

Student name: _____

Teacher: _____

NORTH SYDNEY GIRLS HIGH SCHOOL



2020

Year 11

BIOLOGY

General Instructions

- Reading Time – 5 minutes
- Working Time – 2 hours
- Write using black or blue pen
- Draw diagrams using pencil
- NESA approved calculators may be used
- Write your **teachers name and your own name** at the top of this booklet **AND** the multiple choice answer sheet.

Total Marks – 70

Section I – 20 Marks

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

Record your answer on the Multiple Choice Answer Sheet

Section II – 50 marks

- Attempt questions 21-32
- Allow about 1 hour and 25 minutes for this part

**Write your answers in the space provided.
Adequate lines have been provided.**

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Attempt all questions

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

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

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

A ☐ B ☒ C ☐ D ☐

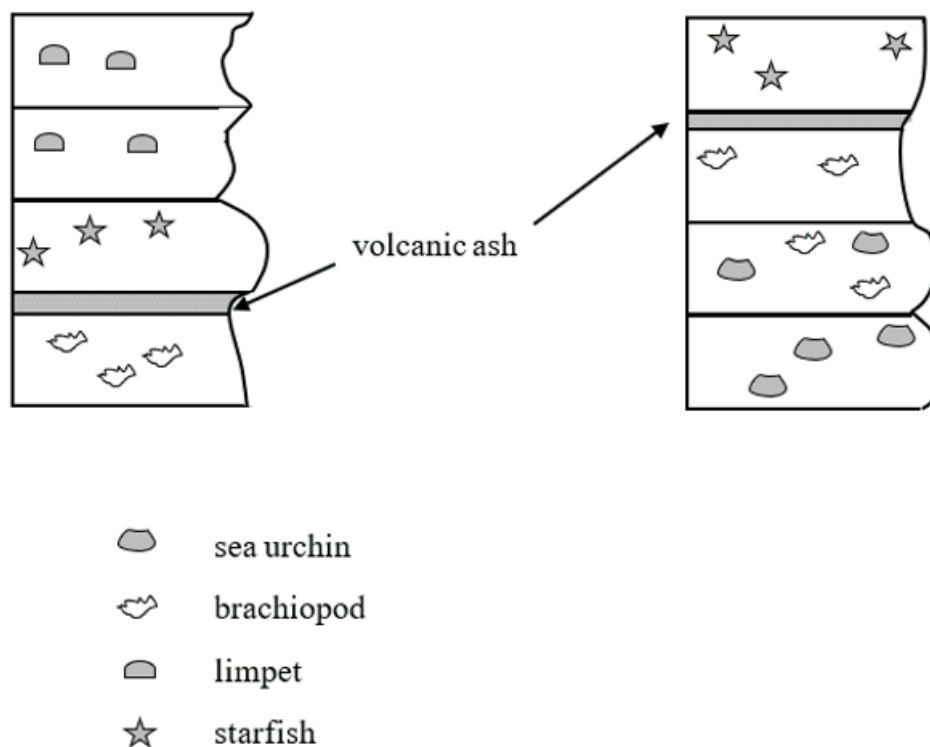
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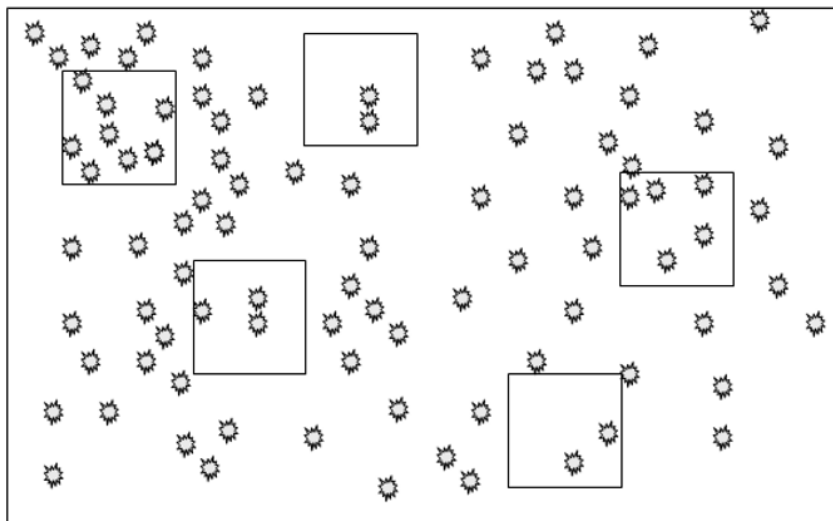
1. The diagram below shows two rock sections from nearby excavations, including some of the fossil species discovered. The volcanic ash deposits are the same age and come from the same eruption.



Which of the following gives the fossils in order from oldest to youngest?

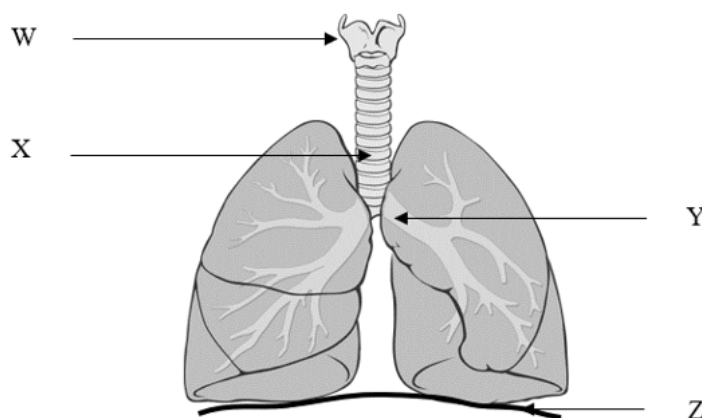
- (A) limpet, starfish, brachiopod, sea urchin
 - (B) star fish, brachiopod, sea urchin, limpet
 - (C) sea urchin, brachiopod, starfish, limpet
 - (D) brachiopod, sea urchin, starfish, limpet
2. Identify which option lists structures in order of smallest to largest.
- (A) Organ, organelle, organism
 - (B) Tissue, cell, organelle
 - (C) Cell, organ system, organism
 - (D) Organ system, tissue, cell

3. The following diagram shows the distribution of salt bush in an area of semi desert.



Some biologists have randomly placed five quadrats as shown above. Each quadrat measures 10m x10m. From these quadrats, what is the population density of salt bush in this area?

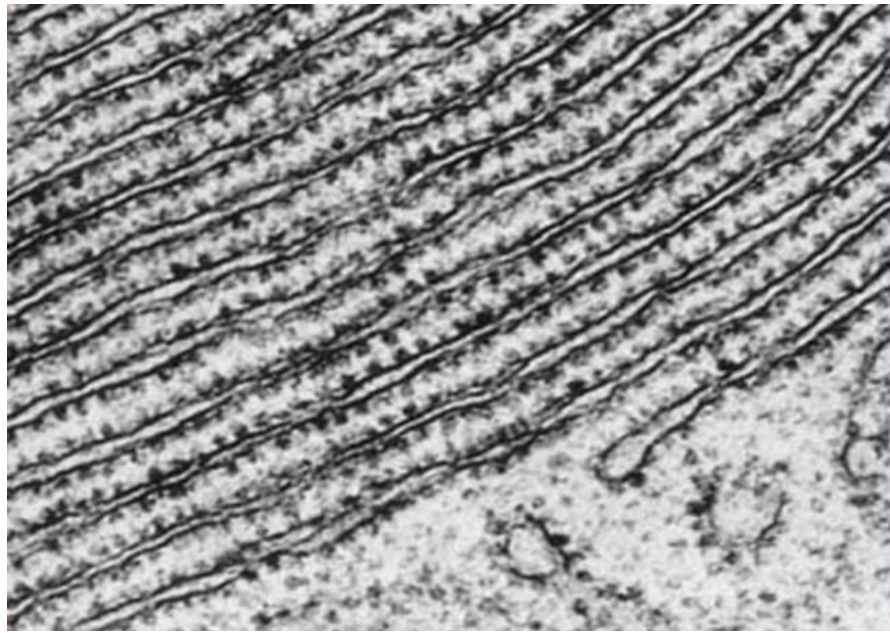
- (A) 100 bushes/100m²
 - (B) 20 bushes/100m²
 - (C) 5 bushes/100m²
 - (D) 4 bushes/100m²
4. The diagram below shows the human respiratory system.



Which option correctly identifies the labelled structures?

	W	X	Y	Z
(A)	larynx	trachea	bronchus	diaphragm
(B)	diaphragm	larynx	trachea	bronchus
(C)	trachea	larynx	bronchiole	diaphragm
(D)	trachea	bronchus	diaphragm	alveoli

5. Identify the main function of the cell structure shown below.



- (A) Waste removal
(B) Energy production
(C) Protein synthesis
(D) Duplication of hereditary material
6. The divided bar graph below shows the relative abundance of four major vegetation types across Australia 50,000 years ago.



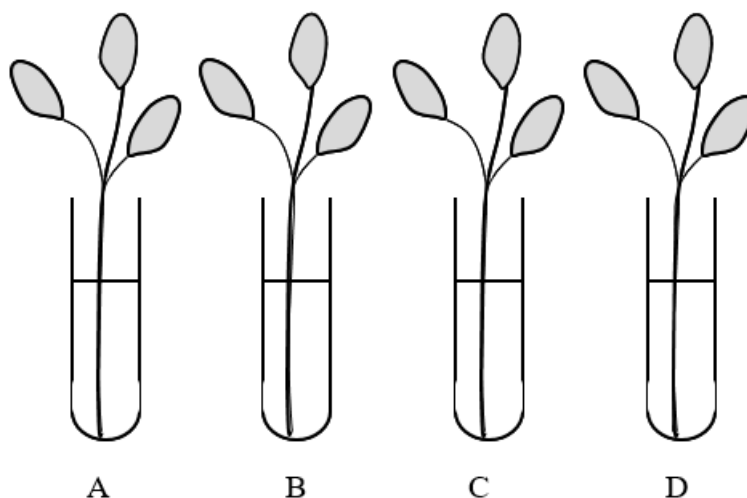
What type of evidence would have been most useful in helping scientists to deduce this?

- (A) Fossil evidence
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7. Which of the following statements about prokaryotic and eukaryotic cells is incorrect?
- (A) Eukaryotic cells have membrane bound organelles and prokaryotic cells do not.
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Use the following information to answer questions 8 and 9.

The diagram shows four identical leafy shoots placed in test tubes of water to investigate how different factors affect transpiration.

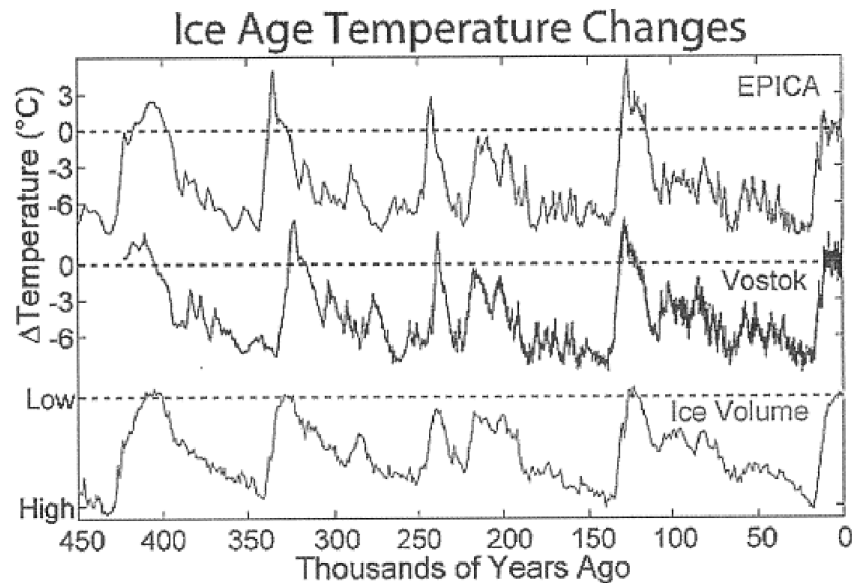


They were placed in four different environments.

Tube	Air temperature (°C)	Wind speed (kmhr ⁻¹)	Humidity (%)
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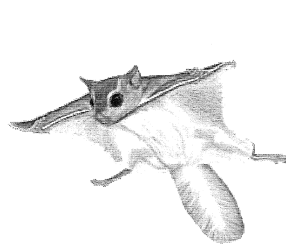
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- (A) A
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9. Which pair of tubes would you use to compare to show the effect of air temperature on transpiration?
- (A) B and D
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10. Radiometric dating and ice core drilling are techniques used to study past ecosystems. The graph shows temperature changes at two sites in Antarctica (EPICA and Vostok) and changes in global ice volumes over time.



Which of the following statements is supported by the data in the graph?

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11. Despite being from different groups of mammals, the North American Flying Squirrel (*Glaucomys volans*) and the Australian Sugar Glider (*Petaurus breviceps*) possess large membranes between their fore and hind limbs that allow them to glide.



North American Flying Squirrel



Australian Sugar Glider

What inference can be made about the North American Flying Squirrel and the Australian Sugar Glider?

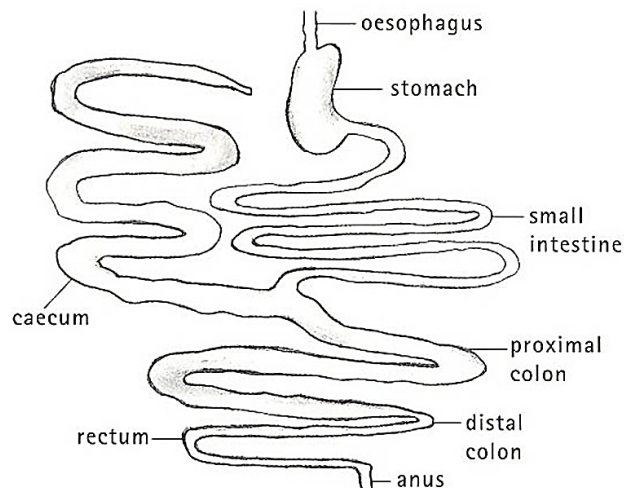
- (A) Their features have evolved because they migrated from Australia to North America.
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12. Certain species of fungi are in an ecological relationship with plants. The fungus absorbs sugars from the roots of the plant and nutrient ions from the soil. Excess absorbed nutrient ions are passed on to the plant allowing it to tolerate drought and grow more vigorously.

What is this an example of?

- (A) Amensalism
(B) Parasitism
(C) Mutualism
(D) Commensalism
13. Using radiocarbon dating, scientists found that a fossilised platypus skull contained 12.5% of the carbon-14 compared to a living sample. Carbon-14 has a half-life of 5730 years. How old is the platypus skull?
- (A) 716 years
(B) 5730 years
(C) 17190 years
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14. The diagram shows the digestive system of a koala.



Why do koalas need such a large caecum?

- (A) Microbial breakdown of their high cellulose diet
(B) To maximise digestion of food by protease
(C) To increase the time before food reaches the small intestine
(D) Mechanical digestion of eucalyptus leaves

15. What are the most likely causes of megafauna extinction in Australia?

- (A) Land clearing and habitat destruction by bushfires
- (B) Nutrient depletion in soils and farming practices
- (C) Hunting by humans and drier climate
- (D) Climate change and introduced species

16. Which of the following contains only biotic factors?

- (A) grass, humidity, microbial disease
- (B) tree hollows, grass, microbial disease
- (C) parasitism, rainfall, turbidity
- (D) soil pH, temperature, humidity

17. Below is a diagram of some vertebrate embryos.



This similarity in structural features is due to:

- (A) convergent evolution
- (B) divergent evolution
- (C) punctuated equilibrium
- (D) parallel evolution

18. Which of the following is NOT used in land rehabilitation after mining?

- (A) Seed collection before mining begins
- (B) Removing of topsoil
- (C) Identification of chemistry of dump and waste removal
- (D) Formation and shaping of stable, drained landforms

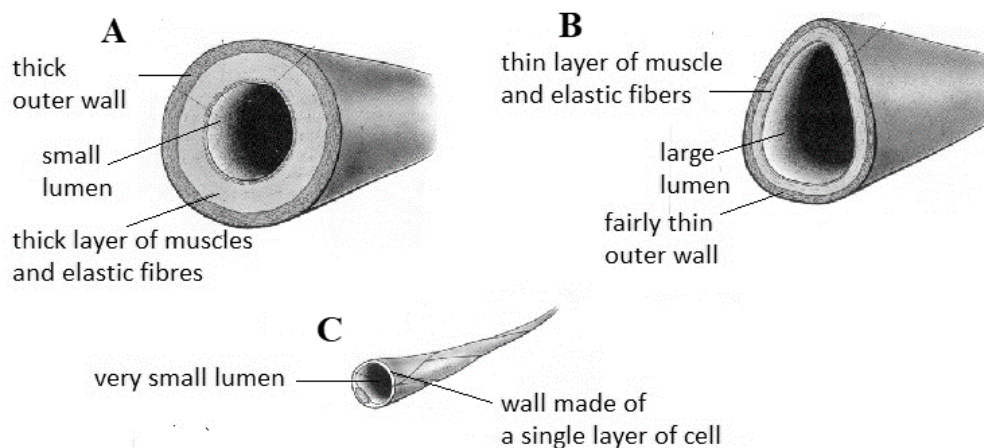
19. Australian eucalypts have many adaptations for survival in hot dry environments.



Which of the below statements is correct?

- (A) Eucalypt leaves have an equal number of stomata on either side of the leaf to maximise gas exchange.
- (B) Eucalypt leaves hang vertically to increase surface area exposed to the heat of the sun.
- (C) Eucalypt leaves have extremely thin waxy cuticles to reduce water loss.
- (D) Eucalypt leaves have palisade mesophyll cells near one surface to minimise the amount of sunlight received.

20. The diagram below shows the cross section of three types of blood vessels.



Which of the below feature(s) valves to prevent backflow?

- (A) Both A and B
- (B) Both A and C
- (C) Only A
- (D) Only B

End of Section I

Section II - 50 Marks

Marks

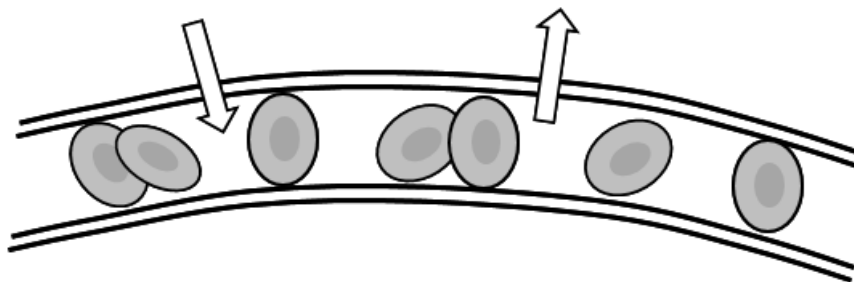
Attempt Questions 21- 32

Allow about 1 hour and 25 minutes for this section.

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

Question 21 (4 marks)

The diagram below shows a section of a capillary, including red blood cells, passing through a muscle in the human body.



- a) Explain one way in which Red Blood Cells are specialised to suit their function.

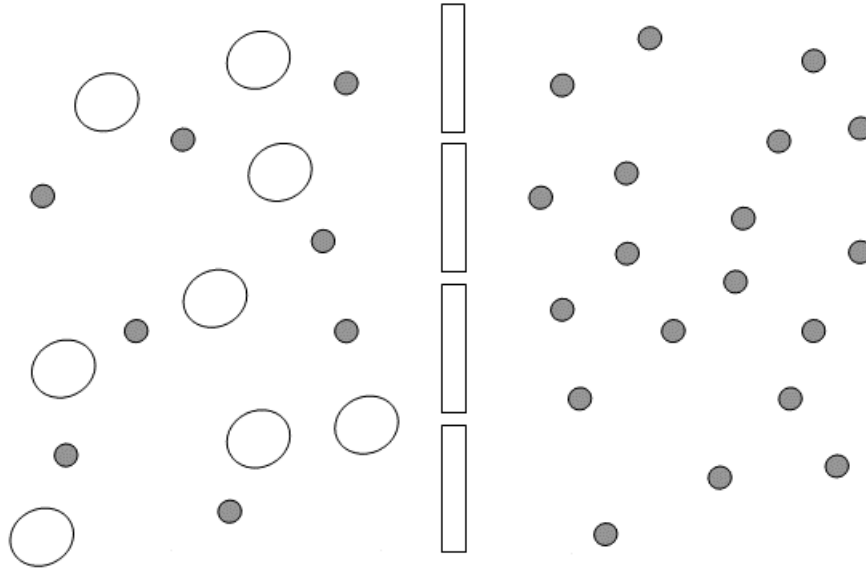
2

- b) Outline TWO changes you would expect in the blood composition as it passes through the muscle.

2

Question 22 (3 marks)

A student wanted to examine the movement of molecules across a semi permeable membrane. They set up an experiment with starch and water. The diagram below represents the initial solution of starch and water, with a semi permeable membrane.

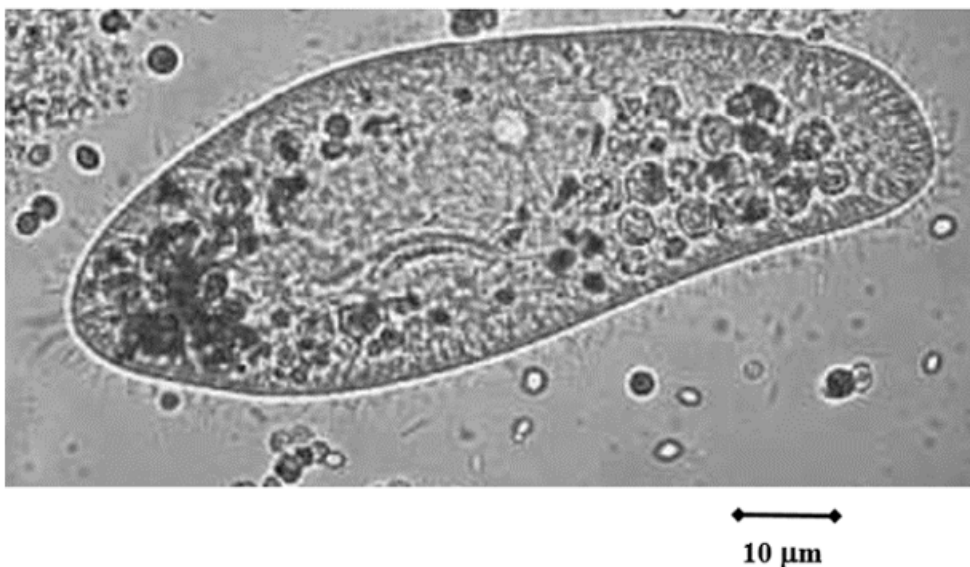


Explain the changes you would expect to see after 10 minutes.

3

Question 23 (3 marks)

The photograph below shows a type of paramecium.



a) Determine the length of this specimen.

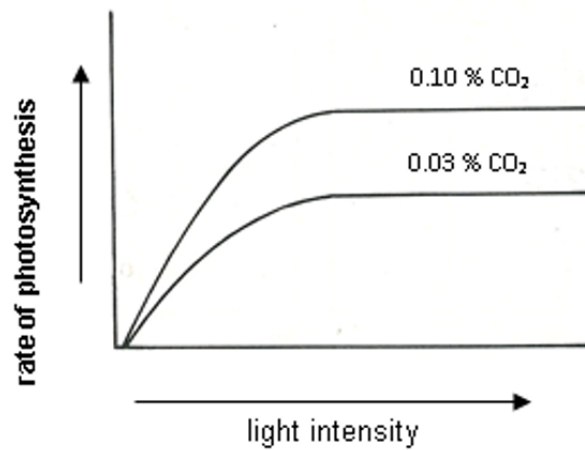
1

b) Discuss the advantages of an organism being unicellular.

2

Question 24 (3 marks)

The graph below shows the relationship between the rate of photosynthesis and light intensity for an aquatic plant with different concentrations of carbon dioxide in the water.



- a) Identify the word equation for photosynthesis.

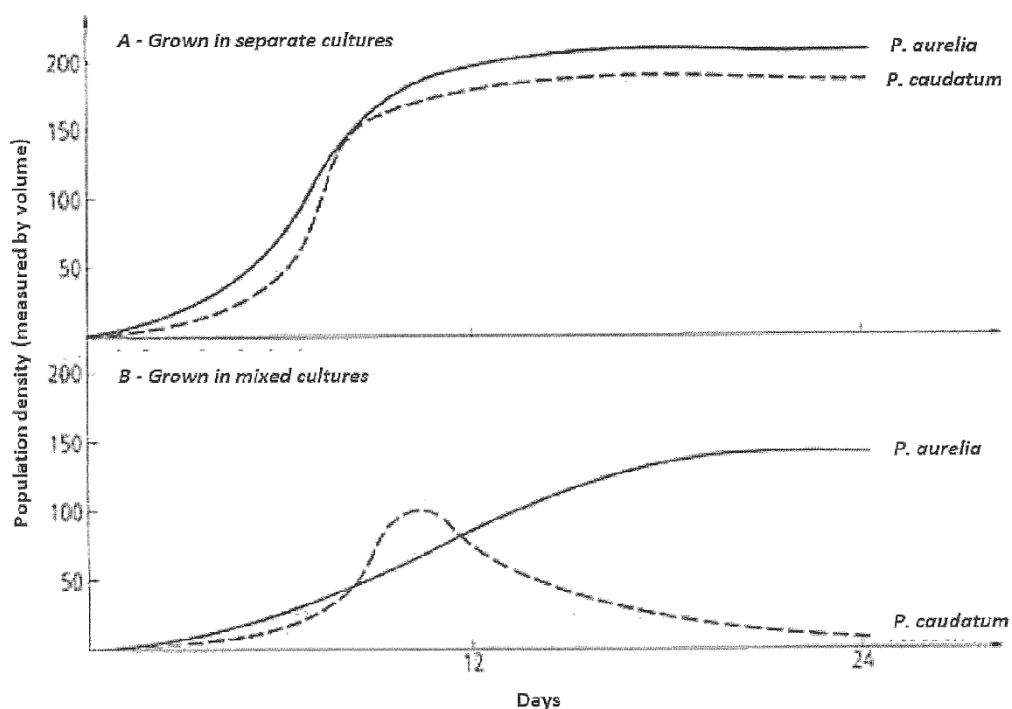
1

- b) What does this graph tell us about the relationships between the rate of photosynthesis, availability of carbon dioxide and light intensity?

2

Question 25 (3 marks)

Paramecium aurelia and *Paramecium caudatum* are two species of unicellular organisms. The graphs below show the results of a study where they were grown on nutrient agar separately, and then together.

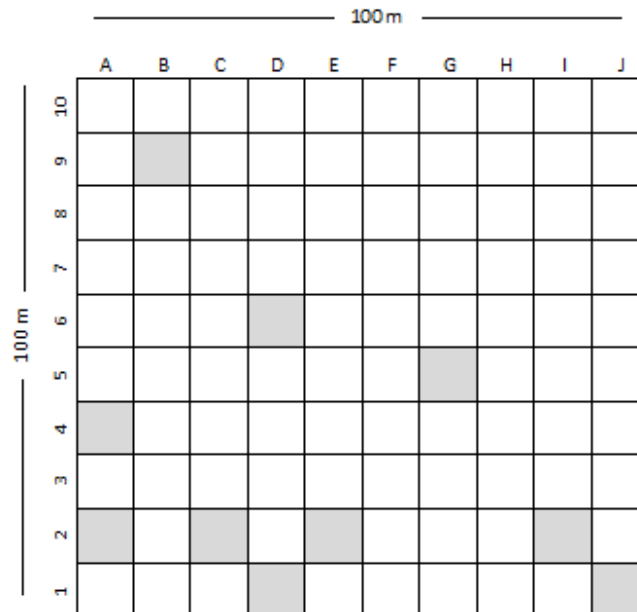


Identify the type of ecological relationship between the organisms shown in the graph and justify your answer.

3

Question 26 (6 marks)

A group of students wanted to estimate the size of native populations in an area of their local bushland. They started by choosing a sample area and setting up a grid, as shown in the diagram below.



Certain quadrats in the sample area were then chosen at random to be sampled. In each of the chosen quadrats, students counted the number of spinifex tussocks and bilby droppings, which were then recorded in the table below.

Quadrat	Count	
	Bilby droppings	Spinifex Grass tussock
A2	0	6
A4	1	12
B9	4	14
C2	0	7
D1	0	4
D6	6	16
E2	0	5
G5	5	18
I2	0	7
J1	0	6

Question 26 continues over the page

- a) Suggest how one abiotic factor AND one biotic factor might affect the spinifex population in the sample area.

3

- b) Evaluate the students' choice of sampling method.

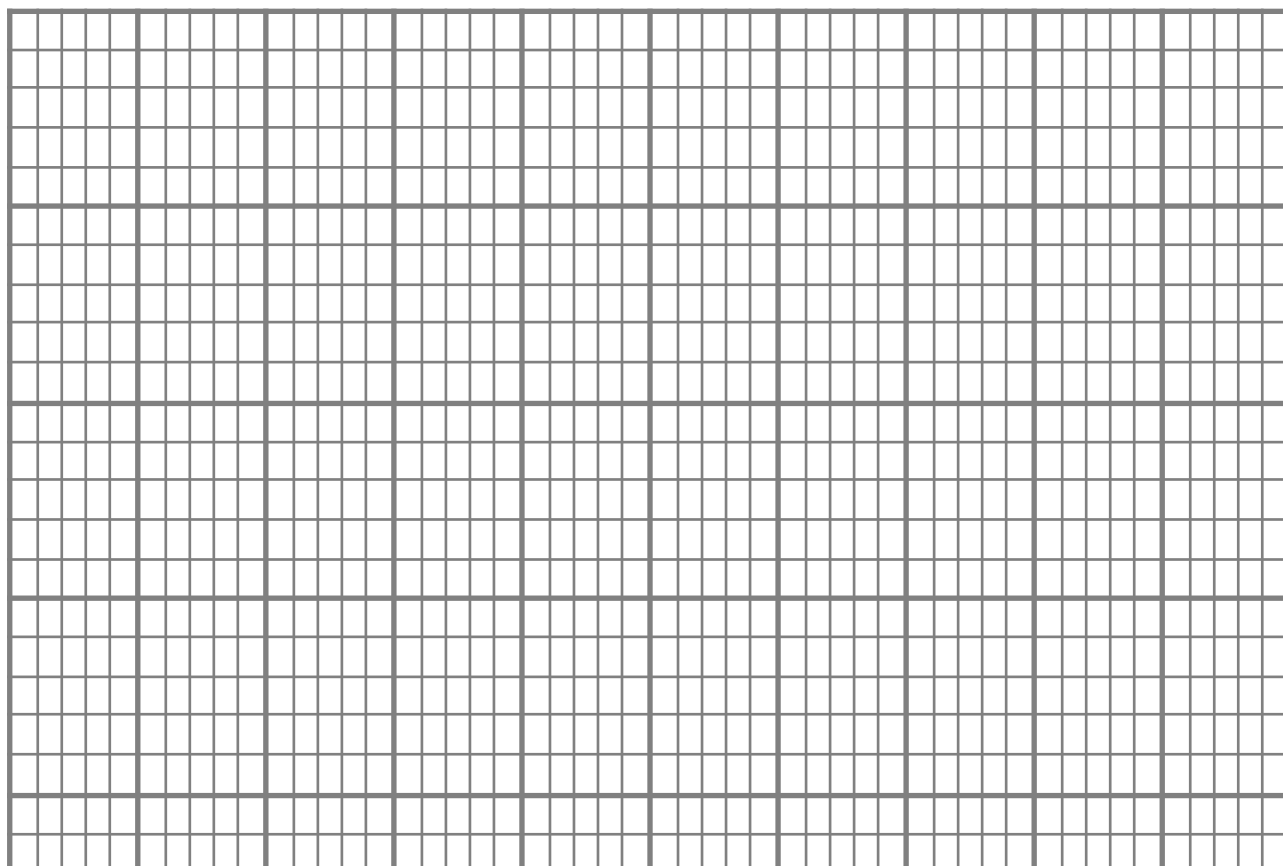
3

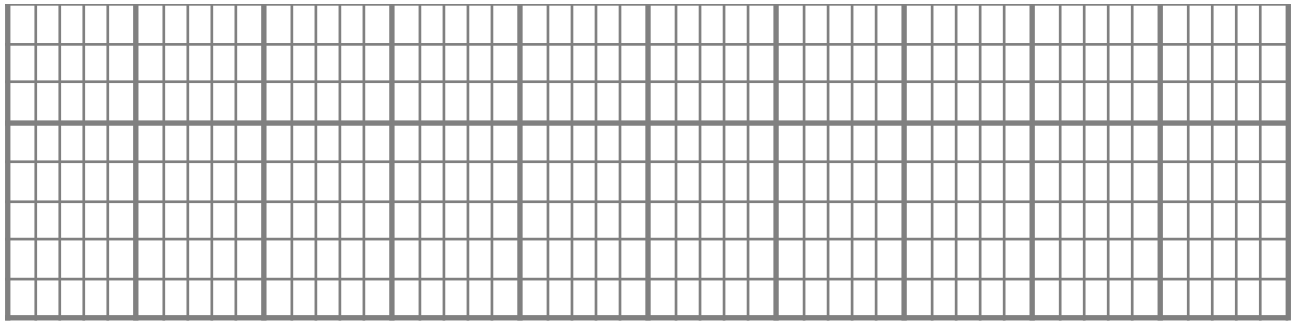
Question 27 (7 marks)

A student had two unlabelled vials. She knew the vials contained two different enzymes from two types of bacteria which act on the same substrate. She tested both samples with this substrate and her results are shown in the table below.

Temperature (°C)	Enzyme Activity (arbitrary units)	
	Enzyme 1	Enzyme 2
0	1	1
10	3	2
20	11	3
30	24	5
40	27	8
50	3	13
60	0	16
70	0	24
80	0	29
90	0	1

- a) Use the grid below to draw a line graph of this data.

4



Question 27 continues on the next page

b) Explain the trends shown in the graph.

3

Question 28 (3 marks)

A study was undertaken to examine cytochrome c, a protein found in a number of different species. All proteins are made of a sequence of connected building blocks called amino acids. Each amino acid in a sequence is usually represented by a 3 letter code. For example, lysine is represented by lys and alanine is represented by ala.

An amino acid analysis was conducted in order to compare the cytochrome c protein found in humans, rabbits and horses. The results of the amino acid analysis are shown below.

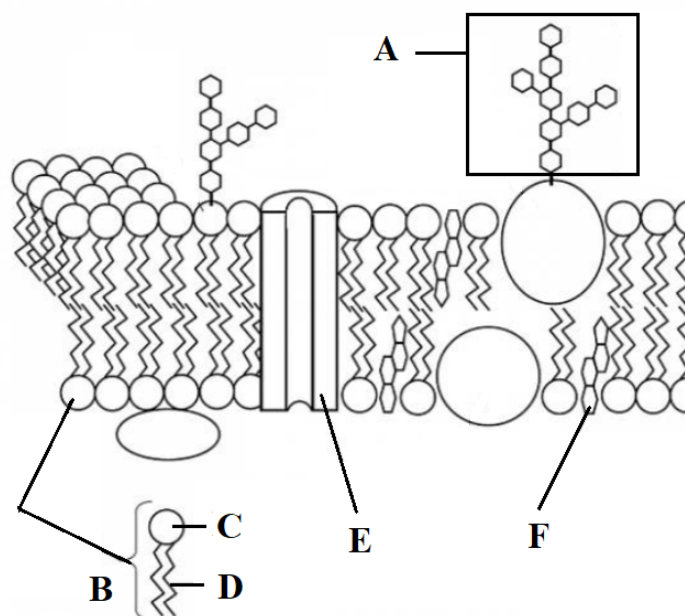
Animal	Amino Acid Sequences in Cytochrome-C																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Human	gln	pro	tyr	ser	thr	ala	lys	asn	lys	ile	gly	glu	asp	thr	leu	met	glu	lys	ala	thr	asn	gh
Rabbit	gln	val	phe	ser	thr	asp	lys	asn	lys	thr	gly	glu	asp	thr	leu	met	glu	lys	ala	thr	asn	gh
Horse	gln	pro	phe	thr	thr	ala	lys	asn	lys	thr	lys	glu	glu	thr	leu	met	glu	lys	ala	thr	asn	gh

Explain the evolutionary relationship shown in the results of this study.

3

Question 29 (5 marks)

The diagram below represents the structure of a membrane in a eukaryotic cell.



a) Complete the table below to identify structures A to F.

3

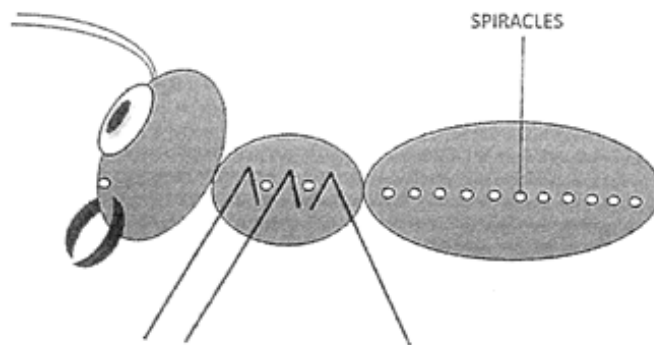
Label	Structure
A	
B	
C	
D	
E	

F	
----------	--

b) Explain how one component of the membrane structure contributes to its selective permeability. **2**

Question 30 (3 marks)

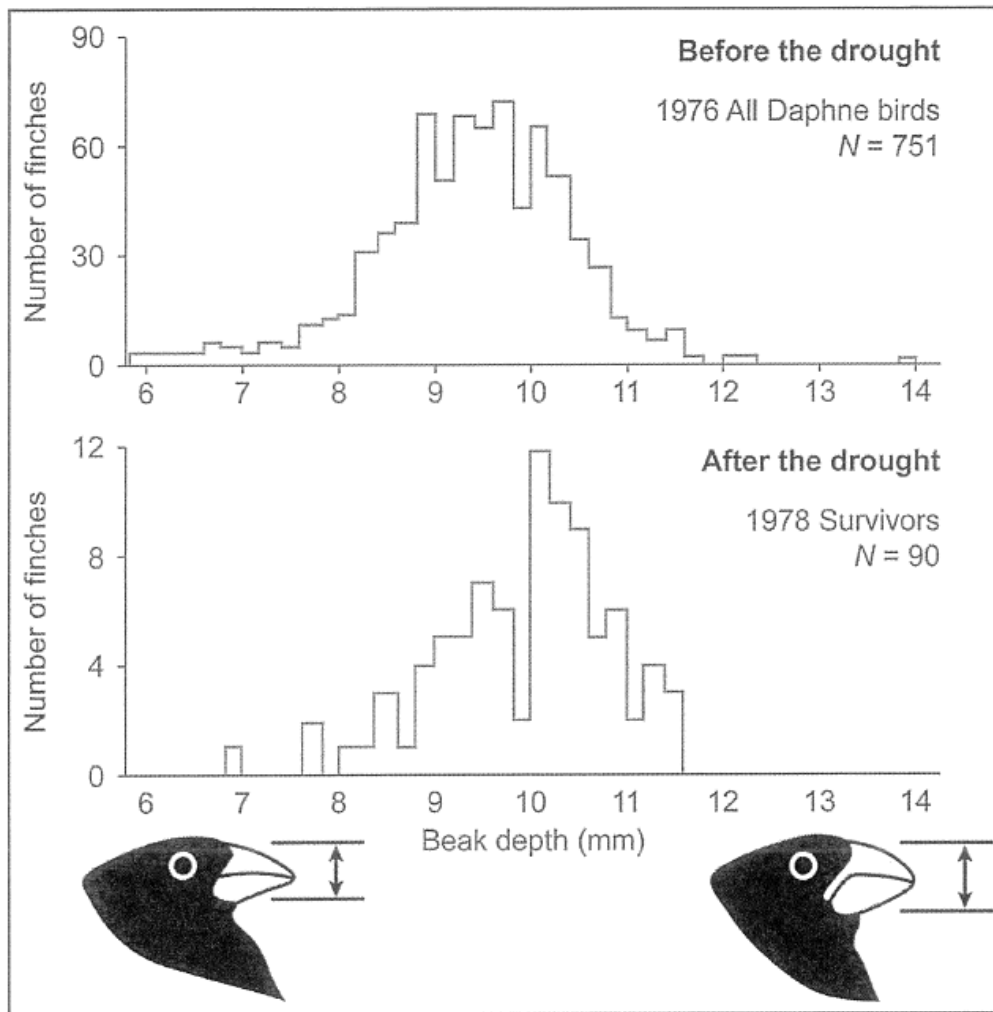
Insects have internal branching air tubes that allow for the direct transport of gases to cells. These tubes are connected to the external environment through breathing pores called spiracles.



Compare the structure and function of the respiratory surfaces for gas exchange in insects to that in fish. **3**

Question 31 (6 marks)

During the late 1970s, the island of Daphne Major in the Galapagos Islands suffered a drought. Scientists recorded the beak sizes of finches living on the island both before and after the drought.



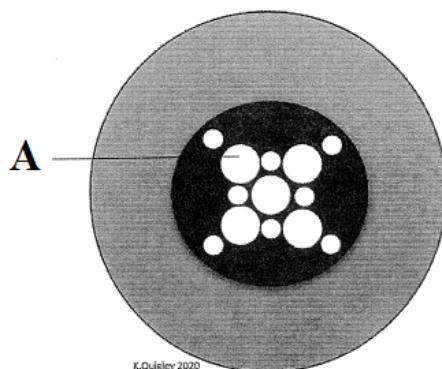
- a) Describe TWO observations when comparing the data before and after the drought.

2

b) Explain these changes using the Theory of Evolution by Natural Selection.

Question 32 (4 marks)

A student produced the following diagram showing some vessels used for transport in plants.



a) Identify structure A.

1

b) Explain the process by which substances are transported in structure A.

3

END OF PAPER

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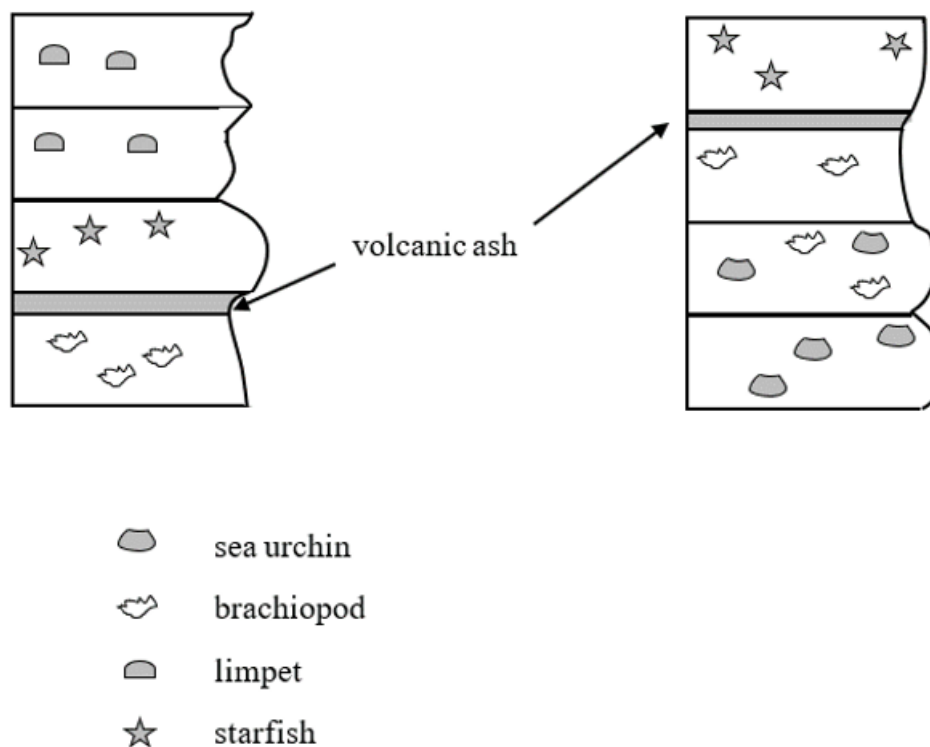
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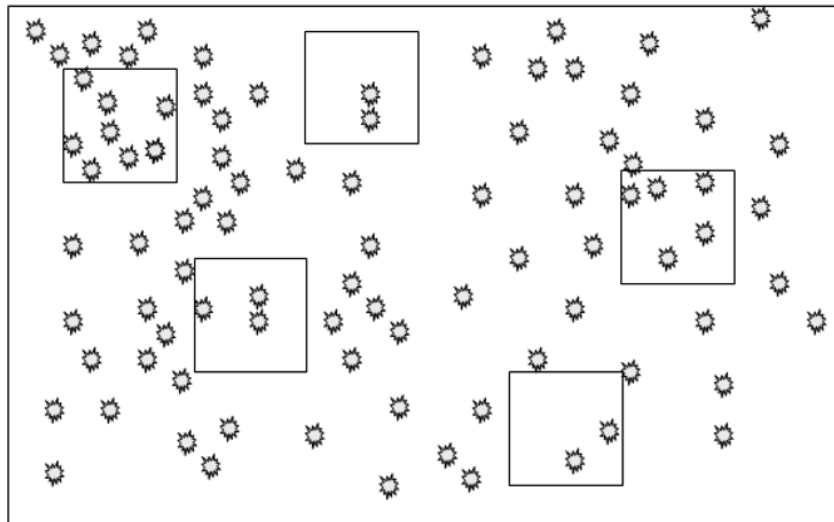
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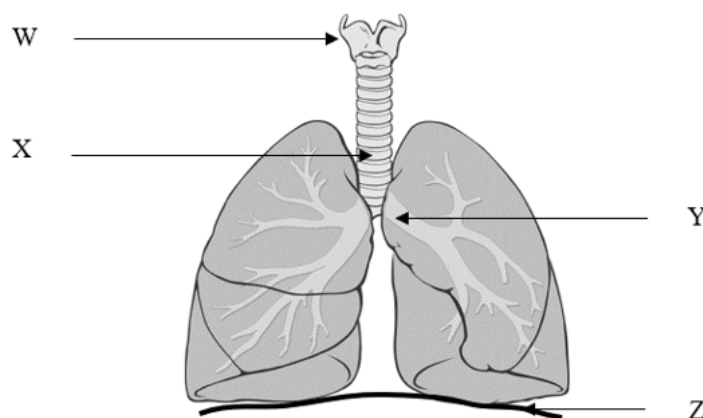
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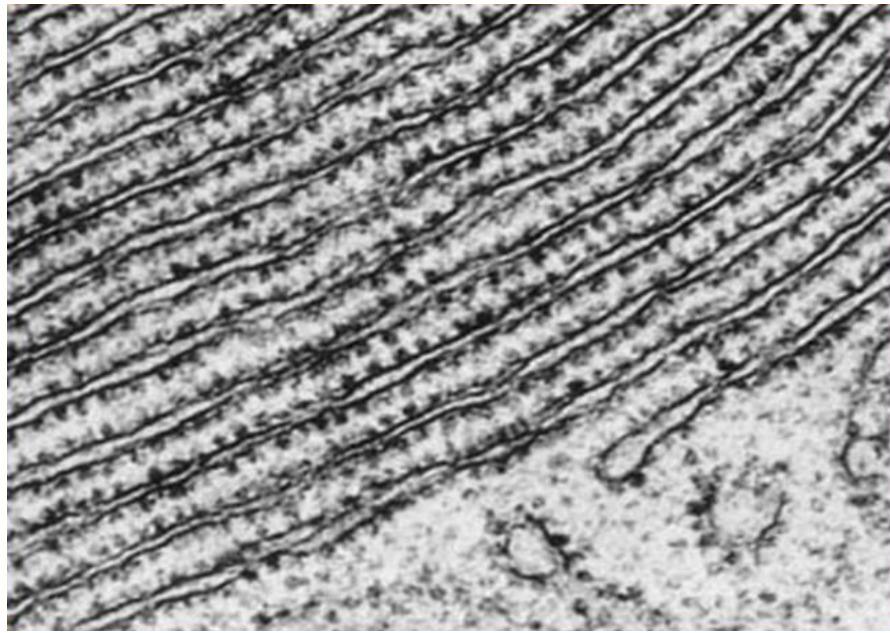
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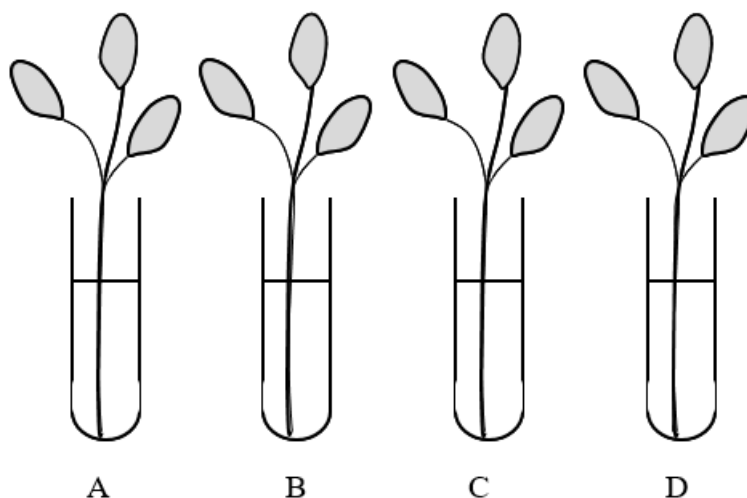
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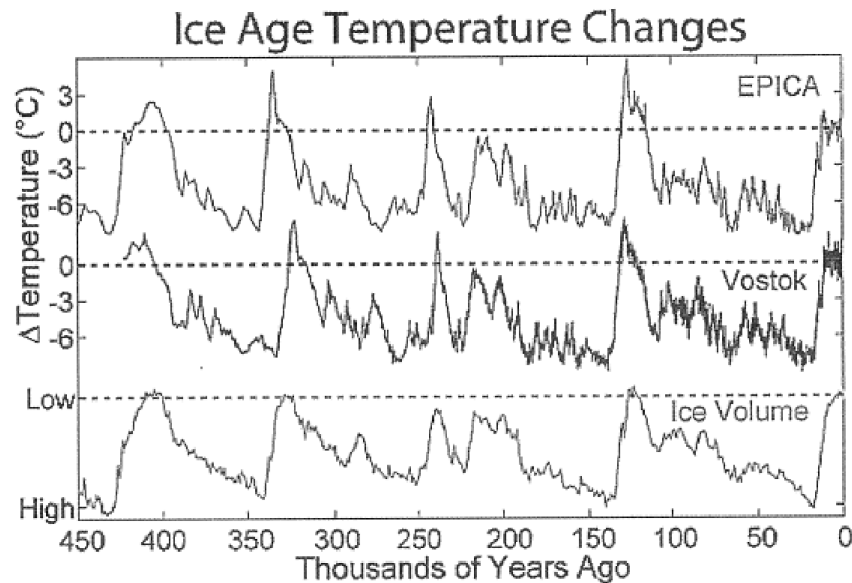


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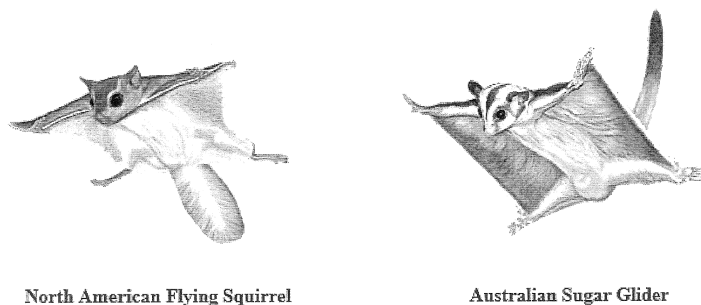
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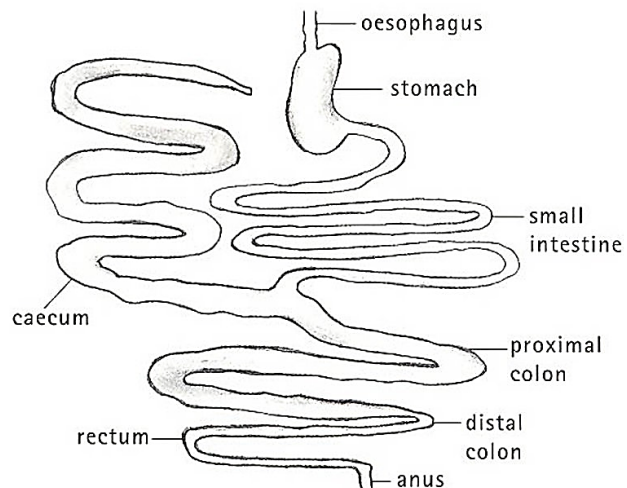
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- (D) 45840 years

14. The diagram shows the digestive system of a koala.



Why do koalas need such a large caecum?

- (A) Microbial breakdown of their high cellulose diet**
- (B) To maximise digestion of food by protease
- (C) To increase the time before food reaches the small intestine
- (D) Mechanical digestion of eucalyptus leaves

15. What are the most likely causes of megafauna extinction in Australia?

- (A) Land clearing and habitat destruction by bushfires
- (B) Nutrient depletion in soils and farming practices
- (C) Hunting by humans and drier climate**
- (D) Climate change and introduced species

16. Which of the following contains only biotic factors?

- (A) grass, humidity, microbial disease
- (B) tree hollows, grass, microbial disease**
- (C) parasitism, rainfall, turbidity
- (D) soil pH, temperature, humidity

17. Below is a diagram of some vertebrate embryos.



This similarity in structural features is due to:

- (A) convergent evolution
- (B) divergent evolution**
- (C) punctuated equilibrium
- (D) parallel evolution

18. Which of the following is NOT used in land rehabilitation after mining?

- (A) Seed collection before mining begins
- (B) Removing of topsoil**
- (C) Identification of chemistry of dump and waste removal
- (D) Formation and shaping of stable, drained landforms

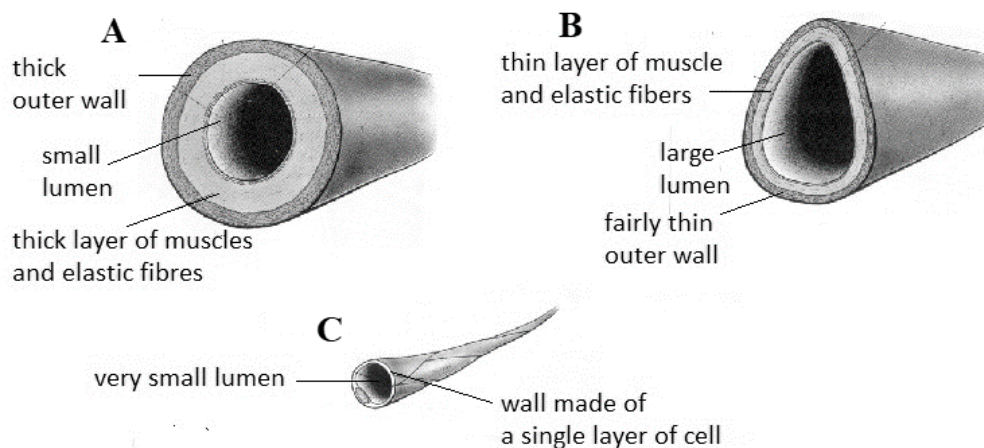
19. Australian eucalypts have many adaptations for survival in hot dry environments.



Which of the below statements is correct?

- (A) Eucalypt leaves have an equal number of stomata on either side of the leaf to maximise gas exchange.
- (B) Eucalypt leaves hang vertically to increase surface area exposed to the heat of the sun.
- (C) Eucalypt leaves have extremely thin waxy cuticles to reduce water loss.
- (D) Eucalypt leaves have palisade mesophyll cells near one surface to minimise the amount of sunlight received.

20. The diagram below shows the cross section of three types of blood vessels.



Which of the below feature(s) valves to prevent backflow?

- (A) Both A and B
- (B) Both A and C
- (C) Only A
- (D) Only B

End of Section I

Section II - 50 Marks

Marks

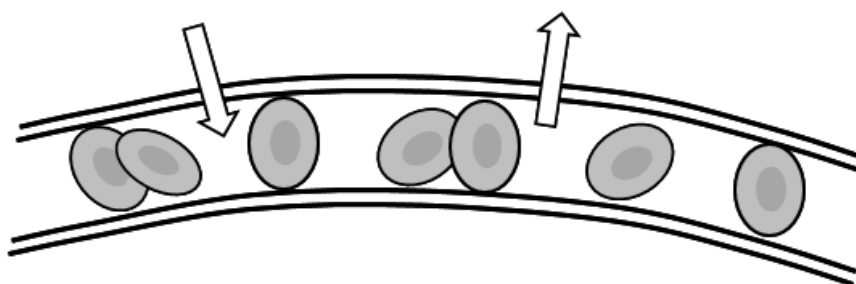
Attempt Questions 21- 32

Allow about 1 hour and 25 minutes for this section.

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

Question 21 (4 marks)

The diagram below shows a section of a capillary, including red blood cells, passing through a muscle in the human body.



a) Explain one way in which Red Blood Cells are specialised to suit their function.

2

- Identify feature relevant to function (eg: biconcave shape, flattened, possesses haemoglobin)
- Explains how this feature improved RBC function (eg: biconcave shape increases surface area and hence SA:V, maximising rate of gas exchange)

Note: “small” was not accepted. ALL CELLS ARE SMALL.

b) Outline TWO changes you would expect in the blood composition as it passes through the muscle.

2

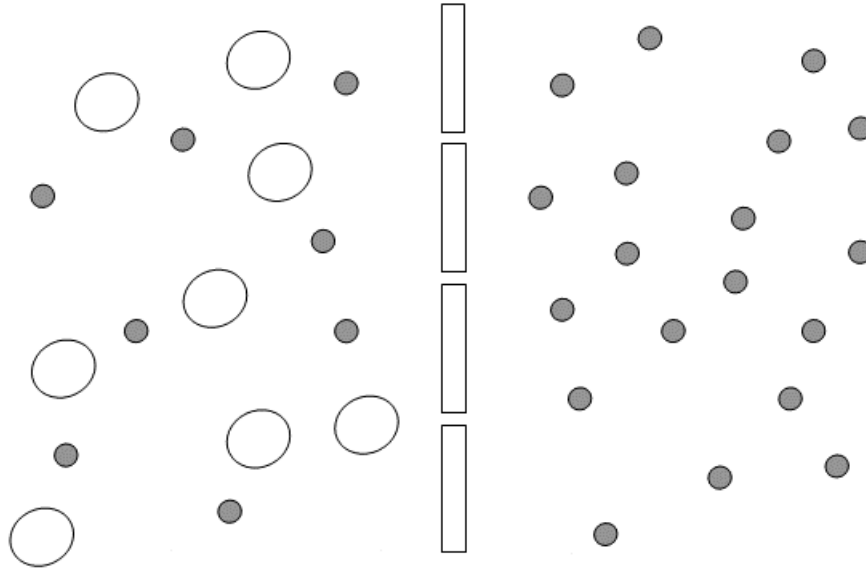
Any two correct changes.

Eg: carbon dioxide concentration would increase; oxygen concentration would decrease.

Many students showed misunderstandings here. RBCs DO NOT leave the blood vessels; it is the capillary that goes through the muscle, NOT RBCs wriggling out of the capillary and going to explore. Only the GASES carried by the RBCs will diffuse in/out of the capillary.

Question 22 (3 marks)

A student wanted to examine the movement of molecules across a semi permeable membrane. They set up an experiment with starch and water. The diagram below represents the initial solution of starch and water, with a semi permeable membrane.



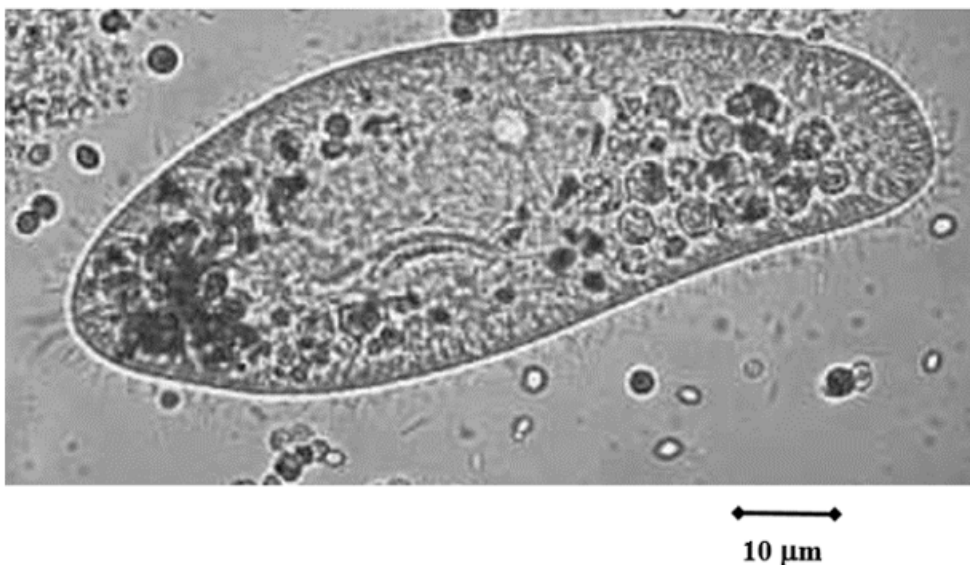
Explain the changes you would expect to see after 10 minutes.

3

1. Outline changes – water would move from right to left across the semipermeable membrane.
Accepted variations in phrasing.
2. Explain changes:
 - ii. Water moves by osmosis from areas of low solute concentration to areas of high solute concentration (also accepted from high solvent conc to low solvent conc)
 - iii. Starch will NOT move because it is too large to pass through the semipermeable membrane

Question 23 (3 marks)

The photograph below shows a type of paramecium.



- a) Determine the length of this specimen.

1

Accepted:

- i. 81 µm – this is obtained when scale is measured INCLUDING diamonds
- ii. 104 µm – this is obtained when scale is measured WITHOUT diamonds
- iii. 114 µm – this is obtained when scale is assumed to be 1 cm. BE CAREFUL IN FUTURE.

Despite the range of answers accepted, very few students achieved this mark. You need to measure the longest part of the microbe INCLUDING the membrane. If you measured 112 mm instead of 114 mm then you did not include the membrane/measured the wrong part. Cilia in the image are difficult to see so students were not required to include these. (No one did.)

- b) Discuss the advantages of an organism being unicellular.

2

Any 2 advantages accepted, so long as the answer makes it apparent why these are advantages.

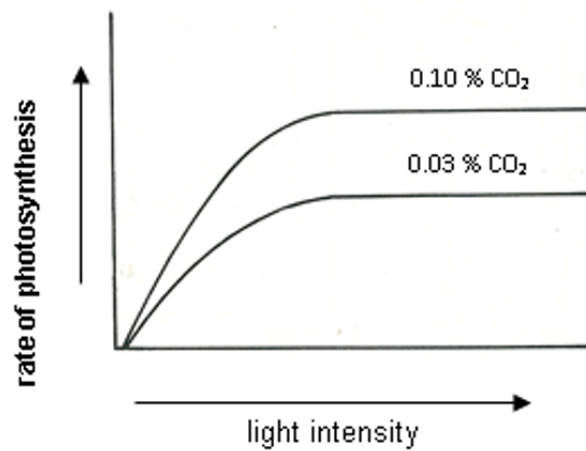
Eg:

- Very rapid reproduction
- Most reproduce asexually; allows reproduction even when isolated from other cells
- direct absorption of nutrients from environment; no specialised digestive or respiratory systems required
- High SA:V ratio maximises rate of passive transport – since these directly absorb nutrients from environment, high SA:V hence increases nutrient transport without additional energy needed
- No reliance on other cells in order to function

Note: 'simple' was only accepted if accompanied by a justification for why simple is good

Question 24 (3 marks)

The graph below shows the relationship between the rate of photosynthesis and light intensity for an aquatic plant with different concentrations of carbon dioxide in the water.



- a) Identify the word equation for photosynthesis.

1

Carbon dioxide + water $\rightarrow$ oxygen + glucose

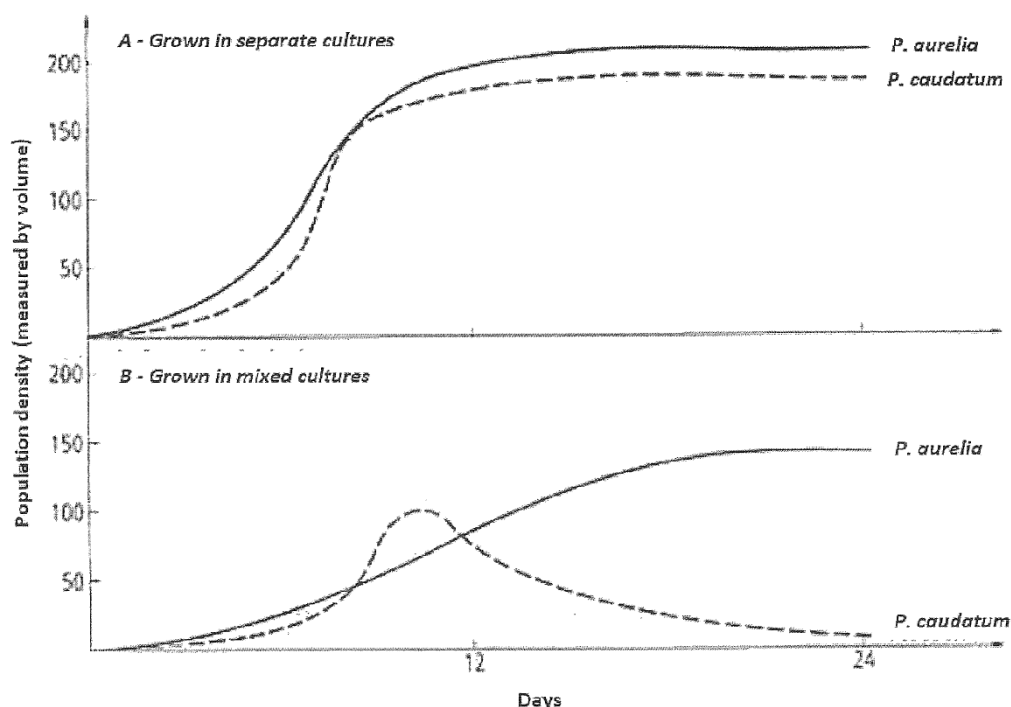
- b) What does this graph tell us about the relationships between the rate of photosynthesis, availability of carbon dioxide and light intensity?

2

- Rate of photosynthesis increases with light intensity UNTIL it plateaus
- Rate of photosynthesis increases with carbon dioxide concentration

Question 25 (3 marks)

Paramecium aurelia and *Paramecium caudatum* are two species of unicellular organisms. The graphs below show the results of a study where they were grown on nutrient agar separately, and then together.



Identify the type of ecological relationship between the organisms shown in the graph and justify your answer.

3

Mark 1.

The type of ecological relationship described is competition.

Mark 2.

Graph B shows the population density of *P. aurelia* increasing as the population density *P. caudatum* decreases. This suggests that *P. aurelia* has outcompeted *P. caudatum* for the resources (food) present in the shared petri dish.

Mark 3

An analysis of Graph A shows that when grown independently, *P. aurelia* reaches a population density of 200, compared to about 180 when grown together with *P. caudatum*. This suggests that *P. caudatum* has also had a competitive effect on *P. aurelia*.

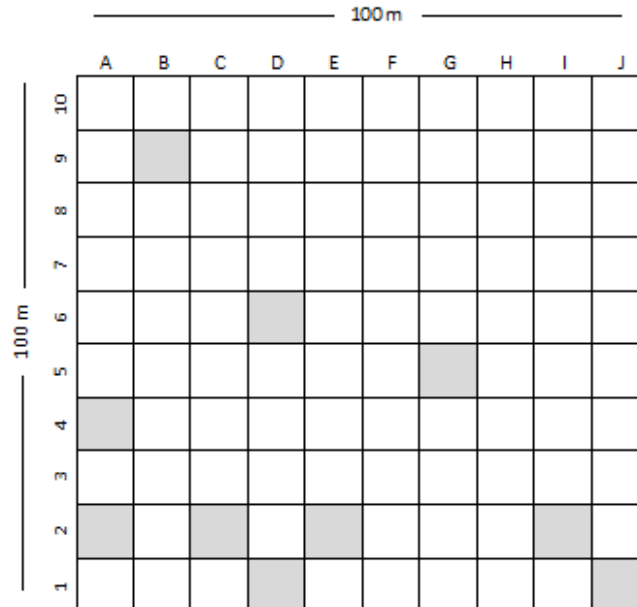
Any other relevant information which indicated the student had fully analysed the graphs, would also have scored the third mark.

Note

It is important that students analyse carefully all parts of any data presented. The band 6 answer should make specific reference to this data, identifying trends and clearly stating the inferences. General statements are not Band 6 answers.

Question 26 (6 marks)

A group of students wanted to estimate the size of native populations in an area of their local bushland. They started by choosing a sample area and setting up a grid, as shown in the diagram below.



Certain quadrats in the sample area were then chosen at random to be sampled. In each of the chosen quadrats, students counted the number of spinifex tussocks and bilby droppings, which were then recorded in the table below.

Quadrat	Count	
	Bilby droppings	Spinifex Grass tussock
A2	0	6
A4	1	12
B9	4	14
C2	0	7
D1	0	4
D6	6	16
E2	0	5
G5	5	18
I2	0	7
J1	0	6

Question 26 continues over the page

- a) Suggest how one abiotic factor AND one biotic factor might affect the spinifex population in the sample area.

3

In answering this question, the student should have made reference to the data provided. It was not there to fill up space!

(a) 3 marks

Mark 1 Any plausible description of an abiotic factor

The only other information given outside the Table and Grid, was the fact that the area sampled was in a bushland setting.

Sample Answer

3

It is likely then that competition from other plants may have had a significant effect on the spinifex population. The data shows fewer spinifex in the lower (1 and 2) quadrats sampled. This could possibly be due to trees with significant canopies occupying these quadrats. The shading effect would have reduced the sunlight reaching the ground thus restricting the growth (plants need sunlight for photosynthesis) and therefore the population density of spinifex. Light deprivation is an abiotic factor

Mark 2 Recognition that the most likely biotic factor affecting spinifex population was the Bilby. There is no evidence of anything else.

Note: animals don't prey on plants, they are not predators. They are consumers (1st order or primary).

Mark 3 An analysis of the tabulated data shows that where Bilby droppings are the greatest, spinifex population density is higher. This suggests a relationship (biotic) between these two organisms. The relationship could be:

- Bilbies feed on spinifex so where spinifex population is higher, Bilby population will be higher
- OR
- Areas where Bilbies populate will produce more droppings, which add nutrients to the soil, which results in more spinifex growth. Note this could also be used as an abiotic factor.

b) Evaluate the students' choice of sampling method.

Mark 1 A description of the suitability of Quadrat sampling in this situation.

Sample Answer

Quadrat sampling is a recognisable Scientific Sampling process. It works best when the organism being sampled is immobile such as plants or animal droppings. It is therefore a very suitable method to be used here.

Mark 2

An extension of the above statement, indicating that while it is suitable for sampling spinifex, it is not suitable for sampling Bilbies, as the droppings in a quadrat may have come from one or many Bilbies

OR

A recognition that while the choice of quadrats was random, clearly the quadrats chosen were not representative of the whole area with 40% (the top right section) not being sampled at all. This reduces the chances that any estimation of the spinifex and bilby numbers in the area being accurate.

OR

Recognition that 10% sampling may not be enough to get accurate and reliable data

Mark 3

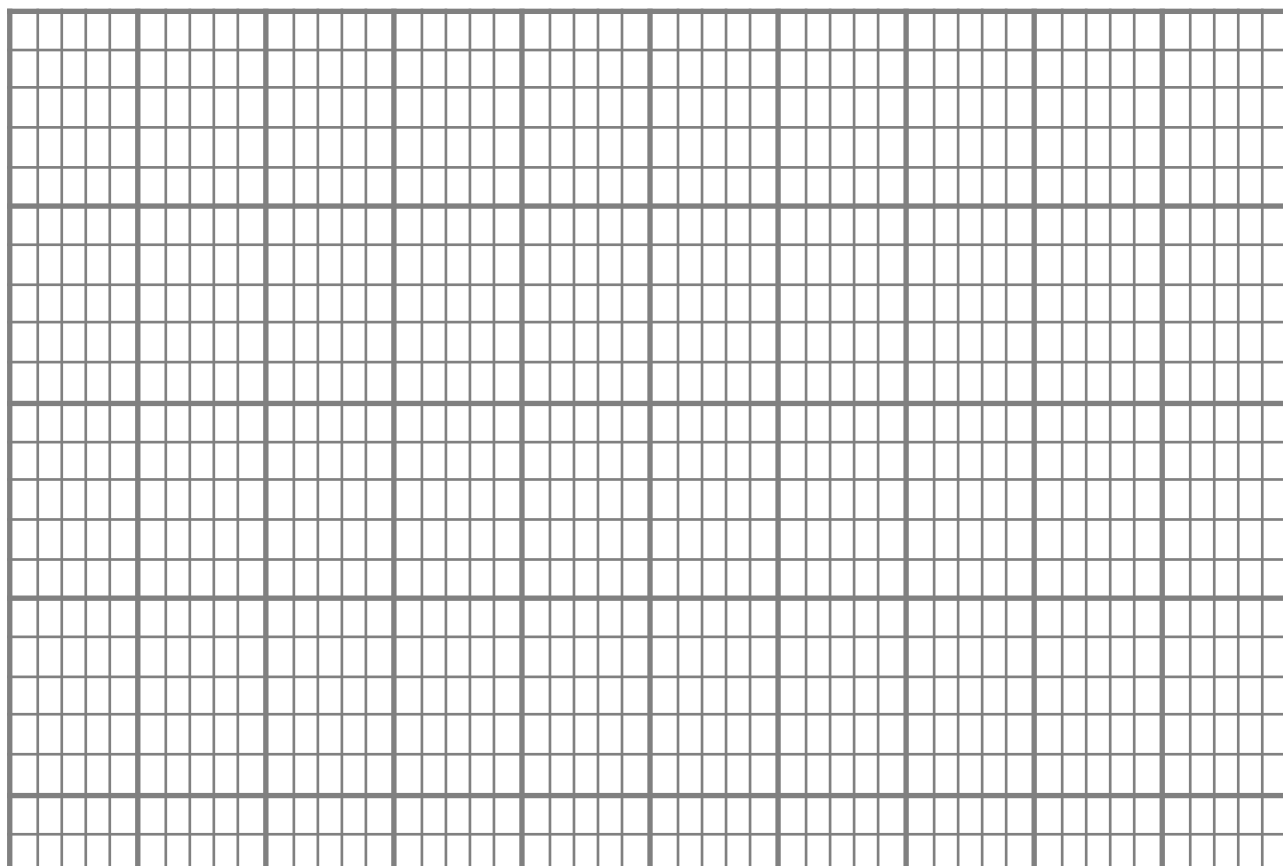
Evidence that the student had analysed the data provided to show that fewer Bilby and Spinifexes occupy the lower part of the area. As this was the part that was most sampled, it is strong evidence that the sampling method used is not valid and would result in incorrect conclusions about population numbers.

Question 27 (7 marks)

A student had two unlabelled vials. She knew the vials contained two different enzymes from two types of bacteria which act on the same substrate. She tested both samples with this substrate and her results are shown in the table below.

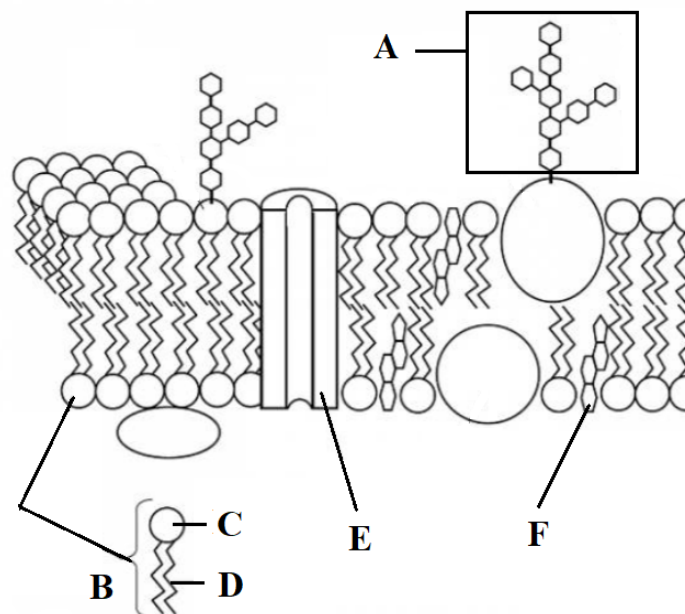
Temperature (°C)	Enzyme Activity (arbitrary units)	
	Enzyme 1	Enzyme 2
0	1	1
10	3	2
20	11	3
30	24	5
40	27	8
50	3	13
60	0	16
70	0	24
80	0	29
90	0	1

- a) Use the grid below to draw a line graph of this data.

4

Question 29 (5 marks)

The diagram below represents the structure of a membrane in a eukaryotic cell.



a) Complete the table below to identify structures A to F.

3

Label	Structure
A	Carbohydrate OR glycoprotein
B	Phospholipid
C	Hydrophilic head OR phosphate
D	Hydrophobic tail OR hydrocarbon tail
E	Channel protein
F	Cholesterol

b) Explain how one component of the membrane structure contributes to its selective permeability.

2

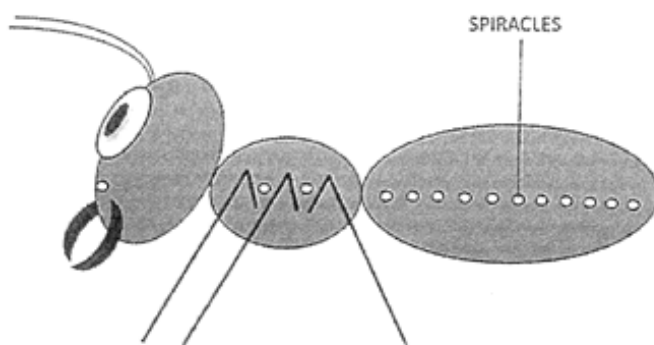
1 mark for description of function of component

1 mark for correct link to how it contributes to selective permeability

e.g. channel proteins are specific for different substances – this means that they can be allowed into or out of the cell when required, leading to selective permeability for their specific substance (e.g. sodium potassium pump)

Question 30 (3 marks)

Insects have internal branching air tubes that allow for the direct transport of gases to cells. These tubes are connected to the external environment through breathing pores called spiracles.



Compare the structure and function of the respiratory surfaces for gas exchange in insects to that in fish.

3

Criteria	Marks
- Describes similarities of and/or differences between the respiratory surface for gas exchange in insects and fish OR - Describes a similarity and a difference between the respiratory surface for gas exchange in insects and fish	3
Describes ONE similarity or difference between the respiratory surface for gas exchange in insects and fish	2
Provides some relevant information	1

Examples

Similarities e.g. gas exchange occurs internally, high surface area of gills and branching tubes for efficient gas exchange, external structures that allow for gases to enter etc.

Differences e.g. direct transport of gases to body cells in insects VS gases diffuse across gills into capillaries for transport to body cells,

Very weak comparisons made. Quite a few students only repeated the stem and described the structure/function of gills in fish i.e. no comparison made □ 1mk

Basic statements such as “both respiratory surfaces are required for gas exchange/respiration” or “ants have spiracles whereas fish have gills” were not accepted as a similarity/difference.

Several misconceptions to clarify:

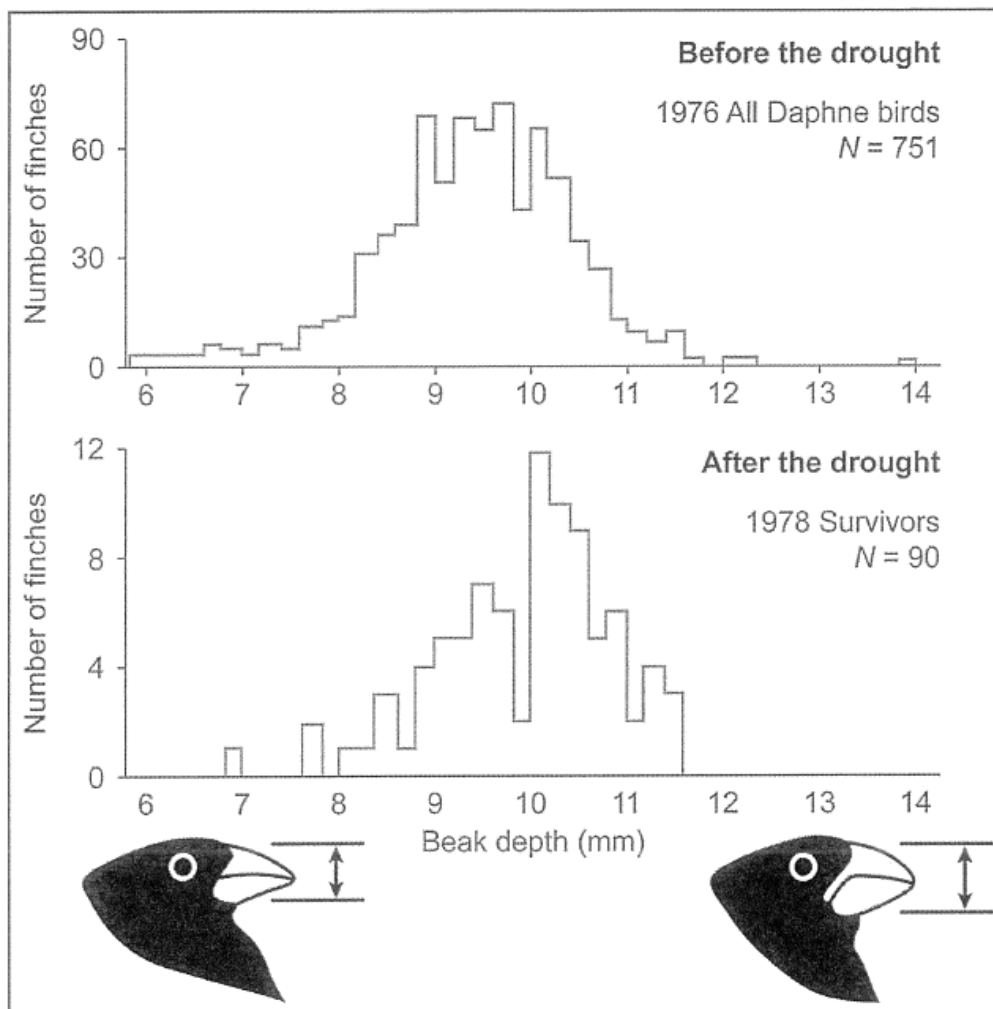
- Fish have a closed circulatory system with blood vessel to transport the gases – similar to ours!
- Gills in fish are technically internal

- Gas exchange occurs between the ends of the branching tubes and the cells in insects. Spiracles are simple the openings where gases enter and exit – think alveoli/capillary vs mouth for us
- Insects do not have skin!

Note: you were not marked down if you referred to gills as external or spiracles as the gas exchange structure.

Question 31 (6 marks)

During the late 1970s, the island of Daphne Major in the Galapagos Islands suffered a drought. Scientists recorded the beak sizes of finches living on the island both before and after the drought.



a) Describe TWO observations when comparing the data before and after the drought.

2

1 mark per correct observation

e.g. Decrease in total number of finches; decrease in range; decrease in proportion of finches with beak depths 8-10mm, increase in proportion of finches 10-11mm, increase in average beak depth

Increase in number of finches with 10-11mm was not accepted – should be proportion NOT number
Beak depth increased was not accepted – implies that the beak depth of each finch increased

Question 31 continues over the page

b) Explain these changes using the Theory of Evolution by Natural Selection.

4

1 mark variation in original finch pop

1 mark selection of finches with favourable trait

1 mark finches with favourable trait survived and reproduced offspring that inherited the trait

1 mark frequency of favourable trait in pop increased

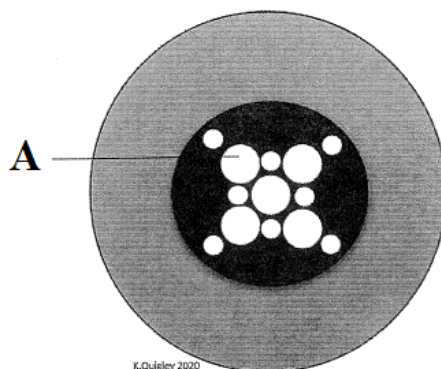
Weaker responses defined the Theory of Evolution by Natural Selection in general terms, using up the bulk of space before linking and explaining the changes in the data.

Quite a few students did not identify the favourable trait using the data (larger beak depth was accepted; however, 12-14 did not survive! Give a range next time) – did not achieve the 1 mark for selection if you did not identify the favourable trait.

Several students also did not mention the final result – frequency of favourable trait in pop increased. Also, be careful of terminology used e.g. dominant trait in population can refer to the dominant/recessive nature of inheritance – more on this for y12!

Question 32 (4 marks)

A student produced the following diagram showing some vessels used for transport in plants.



a) Identify structure A.

1

Xylem

b) Explain the process by which substances are transported in structure A.

3

Criteria	Marks
Explains the below mechanisms for the movement of water in the xylem. • Cohesion • Adhesion • Tension/Transpiration	3
Explains AT LEAST TWO of the above mechanisms	2
Provides some relevant information	1

Phloem – mistake carried

Note: be careful of terminology used – the main mechanism for the movement of water from roots to leaves is tension i.e. the evaporative pull from the top of the water column at the stomata. This tension generates a pressure gradient NOT osmotic/water concentration gradient from roots to leaves.

END OF PAPER