



HIGHER SCHOOL CERTIFICATE EXAMINATION

2000
SCIENCE FOR LIFE
2 UNIT

*Time allowed—Two hours
(Plus 5 minutes reading time)*

DIRECTIONS TO CANDIDATES

Section I—General

- Attempt ALL questions.
- **Part A** 10 multiple-choice questions, each worth 1 mark.
Complete your answers in either blue or black pen on the Answer Sheet provided.
- **Part B** 5 questions, each worth 3 marks.
Answer this Part in the Part B Answer Book.
- Write your Student Number and Centre Number on the cover of each Answer Book.
- You may keep this Question Book. Anything written in the Question Book will NOT be marked.

Section II—Modules

- Attempt THREE questions.
- Each question is worth 15 marks.
- Answer each question in a separate Module Answer Book.
- Write your Student Number and Centre Number on the cover of each Module Answer Book.
- Write the Course, Module Name, and Question Number on the cover of each Module Answer Book.
- You may ask for extra Answer Books if you need them.
- Board-approved calculators may be used.

SECTION I—GENERAL

(25 Marks)

PART A

Attempt ALL questions.

Each question is worth 1 mark.

Instructions for answering multiple-choice questions

- Complete your answers in either blue or black pen.
- 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

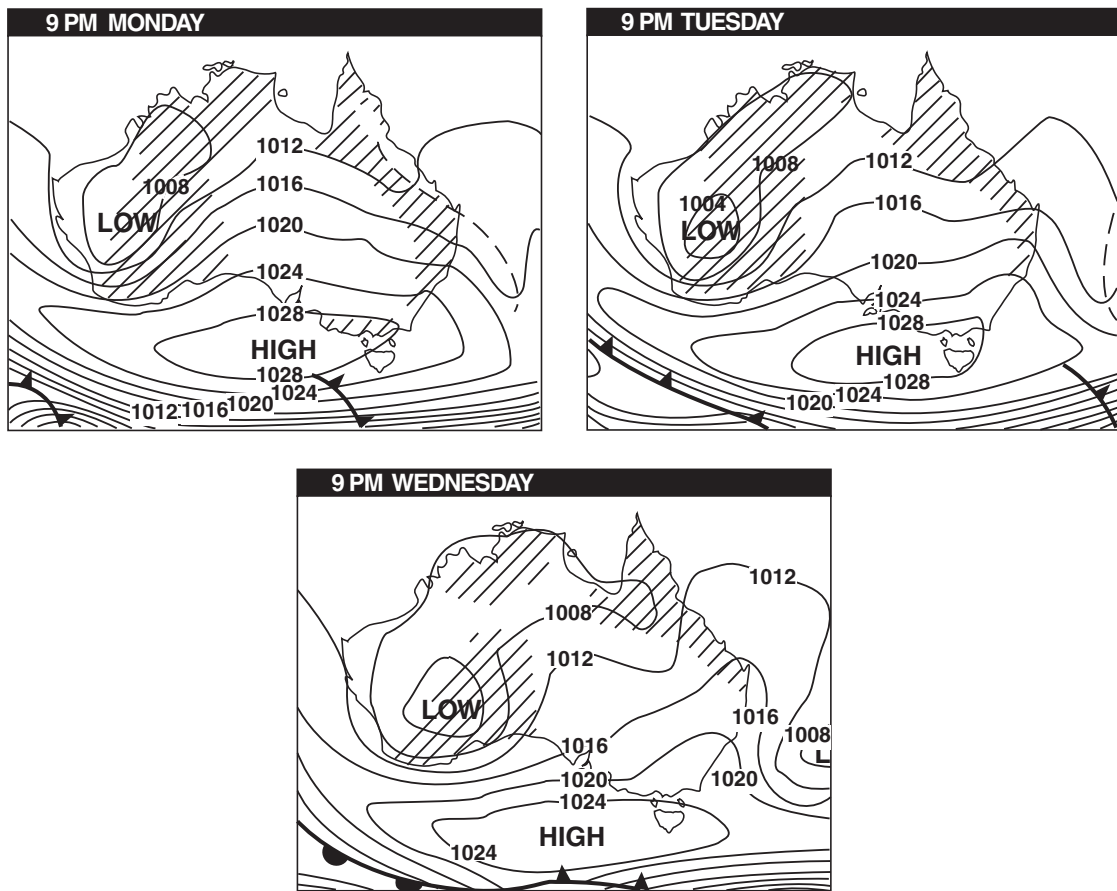
If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

A B C D

If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word **correct** and drawing an arrow as follows.

A B C D
correct ↖

- 1 Weather maps are used to give people information about the weather.

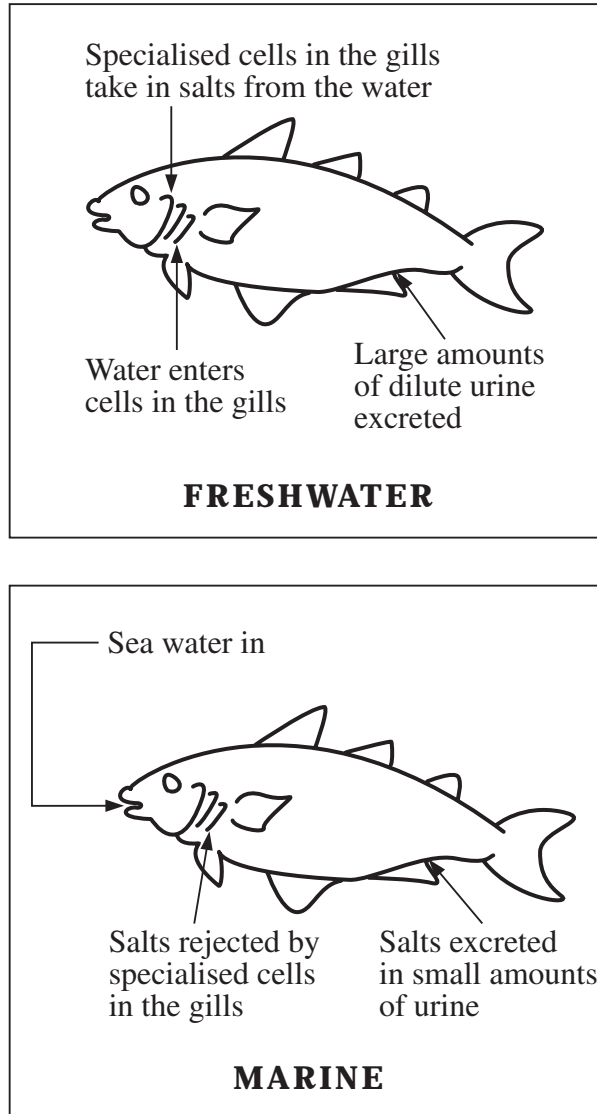


What is the best reason for showing the information in this way?

- (A) People can tell where they are on the map.
- (B) The symbols show how the information was collected.
- (C) The diagrams show scientific data in a simple form.
- (D) The maps allow people to predict Wednesday's temperature in Sydney.

- 2 Fish live in both freshwater and marine environments. The diagrams show several ways fish are able to survive in different environments.

COMPARISON OF WATER BALANCE IN
FRESHWATER AND MARINE ENVIRONMENTS

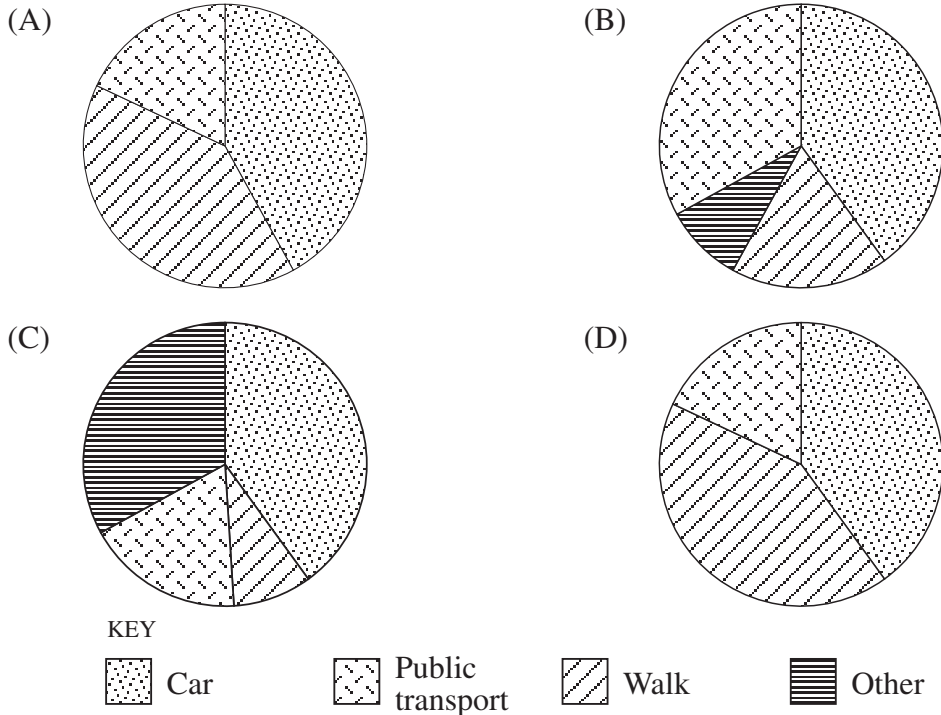


Which of the following is supported by the information in the diagram?

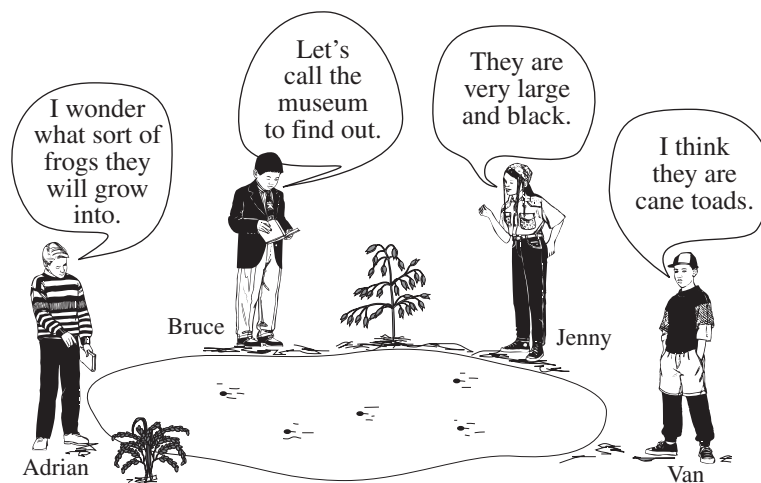
- (A) Freshwater fish drink large amounts of water.
- (B) Freshwater fish excrete small amounts of concentrated urine.
- (C) Marine fish have specialised gill cells, freshwater fish do not.
- (D) Marine fish excrete salts in small amounts of urine.

- 3 A group of people were surveyed to determine the most popular method of transport to and from work. The car was found to be the most popular method of transport, chosen by 40% of people. Eighteen in one hundred walked, while one-third chose public transport.

Which of the pie graphs shows this data?



- 4 Some tadpoles were found in a pond. The students collected some of the tadpoles.



Which of the students is making a hypothesis?

- (A) Adrian
 (B) Bruce
 (C) Jenny
 (D) Van

- 5 This information is about injuries suffered by children.

CHILDHOOD INJURIES

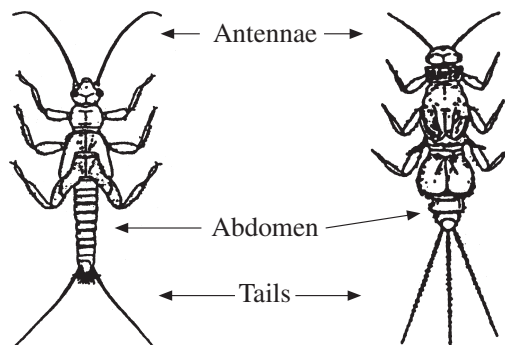
- One in twenty childhood injuries can be classified as a playground injury.
- Of these playground injuries, one in four results in a hospital admission.
- Three out of four childhood injuries involve a fall.
- Almost half the number of playground injuries result from a fall from a height of over one metre.
- A quarter of all childhood injuries occur at home.

Which of the following statements is supported by this information?

- (A) More than half the number of childhood injuries occur away from home.
- (B) One child in four who is injured has to go to hospital because of the injuries.
- (C) If a child falls more than one metre he or she will end up in hospital.
- (D) Five per cent of childhood injuries are a result of faulty playground equipment.
- 6 Natalie collected several small animals from her local creek.

She wanted to design a key to help her classmates identify the animals.

Which of the following questions would be most useful in determining the difference between these two animals?



- (A) How many tails does the animal have?
- (B) Does the animal have gills?
- (C) Does the animal have antennae?
- (D) How many pairs of legs does the animal have?

7

SOIL-SAVING SATELLITES

An Australian farmer has developed a navigation system which uses computers and satellites to help drive tractors, ploughs and headers.

This system allows for very precise driving that is more accurate than a driver could achieve without assistance. As a result, tractors do not compact as much soil beneath their tyres. Crops do not grow well in soil that has been compacted, and on most properties, 90 per cent of soil has been driven over by vehicles during a season.

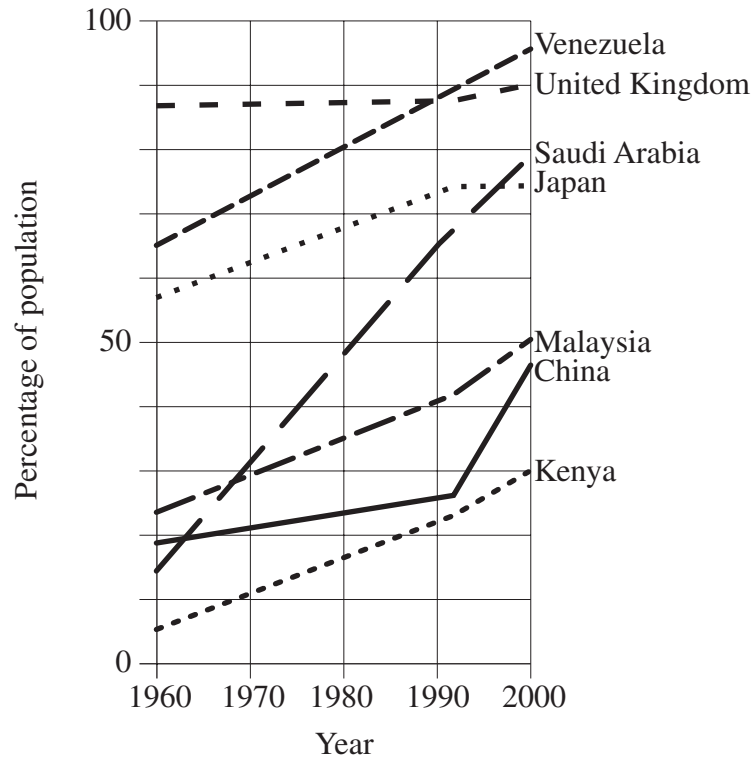
With the system, drivers can work accurately at night and this leads to big savings in time and fuel.

This navigation system is a good example of technology in a practical situation. Which of the following statements describes a benefit from this technology?

- (A) This system replaces skilled drivers with unskilled ones.
- (B) This system can improve crop production.
- (C) This system uses satellites to navigate tractors.
- (D) This system makes farmers better drivers.

- 8 Technology-based industries have encouraged people to move to towns and cities. The graph shows the percentages of people living in towns and cities in a number of countries.

PERCENTAGE OF POPULATION LIVING IN TOWNS AND CITIES



According to the graph, which country had the biggest increase in the percentage of people living in towns and cities from 1960 to 2000?

- (A) China
- (B) Kenya
- (C) Saudi Arabia
- (D) United Kingdom

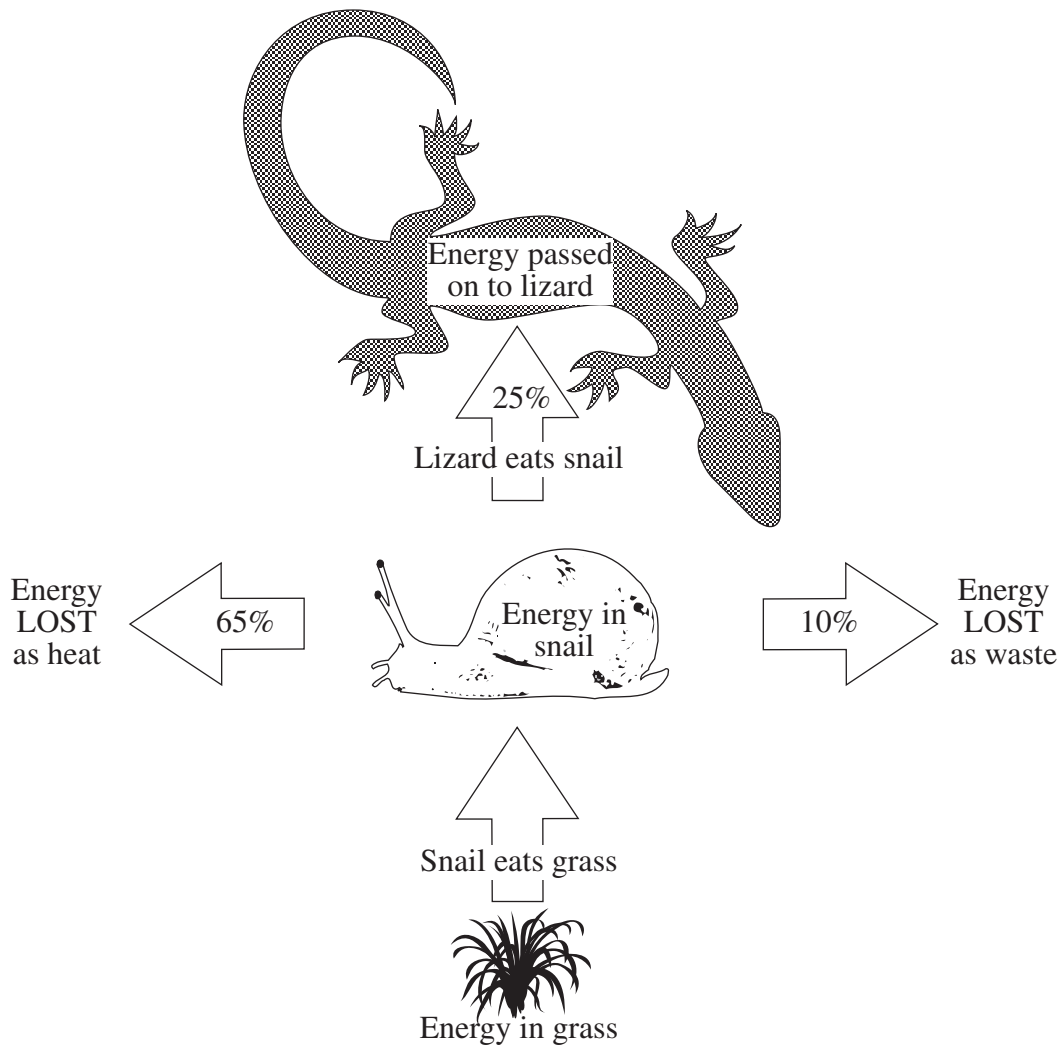
- 9 The table shows pollutants produced by a car engine when the car is travelling at different speeds. It also shows the car's fuel consumption.

I	II	III	IV	V
<i>Speed</i> (km/h)	<i>Carbon monoxide</i> (g/km)	<i>Hydrocarbons</i> (g/km)	<i>Nitrogen oxides</i> (g/km)	<i>Fuel consumption</i> (L/km)
60	5.0	0.45	1.2	5.0
80	5.4	0.53	1.4	5.8
100	6.2	0.62	2.4	7.0
120	9.5	0.83	3.8	10.0

In which column did the quantity of pollutant more than double when the speed of the car doubled?

- (A) II
- (B) III
- (C) IV
- (D) V

- 10 The diagram shows how energy is passed through part of an ecosystem.



If the energy obtained by the snail from the grass was 1000 kilojoules, how much would be passed on to the lizard?

- (A) 25 kilojoules
- (B) 250 kilojoules
- (C) 650 kilojoules
- (D) 1000 kilojoules

PART B

Attempt ALL questions.

Each question is worth 3 marks.

Answer all questions in the Part B Answer Book provided.

- 11** Two students measured the mass and volume of six rocks found on the side of a road. Their results are shown in the table.

<i>Rock</i>	<i>Mass</i> (g)	<i>Volume</i> (mL)
<i>A</i>	3.0	1.2
<i>B</i>	7.0	2.8
<i>C</i>	4.5	1.8
<i>D</i>	10.0	4.0
<i>E</i>	9.1	2.6
<i>F</i>	8.5	3.4

- (a) Use the grid provided in the Part B Answer Book to graph the mass and volume for each of the rocks.
- (b) One rock looked different from the others.
- Use the graph to decide which rock is different from the others. Give a reason for your answer.
- (c) Use the graph to predict the volume of a rock with a mass of 6.0 grams.
- 12** The aim of a student's experiment was to see if large objects sink as quickly in a liquid as small ones do.

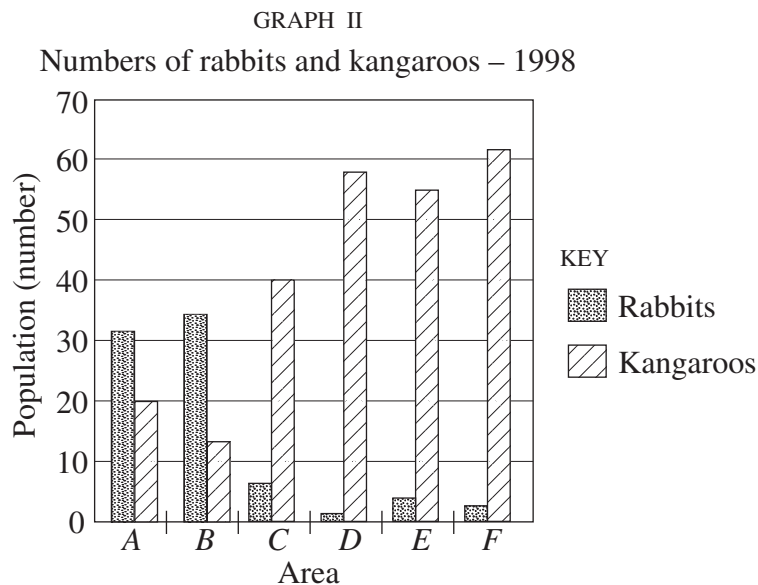
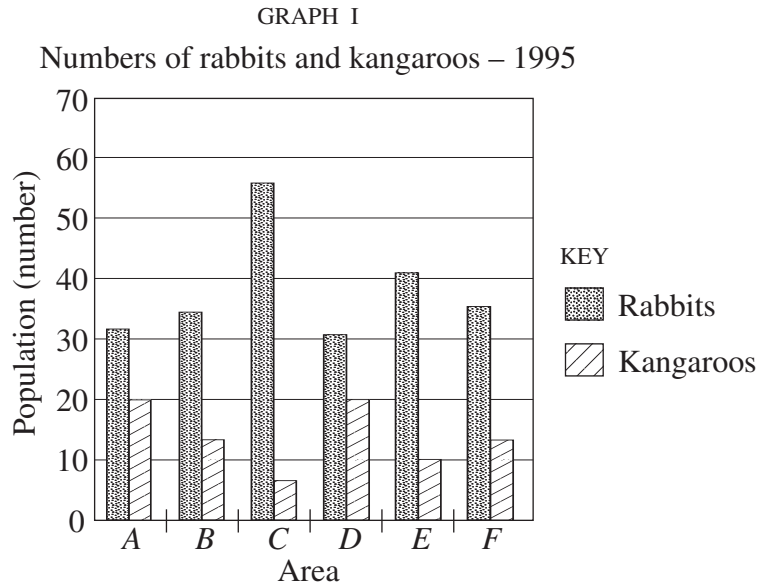
The method used by the student is given.

I dropped a 1 cm diameter glass marble into a fish tank filled with water. It sank 30 cm in 0.8 seconds. Then I dropped a 1 mm diameter lead sphere into a swimming pool. It sank 1.5 m in 4 seconds. Finally, I crushed some aluminium foil into a ball 2 cm in diameter and dropped it into a large beaker filled with alcohol. It sank 100 mm in 2 seconds.

- (a) Which object sank the SHORTEST distance?
- (b) Why should the student have repeated each step several times?
- (c) The method contains several other errors. State ONE of the errors, and explain how you would correct it to make the experiment a fair comparison.

- 13** Reducing the number of rabbits in areas of native vegetation can allow an ecosystem to recover. An example is the Coorong National Park, where native vegetation has regenerated since the number of rabbits has been reduced. At the same time, the number of kangaroos has increased sharply.

The graphs show the numbers of rabbits and kangaroos in six study areas (A–F) in Coorong National Park in 1995 and 1998.

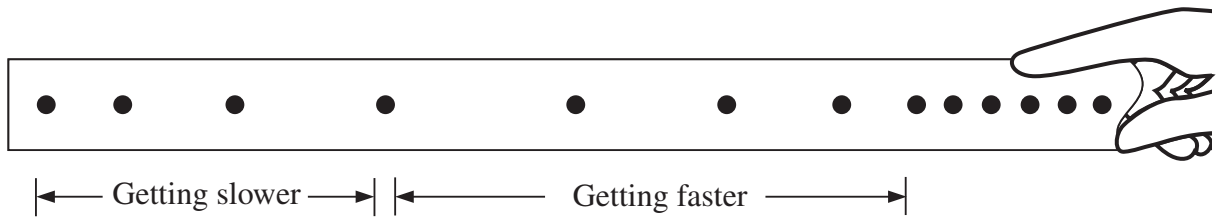


- Describe the relationship between the numbers of rabbits and kangaroos shown in Graph I.
- Graph II shows the effect of reducing rabbit numbers in some areas. Name ONE area in which the number of rabbits was reduced. Give a reason for your choice.
- Suggest a reason for the change in kangaroo population in some areas from 1995 to 1998.

14 Students can use an instrument called a ticker timer to record motion. A dot is printed on a strip of paper every 50th of a second as the strip is pulled through the ticker timer.

- Dots are close together when the strip is moving slowly.
- Dots are far apart when the strip is moving quickly.
- Dots get further apart when the strip accelerates (speeds up).
- Dots get closer together when the strip decelerates (slows down).

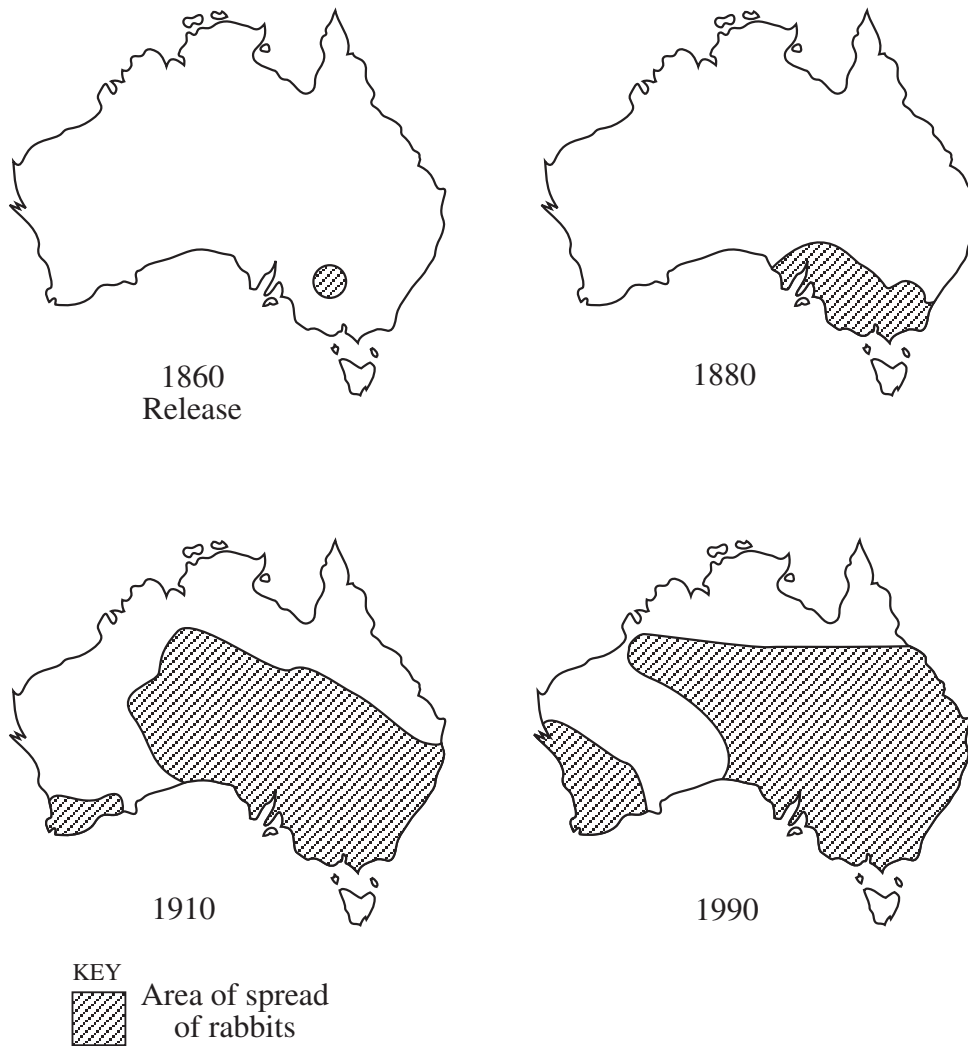
Example: This strip of paper was pulled to the right. 



- Label the strip of paper printed in the Part B Answer Book with the word FAST or SLOW. Explain your answer.
- A strip of paper is passed through a ticker timer and attached to a student riding a bicycle downhill without using the brakes.

Predict the pattern that would be printed on the strip of paper.

- 15 Rabbits were first released in Australia in 1860. The maps show how they have spread throughout much of the country since this time.



- (a) Suggest why the spread of rabbits slowed down between 1910 and 1990.
- (b) Is it possible to say that there was more than one release location? Explain your answer.
- (c) Predict where the rabbits will have spread to by the year 2020. Explain your answer.

SECTION II—MODULES

(45 Marks)

Attempt THREE questions.

Each question is worth 15 marks.

Answer each question in a SEPARATE Module Answer Book.

	Pages
QUESTION 16 FASHION AND SCIENCE	16–17
QUESTION 17 HORTICULTURE	18–19
QUESTION 18 THE HUMAN BODY	20–21
QUESTION 19 SCIENCE FICTION	22–23
QUESTION 20 SCIENCE OF TOYS	24–25
QUESTION 21 SPORT SCIENCE	26–27
QUESTION 22 DISASTERS	28–29
QUESTION 23 MANAGING NATURAL RESOURCES	30–31
QUESTION 24 MARINE OR RIVER STUDIES	32–35
QUESTION 25 BIOTECHNOLOGY	36–37
QUESTION 26 COMMUNICATIONS	38–39
QUESTION 27 CONSUMER SCIENCE	40–41
QUESTION 28 SPACE SCIENCE	42–43

QUESTION 16 Fashion and Science**Marks**

- (a) In the 1950s and 1960s, many cars were large, with big engines, and petrol was cheap. In the 1980s, as petrol became expensive, cars became smaller, with more efficient engines. **5**

Use cars, or any other fashion item that you have studied, to answer the following questions.

- (i) Describe a change in the fashion item made possible by science and technology.
 - (ii) Briefly outline how science and technology have made changes in the fashion item possible.
 - (iii) Suggest how this fashion item may change in the future.
 - (iv) Describe how a factor, other than science and technology, may affect the popularity of this fashion item.
- (b) Suntanning has been criticised by scientists because people who get a tan may be exposed to harmful radiation. **5**
- (i) List TWO factors that may influence a person's decision to get a tan.
 - (ii) Outline an investigation that you could carry out to test the influence of one of these factors.
 - (iii) Discuss ONE advertising strategy that could be used to make people aware of the dangers of suntanning.

Question 16 continues on page 17

QUESTION 16 (Continued)

Marks

- (c) Before radio and television, it was fashionable for a family to own a piano. The white keys of a piano were originally made from ivory, obtained from elephant tusks. 5



- (i) Explain why making large numbers of pianos had a detrimental effect on the environment.
- (ii) Suggest ONE way that science and technology reduced this effect.
- (iii) Describe the detrimental effect on the environment of ONE fashion that you have studied.
- (iv) Cultural heritage is a determinant of fashion. Discuss how radio and television have changed the influence of cultural heritage on fashion.

End of question

QUESTION 17 Horticulture**Marks**

- (a) Fruit production is an important part of our agricultural economy. Apples are one of the most widely grown fruits. The income farmers receive for their apples depends on the way the fruit is used. **5**

An analysis of ONE farmer's apple crop and income is shown in the table.

<i>Market sector</i>	<i>Percentage of crop (%)</i>	<i>Percentage of income (%)</i>
Fresh fruit (domestic)	60	20
Fresh fruit (export)	15	30
Juice and cider	13	25
Canned fruit	12	25

- (i) What percentage of the apple crop is processed?
- (ii) Most of the apples are sold as fresh fruit in Australia. Name TWO factors that influence whether a person would buy a piece of fruit.
- (iii) Some people prefer to grow their own fruit and vegetables. Give ONE reason for this.
- (iv) The farmer finds he has the chance to double his export sales of fresh fruit.

From which market sector should he draw the extra apples needed for export? Explain your answer.

Question 17 continues on page 19

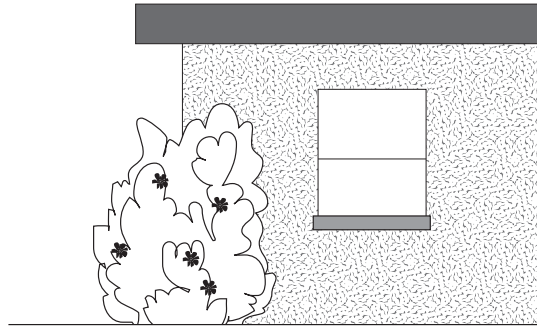
QUESTION 17 (Continued)

Marks

- (b) Plants are often grown for uses other than food.

2

For example, plants often improve the appearance of a building.



PLANTS SOFTEN THE APPEARANCE OF THE CORNER

- (i) Give TWO other reasons for growing plants.
- (ii) For each of these, name ONE plant grown for this reason.
- (c) You have just moved into a new house and you decide to grow your own vegetables. You can use a greenhouse, or hydroponics, or grow the vegetables in the soil. 4
- (i) NAME the method you are going to use.
- (ii) Describe TWO main features of growing vegetables using the method you have chosen.
- (iii) Discuss ONE advantage and ONE disadvantage of the method you have chosen.
- (d) The life of a flowering plant includes the stages in which it is a seed, a young plant, a seedling and an adult plant. At some stage, flowers will be produced. 4

These stages are NOT listed in the correct order.

- (i) Draw a life cycle of a flowering plant to show these stages in their correct order.
- (ii) Plants are at risk from factors such as diseases, predators, pesticides, climate and weather.
- 1 Choose ONE of these factors, and explain how a young plant would be affected by this factor.
 - 2 Describe how this factor can be controlled.

End of question

QUESTION 18 The Human Body

Marks

- (a) The human population has continued to grow at an ever-increasing rate. Humans use the Earth’s resources and create pollution. This has meant that the impact of humans on the biosphere is increasing. **2**

- (i) Describe ONE impact that humans have on the biosphere.
- (ii) Identify ONE way that this impact could cause problems for people in the future.

- (b) **3**

Chicken Flu!

In 1997 Hong Kong was the scene of a major flu scare. It was found that people had caught a type of flu from chickens.

Eighteen people were ill and six people died. The outbreak was contained and there was no evidence of people catching this flu from other people.

- (i) Suggest ONE way this disease could have spread from chickens to people.
- (ii) Discuss ONE method that could be used to control this disease.
- (iii) It was difficult to explain how people caught the disease. Suggest ONE reason for this.

- (c) Humans move through a series of developmental stages in their lives. **4**

- (i) Draw a table in the Module Answer Book, with the headings as shown.

<i>Stage of life</i>	<i>Physical characteristic</i>

- (ii) In the left column, write the names of TWO developmental stages that people experience.
- (iii) For each stage, describe ONE physical characteristic typical of that stage.

(d)

6

Exercise Junkie

Peter weighs 90 kg, 13 kg less than when body building ruled his life.

‘I’d eat six meals a day. I just couldn’t eat enough and couldn’t train enough.

‘I’d do weight training every day for one hour and a half. I’d also do two hours of aerobic work.

‘Body building totally ruled my life. I was so obsessed, it destroyed almost all my relationships.’

‘I was spending \$150 a week on food and \$200 a week on steroids.’

‘At the gym, everyone would help each other train, and comment on how you were looking.’

‘Then I just burnt out. I got these massive mood swings, along with stomach cramps and diarrhoea. I started to realise I was taking it too far. I still exercise now, but it no longer rules my life.’

Article: 'Exercise Junkie' by Jane Southward from Sun-Herald Tempo magazine, 7 November 1999.
Reproduced with permission.

- (i) How many hours of weight training did Peter do per week?
- (ii) Outline ONE negative impact of Peter’s previous lifestyle on both his:
 - 1 mental health;
 - AND
 - 2 physical health.
- (iii) Outline TWO ways body building could have had a positive impact on Peter’s health.
- (iv) Name ONE source from which Peter could obtain information to help him make informed choices about his lifestyle.

End of question

QUESTION 19 Science Fiction**Marks**

- (a) In the science fiction show *Star Trek*, the character 'Mr Spock' is the result of the interaction between our civilisation and an extraterrestrial civilisation known as Vulcans. **3**



- (i) State ONE feature of Mr Spock and explain how it shows that Vulcans and humans could communicate.
- (ii) 'Contact between humans and extraterrestrials would help advance technological developments on Earth.'

Do you agree or disagree with this statement? Give TWO reasons for your answer.

- (b) There is no scientific evidence to support some of the ideas that are popular in science fiction, such as time travel. **4**

Another popular idea in science fiction is that of extrasensory perception, called ESP.

- (i) Christina thinks that a person who claims to have ESP should be able to work out the symbols on cards that someone else is holding.

Outline an experiment that would test her hypothesis.

- (ii) Give a reason why ideas such as time travel are still science fiction rather than part of everyday life.
- (iii) Name ONE idea, other than time travel or ESP, that is still science fiction and has not yet been supported by current scientific knowledge.

QUESTION 19 (Continued)

Marks

- (c) The popular 1970s science fiction show *Lost in Space* featured a young boy called Will Robinson. Will defended himself using a laser gun, he was friends with a robot, and he communicated with people through a large-screen audio-visual system. 3

Devices similar to these are becoming more common.



- (i) Name ONE other device you have studied that was originally described in science fiction but has now become part of everyday life.
- (ii) Explain why this device has become part of everyday life.
- (iii) Other devices described in science fiction are not, at present, part of everyday life.
- Name ONE device that may become part of everyday life within five years.
- (d) Kevin wrote a science fiction story where a slimy green blob grew so large it could swallow up small animals like cats and dogs. 5

In reality, the size to which living organisms can grow is limited by their structure and function.

- (i) State ONE piece of information that suggests that the slimy green blob is a living organism.
- (ii) Explain why the slimy green blob would not be able to grow to an unlimited size.
- (iii) 1 State ONE test you could carry out to check whether the slimy green blob was a living organism.
- 2 What feature of living organisms does this test demonstrate?

End of question

QUESTION 20 Science of Toys**Marks**

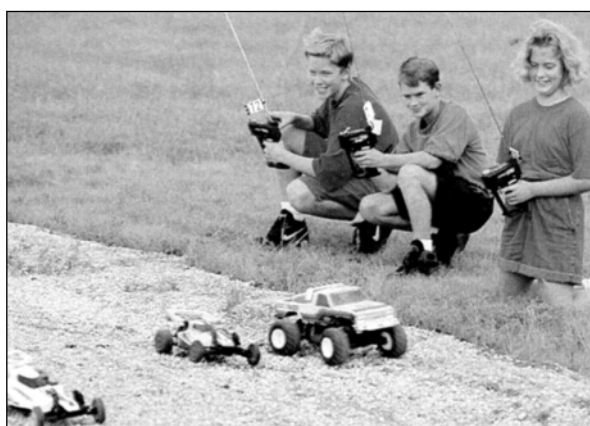
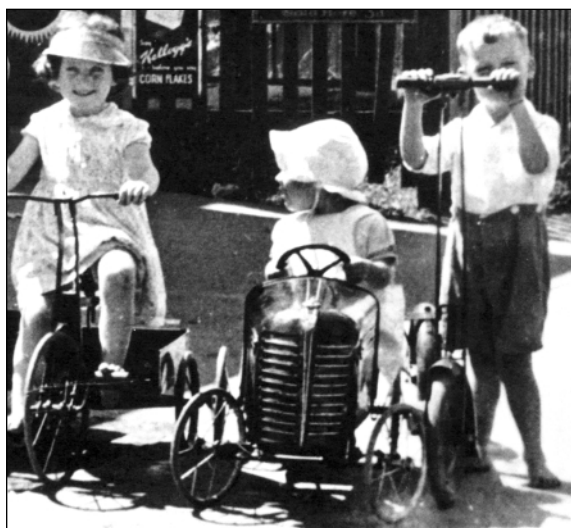
- (a) Babies like to play with blocks.

4

Blocks were originally made from wood. Blocks are now made from wood or from different types of plastic.

- (i) State ONE advantage and ONE disadvantage of plastic blocks compared with wooden blocks for babies' play.
- (ii) State TWO features of blocks that make them safe for babies to use. Explain your answer.

- (b) Many years ago children played with pedal cars by sitting on them and pushing the pedals so the wheels turned and the car moved. Today, children can race their remote control cars against each other.

3

- (i) State TWO ways technology has changed toys.
- (ii) Name ONE negative aspect of children playing with high-technology toys.
- (iii) State ONE psychological message a child could get from playing with a remote control car.

Question 20 continues on page 25

QUESTION 20 (Continued)

Marks

(c)

4

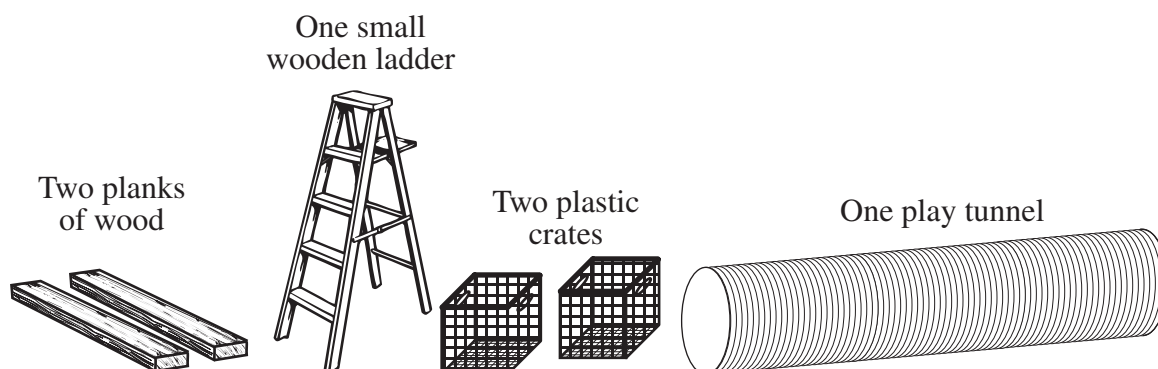
‘My Interactive Bear’

A new best friend for your child.

Squeeze Bear’s paw to hear him sing over thirty different songs, or tell over one hundred exciting stories. Squeeze his paw to play games with him.

Bear can be personalised to remember your child’s name, age, birthday, names of siblings, and more. Bear’s mouth and head move as he talks.

- (i) Explain how this toy could assist the mental and physical development of a three-year-old child.
- (ii) Name another toy that uses electronic technology, but is more suitable for a fifteen-year-old person.
- (iii) Explain why the toy you named in part (c) (ii) is more suitable than Interactive Bear for fifteen-year-olds, in terms of mental and physical development.
- (d) You have been asked to design an activity to help develop children’s physical skills, using the materials shown. 4

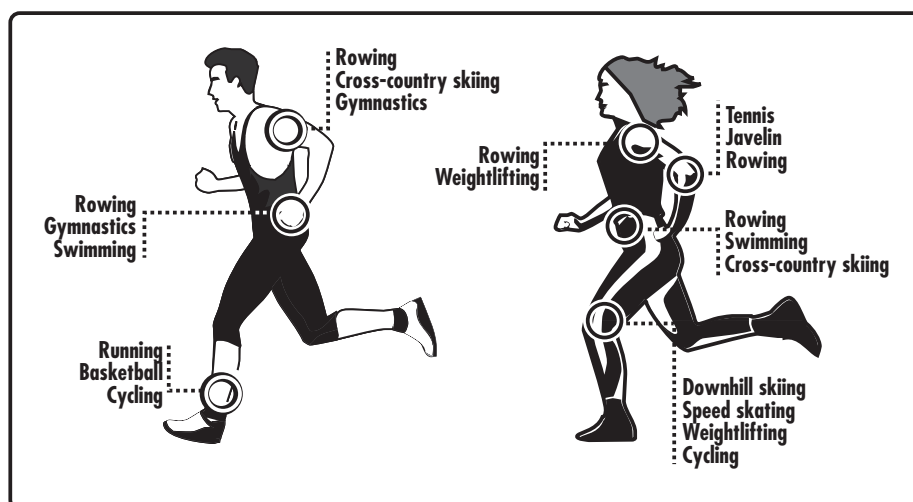


- (i) Briefly describe your planned activity.
- (ii) Explain how your activity could help develop a child’s physical ability.
- (iii) State TWO safety precautions you would need to consider when using these materials with young children.

End of question

QUESTION 21 Sport Science**Marks**

- (a) Drugs are used by people for a variety of reasons. Some sports people use drugs. **3**
- Name ONE drug you have studied in relation to sport.
 - Describe ONE effect of this drug on the body.
 - Explain why a sportsperson may choose to use this drug.
 - Describe any hazards involved with taking this drug.
- (b) Each year, tens of thousands of people take part in physical activities such as fun runs and other local sporting events. Very few people pursue these activities to high levels. **2**
- State ONE reason why people take part in physical activity.
 - Give ONE example of a physical activity in which people can participate for the reason stated in part (b) (i).
- (c) The diagram shows areas of the body that athletes may wish to develop to suit the sport in which they participate. **2**



- Name ONE sport mentioned in the diagram, OR any sport you have studied. State a body part important in that sport.
- Explain how this body part is important in the sport you chose in part (c) (i).
- Describe how a sportsperson participating in the sport you chose in part (c) (i) would develop this body part.

Question 21 continues on page 27

QUESTION 21 (Continued)

- (d) Physics is the area of science that describes the way in which objects behave when they move or experience a force. **4**

Athletes and coaches can use their knowledge of physics to improve athletes' performances in skilled movements.

- (i) Name ONE skilled movement in a sport you have studied.
 - (ii) Describe how a knowledge of physics would help an athlete in this sport improve this skill.
 - (iii) List THREE steps you could use in a training program to teach this skilled movement to an athlete new to the sport.
- (e) Physical activity carries a risk of injury. These injuries may be caused by: **4**
- contact between participants
 - sudden movements
 - the equipment used
 - poor technique.
- (i) Name a physical activity and describe ONE injury that could occur as a result of undertaking this physical activity.
 - (ii) Describe how this injury is likely to be caused.
 - (iii) Outline the treatment needed for this injury.
 - (iv) Explain how this type of injury could be avoided.

End of question

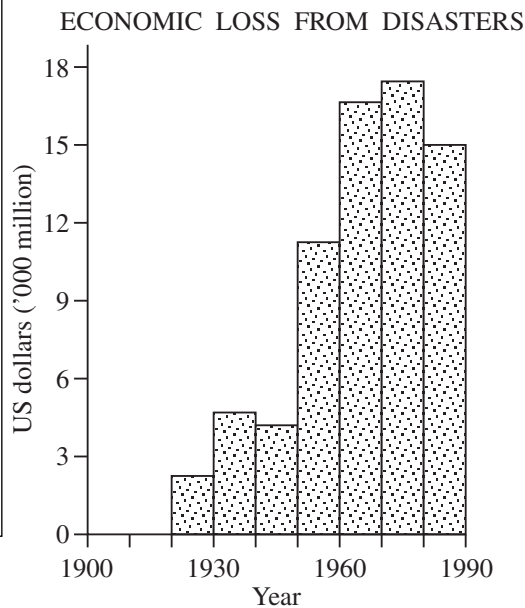
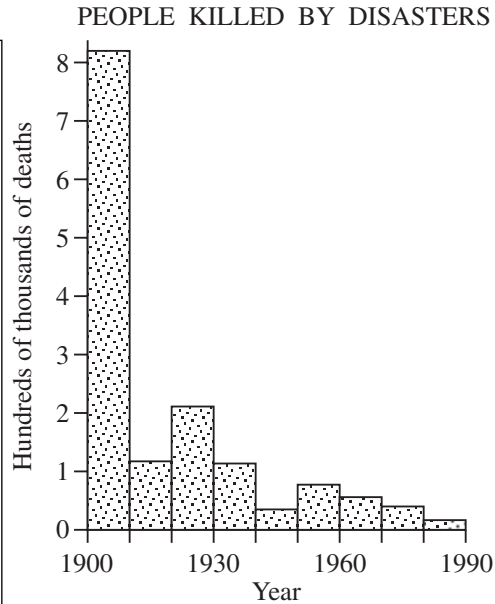
QUESTION 22 Disasters**Marks**

According to the United Nations Environment Project, ‘things appear to be getting worse, in two ways. Natural disasters appear to be becoming more frequent and their effects more severe’.

Recent Major Disasters (1996–98)

Major disasters in recent years include:

- flooding of the Yangtze River in China between late June and mid-August 1996 affected 20 million people and caused economic losses of more than \$US20 000 million;
- flooding in Central Europe in 1997 caused economic damage estimated at \$US2 900 million;
- earthquakes in 1997 claimed the lives of more than 2300 people in Iran;
- a cyclone in the Indian province of Gujarat in June 1998 killed more than 10 000 people;
- hurricane George caused damage estimated at \$US10 million in the Caribbean in September 1998;
- hurricane Mitch led to more than 9000 deaths in Nicaragua and Honduras in October 1998.



- (a) (i) In the years 1996–98, which of the natural disasters described above killed the most people? 4
- (ii) Describe the trends shown by each of the graphs.
- (iii) Suggest a reason for the trend shown in ONE of the graphs.

Question 22 continues on page 29

QUESTION 22 (Continued)

Marks

- (b) Global warming models indicate that increased global temperatures are likely to result in many atmospheric changes. **4**

These would include variations in precipitation (rain, snow and hail) and wind speeds, leading to a greater number of extreme weather conditions.

- (i) State TWO types of disasters that could result from these atmospheric changes.
 - (ii) Can the problems causing global warming be controlled? Explain your answer.
 - (iii) Explain why the two types of disasters you described in part (b) (i) would continue to occur even when the problems causing global warming are controlled.
- (c) Disasters may result from the failure of materials, people, or technology. **4**
- (i) Name ONE disaster that resulted from a failure of one of these factors.
 - (ii) State the cause of the disaster.
 - (iii) Describe ONE way this disaster affected the people involved.
 - (iv) Suggest how a similar disaster could be avoided in the future.
- (d) Regardless of the cause, disasters place enormous pressure on emergency services. **3**
- (i) Name TWO organisations or groups that could be called on after a disaster occurred.
 - (ii) For ONE of these groups, discuss the role they would take in dealing with a disaster.
 - (iii) Explain why co-operation between the two groups you named in part (d) (i) is important.

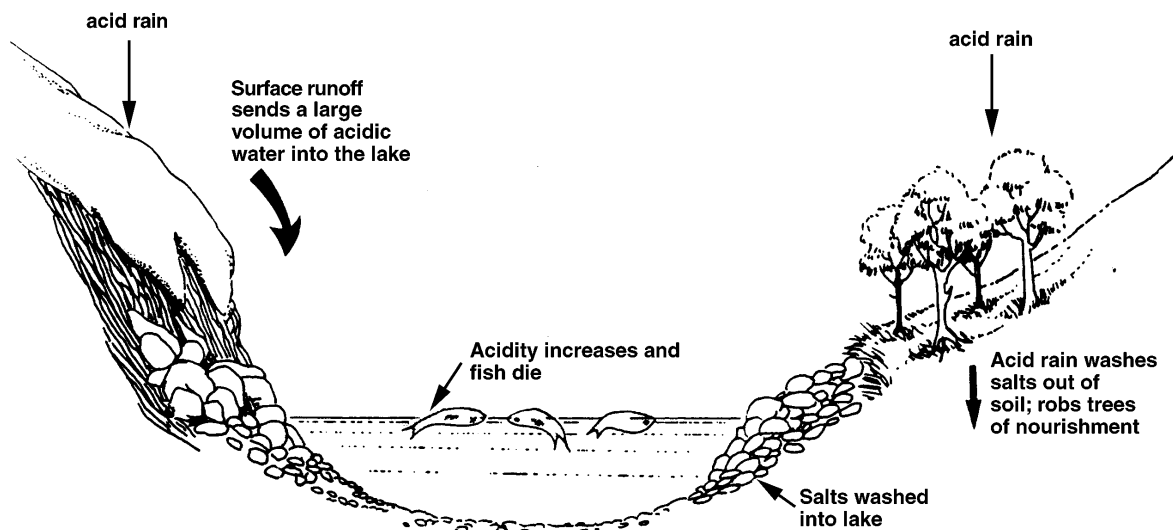
End of question

QUESTION 23 Managing Natural Resources**Marks**

(a) Almost all the activities in our daily life require energy. This leads to the use of non-renewable resources, producing harmful environmental effects. **5**

- (i) What is meant by a non-renewable resource? Name ONE example.
- (ii) Describe ONE way (strategy) to reduce energy used in the home.
- (iii) Describe ONE factor you would need to consider when designing a survey to find out how people would react if the strategy in part (ii) became law.
- (iv) Using your answer to part (iii), write ONE question you would need to include in this survey.

(b) Acid rain is rain that is more acidic than normal rainwater. It may be caused when gases released by coal-burning power stations react with water vapour in the atmosphere, producing dilute acid. Acid rain can increase the acidity of waterways. **3**



Wright, Perry, Tibberstma, Russell, Science in Society, The Jacaranda Press, Milton Qld, 1992, p 109

- (i) What would be ONE effect of acid rain on the ecosystem shown in the diagram?
- (ii) Discuss ONE advantage and ONE disadvantage of using coal-burning power stations, OR any other source of energy you have studied.

Question 23 continues on page 31

QUESTION 23 (Continued)

Marks

- (c) Australia has relied heavily on its natural resources to produce wealth. This may not be possible in the future. **3**
- (i) Name ONE natural resource that you have studied.
 - (ii) Give TWO reasons why this resource is not equally accessible to all people.
 - (iii) What is ONE way that this resource could be made more accessible?
- (d) The table below shows some of the factors to be considered when using a natural resource. **4**

<i>Natural resource</i>	<i>Use</i>	<i>Abundance of supply</i>	<i>ONE environmental consequence of use</i>

- (i) In your Answer Book, complete a table like the one shown, for ONE natural resource.
- (ii) Describe how this resource can be managed to ensure that people's needs can be met into the future.

End of question

QUESTION 24 Marine or River Studies**Marks**

- (a) Only 3% of all the water on Earth is fresh water, and 71% of this fresh water is locked away in icecaps and glaciers. The table shows where water is found in the hydrosphere.

3

<i>Water source</i>	<i>Water volume (cubic kilometres)</i>	<i>Percentage of total water (%)</i>
Oceans	1 268 000 000	97.23
Icecaps, glaciers	28 000 000	2.14
Ground water	8 000 000	0.60
Freshwater lakes	120 000	0.009
Inland seas	100 000	0.008
Soil moisture	64 000	0.005
Atmosphere	12 400	0.001
Rivers	1 200	0.000 1
Total water volume	1 304 297 600	

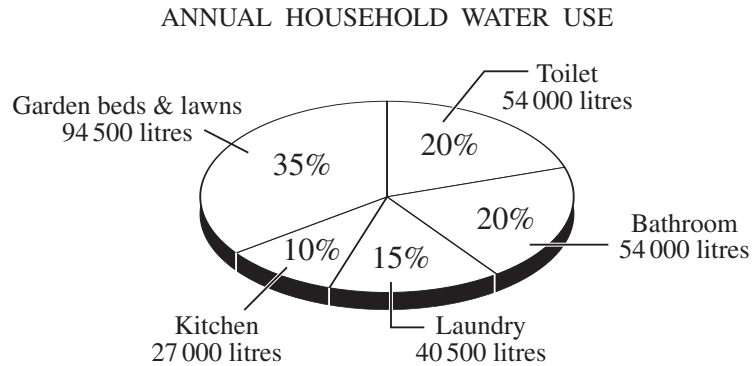
- (i) From the table, name ONE source of fresh water, other than icecaps and glaciers.
- (ii) Name another use for this water source, other than food production.
- (iii) Australia is a very dry continent. What is ONE impact this has had on the lifestyle of Australians?

Question 24 continues on page 33

QUESTION 24 (Continued)

Marks

- (b) Water is one of our most important natural resources, so it is important to use it wisely. The graph shows how household water is used. 3



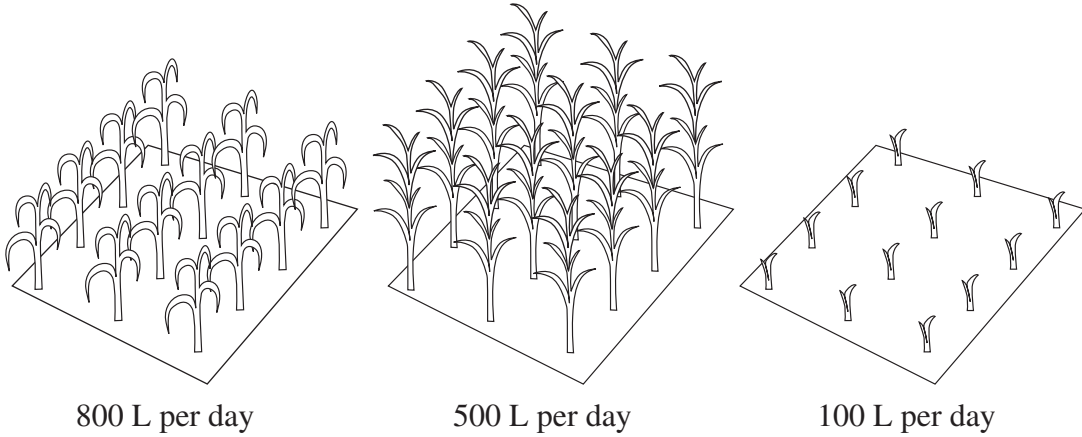
- (i) Select TWO household uses of water, and for each describe how the amount of water being used could be reduced.
- (ii) Describe ONE way that household activities could cause water pollution.

Question 24 continues on page 34

QUESTION 24 (Continued)

Marks

- (c) A researcher conducted an experiment on sugar cane. Three plots of sugar cane were watered daily, each with a different amount of water. After two months the plots looked like this: **5**



- (i) What was the purpose of this experiment?
- (ii) Write a conclusion for this experiment.
- (iii) Name TWO variables that would need to be controlled to ensure a fair test.
- (iv) How would the results of this experiment be useful to a sugar cane farmer?

Question 24 continues on page 35

QUESTION 24 (Continued)

Marks

(d)

4



- (i) This diagram is used to promote water safety. Suggest a slogan that could be used with this diagram.
- (ii) Discuss the impact of TWO recreational activities on water quality.
- (iii) Choose ONE of these activities and discuss how its impact could be reduced.

End of question

QUESTION 25 Biotechnology**Marks**

- (a) One dictionary defines ‘biotechnology’ as the use of biological processes for industrial and other purposes. **3**
- (i) Name ONE use of biotechnology you have studied.
 - (ii) Describe how biotechnology is used for this purpose.
 - (iii) Explain why this particular biological process is used for the purpose you chose in part (a) (ii).
- (b) Scientists believe that a new spray-on chemical may heal wounds without scarring. The product uses substances found in the skin to promote the growth of new skin. **3**
- Like all applications of biotechnology, it will need to be trialled before it can be put to widespread use. Testing this new product involves a number of ethical issues.
- (i) Name ONE ethical issue involved in the application of the above biotechnology.
 - (ii) Explain why it is an important issue to consider.
 - (iii) Explain how this issue can be or has been resolved.
- (c) (i) Name ONE biotechnology that is used to control, alter or repair a biological system. **3**
- (ii) Describe the biological system to which this biotechnology is applied.
 - (iii) Explain how the named biotechnology achieves this.
- (d) (i) Name ONE negative consequence of applying biotechnology to plants, to people, or to other animals. **2**
- (ii) Explain how this problem could be overcome.

Question 25 continues on page 37

QUESTION 25 (continued)

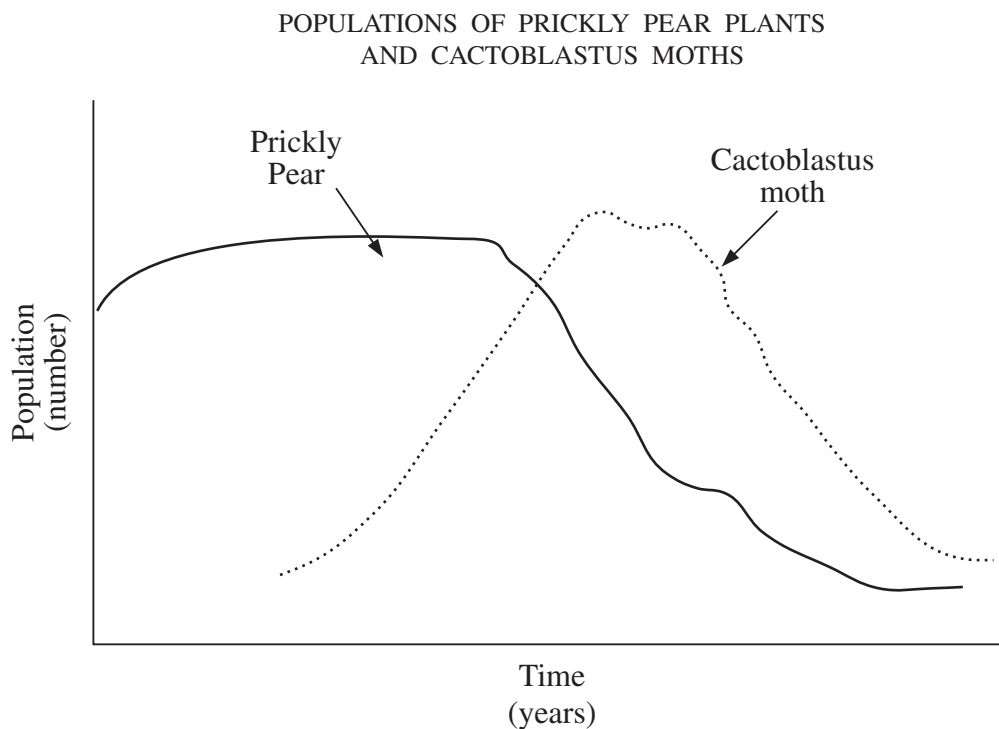
Marks

- (e) The Prickly Pear is a plant that was introduced to Australia from overseas. It became a weed because it did not have any natural predators to stop it from spreading. 4

To control the population of Prickly Pear plants, the Cactoblastus moth was introduced from the same country as the Prickly Pear. The moth lays its eggs inside the plant and after they hatch, the larvae eat and kill the plant.

This is known as 'biological control'.

The graph shows the populations of Prickly Pear plants and Cactoblastus moths in an area over a number of years.



- (i) Explain why biological control is an example of biotechnology.
- (ii) Use the graph to explain why the population of both the Prickly Pear and the Cactoblastus moth decrease as time goes on.
- (iii) Describe ONE advantage of using biological control instead of poisons to kill the Prickly Pear.

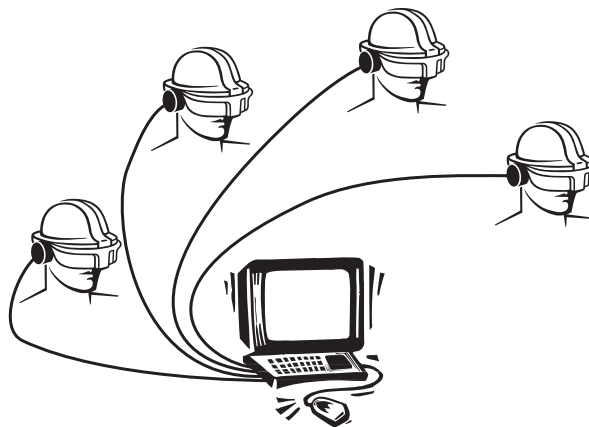
End of question

QUESTION 26 Communications**Marks**

- (a) Imagine you have to communicate an idea to someone across the room, but you are not allowed to speak or send notes. **2**

- (i) State the idea you are trying to communicate.
- (ii) How would you send the message?
- (iii) Describe ONE problem the receiver may have in understanding your message.

- (b) The following drawing suggests a method of communication. **4**



- (i) Describe how this method of communication may work.
 - (ii) What is ONE advantage of this form of communication?
 - (iii) Describe ONE problem that could occur when using this form of communication.
 - (iv) Describe ONE way of improving this method of communication.
- (c) Signs are used to communicate information to people in our multicultural society. **2**

Choose ONE of the following messages and design a sign for this message, that could be understood by all people in our multicultural society.

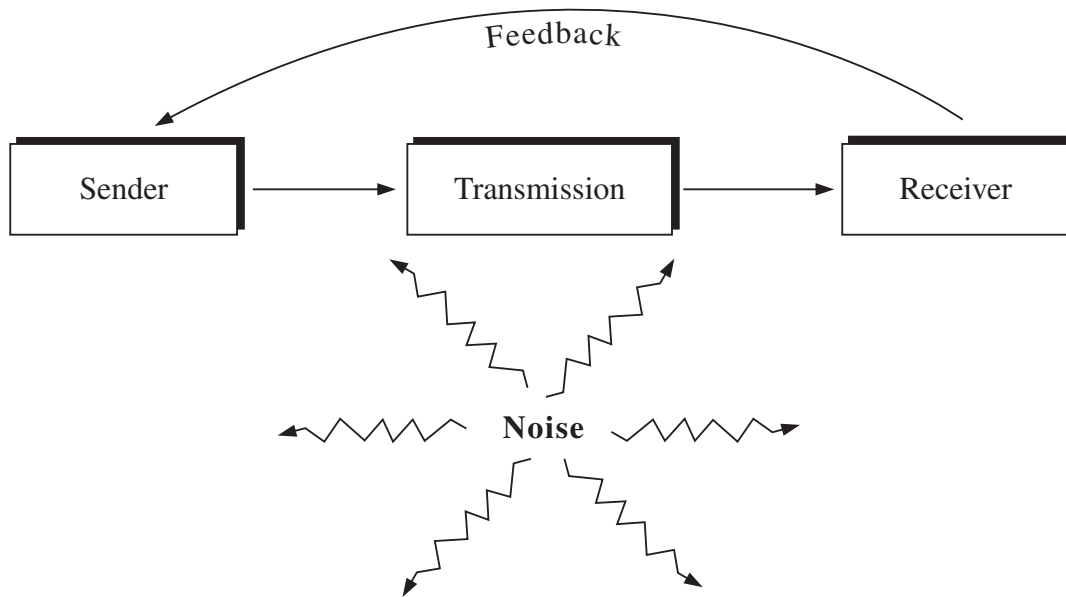
- School ahead
- Safety glasses to be worn
- Deep water
- Be quiet

Question 26 continues on page 39

QUESTION 26 (Continued)

Marks

- (d) The process of communication can often be represented by a model, such as the one shown. 5



- (i) Copy this diagram into your Module Answer Book and label the stages where 'coding' and 'decoding' take place.
- (ii) Name ONE method of communication. Describe how 'coding' and 'decoding' take place in this method of communication.
- (iii) What is meant by the term *noise* in this model?
- (iv) Why is feedback important?
- (e) Technological changes have improved communication systems. 2
- (i) Name ONE communication system that involves technology.
- (ii) Name ONE technological improvement that has been made to this communication system.
- (iii) Describe ONE impact on today's society caused by this improvement.

End of question

QUESTION 27 Consumer Science**Marks**

- (a) Many consumer products have resulted from advances in science and technology. Genetically modified (GM) foods are an example of this. **6**

Genetically modified ingredients could be present in up to 60% of the foods on our supermarket shelves.

The Australian and New Zealand Food Authority (ANZFA) has not assessed such GM ingredients for their effects on humans, and the foods are not labelled as genetically modified.

- (i) Describe how ONE consumer product you have studied has resulted from advances in science or technology.
- (ii) What is ONE advantage to consumers of this product?
- (iii) What is ONE environmental consequence that may result from the technology used to produce or deliver the product that you have described in part (a) (i)?
- (iv) The manufacturers of GM foods claim that these foods are safe. Other people worry about the long-term consequences of eating such products.
 - 1 What advice would you give to consumers wanting to make a choice about buying GM foods?
 - 2 What would you suggest manufacturers do to inform consumers about GM foods?
 - 3 Who should be responsible for ensuring the safety of products available to consumers? Explain your answer.

Question 27 continues on page 41

QUESTION 27 (Continued)

Marks

- (b) This table shows data about the ownership of products by Australian families. **4**

PERCENTAGE OF FAMILIES OWNING PRODUCT

<i>Product</i>	<i>Year</i>				
	<i>1955</i>	<i>1965</i>	<i>1975</i>	<i>1985</i>	<i>1995</i>
Radio	90	100	100	100	100
Black-and-white television	—	45	85	55	20
Colour television	—	—	—	75	95
Video recorder	—	—	—	20	90
CD Player	—	—	—	—	75

- (i) Draw a graph of the data for black-and-white television ownership.
- (ii) Explain the trend shown in your graph.
- (c) Well-known personalities are often shown as ‘experts’ in advertisements. **2**
- (i) Give ONE reason why manufacturers use well-known people to advertise products.
- (ii) Explain why consumers should be careful about believing the information shown in such advertisements.
- (d) Up to 90% of the metal and plastic parts of cars can be recycled or reused. European car manufacturers are required by law to recycle cars once their useful life is over. **3**

It is the responsibility of the car manufacturers to ensure that this process occurs.

- (i) Name TWO environmental consequences that could result from these laws.
- (ii) Explain ONE problem of applying such a law to products such as drink containers, clothing or computers.

End of question

QUESTION 28 Space Science**Marks**

- (a) The table shows the time it would take to send probes to Pluto and to Proxima Centauri (the star closest to our solar system). **2**

<i>Target</i>	<i>Average distance from Earth</i>	<i>Approximate time for probe to reach target</i>
Pluto	5.8 billion kilometres	13 years
Proxima Centauri	40 000 billion kilometres	91 000 years

- (i) Describe ONE difficulty in sending probes to stars other than the Sun.
- (ii) Is it practical for scientists to send a probe to Proxima Centauri and expect to make use of the information sent back throughout the journey?

Explain your answer.

- (b) Journeys to other planetary systems may be possible in the future, but the cost will be enormous. **2**

- (i) Describe ONE reason for space exploration that could justify large amounts of money being spent on it.
- (ii) Describe ONE development in the building of spacecraft that has reduced some of these costs.

- (c) Astronauts may be able to travel safely to Mars in the future. **3**

- (i) What are TWO problems that would need to be solved before sending astronauts to Mars?
- (ii) Give ONE reason for sending astronauts to Mars, rather than sending an unmanned mission.

Question 28 continues on page 43

QUESTION 28 (Continued)

Marks

- (d) It has been estimated that there are over 6000 pieces of spacecraft debris orbiting the Earth. **3**
- (i) Explain why there is so much spacecraft debris orbiting the Earth.
 - (ii) Describe ONE risk created by this debris.
 - (iii) Outline ONE precaution that could be taken to reduce this risk.
- (e) Space science research has resulted in new materials and techniques being available to people for use in everyday objects. **2**
- (i) Name ONE example of a new material now used in everyday objects that has resulted from space science research.
 - (ii) Describe how the material you named in part (e) (i) is used.
- (f) Some space technology is used to learn more about the Universe. Other aspects have a current use on Earth. **3**
- (i) Name ONE example of space technology that has a current, common use on Earth.
 - (ii) Describe the original purpose of this technology.
 - (iii) Discuss how the use of this technology has affected our daily life.

End of paper

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STUDENT NUMBER

CENTRE NUMBER

HIGHER SCHOOL CERTIFICATE EXAMINATION

2000

SCIENCE FOR LIFE

2 UNIT

PART B ANSWER BOOK

DIRECTIONS TO CANDIDATES

- Write your Student Number and Centre Number at the top right-hand corner of this page.
- You should receive this Answer Book with an Answer Sheet for Part A and three Elective Answer Books.
- Answer Questions 11 to 15 in this Answer Book.
- Each question is worth 3 marks.

MARKER'S USE ONLY

PART	Mark	Marker	Check
B			

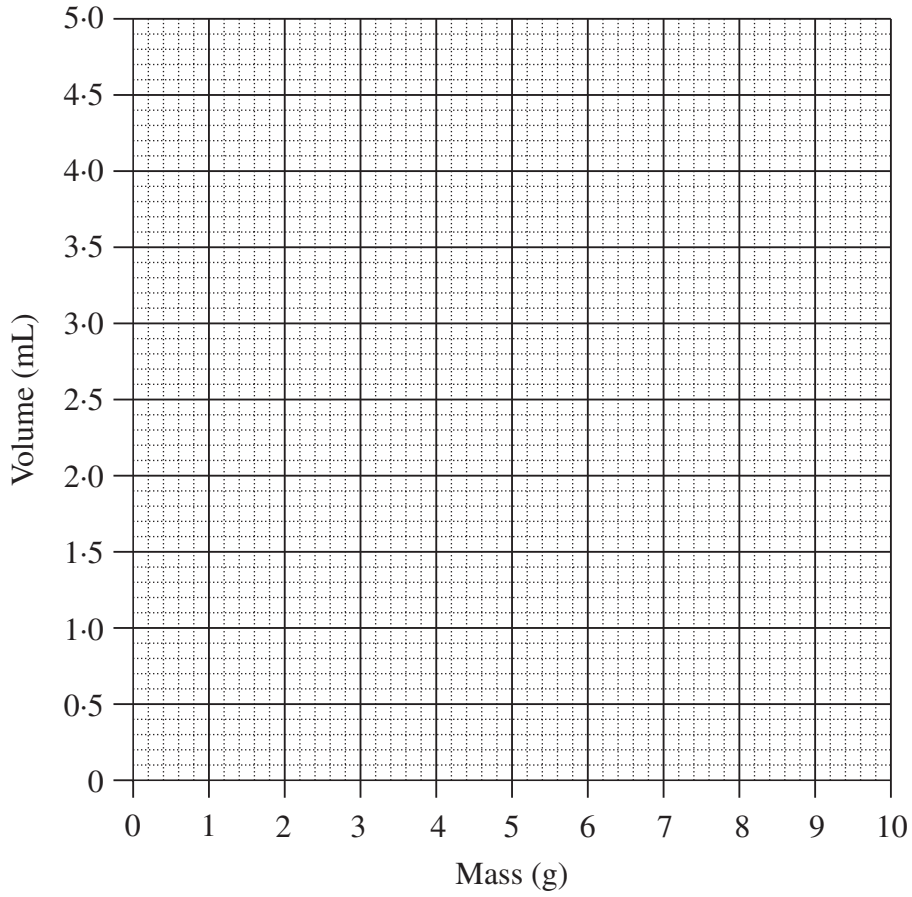
PART B

MARKER'S
USE ONLY

Questions 11 to 15 are worth 3 marks each.

Write your answers in the spaces provided.

11 (a)



- (b)
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- (c)

MARKER'S
USE ONLY

12 (a)

(b)

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(c)

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13 (a)

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(b) Area

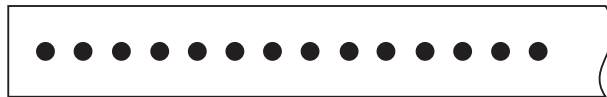
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14 (a)



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MARKER'S
USE ONLY

15 (a)

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