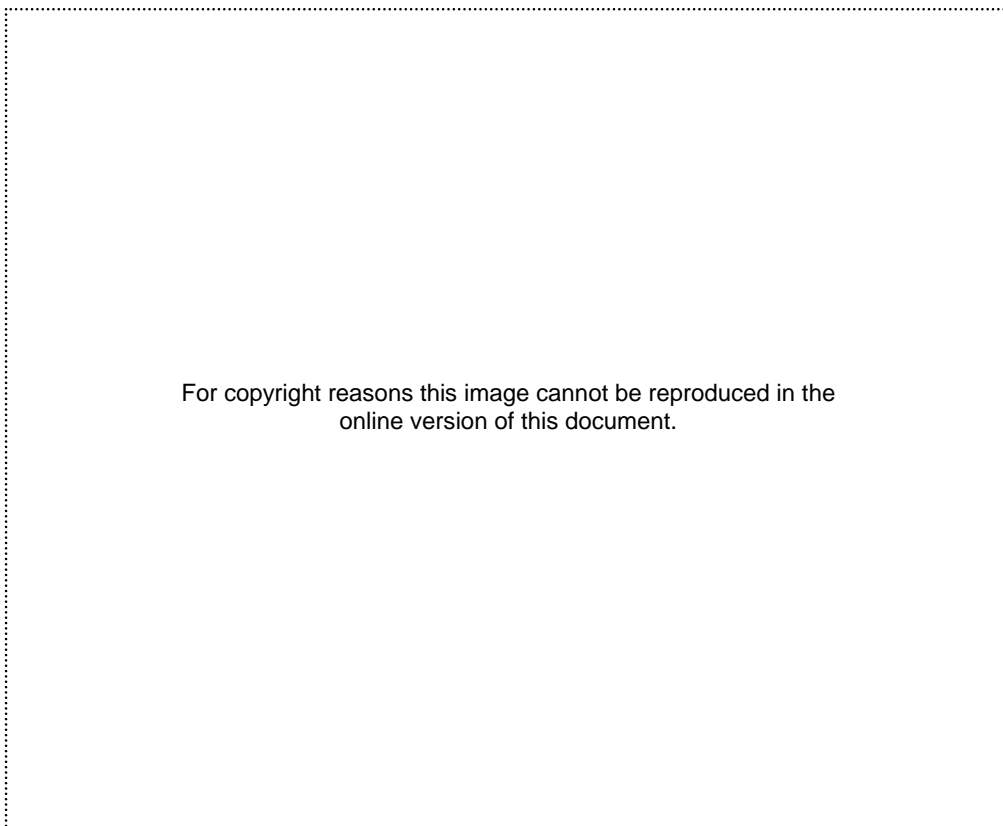
Parasite \_\_\_\_\_ (1 mark)

Plant \_\_\_\_\_ (1 mark)

**Question 32**

**(20 marks)**

Examine the cell drawing shown below.



(a) Name the structures:

A \_\_\_\_\_ (1 mark)

B \_\_\_\_\_ (1 mark)

C \_\_\_\_\_ (1 mark)

D \_\_\_\_\_ (1 mark)

(b) State and describe briefly **one (1)** function of each of the following cell structures:

A \_\_\_\_\_  
\_\_\_\_\_ (2 marks)

C \_\_\_\_\_  
\_\_\_\_\_ (2 marks)

(c) Consider structures B and E.

(i) Name the main process occurring in structure B and write a word equation for this process. (2 marks)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(ii) Name the main process occurring in structure E and write a word equation for this process. (2 marks)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(d) Indicate whether each of the following statements about cells is true or false and give a reason for your answer.

(i) A cell that has a cell wall could be from a plant or an animal. (2 marks)

True / False

Reason: \_\_\_\_\_  
\_\_\_\_\_

(ii) A cell with a vacuole must be from a plant. (2 marks)

True / False

Reason: \_\_\_\_\_  
\_\_\_\_\_

(e) Cells may be prokaryotic or eukaryotic.

(i) List **two (2)** differences between prokaryotic and eukaryotic cells. (2 marks)

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(ii) Name a type of organism, multicellular or unicellular, that is comprised of one or more prokaryotic cells. (1 mark)

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(iii) Name an organism that is comprised of eukaryotic cells. (1 mark)

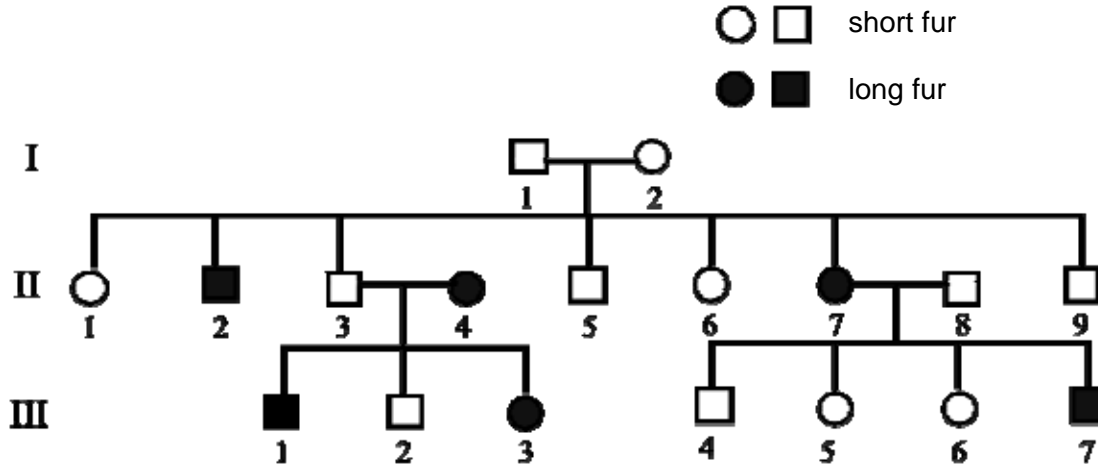
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Question 33

(20 marks)

A farmer breeds rabbits to be sold in pet shops. Like humans, the rabbits have an XY system of sex determination. Some of the rabbits have short fur, while others have long fur. Fur length in these rabbits is controlled by a single gene, where the allele for short hair, H, is dominant to the allele for long hair, h. Pedigree 1 shows the inheritance of fur length in three generations of the rabbits.

**Pedigree 1: Inheritance of fur length**



(a) (i) Does individual III1 in Pedigree 1 have a Y chromosome? Explain your answer. (2 marks)

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(ii) Is the gene controlling fur length in these rabbits located on an autosome or the X chromosome? Explain your answer. (2 marks)

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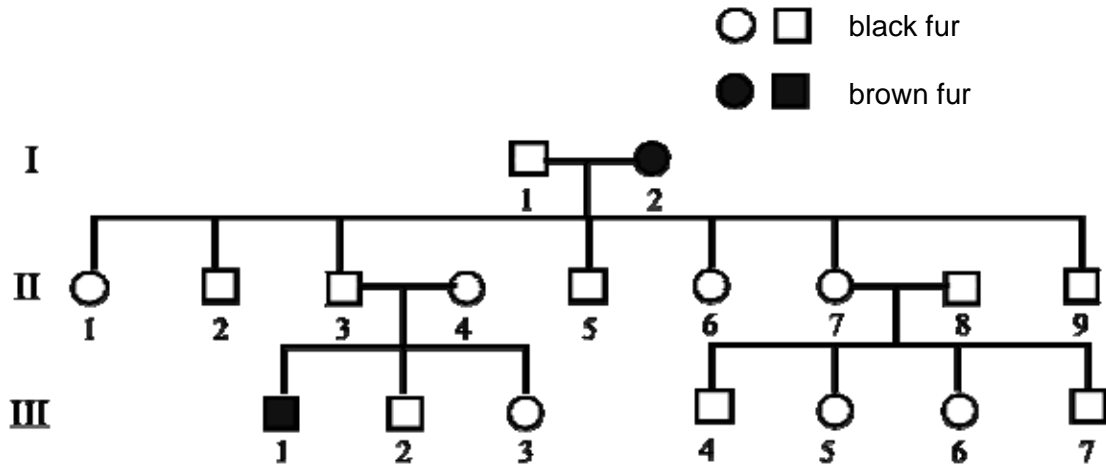
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Some of the rabbits have black fur, while others have brown. Fur colour in these rabbits is controlled by an autosomal gene, where the allele for black fur, B, is dominant to the allele for brown fur, b. Pedigree 2 shows the inheritance of fur colour in three generations of the rabbits.

**Pedigree 2: Inheritance of fur colour**



(b) Identify the fur colour genotypes and phenotypes of the following individuals from Pedigree 2:

I2 Phenotype \_\_\_\_\_ Genotype \_\_\_\_\_ (2 marks)

II3 Phenotype \_\_\_\_\_ Genotype \_\_\_\_\_ (2 marks)

(c) (i) Distinguish between the terms *homozygote* and *heterozygote*. (2 marks)

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(ii) Distinguish between a dominant trait and a recessive trait. (2 marks)

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(d) A breeder wants to produce a litter for a special pet shop order. Half of the litter is to consist of black rabbits and the other half brown rabbits.

(i) Identify **two (2)** individuals from Pedigree 2 that the farmer could use to produce such a litter. (2 marks)

Individual 1 \_\_\_\_\_ Individual 2 \_\_\_\_\_

(ii) Explain your reasoning by presenting a punnet square or similar working. (2 marks)

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(e) In Pedigree 2, Individual II3 is crossed with Individual II7 and they produce a litter of three. What is the probability that one of the litter, chosen at random, has black fur? Show your working. (4 marks)

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Question 34

(20 marks)

The cane toad was introduced into Queensland in 1935 to control the cane beetle. The toads multiplied and spread and have become a serious pest in New South Wales, Queensland and the Northern Territory. They have now crossed the Western Australian border.

Cane toads are toxic and one reason why they are pests is that wildlife eating them may be killed. Biologists studied this problem for the dingo, the Australian native dog, at an area in the Northern Territory where cane toads were monitored annually. The biologists recorded a trapping index for dingoes (number of dingoes caught in traps) and a trapping index for cane toads (number of cane toads caught in traps) annually. The results are shown in the table below.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Trapping index of cane toads	0	5	9	20	35	58	Missing data
Trapping index of dingoes	20	18	16	Missing data	0	1	0

- (a) On the grid provided, plot a line graph of the trapping index of dingoes and the trapping index of cane toads against year.

If you wish to have a second attempt at this item, the grid is repeated on page 39 of this booklet. Indicate clearly on this page if you have used the second grid and cancel the working on the grid on this page. (4 marks)



(b) Describe the results shown in the graph. (4 marks)

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(c) (i) Using the graph, predict the trapping index of Cane toads in Year 7 (1 mark)

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Dingoes in Year 4 (1 mark)

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(ii) In which of the predictions from part (c) (i) do you have the greater confidence, and why? (2 marks)

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- (d) A newspaper journalist wrote an article on this study. The article report claimed that cane toads poison dingoes and that this causes declines in dingo populations. Do you agree or disagree with this statement? Explain your answer. (4 marks)

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- (e) (i) The cane toad is referred to as a 'feral animal'. What does the term 'feral animal' mean? (2 marks)

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- (ii) Name **two (2)** other feral animals found in Western Australia. (2 marks)

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## Question 35

(20 marks)

A biologist wished to estimate the population size of parrots living in a strip of trees beside a golf course. He caught some parrots with a net (Sample 1), placed a coloured band on each bird's leg and then released them from where they had been caught. The following week he returned and caught more parrots (Sample 2). Some of the captured parrots had a coloured band from the first sampling and some did not. The results are shown below.

	Parrots caught	
	Sample 1	Sample 2
Number of captured parrots without band	8	6
Number of captured parrots with band	0	4
Total	8	10

From the data above the population size of the parrots can be calculated using the formula:

$$\hat{N} = \frac{n_1 \times n_2}{m}$$

where  $\hat{N}$  = the estimated population size

$n_1$  = the number of parrots caught and banded in Sample 1

$n_2$  = the total number of parrots (banded and unbanded) caught in Sample 2

$m$  = the number of parrots caught in Sample 2 that were banded in Sample 1

- (a) Calculate the estimated population size of parrots beside the golf course. Show your working. (4 marks)

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- (b) List **four (4)** assumptions required for your estimate in part (a) above to be valid. (4 marks)

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- (c) A population of 22 rats lives in a warehouse. During one month five rats die, 12 are born, two migrate out of the warehouse and three migrate into the warehouse. How many rats are in the warehouse at the end of the month? Show your working. (4 marks)

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- (d) (i) What is meant by the term 'carrying capacity'? (2 marks)

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- (ii) 'A population will grow more rapidly once it exceeds carrying capacity.' Indicate whether this statement is true or false and explain your answer. (2 marks)

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- (e) List **four (4)** ways in which human activities can reduce populations of animal species. (4 marks)

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Question 36

(20 marks)

The table below shows the results of an experiment in which mice learned to run through a maze. The experiment was designed to test the hypothesis that giving mice a food reward improves the speed with which they learn to run the maze. One group of 10 mice received a food reward at the end of the maze while the other group of 10 mice did not.

The table shows the time taken in minutes for mice to run the maze with and without a food reward in trials repeated over six weeks. The numbers in each cell of the table are the means for a group of 10 mice.

Week	Time taken (minutes) by mice receiving a food reward	Time taken (minutes) by mice not receiving a food reward
1	23	24
2	23.5	23.5
3	20	23
4	14.5	20
5	6	19
6	5	16

(a) For the experiment described, name the following: (2 marks)

(i) The dependent variable.

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The independent variable.

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(ii) Why did the biologists use ten mice in each group? Explain your answer. (2 marks)

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- (b) (i) Suppose all the mice receiving a food reward were male and all the mice not receiving a food reward were female. Would the results still be valid? Explain. (2 marks)

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- (ii) Suppose there were 12 mice receiving food rewards and 14 mice not receiving food rewards. Would the results still be valid? Explain. (2 marks)

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- (c) Name **four (4)** factors (excluding sex of the mice and the number of mice used) that should be controlled to ensure a valid experiment. (4 marks)

One: \_\_\_\_\_

Two: \_\_\_\_\_

Three: \_\_\_\_\_

Four: \_\_\_\_\_

- (d) (i) What is meant by 'an experimental control'? (2 marks)

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- (ii) Is the experiment described controlled properly? Explain your answer. (2 marks)

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(e) (i) Do the results of the experiment described support the hypothesis? Explain your answer. (2 marks)

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(ii) Good experimenters are careful to ensure that their experiments are valid. Describe **two (2)** ways in which experimenters can increase the validity of their experiments. (2 marks)

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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**End of Section Two**

**Section Three: Extended answer****10% (20 Marks)**

This section contains **four (4)** questions. You must answer **two (2)** questions. Write your answers on the lined pages provided. Each part carries ten (10) marks.

Answers may be presented in different ways, provided that they communicate your ideas effectively. You may choose to:

- present a clearly labelled diagram;
- write notes beside a clear diagram;
- write lists of points, with sentences that link them;
- write concisely worded sentences; or
- use some other appropriate way to present ideas.

Use black or blue pen or ballpoint for written answers and pencil for diagrams. Crossing out of incorrect material is acceptable and preferred to using correction fluid.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- **Planning:** If you use the spare pages for planning, indicate this clearly at the top of the page.
- **Continuing an answer:** If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

Suggested working time: 30 minutes.

---

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**See next page**

Answer any two questions from 37 to 40.

Indicate the first question you will answer by ticking the box next to the question. Write your answer on pages 29–31. When you have answered your first question, turn to page 32 and indicate the second question you will answer on that page.

**Question 37****(10 marks)**

Disease and predation can be important in regulating population size.

- (i) Distinguish between disease and predation and explain the impact that each of these processes has on population size. (4 marks)
- (ii) Explain whether disease is likely to be density independent or density dependent. (3 marks)
- (iii) Explain whether predation is likely to be density independent or density dependent. (3 marks)

**Question 38****(10 marks)**

The lung is the respiratory organ of mammals. However, respiration occurs in the cells. Using mammals as an example, explain how

- (i) oxygen is transported from the external environment to the body cells. (5 marks)
- (ii) carbon dioxide is transported from the body cells to the external environment. (5 marks)

**Question 39****(10 marks)**

The flower is the reproductive organ of flowering plants.

- (i) Draw a cross-section of a flower and label all parts involved in sexual reproduction. (6 marks)
- (ii) Indicate on your diagram where the processes of pollination, fertilisation and meiosis occur. (4 marks)

**Question 40****(10 marks)**

Microscopes are essential for studying cells.

- (i) Describe how you would prepare a piece of plant tissue for study under the light microscope. (5 marks)
- (ii) Describe how you would measure the diameter of the field of view and the size of the cells you can see using the microscope. (5 marks)







Indicate the second question you will answer from questions 37 to 40 by ticking the box next to the question. Write your answers on the pages provided.

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**End of questions**





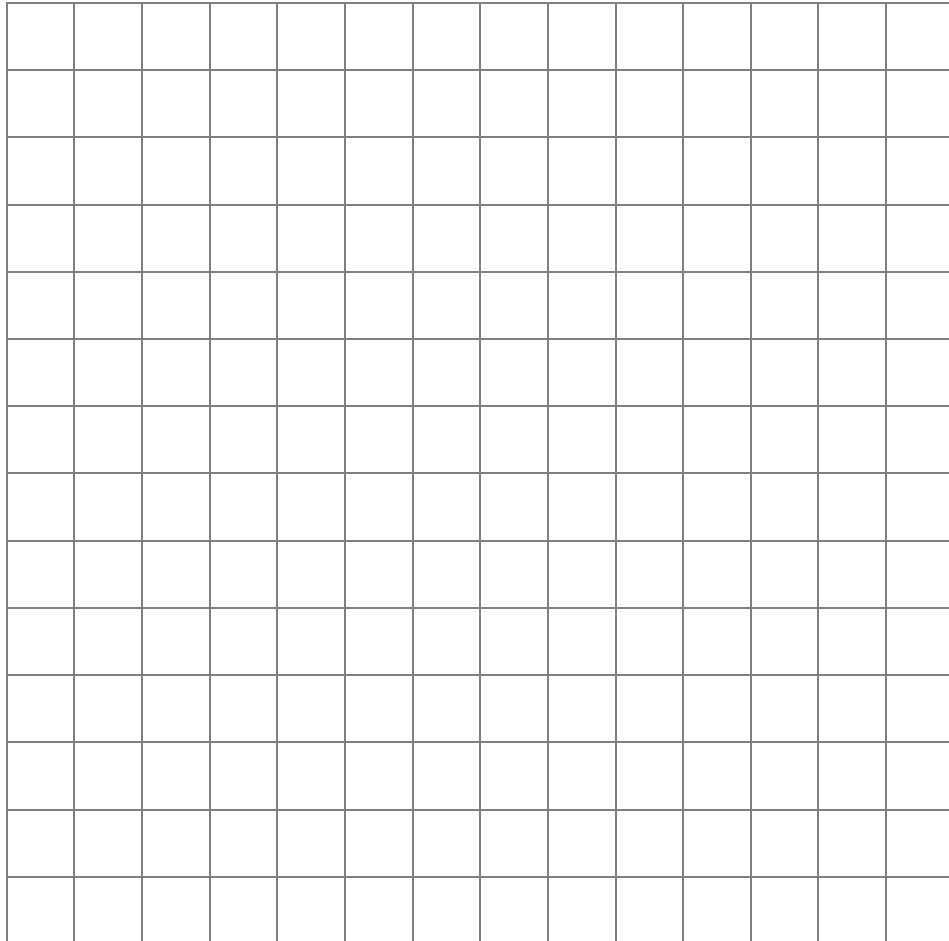












## ACKNOWLEDGEMENTS

### Section Two

**Question 31(d)** Diagram adapted from:  
Campbell, N. A., Reece, J. B., Mitchell, L. G. & Taylor, M. R. (2009). *Biology: Concepts and Connections* (6<sup>th</sup> ed.). San Francisco: Pearson/Benjamin Cummings, p. 755.

**Question 32** Diagram adapted from:  
Brown, D.W., & Sewell, J.J. (1984). *Australian biology test item bank* (Vol. II: Year 12). Melbourne: Australian Council for Educational Research, p. 7.

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