



BIOLOGY

Please place your student identification label in this box

STUDENT NUMBER -

In figures

--	--	--	--	--	--	--	--	--	--

In words

--	--	--	--	--	--	--	--	--	--

TIME ALLOWED FOR THIS PAPER

Reading time before commencing work: Ten minutes
Working time for paper: Three hours

MATERIAL REQUIRED/RECOMMENDED FOR THIS PAPER

TO BE PROVIDED BY THE SUPERVISOR

This Question/Answer Booklet
Separate Multiple Choice Answer Sheet
Standard Answer Book
Paper Binder

TO BE PROVIDED BY THE CANDIDATE

Standard Items: Pens, pencils, eraser or correction fluid, ruler

Special Items: A 2B, B or HB pencil for the separate Multiple Choice Answer Sheet and calculators satisfying the conditions set by the Curriculum Council.

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 THE PAPER

Section	Questions	Students should attempt	Marks	Suggested time/minutes
A Multiple choice	1-30	ALL	60 (30%)	40
B Short answers	31-35	ALL	100 (50%)	90
C Extended answers	36*	Two parts	40 (20%)	50
	37*	Two parts		

Total marks = 200

- * Questions 36 and 37 each consist of four optional parts, of which two should be attempted in each question.

INSTRUCTIONS TO CANDIDATES

- Section A Write your answers on the separate Multiple Choice Answer Sheet using a 2B, B or HB pencil. Do not use a ball point or ink pen. Marks are not deducted for wrong answers.
- Section B Write your answers in the spaces provided in this Question/Answer Booklet. Use a blue or black pen (not pencil) for this section.
- Section C Write your answers in the Standard Answer Book. Use a blue or black pen (not pencil) for this section. Do not copy the questions when answering; merely write the number of the question in the margin.

AT THE END OF THE EXAMINATION

Make sure that your Student Number is on your Question/Answer Booklet and Standard Answer Book(s).

Attach the Question/Answer Booklet to the FRONT of the Standard Answer Book(s) with the paper binder provided.

SEE NEXT PAGE

SECTION A (60 marks)

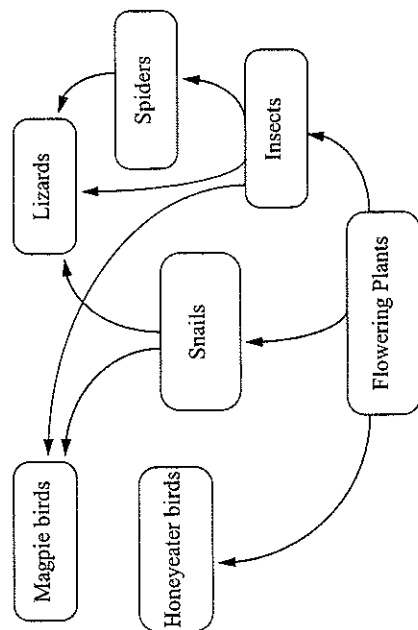
Suggested time: 40 minutes

Record an answer for Questions 1 - 30 by marking your choice of alternatives on the separate Multiple Choice Answer Sheet using a 2B, B or HB pencil.

If you want to change an answer, rub out your first answer and mark the new choice. The answer sheet for Section A will be collected separately by the supervisor.

1. Figure 1 shows how some of the organisms in a suburban garden might be linked in a simple food web.

FIGURE 1



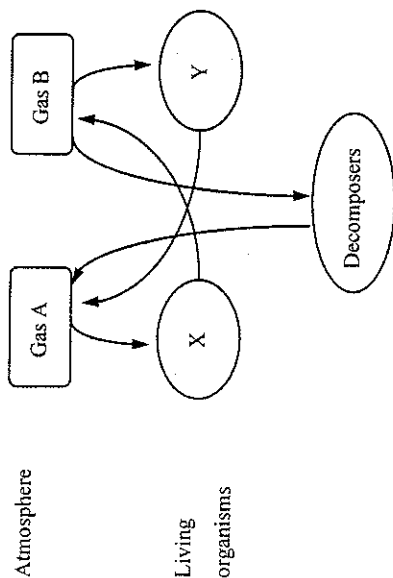
If a gardener started to use a lot of insecticides in this garden, which of the following changes in the fauna of the garden would be most likely?

- (a) Snail numbers would remain unaffected.
- (b) There would be a short-term increase in predation on snails.
- (c) The numbers of animals of all types in the garden would decrease.
- (d) Spiders would disappear from the garden.

SEE NEXT PAGE

2. In Figure 2 the labelled shapes represent different gases in the atmosphere and living organisms of different types. Arrows show the direction of some of the movements of carbon dioxide and oxygen between the atmosphere and living organisms.

FIGURE 2



Which of the following best describes which gases and which type of organism is represented by the labelled shapes?

- X represents autotrophs and gas A is carbon dioxide.
- X represents autotrophs and gas B is carbon dioxide.
- X represents consumers and gas A is oxygen.
- X represents consumers and gas B is oxygen.

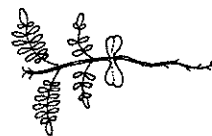
3. It has been known for a long time that seed germination of many Australian plants is affected by fire. Table 3 shows the germination rate of seeds from *Acacia saligna* (a species of wattle) exposed to different treatments.

TABLE 3

Treatment	Temperature (°C)	Germination Rate (%)
None	25	20
Fire	300	90
Hot air	300	19
Smoke	25	85

Which of the following can be concluded from these data?

- Heat will only promote germination if it is accompanied by fire.
- Chemicals from smoke promote germination.
- Seeds from this wattle will only germinate if they are affected by fire.
- Hot air alone can be used to inhibit germination of these wattle seeds.



SEE NEXT PAGE

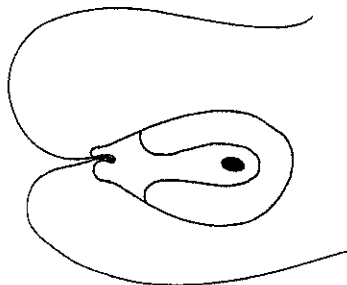
4. Some single-celled algae are grown in shallow ponds to produce commercially useful compounds. Temperature is an important factor affecting the growth rate of the algae. Growth is slow if water temperature is below 20°C. If water temperature exceeds 40°C, the algae may die.

Which of the following may be the best explanation for stress in the algae if the temperature exceeds 40°C?

- The solubility of oxygen in water decreases as temperature increases. The algae are oxygen starved at 40°C.
- High temperature is associated with very strong sunlight. Growth of the algae is inhibited at high light intensity.
- At 40°C the rate of water loss from the algae is too great for their continued survival.
- The structure of proteins in the algae is altered at 40°C. Proteins do not function normally if their structure is altered.

5. Enzymes are highly specific in their action. Most enzymes catalyse only one reaction or a limited number of reactions. Which of the following best explains this property of enzymes?

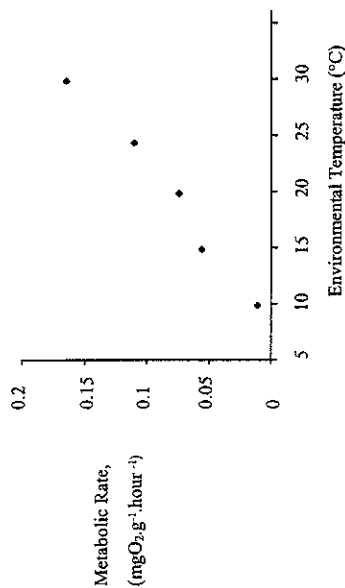
- An enzyme can only be activated by particular molecules.
- The shape of the active site on an enzyme allows only particular substances to bind to it.
- Enzymes lose their activity if pH and temperature conditions are not optimal.
- Enzymes have only a short life and are then destroyed.



SEE NEXT PAGE

6. Figure 6 shows the metabolic rate (MR) of a lizard when kept at different environmental temperatures. MR was measured first at 30°C and then at the lower temperatures.

FIGURE 6



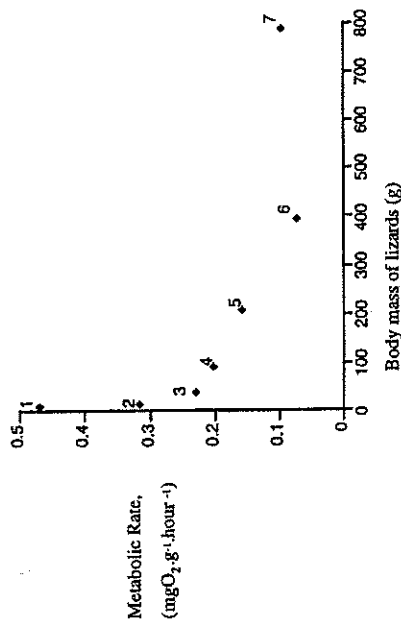
Which of the following best describes how environmental temperature affects the lizard?

- The lizard uses less oxygen at lower environmental temperatures because it conserves energy to maintain its body temperature.
- 30°C is the optimum temperature for the lizard because at this temperature the MR is highest.
- At low temperature the lizard requires a high rate of food intake to maintain its MR.
- The lizard's body temperature cools as the environmental temperature drops and its body processes all take place more slowly at lower temperatures.

SEE NEXT PAGE

- Questions 7, 8 and 9 are based on Figure 7 which shows the average metabolic rates (MR) of inactive adult lizards from seven different species, all measured at 25°C.

FIGURE 7



7. Which of the following is a true statement about the metabolic rate of the lizards?

- Lizards of species 7 had the lowest MR of the lizards measured.
- Lizards of species 6 had the lowest MR of the lizards measured.
- Lizards of species 1 use more oxygen than the other lizards tested.
- There is no evidence that body size has any effect on the MR of lizards.

8. Which of the following is the best comment about the food needs of the lizards?

- Lizards of species 1 would probably eat more food than any of the other lizards.
- Lizards of species 1 would probably eat more food per day, in relation to their body mass, than lizards of species 7.
- Lizards of species 6 would eat more food, in relation to their body mass, than any of the other lizards.
- Lizards of species 7 would spend more time searching for food than any of the other lizards.

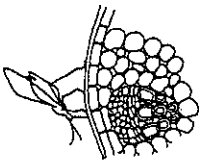
9. The Y axis (vertical axis) of Figure 7 is labelled Metabolic Rate, (mgO₂.g⁻¹.hour⁻¹).

Which of the following could also be used to indicate metabolic rate?

- Carbon dioxide uptake (mgCO₂.g⁻¹.hour⁻¹).
- Water loss (mgH₂O.g⁻¹.hour⁻¹).
- Excretion rate (mgN excreted.g⁻¹.hour⁻¹).
- Carbon dioxide output (mgCO₂.g⁻¹.hour⁻¹).

SEE NEXT PAGE

10. Aphids are small insects whose sucking mouthparts penetrate plant tissues like hypodermic needles. Aphids feed by drawing fluid from the plant into their gut.



Which of the tissues in a plant stem would an aphid need to draw from to obtain ample fluid with the greatest food value?

- (a) Phloem
- (b) Xylem
- (c) Mesophyll
- (d) Epidermis

11. Some fungi can invade the roots of plants and block the xylem vessels.

Which of the following is **unlikely** to result from blockage of the xylem?

- (a) Leaves lose turgor and wilt from insufficient water.
- (b) Leaves show discoloration from nutrient deficiency.
- (c) Stomata remain open to maximise the flow of water through the plant.
- (d) The rate of photosynthesis is reduced.

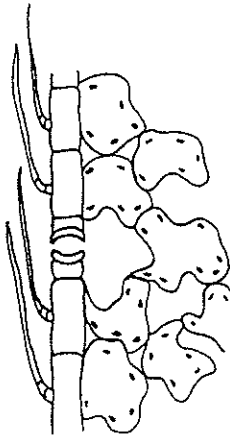


12. If a plant is infected by fungi which block xylem vessels, under which of the following weather conditions will the damaging effects be most obvious?

- (a) Summer conditions of long day length, no wind and warm dry air.
- (b) Summer conditions of long day length, no wind and warm humid air.
- (c) Winter conditions of short day length, no wind and cool dry air.
- (d) Summer conditions of long day length, strong wind and warm dry air.

SEE NEXT PAGE

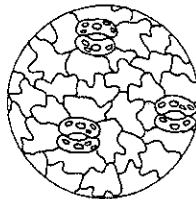
13. Many plants which grow in areas of low water availability have a mat of white hair-like structures formed from the epidermis. The mat probably provides many advantages.



Which of the following is **least** likely to be an advantage gained from the hairs?

- (a) Hairs reflect radiation from the leaf, reducing heat gain and water loss.
- (b) Hairs protect leaf tissues from salt spray in coastal areas, preventing damage.
- (c) Hairs trap a layer of still humid air close to the leaf.
- (d) Hairs trap water from rainfall and make it available for uptake by the leaf.

14. For most land-living flowering plants the surface cuticle of the leaf is waterproof except where stomata occur.



Which of the following best describes the importance of the stomata?

- (a) Stomata provide openings through which carbon dioxide can diffuse out of leaf tissues.
- (b) Stomata control the rate of uptake of water by roots and gas exchange with the atmosphere.
- (c) Stomata provide openings through which oxygen can diffuse into leaf tissues.
- (d) Stomata provide openings through which water can be absorbed from the atmosphere.

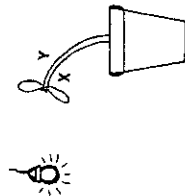
15. Which of the following correctly describes the state of the guard cells when stomatal pores are either open or closed?

- (a) If guard cells are flaccid, stomatal pores are kept open.
- (b) If the osmotic pressure in guard cells is low, stomatal pores will be open.
- (c) If the osmotic pressure in guard cells is high, stomatal pores will be open.
- (d) If guard cells are turgid, stomatal pores are kept closed.

SEE NEXT PAGE

16. Figure 16, below, shows the tip of a young plant stem bending towards the light as it grows.

FIGURE 16



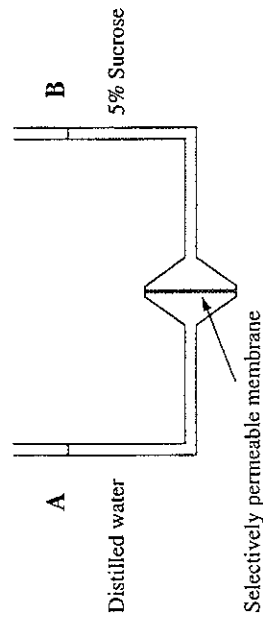
Which of the following best describes how this pattern of growth is caused?

- The concentration of auxin at X is higher than at Y, inhibiting the growth of cells in that region.
- The concentration of auxin at Y is higher than at X, causing cells in the region Y to grow longer than cells in the region X.
- The concentration of auxin at Y is higher than at X, causing cells to divide rapidly in region Y and produce uneven growth.
- The concentration of auxin at X is higher than at Y, causing uneven growth in the walls of cells in the region X.

Questions 17 and 18 relate to Figure 17 which shows two liquids in tubes, separated by a selectively permeable artificial membrane. The tube on side B contains a 5% sucrose solution in water. Distilled water was put into the tube on side A, initially to the same level as the liquid in B.

After 30 minutes the levels of fluid in the two tubes were unequal.

FIGURE 17



17. Which of the following describes and explains the changes in water levels that you would expect in tubes A and B?

- The fluid would rise in A, balancing the weight in each of the tubes.
- The fluid would rise in B because there was a net movement of water molecules from A to B.
- The fluid would rise in A because sucrose moved from B to A.
- The fluid would rise in B because sucrose molecules are larger than water molecules.

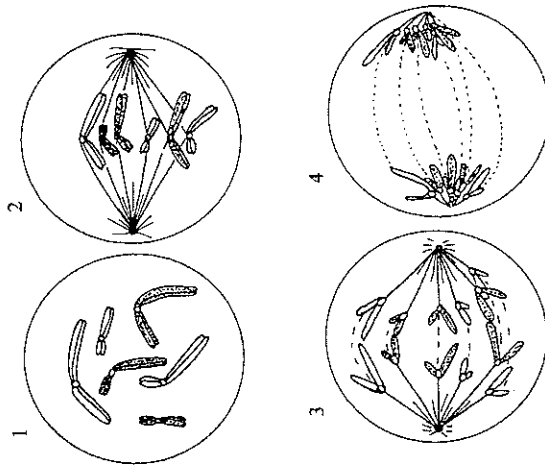
SEE NEXT PAGE

18. Which of the following processes would bring about movement of substances in the situation shown in Figure 19?

- Active transport.
- Pinocytosis.
- Exocytosis.
- Diffusion

Figure 19 shows diagrams of cells in various stages of cell division.

FIGURE 19



19. Which of the following correctly states the type of cell division that is described by Figure 19?

- Mitosis, which results in daughter cells that are genetically different.
- Meiosis, because homologous chromosomes are shown pairing together.
- Mitosis, because homologous chromosomes are behaving independently.
- Meiosis, which results in daughter cells that are genetically identical.

20. Which of the following is an important difference between meiosis and mitosis?

- Homologous chromosomes pair in mitosis but not in meiosis.
- Meiosis occurs only in reproductive processes, mitosis duplicates cells in growth.
- Meiosis is associated with tissue growth, mitosis with sexual reproduction.
- Mitosis results in the production of genetically different cells, meiosis produces identical cells.

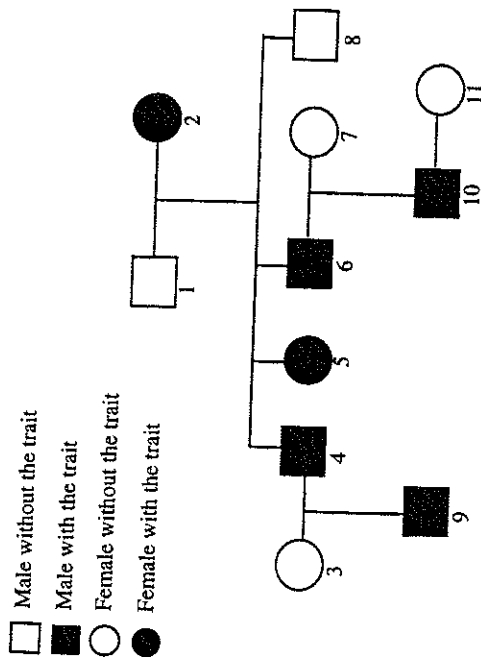
SEE NEXT PAGE

21. Living organisms are believed to have undergone evolutionary changes over a long period of time. Which of the following observations **cannot** be explained using the ideas of evolution?
- Some Australian marsupials have become extinct, having failed in competition with introduced animals.
 - Many types of bacteria have become resistant to antibiotics in recent years.
 - Many animals which are now alive are similar, but not identical, to animals in fossil records.
 - Muscle cells in fishes are very similar to muscle cells in mammals.

22. Captive breeding programs are used as a last resort in attempts to save some endangered animals from extinction. In these programs there is careful control over which animals are allowed to mate. Which of the following explains why this control is necessary?
- Planned matings allow as much genetic diversity as possible to be maintained.
 - Only the very strongest specimens are likely to have healthy offspring.
 - Animals with unusual features would introduce harmful genes into the population.
 - Random mating may lead to inbreeding, resulting in extinction of the species.

Questions 23, 24 and 25 are based on the pedigree chart shown in Figure 23. The occurrence of a particular trait is shown within a family. The individuals numbered 3, 7 and 11 have no history of the trait in their families.

FIGURE 23

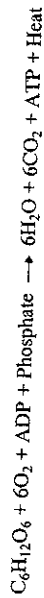


23. Which of the following best describes the allele which gives rise to the trait?
- Autosomal recessive.
 - Sex-linked recessive.
 - Autosomal dominant.
 - Sex-linked dominant.

SEE NEXT PAGE

24. From the information given in Figure 23, which of the following must be true?
- Individual 1 is heterozygous for the trait.
 - Individual 8 is heterozygous for the trait.
 - Individual 2 is homozygous for the trait.
 - None of the individuals shown is homozygous for the trait.
25. If individuals 10 and 11 produce an offspring, which of the following is the probability that the offspring will show the trait?
- 1.0
 - 0.75
 - 0.5
 - 0.25
26. Which of the following statements is the best description of a gene?
- A gene is the total DNA complement of an individual.
 - A gene is a sequence of nucleotides that carries a code for a protein.
 - A gene is a protein molecule which occurs in chromosomes.
 - A gene is the smallest unit of structure in a chromosome.

Questions 27 and 28 refer to the following equation, showing the result of the complete oxidation of a molecule of glucose in a vertebrate muscle cell.



27. Which of the following is a true statement about ATP?
- More ATP is produced when glucose is metabolised in the absence of oxygen than when oxygen is present.
 - Energy is required to synthesise ATP from ADP and phosphate.
 - ATP is a waste product of aerobic respiration and is excreted from cells.
 - Heat that is generated in the oxidation reaction is all released from ATP.
28. Which of the following is **least** likely to happen if the oxygen supply to the cell is stopped?
- Some respiratory activity will continue.
 - Lactic acid concentration in the cell will increase.
 - The rate of ATP production will decrease.
 - The CO_2 output from the cell will increase.

SEE NEXT PAGE

Questions 29 and 30 refer to the following information.

Resting mammals keep their internal body temperature close to 37°C . If the external environment is much colder, blood from close to a skin surface may be cooled. When cooled blood reaches part of the brain, a hormone is released causing a sequence of events which results in metabolic heat being produced in the animal's liver. This is an example of stimulus-response-negative-feedback.

29. Which of the following correctly identifies the stimulus and the response in this example?
- (a) The cold environment is the stimulus and cooling of blood close the skin is the response.
 - (b) Cool blood is the stimulus and metabolic heat production by the liver is the response.
 - (c) Cool blood reaching the brain is the stimulus and release of the hormone is the response.
 - (d) The cold environment is the stimulus and release of the hormone is the response.
30. Which of the following describes negative feedback as a mammal regulates body temperature?
- (a) Blood which has been warmed in the liver eventually reaches the brain. Release of the hormone is then stopped.
 - (b) Loss of heat from blood passing close to the skin causes the blood temperature to drop. Cool blood reaching the brain is negative feedback.
 - (c) Blood which has been warmed by the liver circulates through the body. This takes heat energy to the skin, preventing the body from becoming cold.
 - (d) Metabolic heat production by the liver helps to balance loss of heat from the skin.

SEE NEXT PAGE

Suggested time: 90 minutes

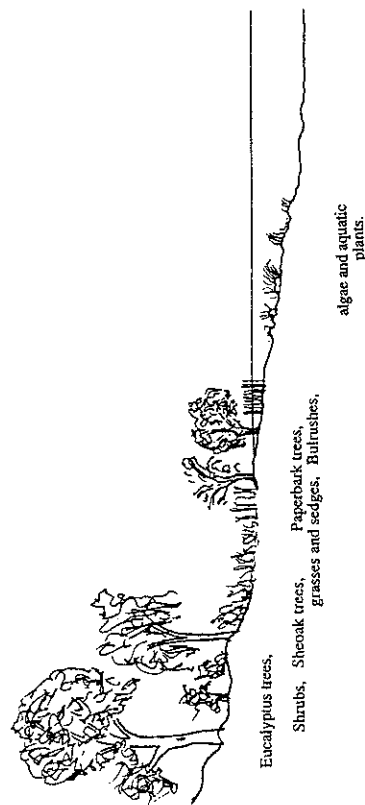
SECTION B (100 marks)

Attempt all questions in this section. Write answers in the spaces provided. Use black or blue ink or ball point pen.

31. (20 marks)

Figure 31a shows a transect of a small river which flows through a woodland.

FIGURE 31a



- (a) (i) Write the names of four different producer organisms likely to provide food resources for organisms living in the river. (2 marks)

- (ii) Construct a food chain of four organisms which could link the terrestrial and the aquatic ecosystems of Figure 31a. (2 marks)

SEE NEXT PAGE

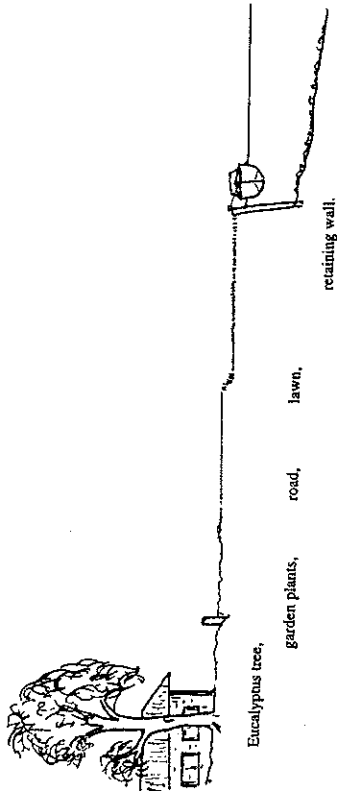
- (b) Heavy boat traffic in small rivers may have harmful effects on the river ecosystem. Briefly describe two such effects. (4 marks)

(i) _____

(ii) _____

- (c) Urban development along some rivers has changed the landscape from that shown in Figure 31a to that shown in Figure 31c.

FIGURE 31c



- Briefly describe two ways in which these changes could alter the way in which the river ecosystem functions. (4 marks)

(i) _____

(ii) _____

- (d) Many of the rivers in the south-west of Western Australia flow through land which has been developed for agriculture in the last 100 years. Briefly describe changes to the ecosystem in the lower reaches of these rivers which might have been brought about by:

(i) damming of rivers _____

(ii) allowing cattle access to the river _____

- (e) Some areas of land in Australia are protected from economic development in order to provide for the conservation of nature. (4 marks)

Give two reasons why this conservation is important. (4 marks)

(i) _____

(ii) _____

32. (20 marks)

- (a) Energy is used as living organisms grow and build the complex chemicals of living tissues.

Briefly describe how plants and animals obtain the energy required for growth.

Plants: _____

(2 marks)

Animals: _____

(2 marks)

- (b) Complete the left-hand column of Table 32b with names of four examples of specific substances which are essential raw materials for plant growth.

Complete the right-hand column with brief statements of how the raw material is used in plant growth.

(4 marks)

TABLE 32b

Name of the raw material	How the raw material is used

SEE NEXT PAGE

- (c) Table 32c shows examples of vertebrate animals which eat fish. Complete Table 32c, giving the names of the main nitrogenous excretory products that you would expect each of these animals to produce when on a diet of fish. (4 marks)

TABLE 32c

Vertebrate animal	Diet	Nitrogenous excretory product
A fish, eg tuna	Fish	
A reptile eg alligator	Fish	
A bird eg osprey	Fish	
A mammal eg brown bear	Fish	

- (d) The diet of an animal affects the amount of nitrogenous waste that it excretes. Complete Table 32d with the names of two mammals, one whose diet you would expect to produce large amounts of nitrogenous waste and the other with a diet producing relatively less nitrogenous waste. Briefly describe the two diets. (4 marks)

TABLE 32d

Name of mammal	Amount of nitrogenous waste	Description of the diet
	large amount	
	small amount	

- (e) Vertebrate animals which became successful on land developed ways of excreting nitrogenous wastes which were different from those of their fish ancestors.

Describe two advantages that reptiles have obtained from excreting nitrogenous waste in a way different from fish, and two advantages the mammals have obtained. (4 marks)

Two advantages for reptiles (i) _____

(ii) _____

Two advantages for mammals (i) _____

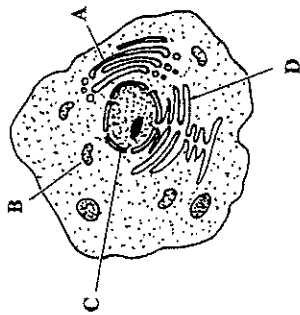
(ii) _____

SEE NEXT PAGE

33. (20 marks)

Figure 33a is a drawing of a white blood cell from a mammal showing various cell organelles.

FIGURE 33a

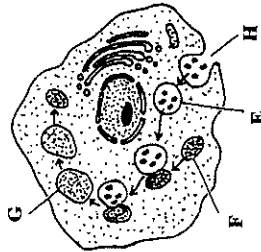


(a) Write the names of the structures which are labelled;

- A _____ B _____
C _____ D _____ (4 marks)

Figure 33b is a diagrammatic presentation of Figure 33a, showing a series of progressive changes to the structures labelled H, E and F.

FIGURE 33b



(b) Name and briefly describe the process that is shown at H on Figure 33b. (4 marks)

- (i) Name _____
(ii) Description _____

SEE NEXT PAGE

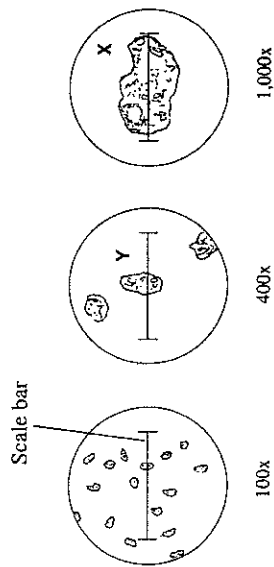
(c) Figure 33b shows the structures E and F fusing together.

Name a type of biologically important substance which is likely to be found in F and describe the process that occurs in G. (4 marks)

- (i) Type of substance in F _____
(ii) Description of the process in G _____

(d) A student used a light microscope to look at a prepared slide showing cells of the same type as shown on Figure 33a. The microscope was fitted with a scale in the ocular lens which represented $1000\mu\text{m}$ at a magnification of $100\times$. Typical fields of view with different objective lenses but the same ocular lens are shown in Figure 33d.

FIGURE 33d



(i) Write the length of the cell which is marked X on Figure 33d. (2 marks)

(ii) Write the width (short axis) of the cell which is marked Y on Figure 33d. (2 marks)

(e) Using the light microscope at $1000\times$, the student would not be able to see the details of structures looking like A on Figure 33a.

- (i) Explain briefly why structures as small as these would not be visible. (2 marks)
(ii) Name equipment or procedures used by scientists to examine the very detailed structure of cell organelles. (2 marks)

SEE NEXT PAGE

34. (20 marks)

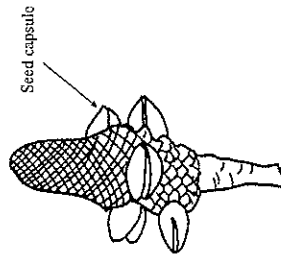
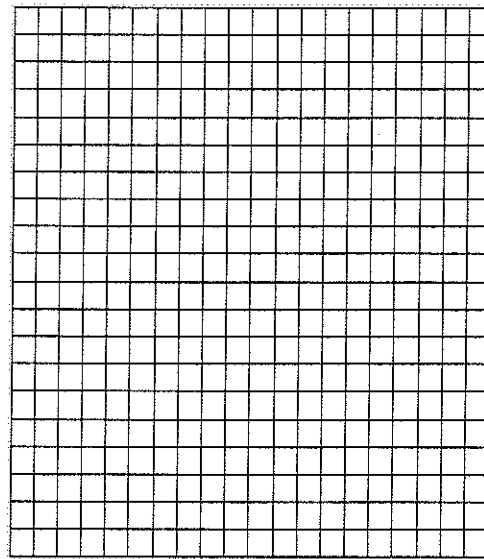
The many species within the genus *Banksia* show great diversity of form and size. They generally have large conspicuous flower spikes that are rich in nectar and are pollinated by animals. After pollination the fruit develops as a woody cone that may be retained on the tree for several years. The seeds are dispersed when the tree dies or a fire occurs.

Table 34a shows data collected during a recent study of *Banksia menziesii* (firewood banksia), a tree on the Swan coastal plain.

TABLE 34a

Age of Cones (years)	Average Number of cones per tree	
	Road Verge Trees	Non-road Verge Trees
1	36	15
2	23	9
3	22	8
4	10	3
5	8	3
6	4	2
7	3	1
8	5	1

- (a) Use the grid below to present the data, comparing the number of cones of different age on trees in the different locations. (4 marks)



N.B. The grid is repeated at the end of the examination book. If you make a mistake put a line through it, write "see back page" beside it, and answer on the grid at the end of this booklet.

SEE NEXT PAGE

- (b) (i) State a hypothesis that the investigator may have been testing. (2 marks)
- (ii) Briefly describe the procedure the scientist should have used to choose which trees to survey. (2 marks)

Seeds are considered to be offspring because they are capable of developing into new individuals. The investigators suggested that the number of cones per tree is a valid measure of the rate at which the trees reproduce.

- (c) Describe and explain the relationship between the age of cones on *Banksia menziesii* trees and the number of cones per tree.

(i) Description

(ii) Explanation

- (d) (i) State one assumption that would have to be made if these data were to be used as a measure of reproduction rate. (2 marks)

- (ii) Describe the relationship between the average number of cones per tree and distance from a road. (2 marks)

Other measurements taken in this investigation of *Banksia menziesii* are shown in Table 34c below.

TABLE 34c

Measurement	Road Verge Trees	Non-road Verge Trees
Density (trees per hectare)	633	567
Height (m)	4.8	4.2
Crown Area (m ²)	9.8	4.9

- (e) Suggest two explanations for the difference between tree growth on the road verge and in areas away from the road verge. (4 marks)

(i)

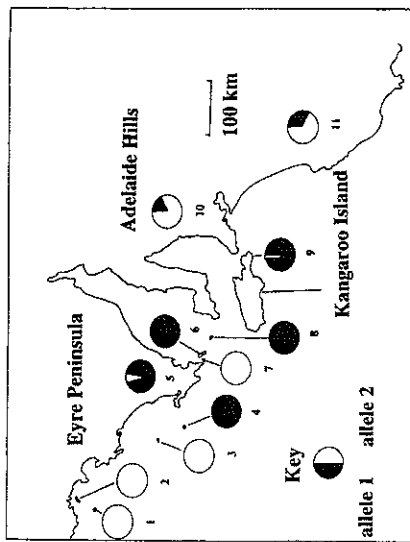
(ii)

SEE NEXT PAGE

35. (20 marks)

Bush rats, *Rattus fuscipes*, inhabit many parts of Australia. Many isolated populations have slight genetic differences from other populations.

In a study of different populations of bush rats in coastal South Australia, animals were examined for the presence of alleles of an autosomal gene. Two alleles (allele 1 and allele 2) were found to have differing frequencies in different populations as shown on Figure 35. The pie diagrams show the relative allele frequencies.



(a) Explain the meaning of the term 'alleles of an autosomal gene'. (4 marks)

(b) (i) Write a short statement to summarise the genetic differences between populations of *Rattus fuscipes* on the mainland and those on small offshore islands. (2 marks)

(ii) In which of the numbered populations would you expect to find:

no heterozygous individuals? _____

the greatest proportion of heterozygous individuals? _____

(2 marks)

SEE NEXT PAGE

(c) Suggest a sequence of events that could have resulted in the genetic differences between the mainland populations of *R. fuscipes* and the populations on the small offshore islands. (4 marks)

Table 35 shows the frequencies of the two alleles in population 9 (Kangaroo Island) and population 10 (Adelaide Hills).

TABLE 35

	Frequency of Allele 1	Frequency of Allele 2
Population 9	0.96	0.04
Population 10	0.21	0.79

Further investigation showed allele 2 to be dominant to allele 1.

(d) (i) If the letter B is used to represent the dominant allele, show all of the possible genotypes for this characteristic. (2 marks)

(ii) Which, of populations 9 and 10, will have the smallest proportion of individuals with the recessive phenotype? (2 marks)

(e) Suppose that a drop in sea level occurred and bush rats travelled freely between the sites where populations 9 and 10 now live.

Describe and explain the effect that you would expect this to have on the frequencies of each allele at the two sampling sites.

(i) Description _____

(2 marks)

(ii) Explanation _____

(2 marks)

SEE NEXT PAGE

SECTION C (40 marks)

Suggested time: 50 minutes

ANSWER SECTION C IN THE STANDARD ANSWER BOOK

SECTION C consists of two questions, 36 and 37. There are four parts to each question. You must answer **two** parts from 36 and **two** parts from 37. Each part carries ten (10) marks.

Question 36 mainly tests your **knowledge** of syllabus content. Question 37 mainly tests **how you apply** your understanding of biological principles.

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 which link them
- present information as a table
- write concisely worded sentences
- use some other appropriate way to present ideas.

Marks may be deducted for answers which are poorly presented or difficult to read. Use black or blue pen or ball point for written answers and pencil for diagrams.

Question 36. Answer any two from 36a to 36d. (10 marks for each.)

- 36a. In some species of fish, females migrate from the sea into freshwater streams to lay eggs. After hatching, the young fish swim to the sea, where they grow to maturity. These fish move between aquatic environments which are very different in salt content.

Describe the physiological processes that these fish must carry out as they adjust to different conditions of salinity.

- 36b. The internal conditions in living cells are different from the external environment.

Explain why it is essential for living cells to maintain this difference.

Use a table to describe the different processes that occur as cell membranes maintain the difference between the internal and external environment of cells.

- 36c. The term 'pyramid of biomass' is used to describe the relative amounts of living material at different trophic (feeding) levels in many biological communities.

Give an example of a community in which a pyramid of biomass would be expected and describe the movements of energy and biomass that result in the pyramid.

- 36d. Many single-celled organisms usually reproduce asexually by binary fission. Many multicellular organisms reproduce sexually.

Describe the advantages and disadvantages of each type of reproduction and how each type of reproduction is suited to the demands of living in a different type of environment.

SEE NEXT PAGE

Question 37. Answer any two from 37a to 37d. (10 marks for each.)

- 37a. Many species of snakes, lizards and birds live successfully in very arid regions of inland Australia. Fewer species of mammals live in these regions.

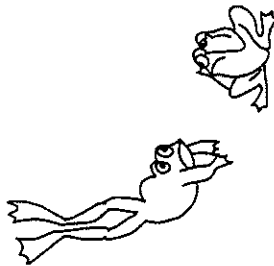
Explain how vertebrate animals from different groups are able to be more successful than mammals in coping with the stresses of extreme temperature, aridity and low productivity in these environments.

A well organized table is a suitable answer format.

- 37b. In some woodland areas, animal browsers consume large amounts of vegetation. Litter does not accumulate. In many Australian woodland areas there are few large browsing herbivores and litter accumulates from leaves and branches. Every few years the litter is reduced by fire. Plant tissues can provide the energy needed by animals or the energy can be released as the material burns.

Compare the controlled processes that take place in an animal with the uncontrolled process called fire, both of which result in the release of energy from the plant material.

- 37c. In recent years, populations of different frog species have declined in many parts of the world. Give examples of different factors which may have led to the decline of frogs and briefly explain how each factor might affect frog populations.

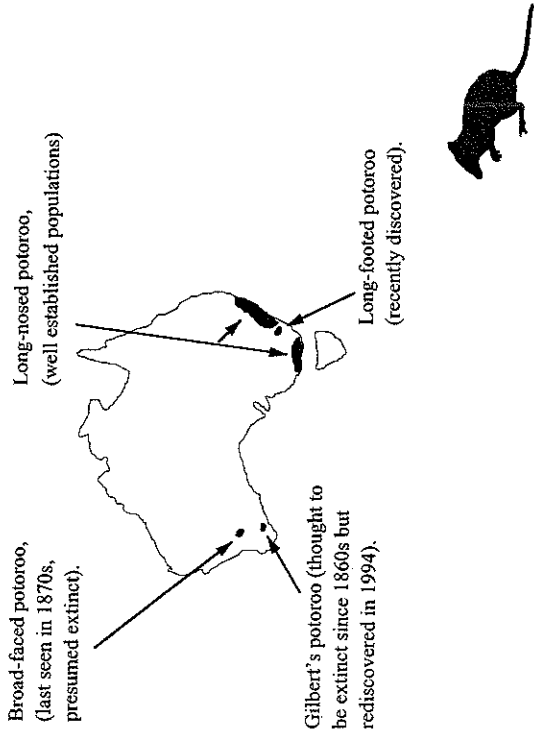


Question 37 continues on the next page.

SEE NEXT PAGE

37d. Figure 37d shows the distribution of small omnivorous marsupials called potoroos.

FIGURE 37d



It is most likely that all species of potaroo have a common ancestor. Suggest an explanation of how four species of potaroo might have evolved from the common ancestor.

Many changes to the distribution of Australian native animals have occurred in the last 150 years. Suggest explanations for the survival of Gilbert's potaroo and the apparent extinction of the broad-faced potaroo.

34. Table 34 and the grid are repeated here. You may use these if you make a mistake on page 22.

TABLE 34a

Age of Cones (years)	Average Number of cones per tree	
	Road Verge Trees	Non-road Verge Trees
1	36	15
2	23	9
3	22	8
4	10	3
5	8	3
6	4	2
7	3	1
8	5	1

