

Student's Name:

Teacher's Name:



2018

Year 11

BIOLOGY

General Instructions

- Reading time – 5 minutes reading time
- Working time – 2 hours
- Write using black pen
- Draw diagrams, tables, graphs using pencil
- NESA approved calculators may be used

Total marks: 75

This paper consists of two parts, Part A and Part B

Part A – 15 marks

- Attempt Questions 1-15
- Allow about 30 minutes for this section

Part B – 60 marks

- Attempt Questions 16-27
- Allow about 1 hour 30 minutes for this section

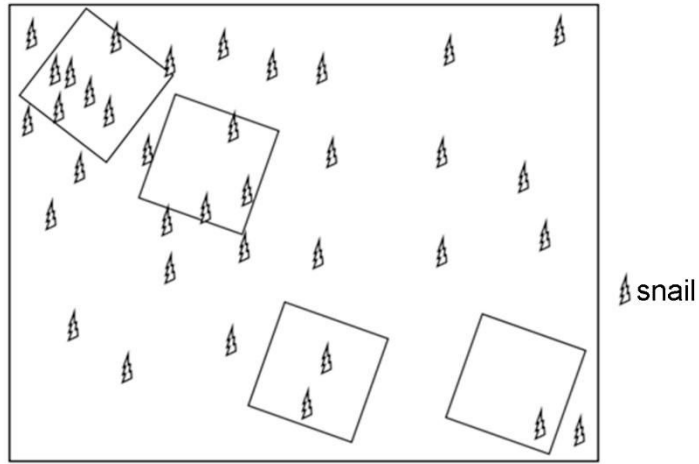
SECTION	MARKS
Part A 15 Multiple Choice	/15
Part B Written Response	/60
TOTAL	/75

PART A

MULTIPLE CHOICE

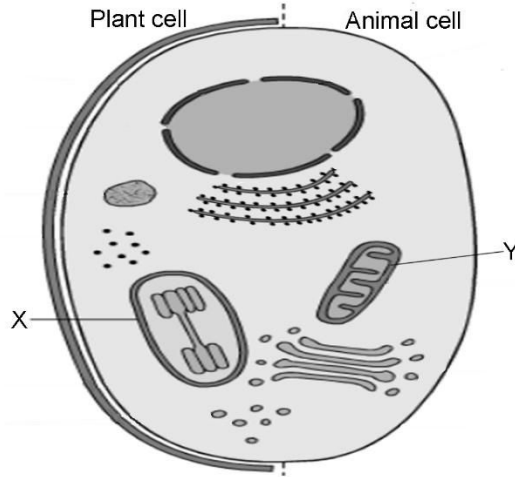
(15 marks)

1. Some biologists were measuring the abundance of snails in a garden. They placed four 1m² quadrats as shown below.



Using the quadrats, determine the population density of the snails.

- (A) 3 snails / m²
 - (B) 9 snails / m²
 - (C) 12 snails / m²
 - (D) 36 snails / m²
2. Below is a diagram depicting two types of eukaryotic cells.



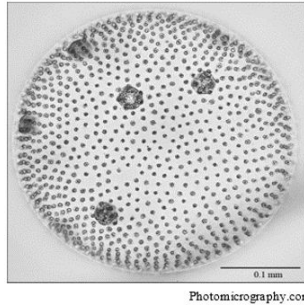
What is the function of the organelles marked X and Y?

	X	Y
(A)	Protein synthesis	Aerobic respiration
(B)	Packaging of proteins for secretion	Photosynthesis
(C)	Protein synthesis	Packaging of proteins for secretion
(D)	Photosynthesis	Aerobic respiration

3. Which of the following statements correctly distinguish active transport from facilitated diffusion?

	Active transport	Facilitated diffusion
(A)	Molecules move up concentration gradient	Molecules move down a concentration gradient
(B)	Only involves large complex molecules	Only involves small lipid-soluble molecules
(C)	Involves random movement of molecules	Requires energy input
(D)	Requires large energy input	Requires small energy input

4. The photograph below shows a group of individuals of a species of *Volvox*. *Volvox* is a species of alga. Individual cells can survive separately, but are generally found clustered together.



Photomicrography.com

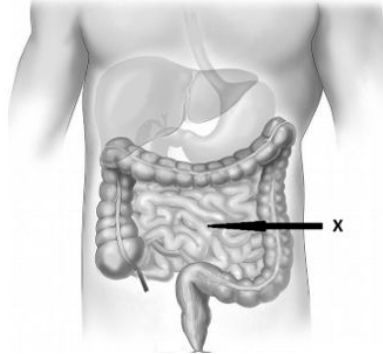
What type of organism would you classify *Volvox* as?

- (A) colonial
- (B) mutualist
- (C) unicellular
- (D) multicellular

5. Which statement best correctly describes the function of the phloem?

- (A) Transports sugars from source tissues to sink tissues.
- (B) Transports dissolved organic substances from the leaves to the roots.
- (C) Transports water and mineral ions from the leaves and source tissues to sink tissues.
- (D) Transports water and inorganic nutrients such as mineral ions, which have been absorbed through the roots in the soil.

6. The diagram below shows part of the human digestive system.



Which one of the following is a major function of structure X?

- (A) The production of faeces.
- (B) The absorption of water and vitamins into the blood.
- (C) The absorption of glucose into the blood.
- (D) The secretion of hydrochloric acid.

7. The graph below shows the impact on population size of two species of monitor lizards (*V. mitchelli* and *V. mertensi*) and a species of finch (*N. phaeton*) after the introduction of cane toads in their habitat.

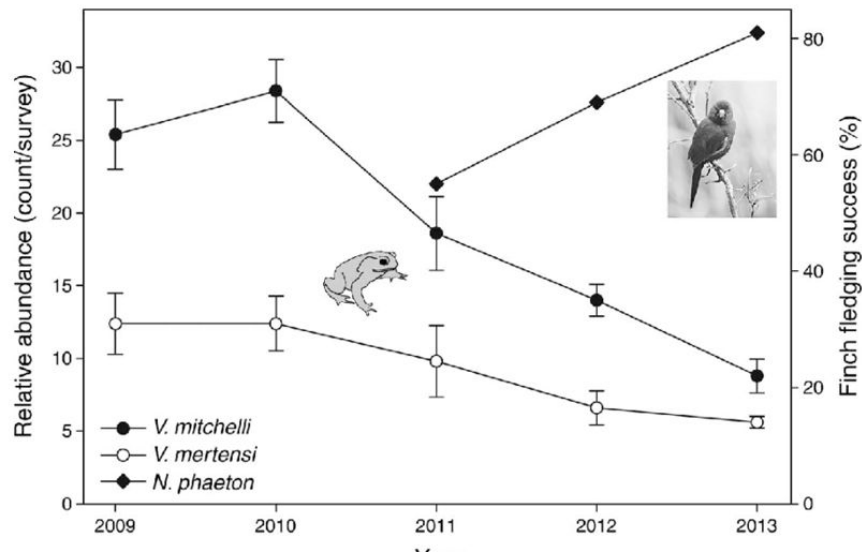


Image taken from:

https://www.researchgate.net/figure/Evidence-for-facilitation-in-the-Crimson-Finch-Neochmia-phaeton-Fledging-success-of_fig2_281833401

What is shown in this data?

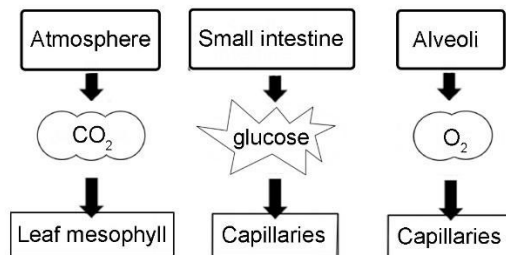
- (A) The monitor lizard abundance decreased due to poisoning while eating cane toads.
 (B) *V. mitchelli* lizards did not initially eat cane toads and then decreased in abundance when they began eating cane toads.
 (C) The percentage of finch fledging success increased while monitor lizards decreased in population abundance.
 (D) Monitor lizards prefer to eat cane toads than finch fledglings and became more affected and decreased in abundance over time.
8. Which of the following adaptations by Australian animals and plants is an example of a physiological adaptation?
- (A) The intertidal marsh crab concentrates and excretes salts using its gills and kidneys.
 (B) Eucalyptus leaves are waxy in order to reflect heat and light reducing water loss through evaporation
 (C) The Spinifex hopping mouse hides in burrows during the day.
 (D) Some Australian lizards have a pale external colour to reflect sunlight resulting in a reduction in heat absorption.
9. An ecosystem is the combination of biotic and abiotic factors and their unique interactions. Which of the following lists ONLY abiotic factors?
- (A) Temperature, topography, light intensity, rainfall.
 (B) Wind, number of organisms, temperature, humidity.
 (C) pH, temperature, distribution of organisms, salt concentration
 (D) Number of organisms, distribution of organisms, predators, disease.

10. *Dipylidium caninum*, is the flea tapeworm that grows to about 46 cm. Its primary host is a dog and its intermediate is a flea or chewing lice. The diagram shows the tapeworm in a dog colon.



What is the best description of the relationship between tapeworm and the dog?

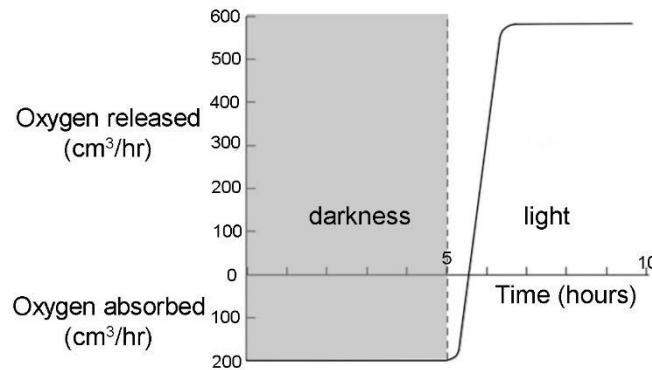
- (A) Allelopathy
 (B) Parasitism.
 (C) Mutualism
 (D) Commensalism.
11. A fossil was discovered and scientists wished to calculate its age. Using the technique of radio-carbon dating they found the fossil had the ratio of 88% stable nitrogen-14 compared to 12% radioactive carbon-14. If carbon-14 has a half-life of 5730 year, what is the approximate age of this fossil?
 (A) 2 850 years old.
 (B) 5 700 years old
 (C) 11 450 years old
 (D) 17 150 years old
12. The diagram shows the movement of substances in organisms.



Which process is taking place in all three examples?

- (A) Absorption
 (B) Diffusion
 (C) Osmosis
 (D) Active transport
13. Which of the following is NOT an example of a primary investigation?
 (A) Performing fieldwork
 (B) Designing a model.
 (C) Conducting experiments in the laboratory
 (D) Researching published data from a primary source

14. A student carried out an experiment using a water plant to investigate gas exchange. The plant was left in darkness for 5 hours and then illuminated for 5 hours with measurements being taken of the amount of oxygen released and absorbed over this time period. Throughout the experiment the temperature was kept constant and data tabulated. The resultant graph is shown below.



If changes in light intensity have no effect of the rate of respiration, what is the best estimate of total oxygen produced by photosynthesis in the last 3 hours of the experiment?

- (A) 600 cm³
 (B) 1000 cm³
 (C) 1200 cm³
 (D) 1800 cm³
15. A biology student conducted a rat dissection to trace the digestion of foods in a mammalian digestive system. They cut the oesophagus and removed the stomach, small intestine, caecum, and large intestine and measured the length of the alimentary canal in the rat using a ruler divided in 1mm divisions. How can the results obtained from this experiment be classified?

- (A) Primary qualitative.
 (B) Primary quantitative.
 (C) Secondary qualitative
 (D) Secondary quantitative

End of Part A

PART B

WRITTEN RESPONSE

(60 MARKS)

16. Cytology is the study of cells. A number of tools and techniques have been discovered and developed to greatly advance our understanding of the structure of cells.

Name and describe how ONE technology is used to determine a cell's structure.

In your response describe at least one advantage of using this technology. (3 marks)

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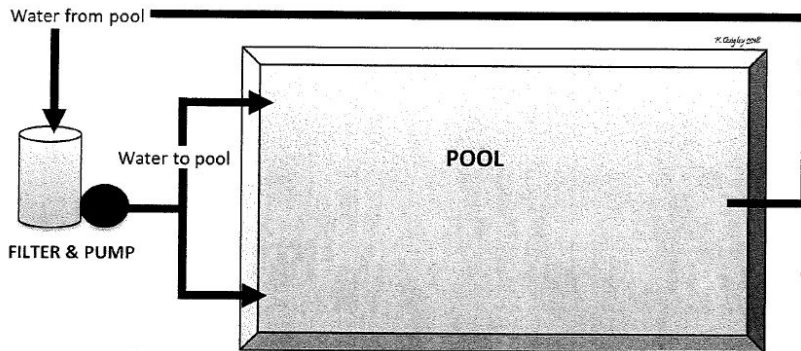
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17. A Biology teacher uses a swimming pool and its filtration system to model an open circulatory system found in insects. (3 marks)



Evaluate the effectiveness of this model. (4 marks)

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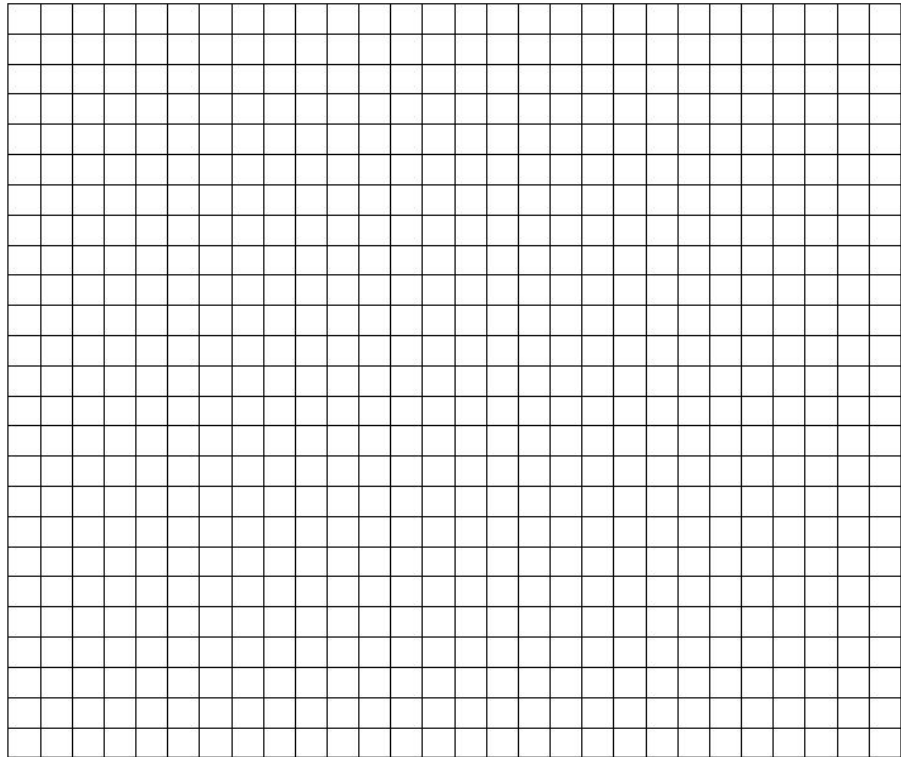
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21. Five different sized cubes of agar, containing pink phenolphthalein indicator, were immersed in the same concentration of acid.
 As acid penetrated the agar it caused the indicator to change from pink to clear.
 The table below shows how long each cube took to become completely clear.

Length of one side of cube (cm)	1	2	3	5	7
Time taken to turn clear (seconds)	10	32	91	815	2350

(a) Graph the data on the grid below. (3 marks)



(b) Describe the trend revealed in the graph. (2 marks)

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(c) Explain the relationship between the surface area : volume ratio of a cell and the maximum size it can grow to. (2 marks)

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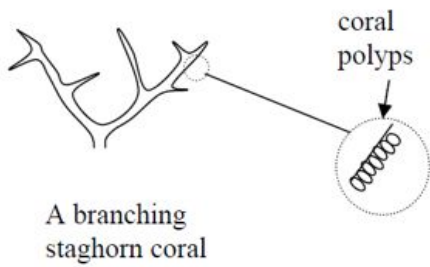
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22. The image below shows onion skin cells under the light microscope.
The average size of these cells has been calculated as $200\ \mu\text{m}$ in length, where the nucleus has a diameter of $10\ \mu\text{m}$.



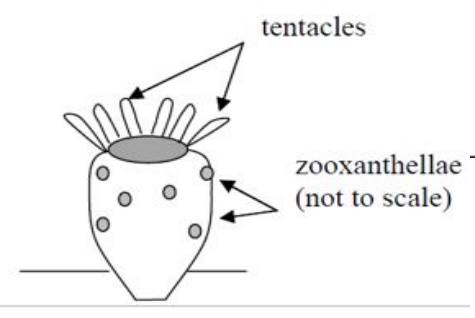
In the space below draw a scaled diagram of an onion skin cell. (4 marks)

23. In 2016 the northern part of the Great Barrier Reef suffered a devastating coral bleaching event. In some areas 90% of the corals were killed.
Read the information below about corals and how they bleach.



Coral consists of colonies of simple organisms called polyps. They secrete a rock-like skeleton. The skeletal surface.

Coral polyp



Coral polyps are animals. They feed on microscopic organisms which they capture with stinging cells on their tentacles. However, they cannot supply all their energy needs in this way and have developed a relationship with a group of algae called zooxanthellae. The algae live inside the tissues of the polyp, where they are supported in a light-rich environment and are protected from predators. Zooxanthellae provide polyps with about 75% of their energy needs.

When sea temperatures reach a certain level, the polyp experiences stress and expels the zooxanthellae. If the temperature drops within a few days the polyps can take up zooxanthellae from neighbouring polyps. However, if the high temperatures persist, they won't do this and will eventually die. The dead coral skeletons are white, hence the term coral bleaching.

Small scale bleaching events have probably occurred fairly regularly in the past, but since 1998 these have been occurring on a far larger scale. The 2016 event was the most severe to date.

There is a strong consensus in the scientific community that coral bleaching is directly attributable to global warming.

This warming means that in El Nino years, when warm currents linger off Eastern Australia, the water is even hotter than usual, and bleaching occurs.

- (a) What proportion of their energy needs do coral polyps generally derive from food which they catch? (1 mark)

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- (b) Identify the nature of the relationship between zooxanthellae and corals. Justify this classification. (2 marks)

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- (c) On the worst affected reefs today, some small, new coral colonies are starting to grow on the dead skeletons of the old corals.

These are thought to have come from single polyps which somehow survived the bleaching.

Could these new colonies possibly survive future bleaching events and illustrate an evolutionary change? Justify your answer. (3 marks)

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24. Complete the table to distinguish between physical digestion and chemical digestion. (4 marks)

Feature	Physical Digestion	Chemical Digestion
Example of a location where it occurs		
What happens at this location		

25. Describe, using at least one example how convergent evolution occurs. (3 marks)

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26. During your study of Year 11 Biology you investigated how an accumulation of microevolutionary changes drove the evolution of the horse and the evolution of the platypus.

Explain why the secondary sources you used were both reliable and valid. (3 marks)

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27. Explain how punctuated equilibrium is different from the gradual process of natural selection. (2 marks)

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Year 11 Biology 2018

Marking Criteria and Answers

Part A – Multiple Choice

1. A
2. D
3. A
4. A
5. A
6. C
7. C
8. A
9. A
10. B
11. D
12. B
13. D
14. D
15. B

Part B – Written Response

16. Marking Guideline

Criteria	Mark
Names and describes how ONE technology is used to determine a cell's structure with at least one advantage of using this technology.	3
Names a technology that is used to determine a cell's structure AND attempts to describe the technology OR lists an advantage	2
<ul style="list-style-type: none">Names a technology that is used to determine a cell's structure OR Provides some relevant information	1

Sample answer

The electron microscope is a technological advancement that has improved our understanding of the structure and function of cells. Using electron beams rather than light the structure of cells has been able to be seen in greater detail. An electron microscope produces a beam of fast moving electrons that travel through coil-shaped electromagnets. These electromagnets bend the electron beams the same way that the glass lenses bend the light beams in a light microscope. The image of the specimen is then formed as a micrograph (photograph) or an image on a screen. This image is much higher resolution and shows a greater depth of field compared to an image obtained from a light microscope.

Marker's comments: Most students answered this question well - they were able to identify and technology and provide an advantage (although the advantage was not always clear and really needs to be compared to something, e.g. electron microscopes have a higher magnification and greater resolution than a light microscope). Although great detail was not expected, many students did not describe how the technology works, e.g. light microscopes use a beam of light bent by lenses to magnify an object)

17. Marking guidelines

Criteria	Mark
Describes effectiveness based on comparison between the model and insect circulatory system and gives evaluation at the end	4
Judgement on effectiveness based on comparison between the model and insect circulatory system	3
Links a feature of the model and the insect circulatory system	2
Identifies features of an open circulatory system	1

Sample answer

The model is effective at showing how circulation occurs in an open system. The pump/filter is like the heart of an insect and the pool represents the fluids in the insect's body. The fluid from an insect's body does not travel through blood vessels; it simply passes through the body tissue and is drawn into the heart at one end and pumped out at the other. This is similar to the pool, where the water is pumped out at one end and then travels freely until it is collected at the opposite end and returned to the pump. Thus this model effectively models an open circulatory system.

Marker's comments: This question was not answered well by many students. The answer required an evaluation of the effectiveness of the model to understand how an open circulatory system (OCS) works. Many students made the mistake of confusing an OCS with the tracheal system in insects. Links between the parts of the model and the OCS in many answers were not strong. It is OK to evaluate the model as not being effective, but in this case there were more arguments for being effective. In this type of question, the final statement needs to be an evaluation. It is also important that if you state that the model is effective, the final evaluation can't be that the model is ineffective.

18. (a) Marking Guidelines

Criteria	Mark
Identifies the effect in enzyme activity AND reason for effect given (must mention blocking the active site)	2
Change in activity described OR blocks the active site	1

Sample answer

The activity of the enzyme would decrease because the inhibitor molecule is attached to the active site, preventing it from binding properly to the substrate.

Marker's comments: This question was not answered well by some. Some students confused an inhibitor model with a substrate, instead of something that blocks the substrate from joining the enzyme. Also, the question asked what happened to the enzyme activity. Many students mentioned the enzyme would not work, but did not write anything about the activity. This would lose a mark in the HSC!

18. (b) Marking guidelines

Criteria	Mark
<ul style="list-style-type: none"> Experiment clearly models the action of enzymes in cells, clearly indication of IV and DV (V) Name the enzyme and substrate (ES) Control (C) Controlled variables (CV) 	4
3 of the 4 above	3
2 of the 4 above	2
1 of the 4 above	1

Sample answer

The enzyme used in the experiment was catalase from potato/zucchini and the substrate was hydrogen peroxide. The variable that was changed was temperature. The same concentration and amount of hydrogen peroxide and three drops of detergent was placed into a test tube that were the same diameter and then the test tubes were placed into waterbaths set at five different temperatures. Cylinders of potato/zucchini that were cut to be the same size, also placed in the water bath, were added to the test tubes with hydrogen peroxide. After two minutes, the test tubes were removed from the water bath and the height of the bubbles formed in the test tube was measured with a ruler. A control was also used. The control for this experiment was the same set-up except there was no potato/zucchini added to the hydrogen peroxide and detergent.

Marker's comments: This question was not answered well. Most students could not remember the appropriate experiment or important details of the experiment that was completed. This asked for an outline of a valid method which means you mention a control, at least one variable that was controlled and to clearly outline how one IV was changed and how the DV was measured. This content is worth reviewing because it is a popular choice of question for HSC and scientific method.

18. (c) Marking guidelines

Criteria	Mark
Describes qualitative results for experimental and control test tubes	2

Discusses results for experiment only	1
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Sample answer

Marker's comments: Many students did not provide enough detail for what would happen before and after the optimum temperature was reached, therefore only received one mark.

18. (d) Marking guidelines

Criteria	Mark
Correct answer	1

Sample answer



Marker's comments: This was an easy question that many students did not answer correctly. It is possible that students may have drawn a graph more appropriate to the experiment they described, in which case it is important to read the question carefully. For students who could not recall the shape of the graph, it would be worth revising.

19. Marking guidelines

Criteria	Mark
Describes a specific example in terms of its specialisation AND relates the specialisation to its function and/or structure	3
Describes a specific example in terms of its specialisation AND attempts to relate the specialisation to its function and/or structure	2
Attempts to link a specialised cell to either its structure or function	1

Sample answer

Capillaries are small specialised cells that form part of the cardiovascular system. With a diameter of 5 - 10µm they are the most abundant blood vessel and are comprised of a single layer of epithelial cells. One of their main functions is to deliver nutrients and substances to extracellular fluids as well as receive wastes. Their porous cell walls which are only one cell thick, allow for substances to easily move into and out of the cardiovascular system. The extensive volume of capillaries in the cardiovascular system also aids in this vital role as they create an extremely large total surface area (around 1000 m²) which allows the exchange of nutrients, oxygen, carbon dioxide and wastes between blood and extracellular fluid to take place.

Marker's comments: This question was answered relatively well. Some students discussed an organelle rather than a specific example of a cell or tissue. When the question requests a specific example, it is important to choose something appropriate and easy to describe, e.g. red blood cells or cells that make up xylem and phloem. For full marks, relate the specialisation to the function and/or structure.

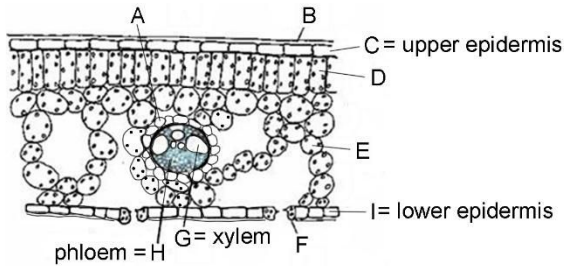
20. (a) Marking Guidelines

Criteria	Marks
<ul style="list-style-type: none"> ● Correctly identifies all three parts of the transverse leaf: <ul style="list-style-type: none"> - xylem - phloem - epidermis (upper and lower) 	3
<ul style="list-style-type: none"> ● Correctly identifies two of the above parts of the transverse leaf 	2
<ul style="list-style-type: none"> ● Correctly identifies one of the above parts of the transverse leaf 	1

Sample answer

Xylem - G
Phloem - H

Epidermis – C & I



Marker's comments: This question was answered relatively well, although many students forgot that there is an upper and lower epidermis, and some students confused the xylem and phloem. In drawings like this, the xylem is usually drawn bigger with thicker (lignified) walls.

20. (b) Marking Guidelines

Criteria	Marks
● Describes in detail the importance of veins and stomata in leaves	4
● Describes in detail the importance of veins or stomata in leaves AND attempts to describe the other	3
● Attempts to explain the importance of veins AND stomata in leaves	2
● Attempts to explain the importance of veins OR stomata in leaves	1

Sample answer

Veins are important structures within leaves as they contain the vascular tissue including the xylem and phloem which allows substances to be transported around the plant. Specifically the xylem transports water and inorganic substances whereas the phloem transports the organic substances that are created during photosynthesis.

The importance of stomata in leaves is that they control the gas exchange in leaves as well as regulating the exchange of water between the plant's internal and surrounding environment. The regulations occur because the stomata have the ability to change shape and thus open and close. When the stomata are opened carbon dioxide enters the leaf and can be used for photosynthesis. However, at the same time oxygen is released as well as water vapour. Stomata importantly can open during the day so as to maximise photosynthetic output.

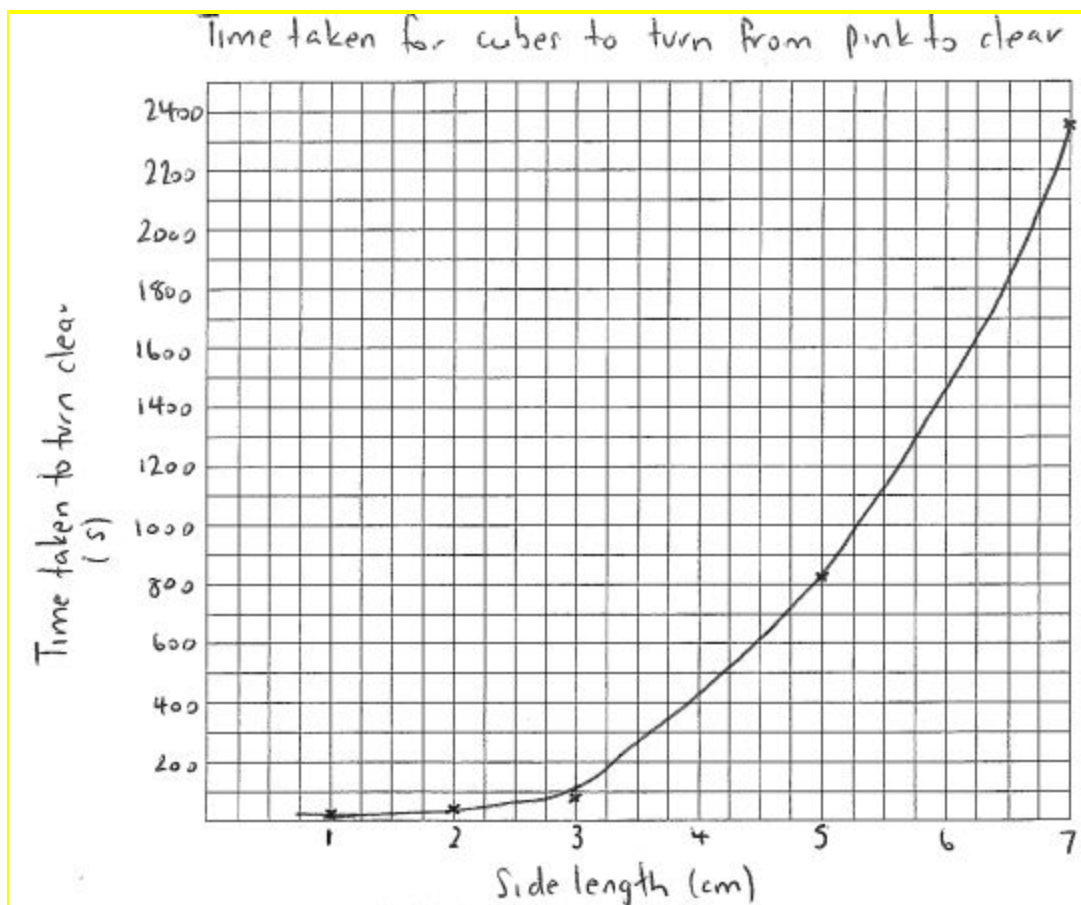
Marker's comments: This question was answered relatively well. Some answers lacked a little detail and did not address both parts of the question which was to write about veins and stomata.

HANNAH

21. (a) Marking Guidelines

Criteria	Marks
Correctly plots graph checking for H= heading Y1= y axis correctly scaled Y2= y axis with correct name label Y3- y axis with correct unit label X1= x axis correctly scaled X2= x axis with correct name label X3= x axis with correct unit label S= scale fills graph paper P=points correctly plotted J= points correctly joined ID= independent and dependent around correct way With 10-11 correct	3
7-10 correct	2
1-6 correct	1

Sample answer



Marker's comments: This question was generally done well. Mistakes were varied. Students are reminded to revise the rules for drawing graphs.

21. (b) Marking Guidelines

Marking Criteria	Marks
<ul style="list-style-type: none"> Two features noted 	2
<ul style="list-style-type: none"> One feature noted 	1

Sample answer

As the cube side length increases the time taken for the cube to be completely penetrated by acid increases at an ever increasing rate.

Marker's comments: This question was not done well. Almost all students noted that as cube side length increases the time taken increases also but very few noted the ever increasing rate shown.

21. (c) Marking Guidelines

Marking Criteria	Marks
<ul style="list-style-type: none"> Makes a correct statement about SA:V ratio and the size of a cell and uses this to explain why there is a maximum size that a cell can grow to (diffusion of materials in and out of cell). 	2
<ul style="list-style-type: none"> One of the above 	1

Sample answer

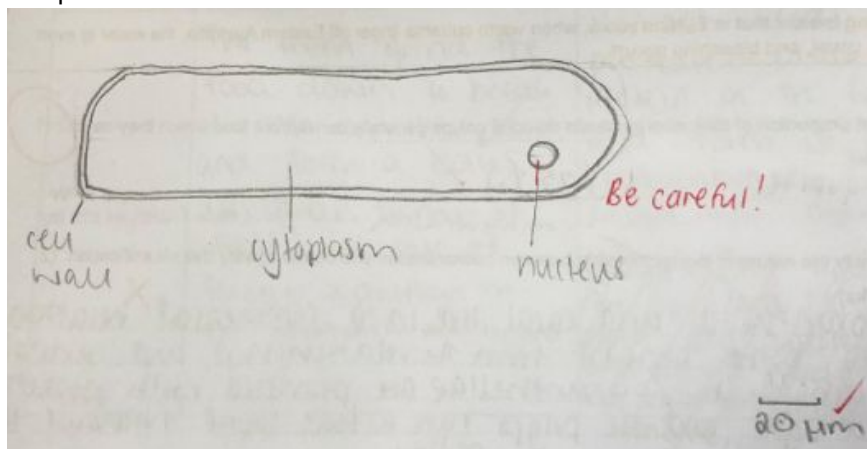
The amount of materials required by a cell is a function of the volume of the cell, while the amount of materials that a cell can take in or expel is a function of its surface area. As a cell increases in size its volume increases at a much greater rate than its surface area does, meaning that the larger the cell becomes the less able it is to supply its own needs. This puts an upper limit on cell size. Cells have to divide once they reach a certain size, otherwise they can't take in enough materials to satisfy their needs.

Marker's comments: Most student's only received one mark for this question. Many responses could not correctly describe the relationship between SA:V and the size of a cell. The majority of students incorrectly suggested that a larger SA:V ratio increased the rate of diffusion (remember our cubes! all cubes had the same depth of colour change). Many students described the relationship between SA:V and the size of a cell but then did not explain why this limits the size cells can go to.

22 Marking Guidelines

Marking Criteria	Marks
Uses appropriate scale, both cell and nucleus drawn to scale, scale labelled on diagram, correctly labelled biological diagram and looks like given cells	4
Uses appropriate scale, onion cell and nucleus drawn to scale, scale labelled on diagram, unlabeled biological diagram OR Uses appropriate scale, onion cell OR nucleus drawn to scale, scale labelled on diagram, labeled biological diagram	3
Uses appropriate scale, onion cell OR nucleus drawn to scale, scale labelled on diagram, unlabeled biological diagram	2
Uses appropriate scale, onion cell OR nucleus drawn to scale, unlabeled biological diagram	1

Sample answer



Marker's comments: As the question focused on drawing a scaled diagram, marks were given in favour of this in the criteria. Most students correctly drew an onion cell to scale although many then did not use that scale to draw the nucleus of the cell. Some students drew too many cells or not the cells observed in the picture and they were penalised for this.

23. (a) Marking Guidelines

Marking Criteria	Marks
<ul style="list-style-type: none"> Correct answer 	1

Sample answer

25%

Marker's comments: Well done by most.

23. (b) Marking Guidelines

Marking Criteria	Marks
<ul style="list-style-type: none"> Relationship identified Justification given 	2
<ul style="list-style-type: none"> Relationship identified 	1

Sample answer

Mutualism. Both organisms benefit – the alga receives protection and the polyp receives energy.

Marker’s comments: Also well done.

23. (c) Marking Guidelines

Marking Criteria	Marks
<ul style="list-style-type: none"> Opinion given Opinion justified in terms of natural selection – variation, differential survival, inheritance of favourable traits, stated or implied. 	3
<ul style="list-style-type: none"> The above done less well. 	2
<ul style="list-style-type: none"> Opinion given 	1

Sample answer

This may illustrate an evolutionary change. The coral polyps which survived presumably possessed a genetic variation which made them better able to survive the heat. As they reproduce they will pass this on to their offspring. In this way, in response to the selecting pressure of high temperatures, more heat resistant corals might evolve.

(A contrary answer, arguing that since the polyps in a colony are all the product of asexual reproduction, and suggesting that the differential survival must therefore be due to chance environmental factors, and therefore not heritable, is also acceptable.)

Marker’ comment - Most students provided an opinion about the ability of these new colonies to possibly survive future bleaching events justifying their answer with understanding of the process of evolutionary change and natural selection.

24. Marking Guidelines

Marking Criteria	Marks
Correctly completes table distinguishing between physical digestion and chemical digestion	4
Partially correctly completes table distinguishing between physical digestion and chemical digestion	1-3

Sample answer

Feature	Physical Digestion	Chemical Digestion
Example of a location where it occurs	Mouth	Stomach
What happens at this location	Teeth chew up food particles into smaller particles	Protein digestion by protease/pepsin into shorter polypeptide chains

Marker’ comment Most students could locate areas in the digestive system of physical and chemical digestion and understood the difference between these processes. Several students showed they only had a general knowledge of chemical digestion and did not relate a particular digestive enzyme to the organic compound on which it acted and where it acted.

25. Marking Guidelines

Criteria	Marks
<ul style="list-style-type: none"> Defines convergent evolution Describes in detail 1 example to explain convergent evolution 	3
<ul style="list-style-type: none"> Defines convergent evolution Outlines 1 example 	2
<ul style="list-style-type: none"> Defines convergent evolution OR outlines 1 example 	1

Sample answer

Sharks, dolphins and the fossils record of ichthyosaurus displaying similar features can be described through convergent evolution. Although coming from different animal groups their similar features suggest that they lived

in a similar environment, in this case an aquatic environment. The selection pressures of their respective environments appeared to be comparable and favour similar features and characteristics, resulting in each animal exhibiting these similar features and characteristics.

NB Do NOT use 'organism' in definition of convergence - individuals do not evolve

Marker' comment Most students can define and distinguish between punctuated equilibrium and gradualism. Though some students referred to evolution of individuals rather than species or populations.

26. Marking Guidelines

Criteria	Marks
<ul style="list-style-type: none"> ● Explain why the sources were reliable and valid <ul style="list-style-type: none"> - Reliable -This means that if your information is current, written by an expert in the area you are investigating, without bias and is in a reputable publication, then your information could be considered reliable AND/OR information similar to several trustworthy sources - A source is valid if the information relates to the problem or hypothesis being investigated AND/OR had evidence supporting contents eg first-hand expt with collection of data 	3
<ul style="list-style-type: none"> ● Gives 2 points 	2
<ul style="list-style-type: none"> ● Attempts to discuss reliability OR validity 	1

Sample answer

The sources used to show how an accumulation of microevolutionary changes drove the evolution of the horse and the evolution of the platypus were valid because they had evidence supporting their contents. eg references to experimental data (valid first-hand investigations) with collection of fossil data.

The sources used were reliable as they were taken from sources that were trustworthy that had a trustworthy author, information which is similar to that published by other trustworthy authors. (ie to help establish the validity of a source, it was compared with other trustworthy sources), current and written by experts in the area of evolution, natural selection. The sources chosen were also written without bias and published in reputable publications, websites or other media sources.

Marker' comment - Most students understand how to determine validity and reliability of secondary sources.

27. Marking Guidelines

Criteria	Marks
<ul style="list-style-type: none"> ● Explains how punctuated equilibrium is different from the gradual process of natural selection 	2
<ul style="list-style-type: none"> ● Describes either punctuated equilibrium OR gradualism 	2

Sample answer

Punctuated equilibrium is evolutionary development with isolated episodes of rapid speciation between long periods of little or no change while gradualism is small changes over each generation that lead to the evolution of a new species.

Marker' comment Most students can correctly distinguish between punctuated equilibrium and gradualism.

28. Marking Guidelines

Criteria	Marks
Names a specific human activity Identifies how activity has impacted an ecosystem Identifies practice to restore damaged ecosystem Explains how practice restored ecosystem	5
Names a specific human activity Identifies how activity has impacted an ecosystem Identifies practice to restore damaged ecosystem Partially explains how practice restored ecosystem	4
Names a specific human activity	2-3

Identifies how activity has impacted an ecosystem	
Identifies practice to restore damaged ecosystem	
Attempts to explain how human activity damages/restores an ecosystem	1

Sample answer

Mining is a process which causes considerable damage to ecosystems. It has been known to cause erosion, decrease biodiversity and contaminate the soil and surrounding water. Australian law requires that mining companies minimise their environmental impact and as a result they must restore the site after the mine is closed. This type of restoration is known as rehabilitation and aims to recreate a sustainable ecosystem that links in with the surrounding area and intends the land and water to be once again produce commodities.

The rehabilitation process is significantly impacted by the type of mine it was, the geochemistry of the area as well as the physical aspects of the mine such as its location. However, there are a number of processes that all mines require if they are to be rehabilitated and they include:

- * The removal and the cleaning up of any contaminants. Contaminants and wastes products from the operation are contained or removed. This prevents toxic chemicals leeching into the environment.
- * Land form must be reconstructed. The landforms must be stabilised and reconstructed to minimise erosion and provide proper drainage. The Murrin Murrin Nickle operation in north-west Western Australia was able to successfully revegetate the ecosystem as well as constructing a stable concave slop profile.
- * It is essential to regenerate the soil. After the land forms are stabilised the soil must restored to allow plant growth.
- * Revegetation occurs after the regeneration of the soil. This allows a successful ecosystem to be established and one that will continue to grow, develop and reproduce.
- * Once a successional plant community is establish this enable fauna to be brought back into the environment.

An example of a success rehabilitation of a mining site that included the processes above occurred at the Wattle Dam mine near Kambalda, Western Australia. A gypsum treatment for the underlying waste was undertaken before fertilisation of topsoil occurred. The elimination of raised banks to avoid erosion and the placement of tree debris to control erosion took place before revegetation occurred.

Marker' comment - Most students could identify a human activity, describe how it affected an ecosystem and then explain strategies that were used to restore the ecosystem and the effects of these strategies