



Western Australian Certificate of Education Examination, 2011

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

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 attempted	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
Total					100

Instructions to candidates

- The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2011*. 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 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 black or blue pen for this section. Only the graph may be drawn in pencil.

Spare answer pages are provided at the end of this booklet. If you need to use these indicate where the answer is continued in the original answer space, e.g. write 'continued on page 41'. 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 the answer required.

Section Three: Write your answers in the space provided in this Question/Answer Booklet. Wherever possible, confine your answers to the line spaces provided. Use a black or blue 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 41'. 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.

1. Which of the following is a decomposer?
 - (a) tree
 - (b) fungus
 - (c) kangaroo
 - (d) shark

2. In a DNA molecule, the cytosine base pairs with
 - (a) adenine.
 - (b) thymine.
 - (c) guanine.
 - (d) uracil.

3. The element nitrogen always occurs in which of the following organic compounds?
 - (a) proteins
 - (b) carbohydrates
 - (c) lipids (fats)
 - (d) starches

4. In flowering plants, the male reproductive structures are the
 - (a) petals.
 - (b) pistils.
 - (c) stamens.
 - (d) stigmas.

Questions 5–7 relate to a student viewing a smear of red blood cells under a microscope.

5. The microscope is set with an ocular of 10X and an objective of 10X. To increase the magnification to 400X, the student should set the
- (a) ocular to 20X and objective to 40X.
 - (b) ocular to 20X and the objective to 15X.
 - (c) objective to 20X and leave the ocular unchanged.
 - (d) objective to 40X and leave the ocular unchanged.
6. When the magnification is increased to 400X, which of the following will increase?
- (a) resolution of the image
 - (b) number of cells visible
 - (c) diameter of the field of view
 - (d) depth of the field of view
7. The student estimated the average diameter of the red blood cells to be 7.6 μm . What is the average diameter of these cells in millimetres (mm)?
- (a) 0.76
 - (b) 0.076
 - (c) 0.0076
 - (d) 0.00076
8. In pedigrees, females are represented by
- (a) circles.
 - (b) diamonds.
 - (c) squares.
 - (d) triangles.
9. A parasite either does not reproduce or reproduces asexually in the
- (a) final host.
 - (b) primary host.
 - (c) definitive host.
 - (d) intermediate host.
10. In mammals, oxygen moves from air in the lungs into the blood by the process of
- (a) osmosis.
 - (b) diffusion.
 - (c) phagocytosis.
 - (d) translocation.

11. Approximately what percentage of the energy fixed in the bodies of primary producers in an ecosystem will be available to secondary consumers?
- (a) 100
 - (b) 10
 - (c) 1
 - (d) 0.1
12. Lions take turns to chase and tire out their prey. This behaviour is an example of
- (a) collaboration.
 - (b) commensalism.
 - (c) competition.
 - (d) symbiosis.
13. Lions feed exclusively on animals and are therefore
- (a) carnivores.
 - (b) frugivores.
 - (c) herbivores.
 - (d) omnivores.
14. Insects have an open circulatory system. In open circulatory systems
- (a) there are no blood vessels.
 - (b) the heart has three chambers.
 - (c) the heart has four chambers.
 - (d) the internal organs are bathed in blood.
15. In American terriers, the presence of hair is determined by an autosomal gene, where the allele for hair (H) is dominant to the allele for no hair (h). If a terrier with the genotype Hh is crossed with a hairless terrier, what is the probability of obtaining a hairless puppy?
- (a) 0.75
 - (b) 0.50
 - (c) 0.33
 - (d) 0.25
16. Algal cells are common in the surface waters of the ocean. Cells with a high surface area to volume ratio sink more slowly than cells with a low surface area to volume ratio. Which of the following cells will sink at the slowest rate?
- (a) a small cell with long spines
 - (b) a small cell with short spines
 - (c) a large cell with long spines
 - (d) a large cell with short spines

17. The non-living factors in an ecosystem are termed
- (a) biotic.
 - (b) abiotic.
 - (c) aerobic.
 - (d) anaerobic.
18. Sex in sea turtles and crocodiles is determined by
- (a) chromosomes.
 - (b) temperature.
 - (c) food availability.
 - (d) salinity.
19. A living cell was placed in a dilute salt solution in a dish. The cell expanded until it eventually burst. The cell burst because the
- (a) cell membrane was damaged by salt crystals.
 - (b) cell membrane was not permeable to water.
 - (c) salt concentration of the solution was higher than that of the cell.
 - (d) salt concentration of the solution was lower than that of the cell.
20. DNA contains the genetic code for the production of
- (a) carbohydrates.
 - (b) lipids (fats).
 - (c) proteins.
 - (d) starches.
21. Which of the following is an example of density-dependent population change?
A decrease in the size of a
- (a) cat population due to an infectious disease.
 - (b) fish population due to chemical pollution.
 - (c) beetle population due to a forest fire.
 - (d) mouse population due to a flood.
22. An aquarium containing sand, fresh water, water plants and herbivorous fish most closely resembles
- (a) the biosphere.
 - (b) a community.
 - (c) an ecosystem.
 - (d) a population.

23. A gardener hypothesised that a chemical in tap water was reducing the number of flowers on her orchids. Which of the following is a valid prediction arising from her hypothesis?
- (a) Orchids that are not watered will grow more flowers than orchids that are watered.
 - (b) Orchids that are watered will grow more flowers than orchids that are not watered.
 - (c) Orchids watered with tap water will grow more flowers than orchids watered with rain water.
 - (d) Orchids watered with distilled (pure) water will grow more flowers than orchids watered with tap water.
24. In humans, damaged body cells are replaced through
- (a) meiosis.
 - (b) mitosis.
 - (c) cytosis.
 - (d) endocytosis.
25. Mitochondria are the sites of
- (a) photosynthesis.
 - (b) chemosynthesis.
 - (c) respiration.
 - (d) transpiration.
26. Which of the following statements about the scientific method is true?
- (a) An experiment can be valid and reliable but not ethical.
 - (b) Increasing the sample size decreases the reliability of an experiment.
 - (c) All experiments must have three independent variables.
 - (d) Controlled experiments cannot be conducted in the field.
27. Twenty quadrats, each measuring 1 metre by 1 metre, were placed in an area of rocky shore containing limpets (a type of marine snail that lives attached to the rocks). The average number of limpets in each quadrat was 16. If the study area covered 500 square metres, what is the estimated number of limpets in the study area?
- (a) 16
 - (b) 320
 - (c) 8000
 - (d) 320 000
28. Lipids are organic molecules that are
- (a) found in animals but not in plants.
 - (b) the main components of chromosomes.
 - (c) products of cellular respiration.
 - (d) used for energy storage.

29. Some species of photosynthetic algae live in the outer layers of the bodies of jellyfish. The algae produce glucose that is absorbed by the jellyfish. What is the most likely outcome if a jellyfish is kept in the dark?
- (a) The jellyfish will require more carbon dioxide.
 - (b) The growth rate of the jellyfish will slow down.
 - (c) Neither the algae nor the jellyfish will be affected.
 - (d) The algae will die but this will not affect the jellyfish.
30. In plants, seed dispersal
- (a) separates fertile from infertile seeds.
 - (b) raises density-dependent mortality in seedlings.
 - (c) increases competition between seedlings and parent plants.
 - (d) allows plants to colonise new habitats.

End of Section One

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 for this section. Only the graph may be drawn in pencil.

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)**

(a) Photosynthesis occurs in some plant cells.

(i) Name **two (2)** inputs of photosynthesis. (2 marks)

One: _____

Two: _____

(ii) Name **two (2)** outputs of photosynthesis. (2 marks)

One: _____

Two: _____

(b) (i) Does respiration occur in plant cells? Explain your answer. (2 marks)

(ii) Name **two (2)** outputs of respiration. (2 marks)

One: _____

Two: _____

See next page

- (c) (i) What is the main difference between a photosynthetic and a chemosynthetic organism? (2 marks)

- (ii) What is the main difference between a saprophytic and a parasitic plant? (2 marks)

- (d) Indicate whether each of the following statements about water transport in plants is true or false by circling the correct answer. Give a reason for your answer.

- (i) Plants transport water from their roots to their leaves in the phloem. (2 marks)

True/False

Reason: _____

- (ii) In plants, root hairs, which take up substances from the soil, have a high surface area to volume ratio. (2 marks)

True/False

Reason: _____

(e) (i) Distinguish between diffusion and osmosis. (2 marks)

(ii) Provide an example of diffusion in plants. (1 mark)

(iii) Provide an example of osmosis in plants. (1 mark)

Question 32

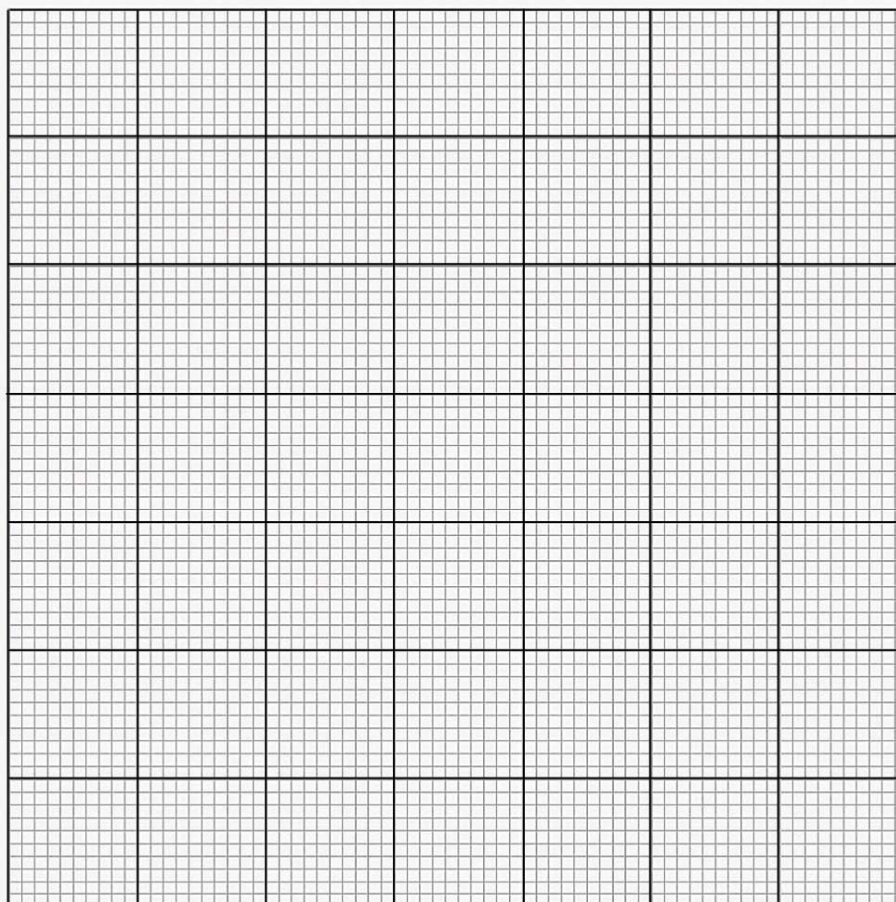
(20 marks)

During the nineteenth century, ships' crews often released goats on uninhabited islands. The sailors hoped that the goats would establish populations on the islands so that sailors could hunt the goats for meat when ships called in the future. The number of goats on each of two islands was monitored for several years. The results are shown in the table below.

Number of goats	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Island 1	4	8	15	Missing data	67	41	42
Island 2	7	4	11	28	56	49	48

- (a) On the grid provided, plot a line graph of the 'number of goats' against 'year' for each of islands 1 and 2, i.e. plot the data separately for islands 1 and 2. (4 marks)

If you wish to have a second attempt at this item, the grid is repeated on page 43 of this examination booklet. Indicate clearly on this page if you have used the second grid and cancel the working on the grid on this page.



(b) (i) Using the graph, predict the number of goats on Island 1 in Year 4. (1 mark)

(ii) At the beginning of Year 8 on Island 2, there were 48 goats. During Year 8, 20 goats were born, sailors killed 10 goats and 28 goats died of other causes. What is the population size of the goats on the island at the end of Year 8? Show your workings. (3 marks)

(c) Island 1 is 500 hectares (ha) in total area. Island 2 is 800 ha in total area.

(i) Calculate the population density of goats (goats/ha) on Island 1 in Year 2. Show your workings. (2 marks)

(ii) Which island had the greater density of goats in Year 7? Show your workings. (2 marks)

(d) A biologist studied the carrying capacity of the islands for the goats.

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

(ii) Based on the data in the table and the graph, was the carrying capacity of goats reached on Island 2 by year 7? Explain your answer. (2 marks)

(e) (i) Name **two (2)** abiotic factors that could determine the carrying capacity of the islands for the goats. (2 marks)

One: _____

Two: _____

(ii) Name **two (2)** biotic factors that could determine the carrying capacity of the islands for the goats. (2 marks)

One: _____

Two: _____

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See next page

Question 33

(20 marks)

- (a) Biological classification is a hierarchical system based on seven major groups: class, family, genus, kingdom, order, phylum and species. Kingdom is the highest group; place the remaining groups in order from highest to lowest. (4 marks)

- (b) Indicate whether each of the following statements about biological classification is true or false by circling the correct answer. Give a reason for your answer.

- (i) Species that belong to the same order must belong to the same class. (2 marks)

True/False

Reason: _____

- (ii) Individuals belong to the same genus if they can interbreed and produce fertile offspring. (2 marks)

True/False

Reason: _____

- (c) The table below shows the common and scientific names of five species of fish.

Common Name	Scientific Name
Atlantic Herring	<i>Clupea harengus</i>
Australian Herring	<i>Arripis georgianus</i>
Cardinal Fish	<i>Apogon latus</i>
Horse-eye Jack	<i>Caranx latus</i>
Western Australian Salmon	<i>Arripis truttaceus</i>

- (i) What is the genus name of the Atlantic Herring? (1 mark)

- (ii) Which two species in the table are the most closely related to each other? Give reasons for your choice. (3 marks)

In biological classification, a dichotomous key is often used to identify unknown organisms. The dichotomous key below can be used for identifying sharks and stingrays. A labelled diagram of a shark and a stingray are also given below to help with some of the terminology used in the key.

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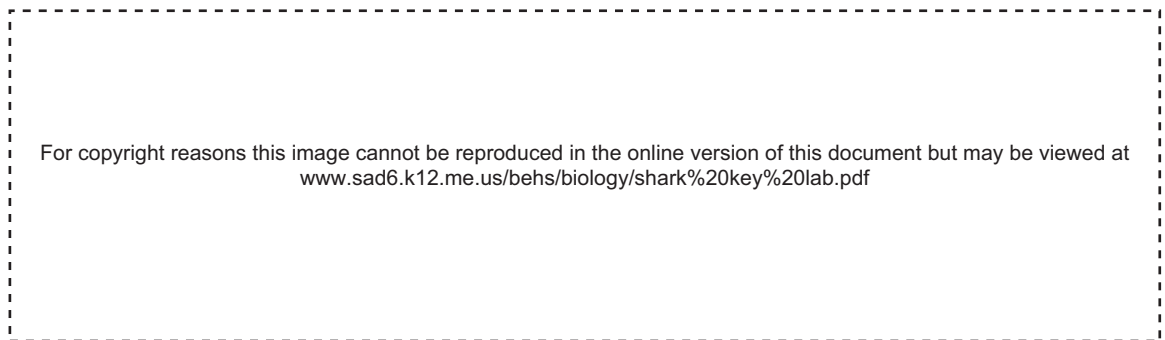
See next page

- (d) (i) Why is the key termed 'dichotomous'? (1 mark)

- (ii) How many families in the key have representatives with a flattened body and a whip-like tail? (1 mark)

- (iii) How can representatives of the Family Mobulidae be distinguished from those of the Family Dasyatidae? (2 marks)

- (e) (i) Use the dichotomous key to determine the family name of organism A. (1 mark)



Family name: _____

- (ii) List **three (3)** features of organism A that were important in making this identification. (3 marks)

One: _____

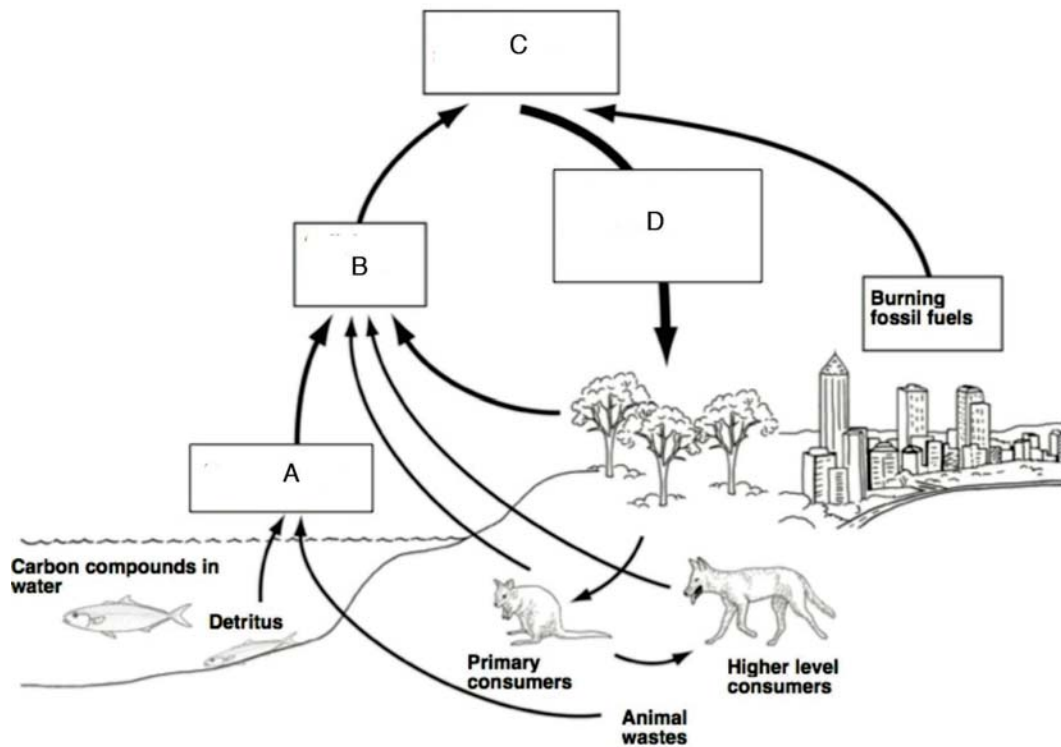
Two: _____

Three: _____

Question 34

(20 marks)

- (a) The following diagram shows the carbon cycle. Each of the boxes A, B, C and D represent carbon dioxide (CO₂).



Indicate which box or boxes (A, B, C or D) in the diagram represent each of the following: (4 marks)

- (i) CO₂ in the atmosphere. _____
- (ii) CO₂ being absorbed for photosynthesis. _____
- (iii) CO₂ produced by cellular respiration. _____

- (b) Indicate whether each of the following statements about food chains is true or false by circling the correct answer. Give a reason for your answer.

- (i) Food chains are simpler than food webs. (2 marks)

True/False

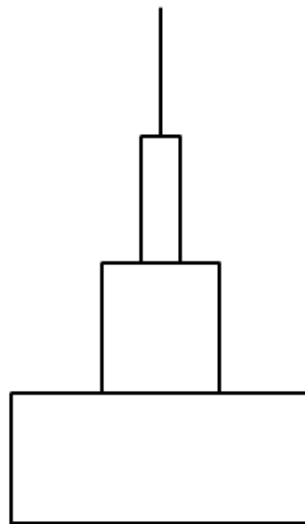
Reason: _____

- (ii) Food chains recycle energy in ecological communities. (2 marks)

True/False

Reason: _____

- (c) The following diagram shows a biomass pyramid for a terrestrial ecological community.



On the diagram, mark clearly the level corresponding to

- (i) primary producers. (1 mark)
- (ii) secondary consumers. (1 mark)
- (iii) the highest biomass. Why does this level have the highest biomass? (2 marks)

(d) (i) What is the main difference between an autotroph and a decomposer? (2 marks)

(ii) What is the main difference between a herbivore and an omnivore? (2 marks)

(e) The following table shows the net primary productivity of three different marine ecosystems and eight different terrestrial ecosystems.

Ecosystem	Net primary productivity (g/m ² /yr)
Marine	
Open ocean	83
Estuary	1 500
Algal beds and coral reefs	2 500
Terrestrial	
Desert and semi-desert scrub	80
Tundra	125
Temperate grassland	580
Cultivated land	580
Boreal forest (taiga)	792
Savanna	958
Temperate deciduous forest	1 208
Tropical rain forest	2 167

Name

(i) the least productive marine ecosystem. _____ (1 mark)

(ii) the most productive terrestrial ecosystem. _____ (1 mark)

(iii) **two (2)** factors that influence the net primary productivity of ecosystems. (2 marks)

Question 35

(20 marks)

In the Eastern Goldfields region of Western Australia, wild dogs have formed into packs that have been attacking sheep and cattle. In an effort to control wild dog numbers, doggers have been employed to shoot the dogs or bait them with poison. The doggers kept records of the number of wild dogs that they believed were killed by shooting and poison baiting in the region in the period 1998–2008. These records are given in the following table.

Year	Total kills	Wild dogs shot	Wild dogs baited
1998	164	55	109
1999	305	99	206
2000	27	9	18
2001	31	8	23
2003	98	34	64
2004	233	75	158
2005	454	120	334
2006	366	121	245
2007	297	89	208
2008	199	44	155

- (a) (i) Indicate whether each of the following statements is true or false by circling the correct answer. (2 marks)

Statement 1: The doggers' records indicate that the total number of wild dogs killed by poison baits was greater than the number killed by shooting.

True/False

Statement 2: The doggers' records indicate that more wild dogs were killed in 2007 than in 1998.

True/False

- (ii) Are the records of kill numbers for shooting likely to be more or less accurate than those for baiting? Explain your answer. (2 marks)

- (b) List **four (4)** factors that could have influenced the number of wild dogs killed by poison baits in any year. (4 marks)

One: _____

Two: _____

Three: _____

Four: _____

- (c) On the basis of the information presented in the table on the previous page, it is not possible to conclude that baiting is more effective than shooting in controlling wild dog numbers. Provide **four (4)** reasons why this information may not support this conclusion. (4 marks)

One: _____

Two: _____

Three: _____

Four: _____

- (d) A scientist hypothesised that baiting decreased the number of wild dogs in the Eastern Goldfields region.

- (i) What is the dependent variable for this hypothesis? Explain your answer. (2 marks)

- (ii) What is the independent variable for this hypothesis? Explain your answer. (2 marks)

- (e) To test the hypothesis, the scientist identified two large areas with similar numbers of wild dogs. Poison baits were laid in one of these areas but not in the other. After two years, the number of dogs in each area was estimated by aerial spotting. There was estimated to be twice as many dogs in the unbaited area as in the baited area.

- (i) What is the control in this experiment? (1 mark)

- (ii) Do the results support the hypothesis? Explain your answer. (3 marks)

Question 36

(20 marks)

(a) The number of chromosomes in a skin cell in the house mouse is 40. Indicate whether each of statements (a) (i) and (ii) about chromosome numbers in the house mouse is true or false by circling the correct answer. Give a reason for your answer.

(i) The haploid number of chromosomes in the house mouse is 40. (2 marks)

True/False

Reason: _____

(ii) A sperm cell in the house mouse will have 40 chromosomes. (2 marks)

True/False

Reason: _____

(b) Like humans, the house mouse has an XY system of sex determination.

(i) How many sex chromosomes occur in a sperm cell of a house mouse? (1 mark)

(ii) How many autosomes occur in a skin cell of a female house mouse? (1 mark)

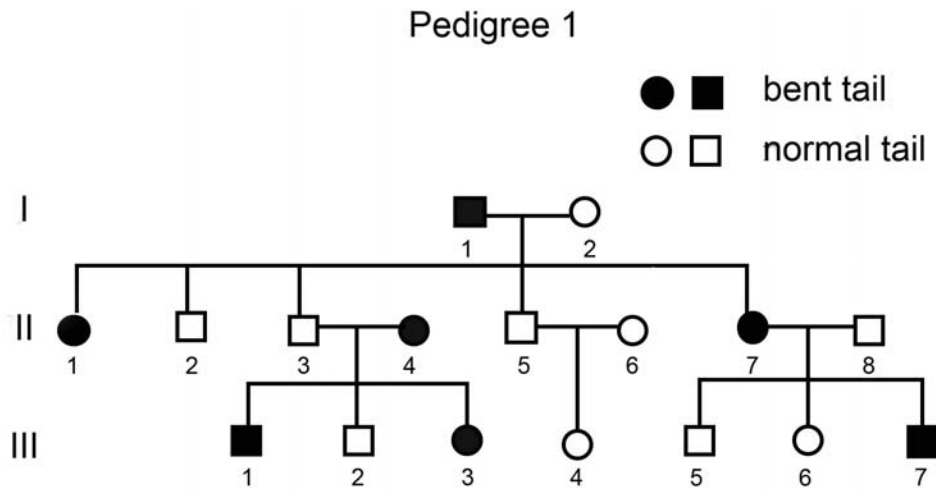
(iii) In the house mouse, does the male or female parent determine the sex of the offspring? Explain your answer. (2 marks)

- (c) Some of the individuals in a particular strain of house mouse have black fur, while others have brown fur. In these mice, fur colour is controlled by an autosomal gene, where the allele for black fur (B) is dominant to the allele for brown fur (b). A heterozygous black mouse is crossed with another heterozygous black mouse.

- (i) What genotypes are expected in the offspring of this cross and in what proportions are they expected to occur? (2 marks)

- (ii) What phenotypes are expected in the offspring of this cross and in what proportions are they expected to occur? (2 marks)

Pedigree 1 below shows the inheritance of a bent tail in a house mouse family. Bent tail is an X-linked, dominant trait.



(d) (i) What is an X-linked trait? (1 mark)

(ii) What is a dominant trait? (1 mark)

(iii) Is individual II-4 in pedigree 1 a descendant of individual I-1? Explain your answer. (2 marks)

- (e) (i) If individuals I–1 and II–6 in pedigree 1 were crossed, what proportion of their sons would have bent tails? Show your workings. (2 marks)

- (ii) If individuals II–2 and II–7 in pedigree 1 were crossed, what proportion of their daughters would have bent tails? Show your workings. (2 marks)

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.

Where applicable, answers may be presented in different ways, provided 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;
- 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 preferable 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 use the space to continue an answer, indicate where the answer is continued in the original answer space, i.e. give the page number.

Suggested working time: 30 minutes.

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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 32–35. When you have answered your first question, turn to page 36 and indicate the second question you will answer on that page.

Question 37 **(10 marks)**

- (i) Explain, using examples, the differences between populations, communities and ecosystems. (6 marks)
- (ii) Explain, using examples, the difference between competition and predation. (4 marks)

Question 38 **(10 marks)**

The European rabbit is a common pest species in south-western Australia.

- (i) Explain how the capture-recapture method could be used to estimate the number of European rabbits on a farm. (6 marks)
- (ii) Name **four (4)** requirements that must be met in order for the capture-recapture method to provide an accurate estimate of the number of individuals of a species in an area. (4 marks)

Question 39 **(10 marks)**

- (i) Draw a plant cell and label **six (6)** features. (6 marks)
- (ii) Name **two (2)** features that are present in plant cells but not in animal cells. (2 marks)
- (iii) Name **two (2)** differences between eukaryotic and prokaryotic cells. (2 marks)

Question 40 **(10 marks)**

Reproduction can be either sexual or asexual.

- (i) Name **three (3)** characteristics of sexual reproduction. (3 marks)
- (ii) Name **three (3)** characteristics of asexual reproduction. (3 marks)
- (iii) State **two (2)** advantages and **two (2)** disadvantages of asexual reproduction. (4 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.

Question 37 (10 marks)

- (i) Explain, using examples, the differences between populations, communities and ecosystems. (6 marks)
- (ii) Explain, using examples, the difference between competition and predation. (4 marks)

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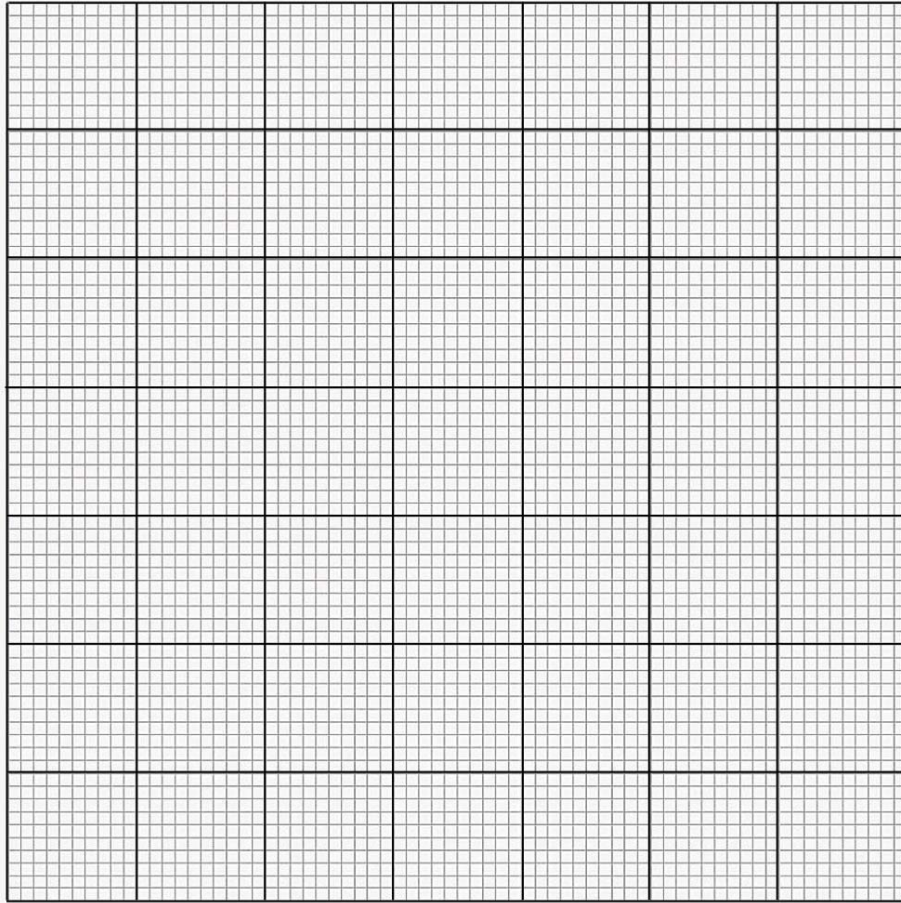
Question 39 (10 marks)

- (i) Draw a plant cell and label **six (6)** features. (6 marks)
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- (iii) Name **two (2)** differences between eukaryotic and prokaryotic cells. (2 marks)

Question 40 (10 marks)

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- (i) Name **three (3)** characteristics of sexual reproduction. (3 marks)
- (ii) Name **three (3)** characteristics of asexual reproduction. (3 marks)
- (iii) State **two (2)** advantages and **two (2)** disadvantages of asexual reproduction. (4 marks)



ACKNOWLEDGEMENTS

Section Two

- Question 33(d):** Text and diagram adapted from: Biggs, A.L. (2004). Dichotomous key and diagram. In *Biology: The dynamics of life* (p. 117). Retrieved February, 2011, from www.sad6.k12.me.us/behs/biology/shark%20key%20lab.pdf.
- Question 33(e):** Diagram adapted from: Biggs, A.L. (2004). Dichotomous key and diagram. In *Biology: The dynamics of life* (p. 117). Retrieved February, 2011, from www.sad6.k12.me.us/behs/biology/shark%20key%20lab.pdf.
- Question 34(a):** Diagram adapted from: Cale, B. (n.d.). Diagrammatic representation of the carbon cycle. Figure 17.5. In M. Calver, A. Lymbery, J. McComb & M. Bamford. (Eds). (2009). *Environmental biology*. Port Melbourne, Vic: Cambridge University Press, p. 400.

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*Published by the Curriculum Council of Western Australia
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