



BOARD OF STUDIES
NEW SOUTH WALES

2004 SCHOOL CERTIFICATE TEST

General Test Instructions

- Total marks: 100
- Reading time: 10 minutes
- Working time: $1\frac{1}{2}$ hours
- Write using black or blue pen
- You may use a pencil to draw or complete diagrams
- Attempt ALL questions
- Write your Centre Number and Student Number at the top of pages 29, 33 and 37

Science

Section 1 Pages 2–22

50 marks

Questions 1–50

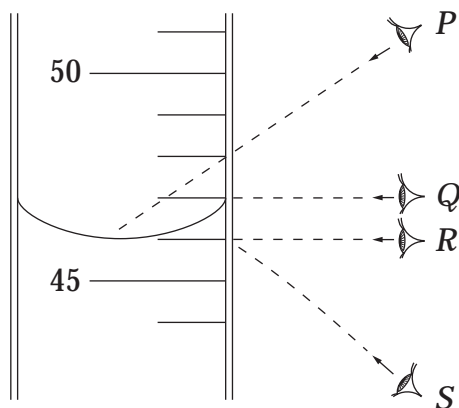
Section 2 Pages 25–38

50 marks

This section has FOUR parts

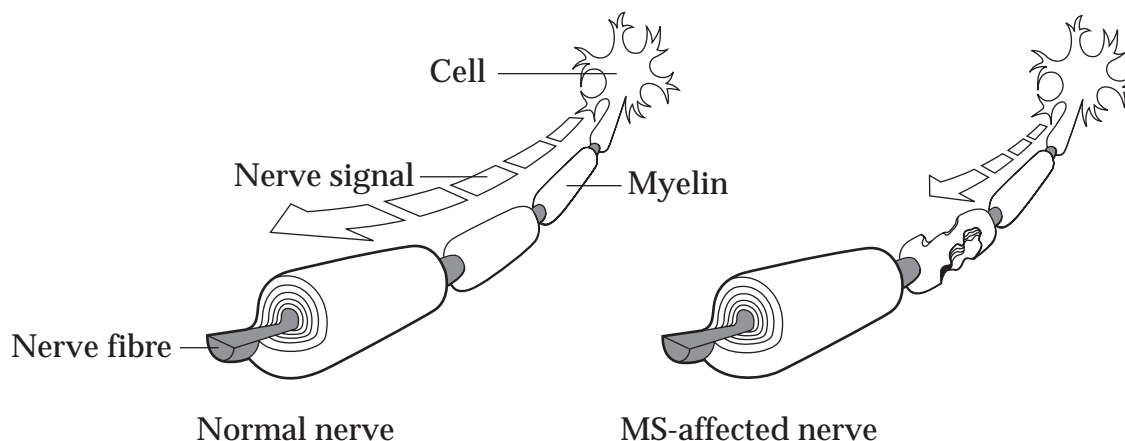
Part A	– 10 marks	Questions 51–60
Part B	– 14 marks	Questions 61–63
Part C	– 14 marks	Questions 64–65
Part D	– 12 marks	Questions 66–67

- 1 Which of the following is an example of an abiotic feature of an environment?
- (A) Air
(B) Fungus
(C) Human
(D) Plant
- 2 The diagram shows liquid in a measuring cylinder.



- From which position should the reading be taken to give the most accurate volume of the liquid?
- (A) *P*
(B) *Q*
(C) *R*
(D) *S*
- 3 Which of the following environments is best for fossil formation?
- (A) Lava flow
(B) Exposed beach
(C) Base of cliff
(D) Muddy river mouth
- 4 What are the rows of the Periodic Table called?
- (A) Elements
(B) Families
(C) Groups
(D) Periods

- 5 Multiple sclerosis (MS) is a disease where the transmission of nerve signals through the body is disrupted.



From the diagram, what happens to a nerve when a person has MS?

- (A) The cell is enlarged.
 - (B) The myelin is damaged.
 - (C) The nerve fibre is damaged.
 - (D) The nerve signal travels in the opposite direction.
- 6 Scientists have developed a new model to explain the way a human body responds to a non-infectious disease.

What would scientists do to verify this new model?

- (A) Compare the old model with the new one.
 - (B) Reject the old model and replace it with the new one.
 - (C) Make predictions using the new model and test them.
 - (D) Use the new model to research an infectious disease.
- 7 What are molecules of an element made of?
- (A) Atoms of the same element
 - (B) Atoms of two different elements
 - (C) Atoms of the same compound
 - (D) Atoms of two different compounds

Use the following information to answer Questions 8 and 9.

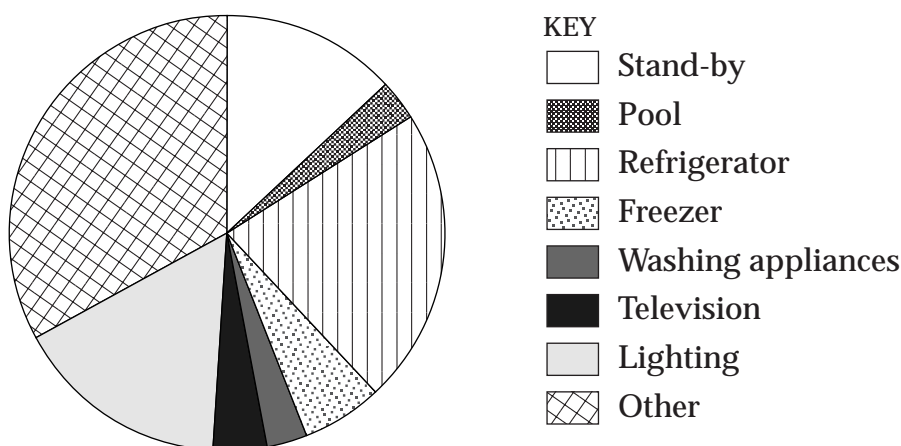
Phan and Erika carried out an experiment using a remote-controlled car travelling in a straight line. The table shows the students' experimental results.

<i>Time</i> (seconds)	<i>Total distance travelled</i> (metres)
0	0
10	10
20	15
30	20
40	25
50	25

- 8** Which of the following is the best piece of equipment to measure distance in this experiment?
- (A) Stopwatch
 - (B) 30 cm ruler
 - (C) Metre ruler
 - (D) 50 m tape measure
- 9** Phan and Erika used their results to calculate the speed of the car. What units should they use for speed?
- (A) Metres
 - (B) Metres per second
 - (C) Seconds
 - (D) Square metres
- 10** Which of the following releases large amounts of carbon dioxide into the atmosphere?
- (A) Evaporation of oceans
 - (B) Combustion of fossil fuels
 - (C) Generation of power by wind turbines
 - (D) Generation of power using nuclear energy

Use the graph to answer Questions 11 and 12.

The graph shows data about the use of electricity in Australian homes.



- 11 Which of the following uses the most electricity in Australian homes?
- (A) Freezer
 - (B) Lighting
 - (C) Stand-by
 - (D) Television
- 12 Approximately what percentage of electricity in Australian homes is used by refrigerators and freezers?
- (A) 10%
 - (B) 25%
 - (C) 60%
 - (D) 90%
- 13 The human body's coordination is controlled by the nervous and the hormonal systems. Which statement best describes how these systems work?
- (A) The nervous system and the hormonal system work independently of each other.
 - (B) The nervous system coordinates slow reactions and the hormonal system coordinates fast reactions.
 - (C) The nervous system and the hormonal system work together to make responses to the environment.
 - (D) The nervous system coordinates the body during the day and the hormonal system coordinates the body during the night.

Use the table to answer Questions 14 and 15.

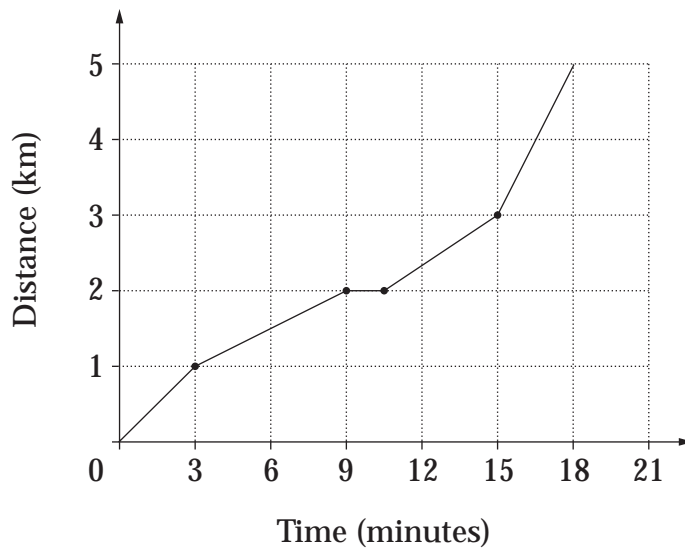
The table shows data about various cancers in Australia in 1983 and 1997.

<i>Type of cancer</i>	<i>New cases</i>		<i>Related deaths</i>	
	<i>1983</i>	<i>1997</i>	<i>1983</i>	<i>1997</i>
Melanoma	3 779	8 378	627	913
Colon	7 201	11 240	2 788	3 542
Breast	5 389	10 181	2 033	2 602
Lung	6 090	7 833	5 405	6 663
Leukaemia	1 476	2 026	959	1 216
Prostate	3 714	9 737	1 394	2 448
Gynaecological	2 982	3 638	1 197	1 314

- 14 Which type of cancer had most *Related deaths* in 1997?
- (A) Breast
(B) Gynaecological
(C) Lung
(D) Prostate
- 15 Comparing 1983 to 1997, which type of cancer had the greatest increase in *New cases*?
- (A) Breast
(B) Colon
(C) Lung
(D) Prostate
- 16 Which statement best describes the current scientific explanation for the cause of earthquakes?
- (A) Earth's crust is made of large plates that move against each other.
(B) Chemical reactions inside Earth make gases that push up Earth's surface.
(C) The Moon, Sun and planets cause gravitational forces that pull Earth's surface.
(D) Rocks in the lithosphere tend to sink, while rocks in the asthenosphere tend to rise.

Use the graph to answer Questions 17–19.

The graph represents Tristan's journey as he rode his bicycle from his house to his friend's house.



- 17 How far is it from Tristan's house to his friend's house?
- (A) 2 km
(B) 5 km
(C) 9 km
(D) 18 km
- 18 Tristan stopped for a rest during the ride. For how long did he stop?
- (A) 1 minute
(B) 1.5 minutes
(C) 2 minutes
(D) 9 minutes
- 19 Between which times was Tristan travelling fastest?
- (A) 0–9 minutes
(B) 9–10.5 minutes
(C) 10.5–15 minutes
(D) 15–18 minutes

20 What is the chemical formula for sulfuric acid?

- (A) H_2SO_4
- (B) HS_4O
- (C) H_4SO_2
- (D) $\text{HS}(\text{OH})_4$

Use this information to answer Questions 21 and 22.



21 What does X represent in this equation?

- (A) carbon dioxide
- (B) calcium sulfate
- (C) hydrogen
- (D) sulfuric hydroxide

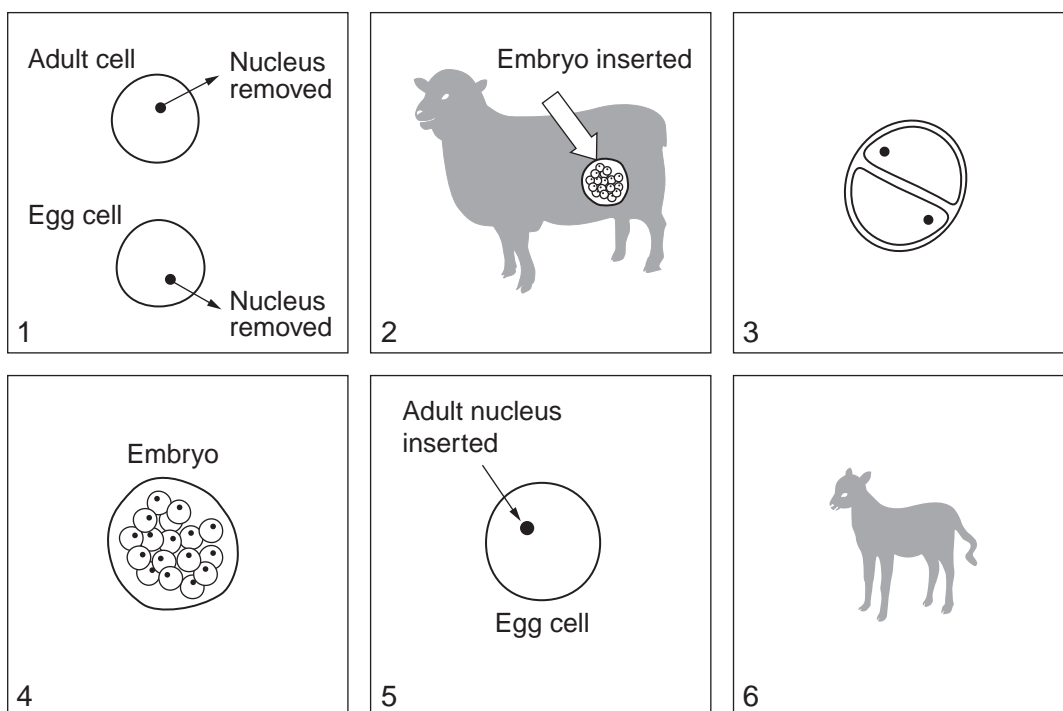
22 What is the name of this type of chemical reaction?

- (A) Combustion
- (B) Corrosion
- (C) Decomposition
- (D) Neutralisation

23 Why does the human body need to protect itself from diseases?

- (A) Diseases cause evolutionary change.
- (B) Infectious diseases always enter the body through the skin.
- (C) Diseases disrupt the normal functioning of a person's body.
- (D) All non-infectious diseases can be passed easily from one person to another person.

24 The six diagrams show a reproductive process. They are not in the correct order.

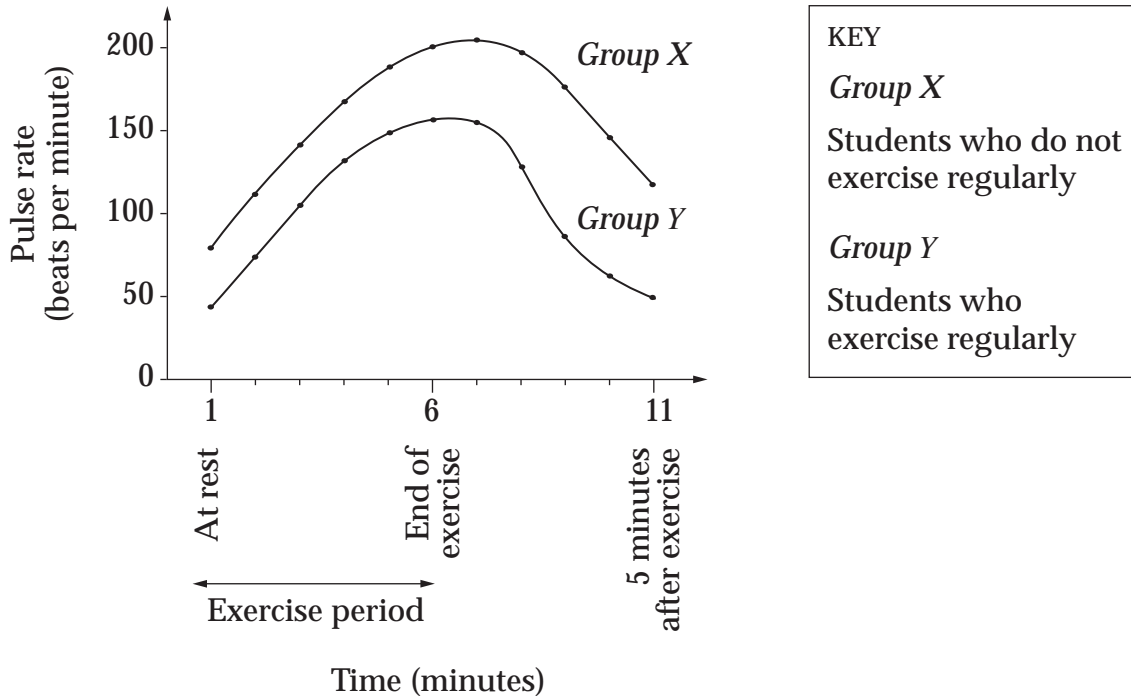


Which choice shows the correct sequence for this process?

- (A) 1 → 2 → 4 → 5 → 3 → 6
 - (B) 1 → 3 → 2 → 5 → 4 → 6
 - (C) 1 → 2 → 4 → 3 → 5 → 6
 - (D) 1 → 5 → 3 → 4 → 2 → 6
- 25 Which of the following is usually a feature of a reliable experimental design?
- (A) A large sample size is used.
 - (B) Only one variable is kept the same.
 - (C) The procedure cannot be copied by other scientists.
 - (D) There are many variables which are not kept the same.

Use the following information to answer Questions 26 and 27.

The graph shows the results from an experiment to see the effect of exercise on pulse rates.



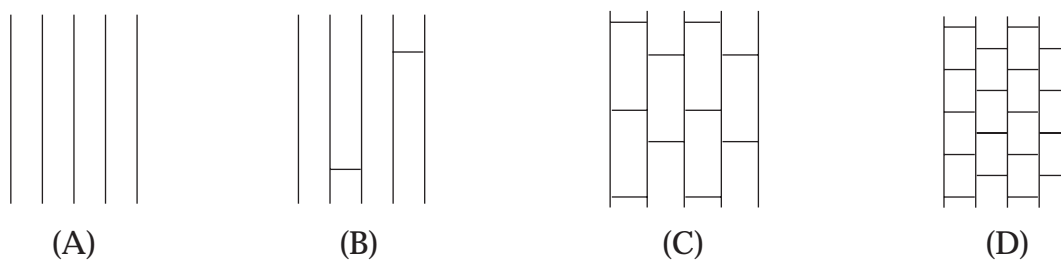
- 26** What is one trend in these results?
- (A) Pulse rates increased throughout the experiment.
 (B) Pulse rates decreased throughout the experiment.
 (C) Pulse rates remained constant throughout the experiment.
 (D) Pulse rates increased, then decreased, during the experiment.
- 27** What conclusion about the students in this experiment can be drawn from these results?
- (A) Regular exercise lowers pulse rate.
 (B) Regular exercise has no effect on pulse rate.
 (C) People who do regular exercise have a higher pulse rate.
 (D) People who do not regularly exercise have a lower pulse rate.

Use this information to answer Questions 28–30.

The table shows some properties of three types of polymers.

<i>Polymer</i>	<i>Properties</i>
Thermoplastic	<ul style="list-style-type: none"> softens when heated small amounts of linking between strands of polymer permanently changes shape when stretched
Elastomer	<ul style="list-style-type: none"> returns quickly to original shape after stretching moderate amounts of linking between strands of polymer
Thermosetting	<ul style="list-style-type: none"> large amounts of linking between strands of polymer does not soften when heated

28 Which diagram best represents the structure of a thermoplastic polymer?



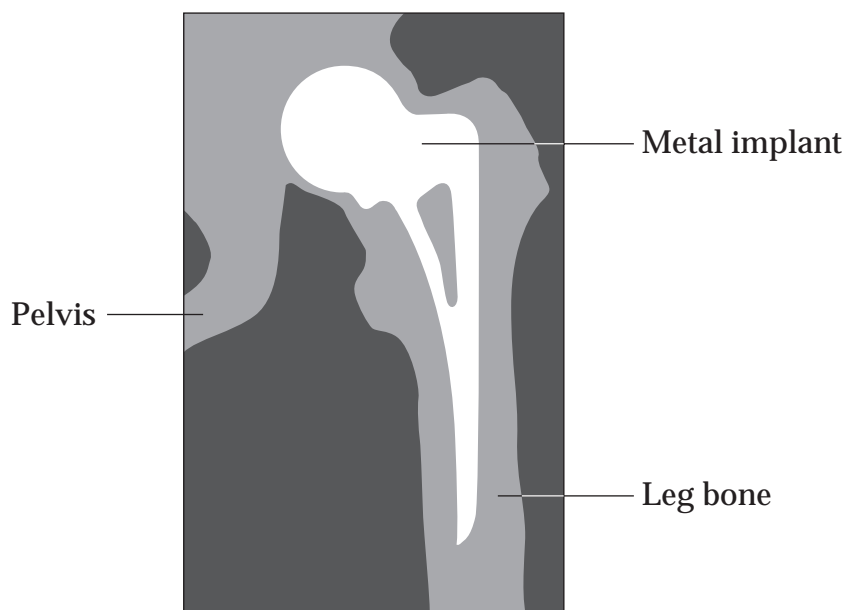
29 Four polymer samples were tested in a laboratory. Which sample is made from an elastomer?

	<i>Placed in hot water</i>	<i>After stretching</i>
(A)	no change	broken
(B)	bends	becomes longer
(C)	no change	becomes longer
(D)	no change	no change

30 What would be a suitable use for thermosetting polymers?

- (A) Garden hose
 (B) Mouthguard
 (C) Saucepan handle
 (D) Shrink-wrap packaging

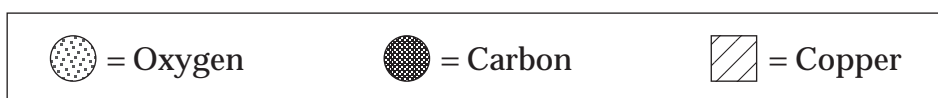
- 31 The diagram shows an X-ray photograph of a metal implant in a hip joint.



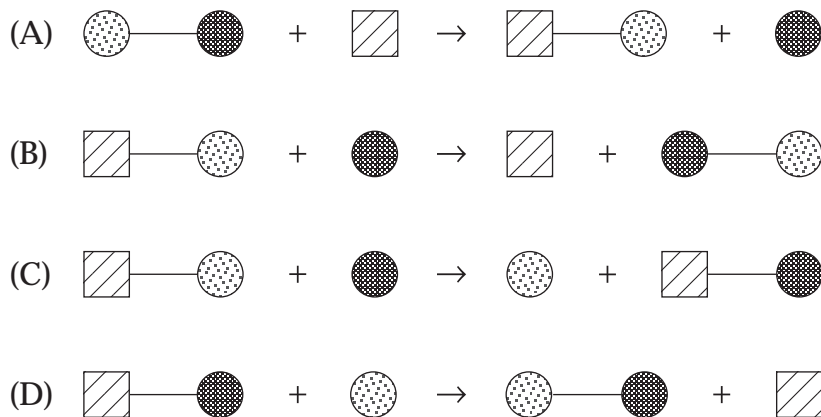
Why can we see the implant on the X-ray photograph?

- (A) X-rays are blocked by the implant.
 - (B) X-rays make the implant radioactive.
 - (C) X-rays can pass through tissue, bone and the implant.
 - (D) X-rays are a low-energy form of electromagnetic energy.
- 32 Which elements of the Periodic Table are the most similar in their properties?
- (A) Elements that are gases
 - (B) Elements across the same row
 - (C) Elements down the same column
 - (D) Elements with atomic numbers less than 20

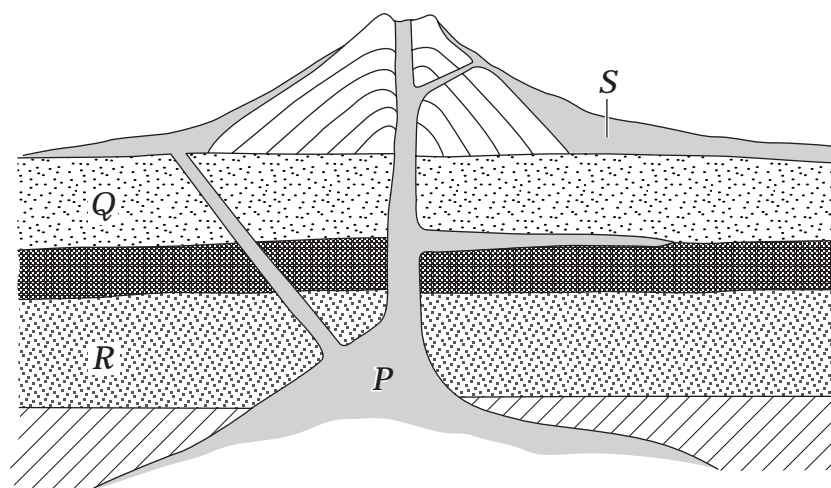
- 33 Under certain conditions, when copper oxide is heated with carbon, the copper oxide will lose oxygen and copper will be formed. The oxygen will combine with the carbon to form carbon monoxide.



Which set of diagrams represents this reaction?



- 34 The diagram shows a geological cross-section of an area.



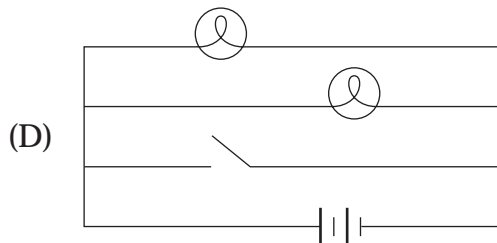
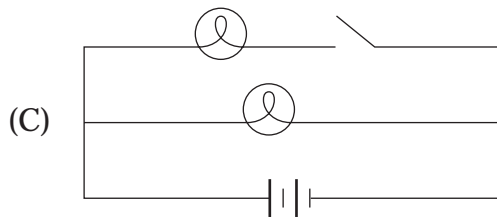
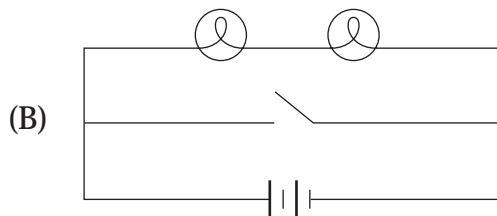
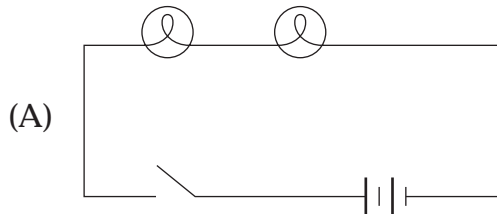
Which of the labelled rocks is the oldest?

- (A) *P*
 (B) *Q*
 (C) *R*
 (D) *S*

35 Delta set up a circuit that consisted of:

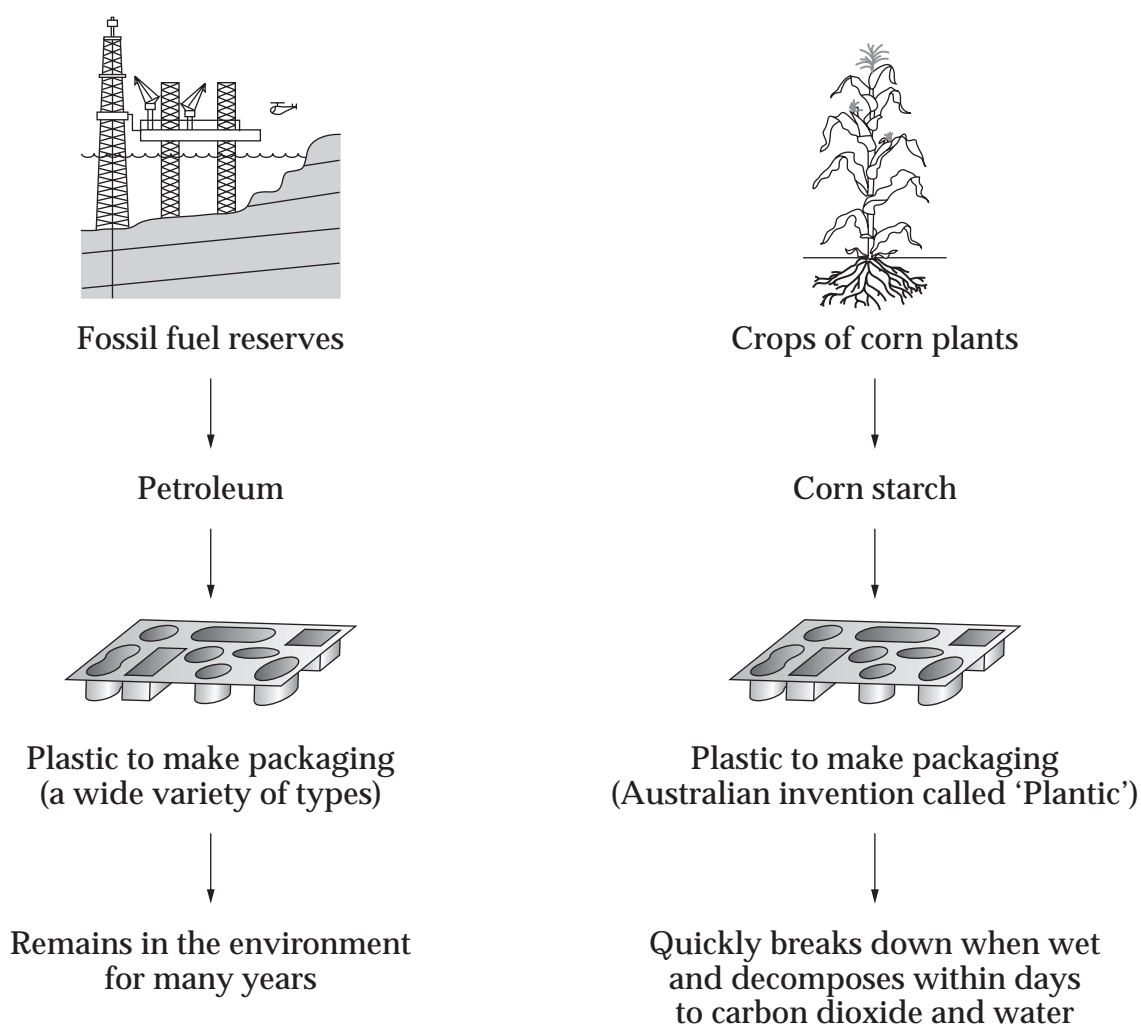
- a power source
- two globes connected in parallel
- a switch connected in series with one light globe.

Which of the following circuit diagrams represents her circuit?



Use this diagram to answer Questions 36–38.

The diagram shows two alternative ways to produce plastic used for packaging.



36 What is 'Plantic'?

- (A) A type of plant
- (B) The plastic made from petroleum
- (C) The plastic used for all packaging trays
- (D) A plastic invented by Australian scientists

- 37 Which substances can be used to make plastic packaging?
- (A) Corn starch and petroleum
 - (B) Fossils and corn starch
 - (C) Oil rigs and corn plants
 - (D) Petroleum and crops
- 38 What is one benefit of inventing 'Plantic'?
- (A) Plantic will increase the use of fossil fuels.
 - (B) Plantic is made from a renewable resource.
 - (C) Plantic can last in the environment for many years.
 - (D) Plantic does not add any carbon dioxide to the atmosphere.

39

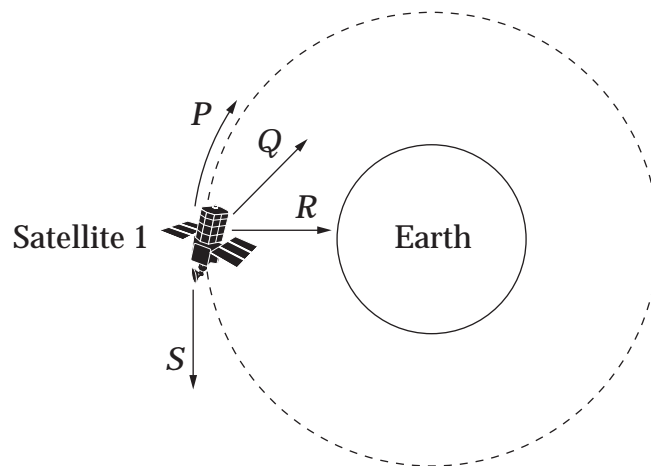
Organs treated outside the body

Doctors have recently used a new technique for treating cancer. The surgery involves removing the diseased organ, treating it with radiotherapy and then re-implanting the organ into the patient. This type of operation has allowed doctors to treat the organ with high doses of radiation, without harming other organs.

What would be an advantage of this new technique?

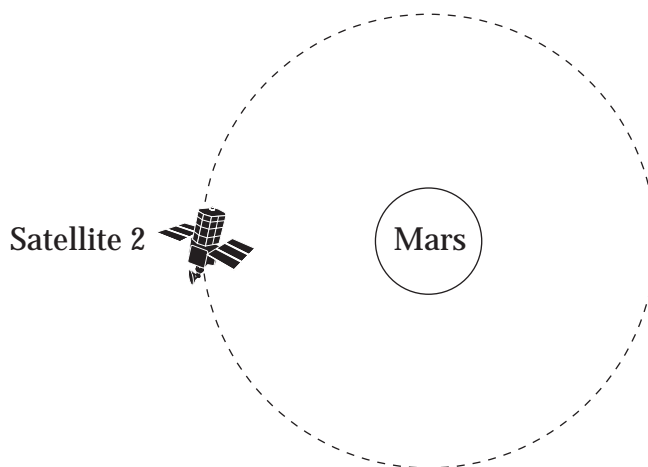
- (A) Surgery is not required to cure cancer.
- (B) Complete recovery of the patient is guaranteed.
- (C) All types of cancers can be cured using this treatment.
- (D) Higher doses of radiation can be used to kill the cancer.

Use the diagram to answer Questions 40–43.



- 40 Which arrow, *P*, *Q*, *R* or *S*, shows the direction of the force of gravity on Satellite 1?
- (A) *P*
(B) *Q*
(C) *R*
(D) *S*
- 41 Which of the following does NOT affect the size of the force of gravity on Satellite 1?
- (A) Mass of Earth
(B) Mass of Satellite 1
(C) Distance between Earth and Satellite 1
(D) Speed at which Satellite 1 is travelling

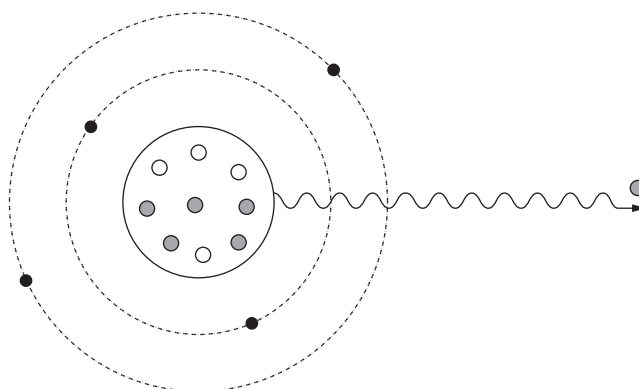
- 42 An identical satellite is orbiting Mars. Both satellites are the same distance from the centre of the planet that they orbit. Mars has a mass that is approximately 10% of Earth's mass.



- Which statement correctly compares the force of gravity on the two satellites?
- (A) The force on Satellite 2 is equal to the force on Satellite 1.
 - (B) The force on Satellite 2 is larger than the force on Satellite 1.
 - (C) There is no force on Satellite 2 but a large force on Satellite 1.
 - (D) The force on Satellite 2 is smaller than the force on Satellite 1.
- 43 Which statement about mass and weight is correct?
- (A) Your mass would be the same on Earth and Mars.
 - (B) Your weight would be the same on Earth and Mars.
 - (C) Your mass would be less on Mars than on Earth.
 - (D) Your weight would be more on Mars than on Earth.

Use the diagram to answer Questions 44 and 45.

The diagram represents a neutral atom with a subatomic particle being released.



44 What type of particle has been released?

- (A) Electron
- (B) Neutron
- (C) Nucleus
- (D) Proton

45 As the subatomic particle is released, it has kinetic energy.

What was the original form of this energy?

- (A) Gravitational
- (B) Light
- (C) Nuclear
- (D) Sound

46 Harry hit a cricket ball with a force of 10 newtons. What was the force of the ball on the bat?

	<i>Size of force (newtons)</i>	<i>Direction of force</i>
(A)	10	away from bat
(B)	10	towards bat
(C)	Greater than 10	away from bat
(D)	Greater than 10	towards bat

- 47 Chris wished to investigate the effects of nutrient *N* on plant growth. She set up the following pots for her experiment.

<i>Pot</i>	<i>Contents</i>	
1	10 grass seeds	no nutrient <i>N</i>
2	10 radish seeds	no nutrient <i>N</i>
3	1 grass seed	nutrient <i>N</i>
4	1 radish seed	nutrient <i>N</i>
5	1 grass seed	no nutrient <i>N</i>
6	1 radish seed	no nutrient <i>N</i>
7	10 grass seeds	nutrient <i>N</i>

Which of the following groups of pots should Chris have used to get the most valid results?

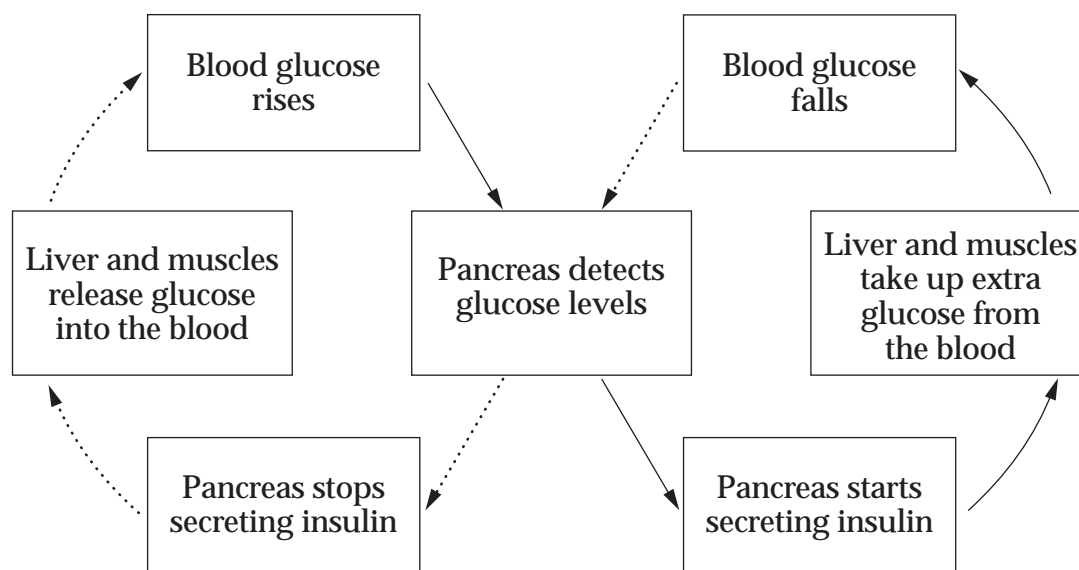
- (A) Pots 1 and 7
(B) Pots 2 and 7
(C) Pots 2, 4 and 6
(D) Pots 3, 4, 5, 6
- 48 How will the current in an electric circuit be affected if the resistance remains constant but the voltage is increased?
- (A) The current will increase.
(B) The current will decrease.
(C) The current will change direction.
(D) The current will remain unchanged.

49 Helium is a gas that is very stable and chemically inactive.

What feature of helium makes it inactive?

- (A) Size of protons
- (B) Number of neutrons
- (C) Location of protons
- (D) Arrangement of electrons

50 The diagram represents a process that occurs in the human body.



What happens when the pancreas detects a drop in blood glucose levels?

- (A) The pancreas starts secreting insulin.
- (B) The pancreas stops secreting insulin.
- (C) The liver and muscles remove glucose from the blood.
- (D) More glucose is produced by the pancreas.

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NEW SOUTH WALES

**2004
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TEST**

Science

Section 2 Pages 25–38

50 marks

This section has FOUR parts

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|-------------------|-----------------|
| Part A – 10 marks | Questions 51–60 |
| Part B – 14 marks | Questions 61–63 |
| Part C – 14 marks | Questions 64–65 |
| Part D – 12 marks | Questions 66–67 |

PART A

Questions 51–60 are worth 1 mark each.

Answer each question with ONE word or ONE number only.

Use the Section 2 Part A Answer Sheet for Questions 51–60.

Completing the boxes on the answer sheet

Write firmly and clearly. Your answer must be written from left to right. Use block letters for words. Numbers must be used for numerical answers. Decimal points and negative signs must be clearly shown in separate boxes. Do NOT let any part of the letter or number touch the sides of the answer boxes.

Sample 1: $-7 \div 2 =$

-	3	.	5		
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Sample 2: How many days are in a week?

7	
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 days

Sample 3: What is the fifth month?

M	A	Y			
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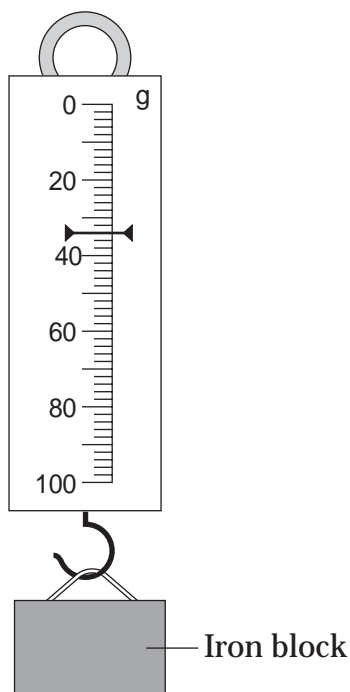
If you think you have made a mistake, put a line through the incorrect answer and write the correct one above the box.

M A Y

~~J U N E~~

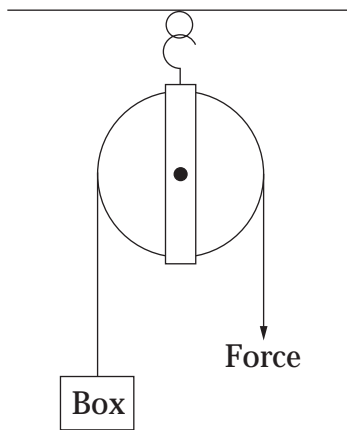
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- 51 In which step of a formal scientific report are observations and measurements recorded?
- 52 What is the scientific term that describes the currents that cause the movement of the crustal plates?
- 53 What is the mass, in grams, of the iron block?



- 54 Name the thread-like structures containing DNA that are found in the nucleus of most cells.
- 55 What term is used to describe the number of waves passing a certain point in each second?
- 56 What scientific term describes contamination of an environment by unwanted substances?
- 57 What type of chemical reaction is the rusting of iron?

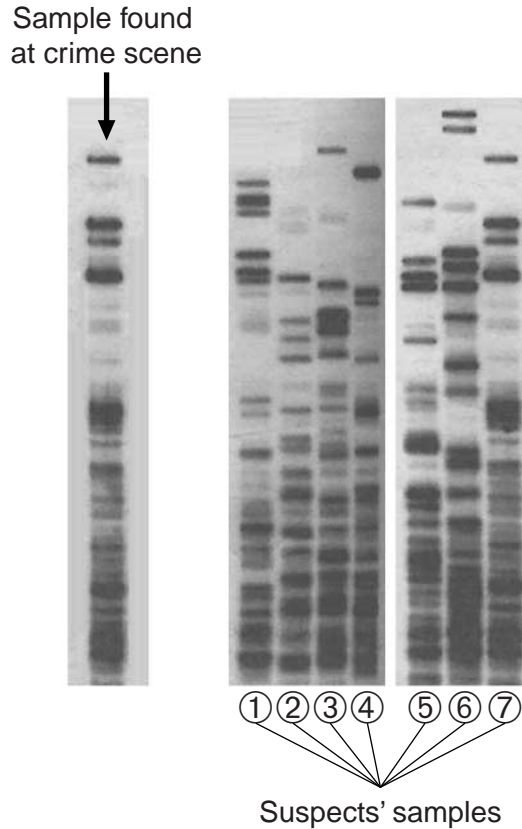
58 Name the type of simple machine shown in the diagram.



59 We see words on a page because light bounces off the page. What property of light is responsible for this?

60 DNA fingerprinting can be used to identify a suspect in a crime.

The diagram shows a DNA pattern found at a crime scene. Which suspect's sample matches the sample found at the crime scene?



Section 2 (continued)

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PART B

Centre Number

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Student Number

Answer the questions in the spaces provided.

Marks

Question 61 (6 marks)

Melissa suggested that coffee in plastic cups stays hot longer than thick tomato soup in plastic cups.

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Plan a safe experiment to test this idea.

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Marks

Question 62 (4 marks)

Construct a table to show which of the following reproductive organs are female and which are male:

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ovary, urethra, Fallopian tube, cervix, testis, prostate gland, vagina.

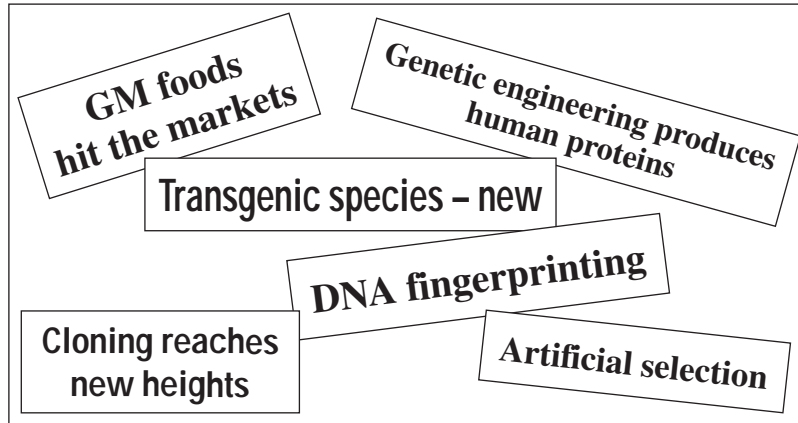
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Marks

Question 63 (4 marks)

The diagram shows some newspaper headlines related to biotechnology.

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Select ONE of these biotechnologies, or ONE you have studied in class.

Discuss TWO impacts of its use on society.

Type of biotechnology:

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Section 2 (continued)

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PART C

Centre Number

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Student Number

Answer the questions in the spaces provided.

Marks

Question 64 (7 marks)

- (a) A new power plant for generating electricity is to be built in a bushland area. **2**

Identify TWO potential impacts on the environment of building this new power plant.

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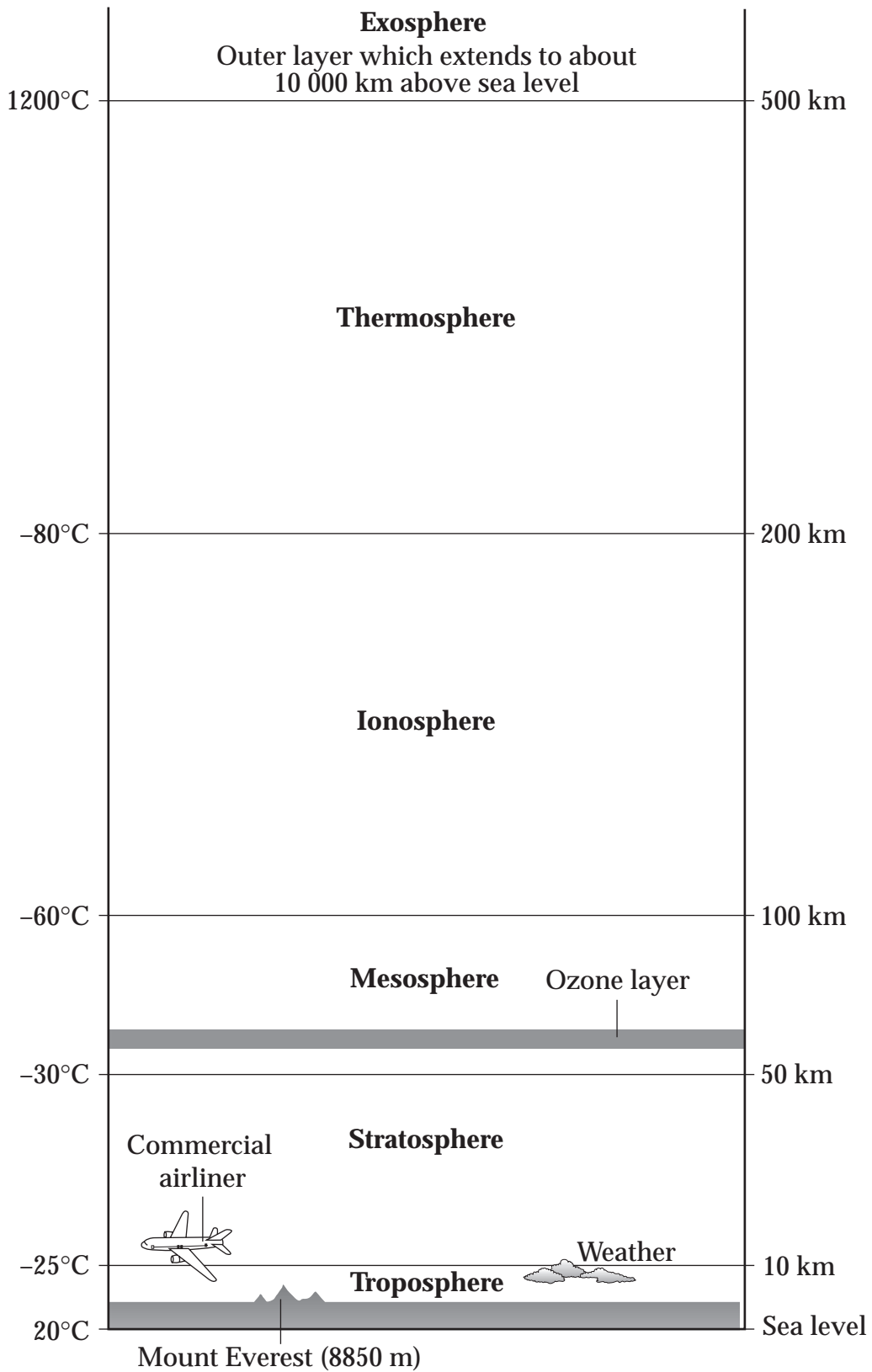
- (b) In Australia, most electricity is generated either by burning coal or by water flowing through a hydro-electric power plant. **5**

Discuss reasons that support the method of electricity generation you believe has LEAST impact on the environment.

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Question 65 (7 marks)

The diagram shows the layers of Earth's atmosphere. Not all parts of the diagram are drawn to scale.

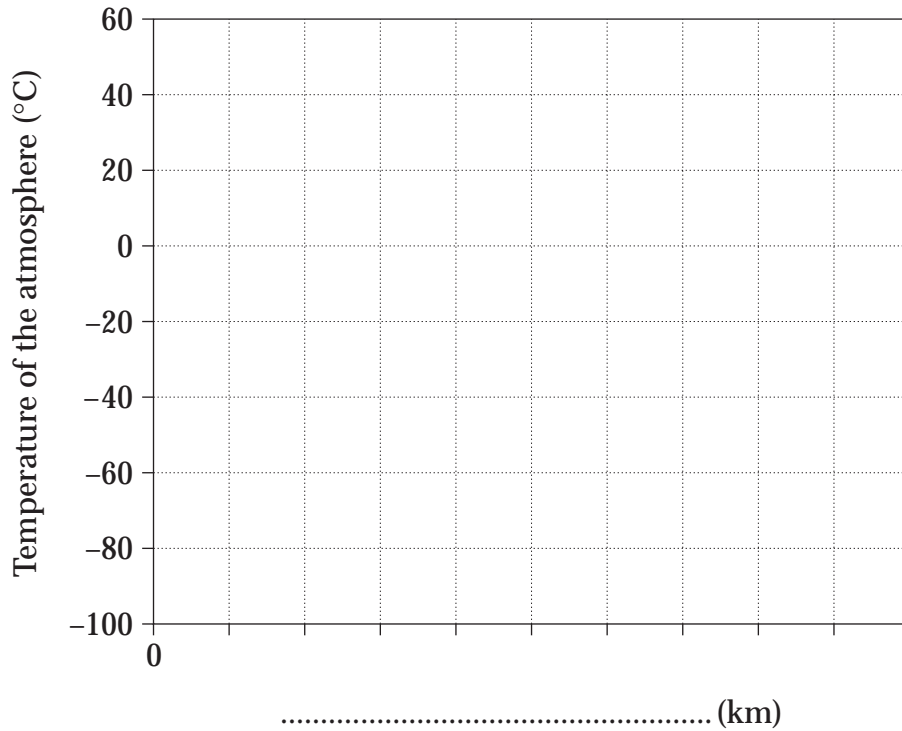


Question 65 continues on page 35

Marks

Question 65 (continued)

- (a) Using the information in the diagram, graph the temperature changes from sea level to the top of the ionosphere. 4



- (b) Using the information in the diagram, calculate the difference in temperature between 200 km and 500 km above sea level. 1

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- (c) In the diagram, the Mesosphere has been drawn to scale. Estimate the height of the ozone layer above sea level. 1

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- (d) Using the information in the diagram, suggest ONE reason why commercial aircraft fly mainly in the stratosphere. 1

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Section 2 (continued)

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PART D

Centre Number

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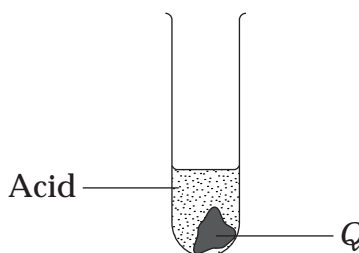
Student Number

Answer the questions in the spaces provided.

Marks

Question 66 (7 marks)

The diagram shows a test tube containing an acid. A piece of substance *Q* is added.



- (a) *Q* is a shiny-grey substance that can conduct electricity. What type of substance is *Q*? **1**

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- (b) (i) Identify ONE risk in this experiment. **1**

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- (ii) Describe ONE safety precaution that would reduce this risk. **2**

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- (c) What are THREE observations that could be made when the acid begins to react with substance *Q*? **3**

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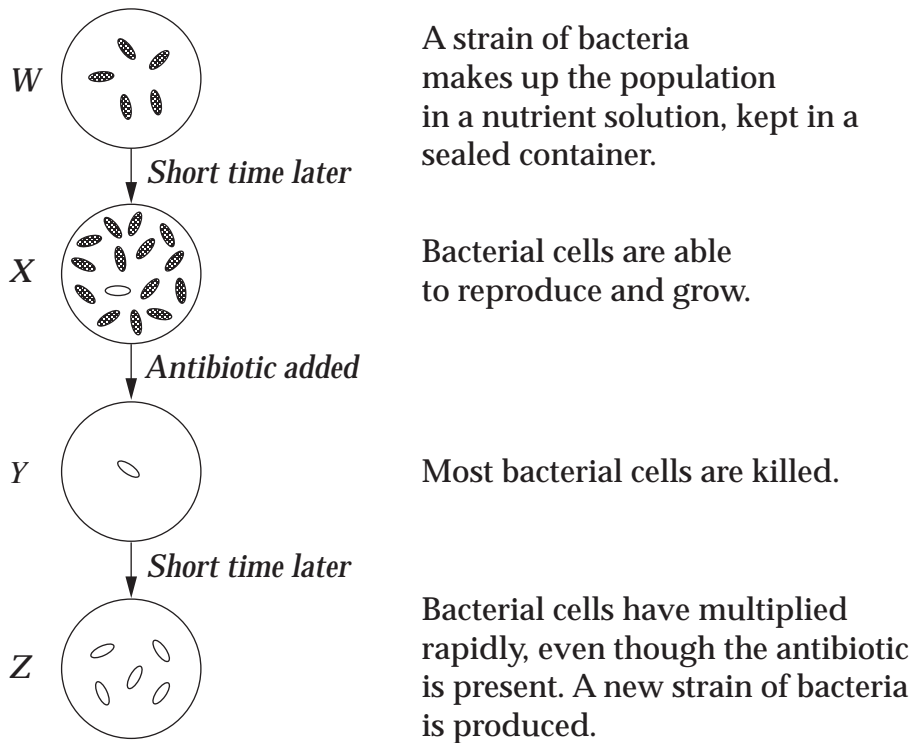
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Marks

Question 67 (5 marks)

(a) The diagram shows natural selection in a bacterial population.

3



Using the information in the diagram, explain how the process of natural selection has occurred.

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(b) DNA mutations can occur when an organism reproduces. Explain why such mutations may be an advantage for its survival.

2

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End of test