

BOARD OF STUDIES
NEW SOUTH WALES

HIGHER SCHOOL CERTIFICATE EXAMINATION

1999

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 Answer Book.
- Write your Student Number and Centre Number on the cover of each Answer Book.
- Write the Course, Module Name, and Question Number on the cover of each 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.

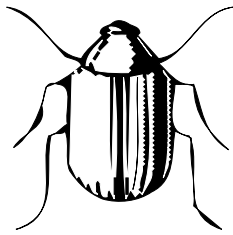
A B C D
correct ↖

- 1 The diagram below shows a beetle.



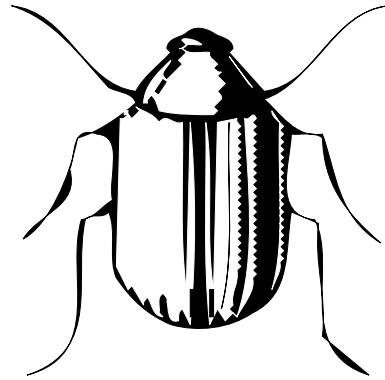
Four students were asked to draw a scale diagram of this beetle. Which of the following diagrams shows the beetle drawn correctly to scale?

(A)



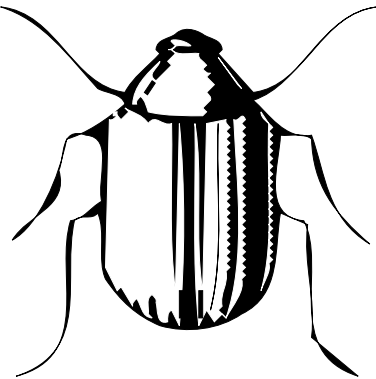
1 mm = 5 mm
(drawing) (real life)

(B)



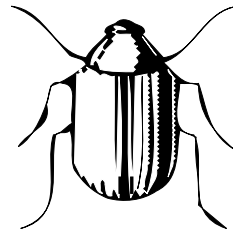
1 mm = 0.2 mm
(drawing) (real life)

(C)



1 mm = 20 mm
(drawing) (real life)

(D)



1 mm = 2 mm
(drawing) (real life)

2 The following question refers to the table of information.

<i>Food substance</i>	<i>Health effect</i>
high in salt	increases risk of high blood pressure
high in saturated fat/cholesterol	increases risk of coronary heart disease
high in fat	increases risk of cancer
high in calcium	reduces risk of osteoporosis
high in fibre, grain products, fruits and vegetables	reduces risk of cancer
high in fibre, grain products, fruits and vegetables	reduces risk of coronary heart disease
fruits and vegetables	reduces risk of cancer
artificial sweeteners	reduces risk of tooth decay

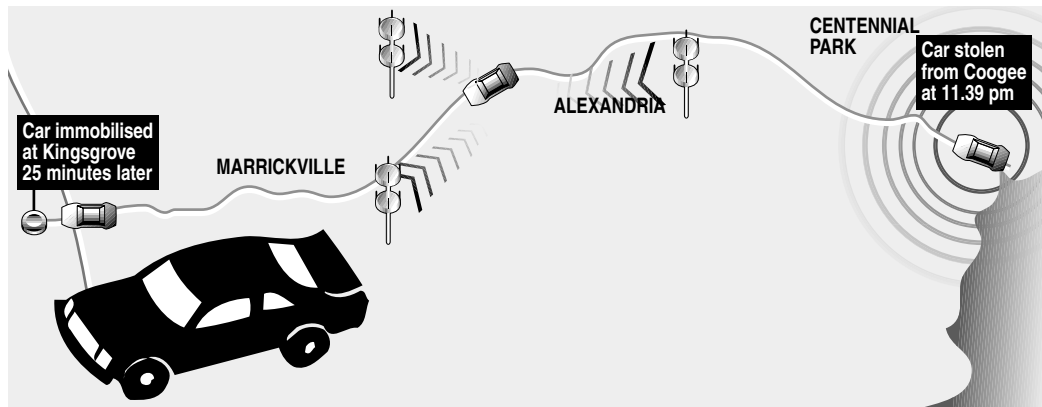
New Scientist 2.11.1996

A person wishing to reduce their risk of cancer and coronary heart disease would have a diet

- (A) high in calcium, grain products, fruits, vegetables and fat.
- (B) high in saturated fat/cholesterol, grain products, fruits and vegetables.
- (C) high in salt, calcium and fat.
- (D) high in fibre, grain products, fruits and vegetables.

- 3 Police have developed a high-tech tracking system to stop a stolen car by remote control.

A car is stolen from Coogee at 11.39 pm and immobilised (brought to a stop) at Kingsgrove 25 minutes later.



Sydney Morning Herald

The process involves the following four steps.

<i>X</i>	Police immobilise the car by remotely cutting fuel when the car slows to a safe speed.
<i>P</i>	Tracking begins when the car moves. A police patrol is alerted.
<i>Y</i>	Stealing the car starts a silent alarm. A transmitter sends a signal to police headquarters.
<i>S</i>	Police headquarters calculates the exact position of the car. The car's journey is electronically mapped and the police patrol is updated on its position.

The correct order for the steps is

- (A) *Y, P, S, X*
 (B) *P, Y, X, S*
 (C) *Y, P, X, S*
 (D) *P, S, Y, X*

4

Health through chocolate

Chocolate not only tastes good—it might even improve your health. Scientists have found that the smell of chocolate causes a positive response in the body's immune system. The smell of rotten meat produces a negative response.

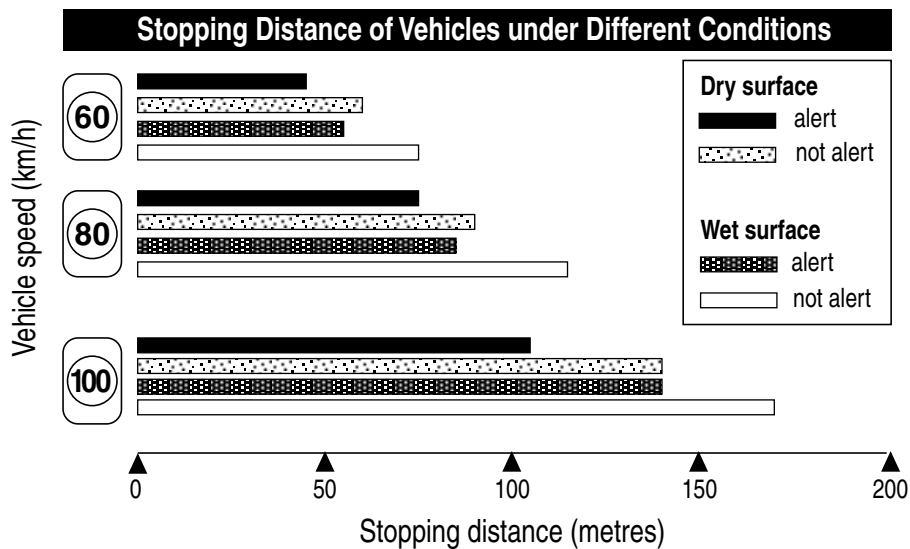
The body's immune system helps fight disease.

© The Daily Telegraph

Scientists carried out an investigation which involved two large groups of people. The scientists must have

- (A) asked people whether they preferred the smell of rotten meat or chocolate.
- (B) asked people if they felt more sick after smelling chocolate or after smelling rotten meat.
- (C) measured the immune response of people after smelling chocolate, then rotten meat.
- (D) compared the immune response of people who had smelt chocolate with that of people who had smelt rotten meat.

5 The graph shows how stopping distances are related to vehicle speed, road conditions and the alertness of the driver.

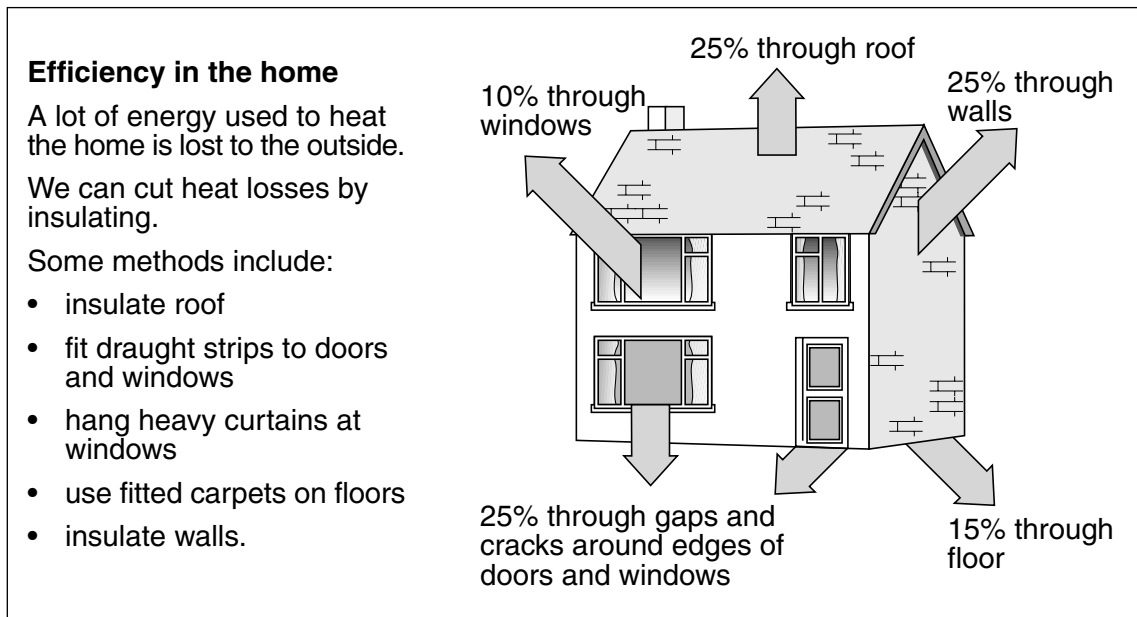


*Red October
Road Safety
Month
Booklet,
Reprinted
with kind
permission of
Open Road*

For a driver who is not alert, travelling at 80 km/h on a wet surface, the stopping distance required is

- (A) 90 m
- (B) 75 m
- (C) 115 m
- (D) 170 m

- 6 The diagram shows the typical heat energy losses from a home without insulation.

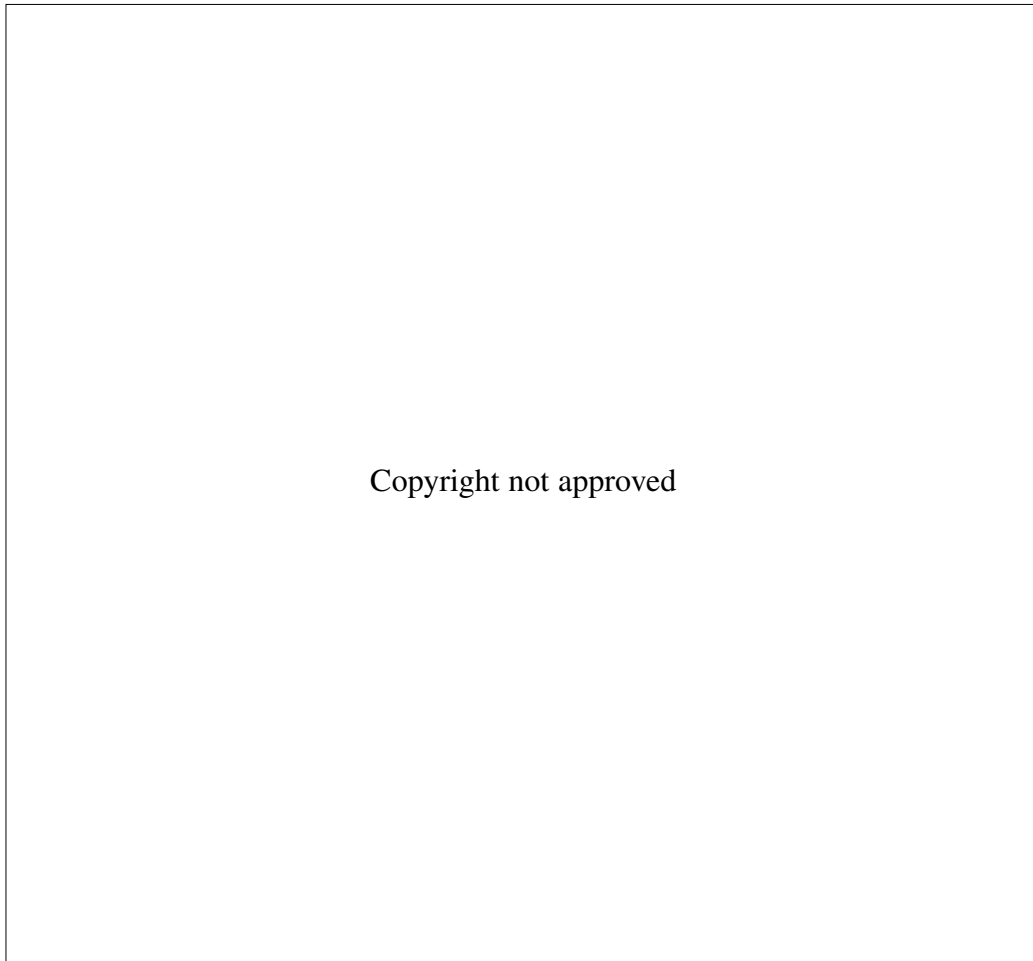


Bethal, George, Science through diagrams, Oxford University Press, Oxford, 1997

Which combination will save the most energy?

- (A) Insulate the roof and insulate the walls.
- (B) Carpet the floors and place draught strips around edges of doors and windows.
- (C) Carpet the floors and hang heavy curtains at the windows.
- (D) Insulate the walls and hang heavy curtains at the windows.

- 7 The graph shows the percentage of sand, clay and silt in different soil types.



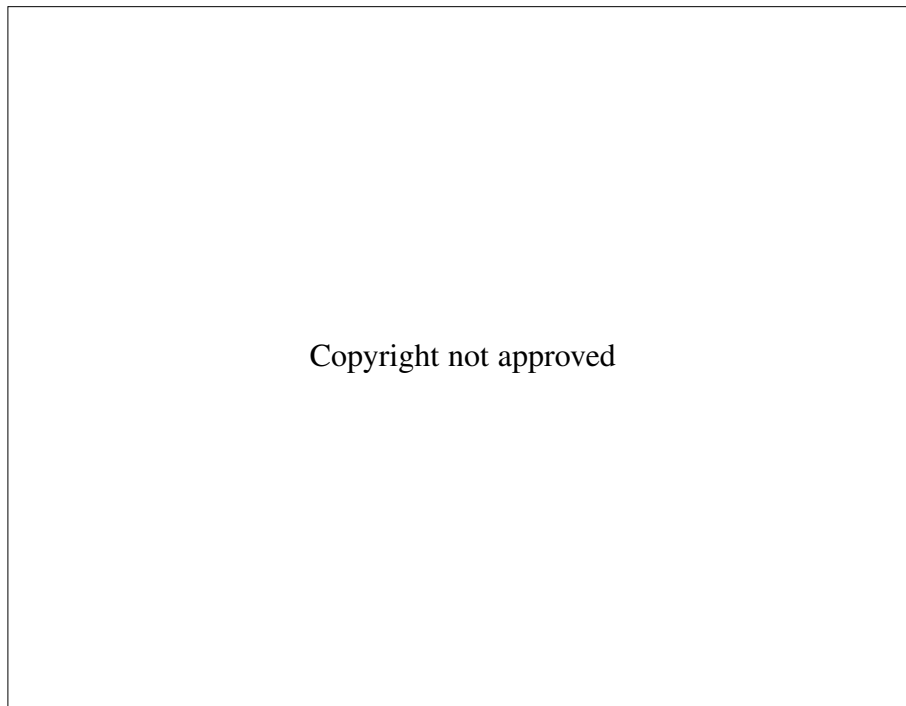
What does this graph tell you?

- (A) 'Clay loam' does not contain silt or sand.
- (B) 'Silty clay loam' contains more sand than 'loamy sand'.
- (C) 'Clay' is the same colour as 'silt' because clay has no sand in it.
- (D) 'Clay loam' and 'loam' contain about the same percentage of sand.

- 8 Recycled plastic is being used for constructing runways for planes to land on. It is expensive to transport to remote places, but it does not crack, or suffer from erosion after heavy rain. It is salt resistant and can be laid over sandy ground.

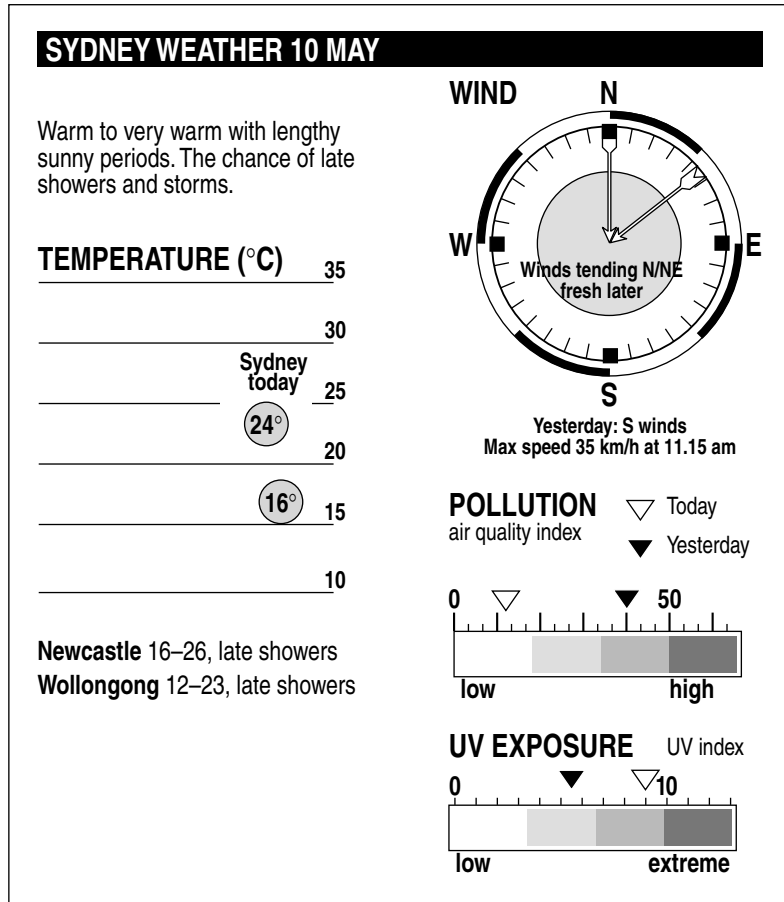
This information shows that the material is good for use in remote tropical rainforests because

- (A) plastic cannot be recycled in other ways.
 - (B) it requires no machinery to lay it on sandy ground.
 - (C) although transporting it is expensive, it needs little care.
 - (D) it is biodegradable so it will not pollute the rainforest.
- 9 The graph shows how the body temperatures of some animals are affected by room temperature.



Which of the following statements is supported by the graph?

- (A) A cat's body temperature changes greatly during the day.
- (B) The body temperature of a lizard is almost the same as the room temperature.
- (C) An echidna always has a higher body temperature than a platypus.
- (D) The body temperature of a possum is lower than 34°C.



According to the forecast, what were the weather conditions predicted for 10 May in Sydney?

	<i>Temperature (min/max)</i>	<i>Wind</i>	<i>Pollution</i>	<i>UV exposure</i>
(A)	16–26	N/NE	50	9.0
(B)	16–24	N/NE	12	5.7
(C)	16–24	N/NE	12	9.0
(D)	12–23	S/SW	50	5.7

PART B

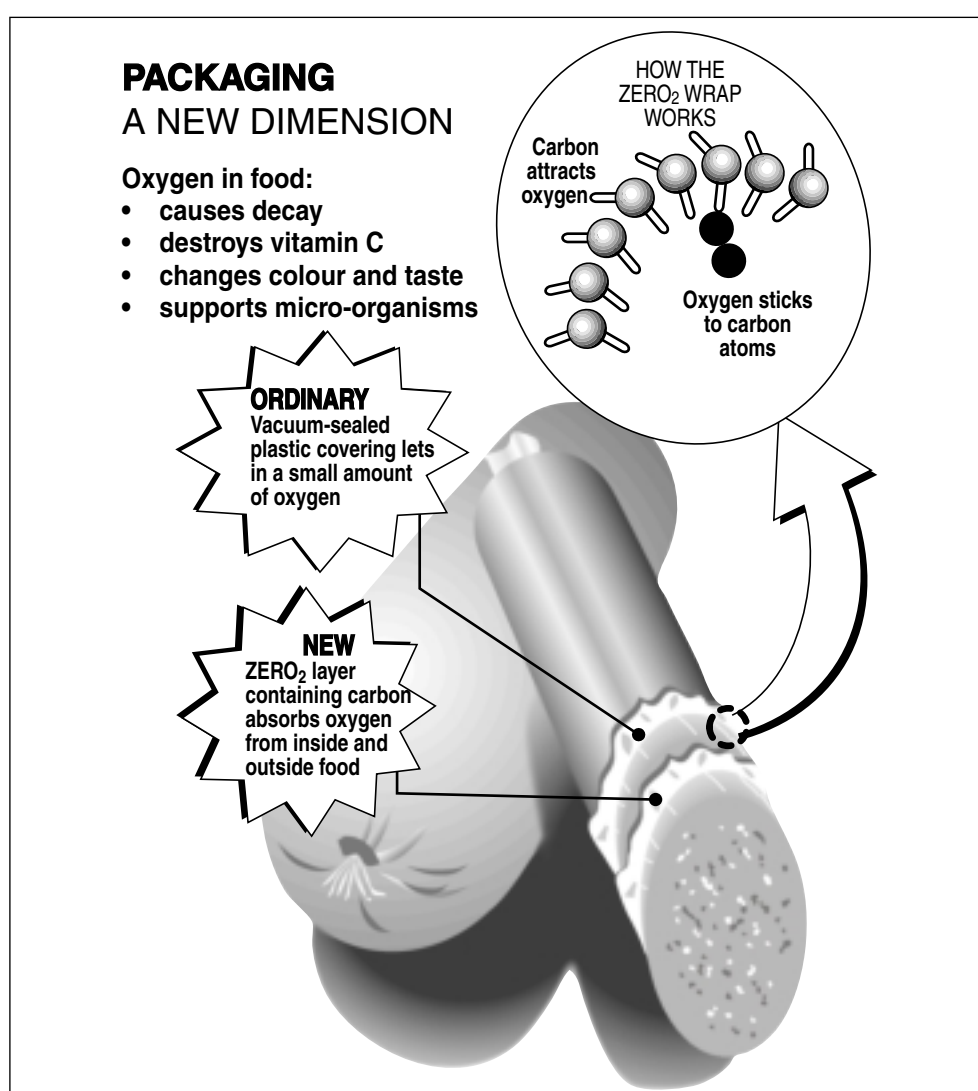
Attempt ALL questions.

Each question is worth 3 marks.

Answer all questions in the Part B Answer Book provided.

- 11 The CSIRO has developed a new food wrap called ZERO₂. It is claimed that this food wrap keeps food and drinks fresh for longer.

The diagram shows how the new wrap is reported to perform better than ordinary plastic wrap.



© Sydney Morning Herald

- (a) According to the diagram, what is the major cause of food losing its freshness?
- (b) A student wants to test if this new wrap keeps a piece of cheese fresh for longer than the ordinary wrap. Describe how the student should carry out this test.

12 Car buyers have been advised by a consumer group to think of safety issues rather than price when buying a new car. Crash tests were carried out by the consumer group and twenty car models were tested. Only two were rated as having a good level of safety, six were acceptable, while twelve were poor. Car manufacturers criticised these tests, saying they were irrelevant, misleading and ill-researched.

- (a) Give ONE reason why you would accept the ratings from the consumer group.
- (b) On what basis could the car manufacturers criticise these tests?
- (c) Why would manufacturers criticise negative comments from consumer groups?

13 Lila and Gerry performed an experiment to investigate sugar dissolving in water. Their method is shown below.

- METHOD
- 1 Fill a glass with water from the tap.
 - 2 Add a teaspoon of sugar crystals and stir.
 - 3 Use a stop-watch to measure how long it takes for all the sugar to dissolve.
 - 4 Empty the glass and rinse it.
 - 5 Repeat steps 1–4 twice.

They did the experiment again using cubes of sugar instead of sugar crystals.

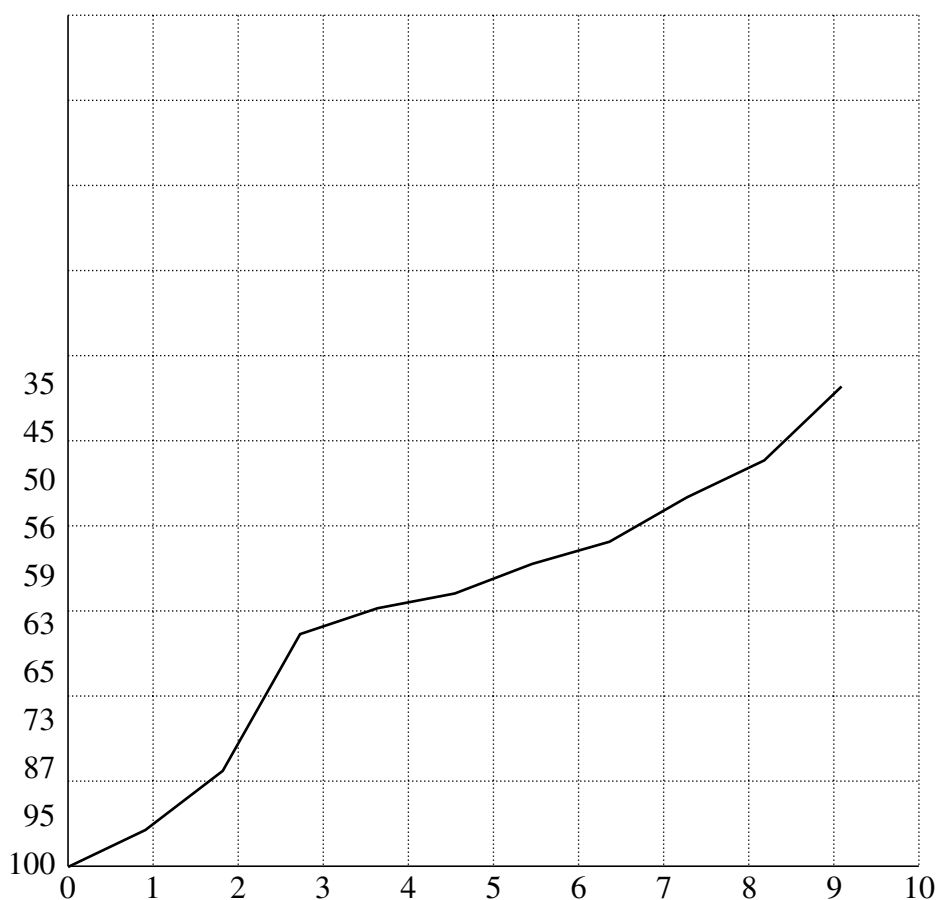
Draw a table that they could use to record their results.

- 14 Tatiana, Carol and George performed an experiment to observe boiled water as it cooled. Their results are shown in the table.

Time (minutes)	0	1	2	3	4	5	6	7	8	9	10
Temperature (°C)	100	95	87	73	65	63	59	56	50	45	35

They were asked to draw a graph of their results. Tatiana's graph is shown below.

List SIX corrections you would make to Tatiana's graph.



- 15 During your course of study you were to carry out a project based on one or more of the modules.
- What was the purpose of your project (the question you were trying to answer)?
 - Briefly describe TWO steps you followed to answer the question.
 - Explain how your results did, or did not, answer your question.

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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	18–20
QUESTION 18 THE HUMAN BODY	21
QUESTION 19 SCIENCE FICTION	22–23
QUESTION 20 SCIENCE OF TOYS	24–25
QUESTION 21 SPORT SCIENCE	26–28
QUESTION 22 DISASTERS	30–31
QUESTION 23 MANAGING NATURAL RESOURCES	32–33
QUESTION 24 MARINE OR RIVER STUDIES	34–36
QUESTION 25 BIOTECHNOLOGY	37–39
QUESTION 26 COMMUNICATIONS	40–42
QUESTION 27 CONSUMER SCIENCE	43–45
QUESTION 28 SPACE SCIENCE	46–47

QUESTION 16 Fashion and Science**Marks**

(a)

4

Mobile trends

Early mobile phones were chunky and had limited features such as push button dialling. They had short battery lives.

Today, the size of mobile phones has shrunk and they include features such as web browsing, e-mail, calculators and even games.

Science and technology have an impact on fashion items such as mobile phones. For a fashion you have studied:

- (i) Name the fashion. Describe how the fashion has changed as a result of science and technology.
 - (ii) Predict how this fashion might change in the future. Explain how science and technology could cause this change.
- (b) Fashion is a term used to describe many aspects of our lives—everything from car design to clothing, music and food. **8**

- (i) What is meant by the term *fashion*?
- (ii) Describe how a fashion has changed as a result of the influence of another culture.
- (iii) Copy this table into your Answer Book.

<i>Factor influencing fashion</i>	<i>Example</i>

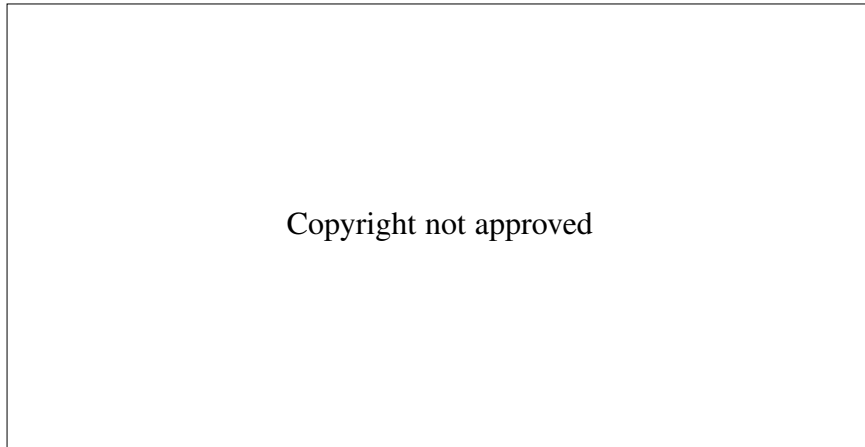
Complete the table by describing TWO factors, other than cultural heritage, that influence fashion. Give ONE example for each factor.

Question 16 continues on page 17

QUESTION 16 (Continued)

Marks

- (c) The first high heels were worn in the 1700s. The heels were so high some wearers needed help to walk. **3**



A SHOE FROM THE 1700s

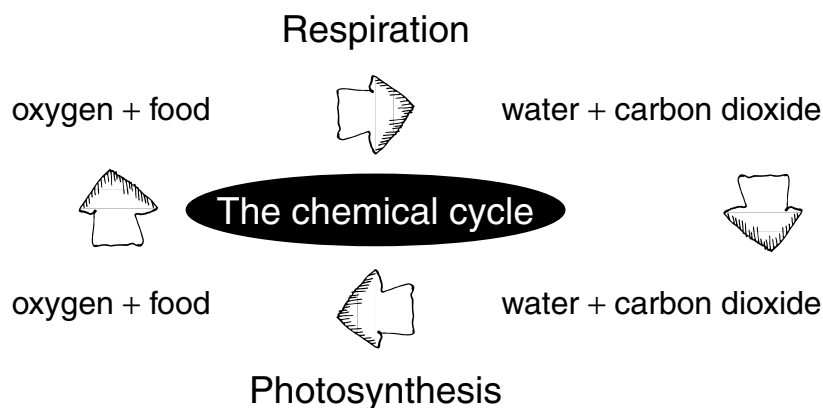
Similar shoes with heels of 20 cm are considered fashionable again. Some fashion models are taking out insurance in case of accidents because these shoes cause back, foot and ankle damage.

- (i) Name a fashion you have studied. State ONE detrimental effect of this fashion.
- (ii) Suggest TWO reasons why people follow this fashion, even though it is harmful.

End of question

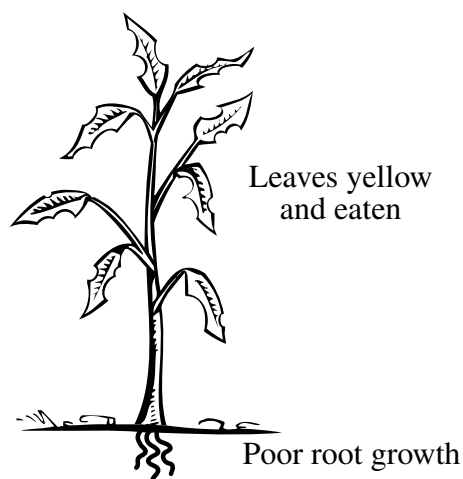
QUESTION 17 Horticulture**Marks**

- (a) The diagram shows how some chemicals are cycled in nature.

2

- (i) What is the essential role played by plants in this cycle?
- (ii) Apart from their role in the cycle above, describe ONE other way in which plants are essential for life on Earth.
- (b) The table shows the effect on plants when the soil lacks some elements. **3**

<i>Element lacking</i>	<i>Effect on plant</i>
nitrogen	yellow/green leaves; weak stem
potassium	poor flower and fruit growth
magnesium	leaves turn yellow from bottom upwards
phosphorus	poor root growth



Kim finds this plant in the vegetable garden and wants to know how to improve its health.

- (i) Which TWO elements should Kim add to the soil? Explain your answer.
- (ii) What else could Kim do to improve the health of the plant?

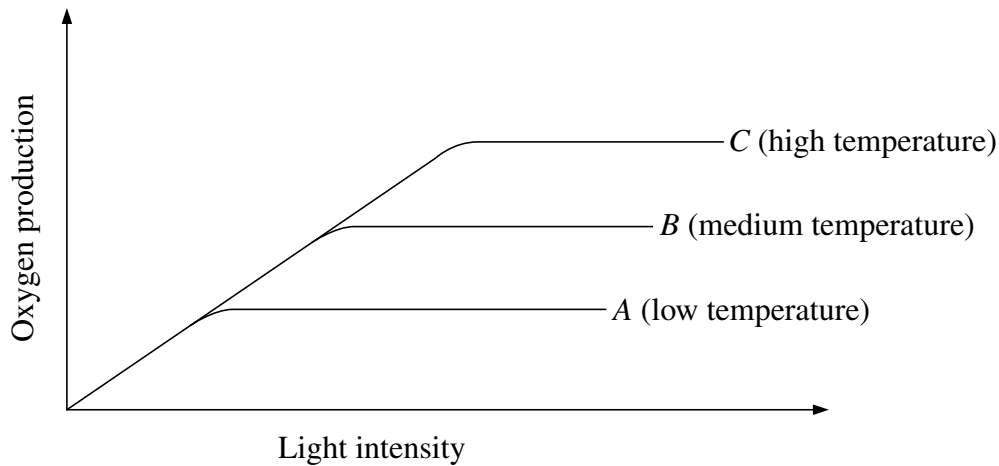
Question 17 continues on page 19

QUESTION 17 (Continued)

Marks

- (c) The graph shows the results from an experiment to determine the amount of oxygen produced by a plant under different conditions. 4

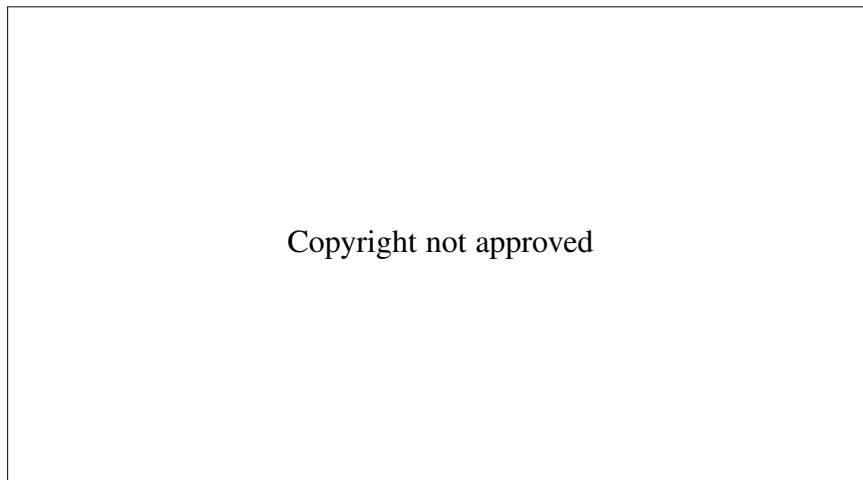
The experiment consisted of a number of separate stages.



- (i) What were the TWO conditions that were varied in this experiment?
- (ii) What conclusions can be drawn from the experiment?

(d)

2



The diagram shows plants being grown in a greenhouse.

Use a greenhouse or any other method of growing plants to answer the following:

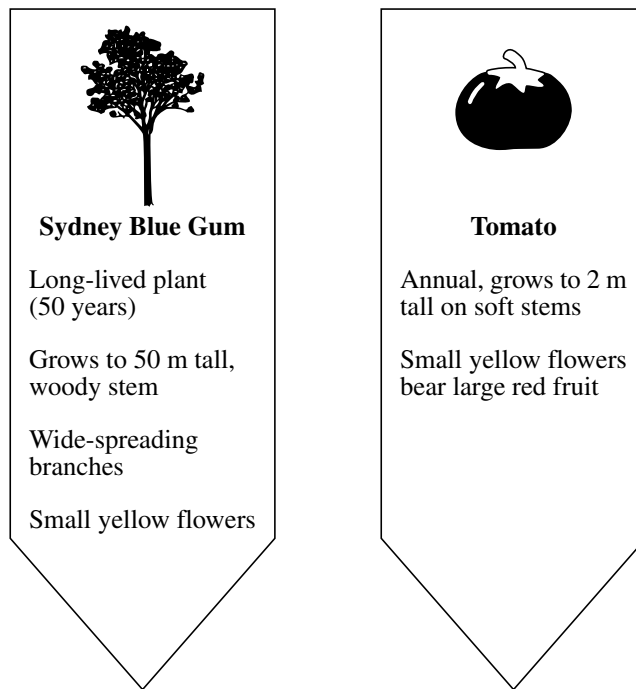
- (i) Describe ONE way in which the method changes the environment in which the plants grow.
- (ii) Explain how this would be an advantage to the grower.

QUESTION 17 (Continued)

Marks

(e) The diagram shows name tags from two plants.

4



- (i) For each plant, name ONE feature that makes it useful. Explain what makes each feature useful.
- (ii) Draw a plant that you have studied (not the tomato or Sydney Blue Gum) and label TWO features involved in the plant's reproduction.

End of question

QUESTION 18 The Human Body**Marks**

(a) Lifestyle can affect all stages of human development from conception to old age. Some aspects of lifestyle are harmful. **6**

- (i) Name TWO stages of life. For each stage name ONE harmful activity typical of that stage.
- (ii) Describe how each of these activities may affect a person's physical or mental health.
- (iii) Select ONE of these activities. Design an advertisement to discourage this activity by explaining its damaging effects.

(b) Diseases may be caused by bacteria, genetic defects, poor nutrition or other factors. **3**

- (i) Name ONE disease you have studied and state its cause or its method of transmission.
- (ii) For this disease, state its treatment or cure.
- (iii) Explain how this disease could be prevented.

(c) Three students, Lazo, Vinny and Thieu were asked the question: **6**

‘What does the word *biosphere* mean?’.

They gave the following answers:

LAZO: ‘It is everything that is alive and is not dead.’

VINNY: ‘It is the part of the Earth that contains and supports life.’

THIEU: ‘It is the part of the Earth where humans can live.’

- (i) Which of these is the best answer?
- (ii) Humans cause damage to many parts of the biosphere.
 - 1 Name ONE human activity that damages the biosphere.
 - 2 Name the part of the biosphere that this activity affects.
 - 3 Describe the effect on the biosphere.
 - 4 Explain how the damage could be reduced.

End of question

QUESTION 19 Science Fiction**Marks**

- (a) In H. G. Wells' novel *The Food of the Gods*, a miracle fertiliser is used to produce giant plants, rats, wasps, hens and even people. A description of a giant wasp was given by one of the characters in the novel: **3**

It was as big or bigger than a barn owl . . . When he came to measure the thing, he found it was twenty-seven and a half inches (70 cm) across its open wings, and its sting was three inches (7.5 cm) long . . . he estimated the length of the creature from head to sting as eighteen inches (45 cm) . . .

- (i) Use this information to draw a scaled diagram of the wasp. Label the drawing and show the scale you used.
- (ii) How might the size of this wasp affect its ability to fly?
- (b) Robots have stepped out of science fiction and into our lives. Robots entertain us, work for us, and tantalise us with their potential. **2**
- (i) Name a device or idea other than robots that first appeared in science fiction but is now a part of everyday life.
- (ii) Describe how this device or idea is now used.
- (c) If you were to meet an extraterrestrial, how would you: **2**
- (i) determine whether or not it was alive?
- (ii) confirm that it did not come from Earth?
- (d) Time travel, matter transfer, and invisibility are ideas used by science fiction writers. For example, time travel is used as the central theme in the film *Back to the Future*. However, these ideas cannot be validated by current scientific knowledge. **3**
- (i) Select ONE such idea and describe how it was used in a novel or film (other than *Back to the Future*) that you have studied.
- (ii) Give ONE scientific reason why this device or idea is not possible.
- (iii) If this device or idea *were* possible, suggest ONE negative effect this could have on your life.

Question 19 continues on page 23

QUESTION 19 (Continued)

Marks

- (e) In 1908 a huge explosion like that of a nuclear bomb occurred in Siberia. Tens of thousands of trees were flattened by the blast. More puzzling, the blast occurred high in the air, leaving no craters on the ground. 2

One explanation has been that a giant alien spaceship exploded.

If you were asked to investigate such an event, what steps would you take?

- (f) The existence of alien lifeforms has been used in many science fiction stories. There is an international research program called SETI—the Search for Extraterrestrial Intelligence—looking for intelligent life beyond Earth. An Australian SETI project is looking for alien signals, using the Parkes radio telescope. Any such signal would have taken hundreds of years to reach us. 3



RADIO TELESCOPE

- (i) Give TWO consequences for human civilisation if SETI detects intelligent life beyond Earth.
- (ii) If we were able to communicate with aliens, what would be ONE piece of information we would need to exchange? Explain your answer.

End of question

QUESTION 20 Science of Toys**Marks**

(a) The impact of technology has resulted in many current toys making noise above that of a vacuum cleaner (about 75 decibels). Examples of such toys include talking dolls, sirens on toy cars and toy guns. **3**

- (i) Describe ONE effect this amount of noise might have on the children who play with them.
- (ii) Suggest how the presence of the technology (eg voice of a doll) has changed the way children play with such toys.
- (iii) Name any of the toys mentioned above or any toy that you have studied. Describe ONE technological development that has made the current form of the toy possible.

(b) Toys can be classified into categories based on the psychological message that they carry. **5**

- (i) Using the list of toys below (or any other toys you have studied) classify them into two or more groups, with headings.

tricycle	model plane	talking doll
teddy bear	action figures	blocks
skipping rope	toy drum	laser weapons
water pistol	board game	dolls' house
colour pencils	frisbee	

- (ii) For ONE toy you have classified, explain why you placed it into the group that you chose.
- (iii) Some parents are very concerned about the psychological messages some types of toys carry.

Suggest TWO toys that may be of concern to parents. Explain the cause of their concern.

Question 20 continues on page 25

QUESTION 20 (Continued)

Marks

- (c) Many toys assist both the physical and the mental development of children. They may be used by many different age groups. Playing with toys involves many different activities such as balancing, running, reading, thinking, manipulating, jumping, throwing, cooperating with others and many more. 4

- (i) Describe TWO toys that would be unsuitable for a toddler who is 1 to 2 years old. Explain your answer.
- (ii) Copy and complete the table in your Answer Book by:
- naming suitable toys;
 - identifying the type of activities involved in playing with that toy;
 - stating whether that toy would MOSTLY assist either *mental* or *physical* development.

One example has been given in the table.

<i>Name and description of toy</i>	<i>Most suitable age group</i>	<i>Activities</i>	<i>Physical or mental development</i>
round, rubber ball	2 to 4 years	throwing, rolling	physical
	10 to 14 years		
	0 to 12 months		

(d)



3

Roller blade manufacturers have developed a four-wheel drive in-line skate that allows you to travel along dirt tracks and rough terrain.

Using roller blades or another toy, game or ride that you have studied:

- (i) name ONE branch of science involved in its design;
- (ii) state the link between the branch of science and the toy, game or ride;
- (iii) describe ONE safety feature that makes it suitable for the people for whom it is intended.

End of question

QUESTION 21 Sport Science**Marks**

- (a) A quality diet is necessary for athletes to give their best performance.

4

A quality diet should be:

- high in carbohydrate
- low in fat
- sufficient in protein
- high in dietary fibre
- low in sodium
- sufficient in water
- low in alcohol.

The table shows some foods that an athlete may eat.

<i>Food</i>	<i>Nutrient per 100 g (1 g = 1000 mg)</i>				
	<i>Water (g)</i>	<i>Protein (g)</i>	<i>Fat (g)</i>	<i>Carbohydrate (g)</i>	<i>Sodium (mg)</i>
boiled potatoes	78	2	0.1	19	6
potato salad	72	3	9.2	13	380
boiled rice	73	2	0.2	24	5
fried rice	65	5	7.3	23	10
macaroni	72	3	0.5	23	2

- (i) State which food in the table is least likely to be in a quality diet for an athlete. Give TWO reasons for your answer.
- (ii) Alcohol is a drug. It can cause dehydration (loss of water) and reduce the athlete's judgement and coordination. Alcohol reduces the body's ability to store carbohydrate in muscles and control body temperature.

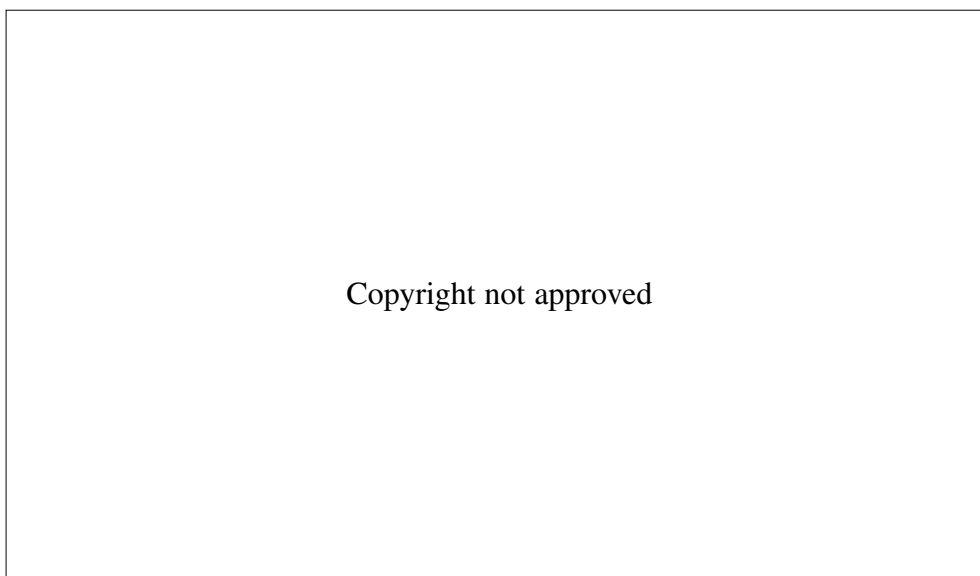
An athlete drinks some alcohol at a party. Using the list of foods in the table, state ONE way the athlete could reduce the harmful effect of the alcohol. Explain your answer.

Question 21 continues on page 27

QUESTION 21 (Continued)

Marks

- (b) Physical activities such as rock climbing, caving and canoeing involve risks for the participant. **4**
- (i) State TWO reasons that motivate individuals to pursue such activities.
 - (ii) State ONE risk involved in one of the activities listed above or any other you have studied. Suggest ONE way in which this risk can be reduced.
- (c) In recent years there have been campaigns to encourage school-aged Rugby League and Rugby Union players to choose playing positions best suited to their body type. **2**
- (i) Name a sport you have studied.
 - (ii) Draw and name a body type.
 - (iii) Label TWO features that make it suited to this sport.
- (d) These diagrams contrast TWO ways of dealing with injuries caused by sporting accidents. **3**



- (i) The diagrams mention factors that can make the effects of a soft tissue injury worse.
Explain the correct methods of dealing with sports injuries.
- (ii) Describe ONE way to prevent sports injuries from occurring.

QUESTION 21 (Continued)

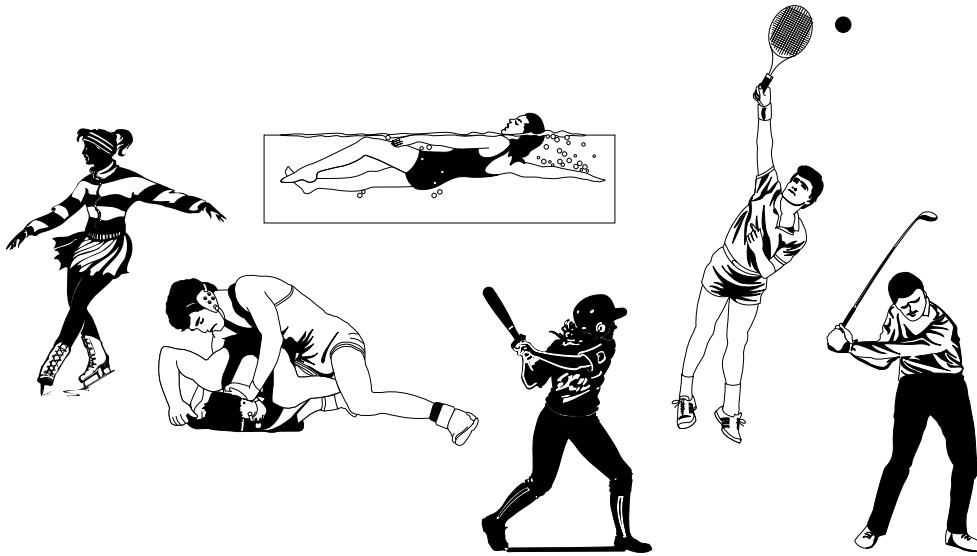
Marks

(e) Knowledge of physics principles such as:

2

- levers
- angle of swing
- forces, and
- rotation

can help athletes improve their performance.



Name a sport that you have studied.

For this sport:

- select a skilled movement;
- explain the physics principle involved in this movement.

End of question

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Please turn over

QUESTION 22 Disasters**Marks**

- (a) A newspaper reported that 60 teenagers were killed and 190 injured in a disco fire in Sweden in 1998. **6**

The police said that the fire was not deliberately lit. An eyewitness said that just before the fire started, lights and speakers fell from the ceiling.

Some people were trampled as they tried to get out of the only door.

To escape the fire, teenagers broke windows and jumped from the roof of the three-storey building.

Use this information to answer the following questions:

- (i) Suggest a possible cause for the fire.
 - (ii) State TWO forms of technology that could have been used to prevent or minimise the effects of the fire.
 - (iii) Choose ONE of these technologies you stated in part (ii) above. Use a flowchart to show how this technology could be used.
 - (iv) State ONE service that could help victims cope with the effects of disasters. Explain why this service is important.
- (b) A train derailment accident resulted in the death of some of the passengers. Of the 97 people killed, only 11 died in the actual train derailment. The remaining 86 people died when the bridge across the rail track collapsed after the train hit it. **2**
- (i) Suggest ONE reason why this incident could be considered a disaster.
 - (ii) Suggest ONE reason why this incident might not be considered a disaster.
- (c) In preparation for the Sydney 2000 Olympics, authorities have developed Disaster Plans. Emergency services have used these plans to practise their response to disasters. **2**

Suggest TWO advantages of having prepared and rehearsed such plans.

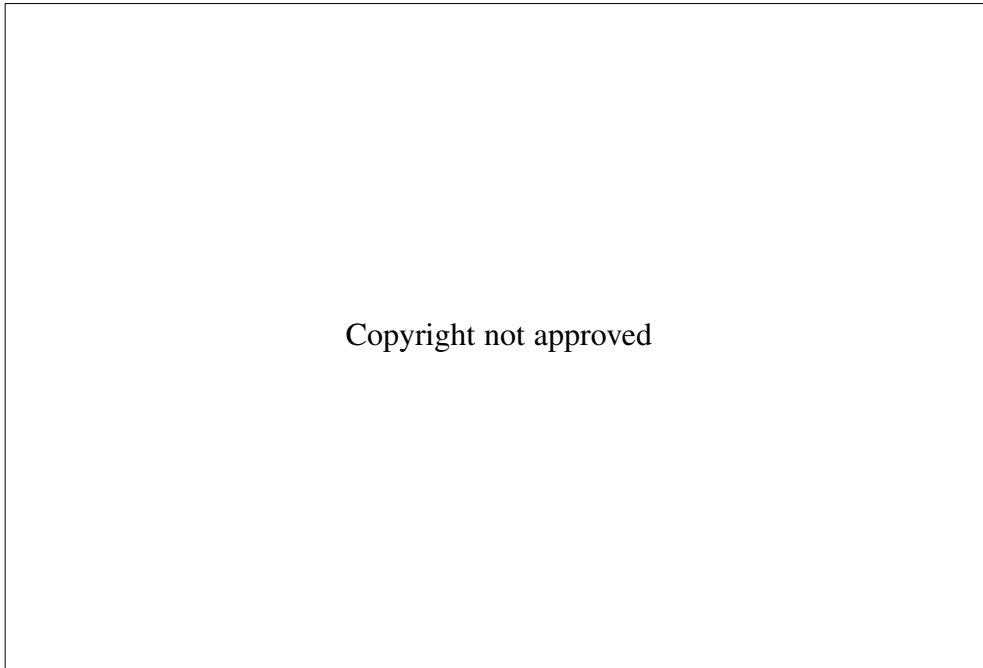
Question 22 continues on page 31

QUESTION 22 (Continued)

Marks

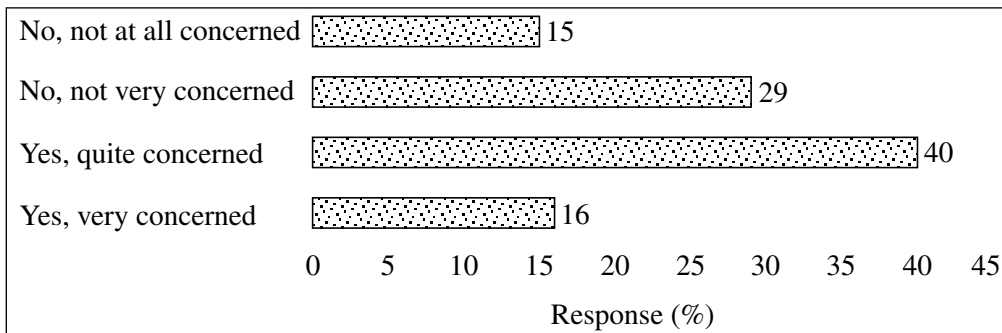
(d) Australia is a dry continent where droughts are a common natural disaster.

5



Sydney Water conducted a survey to find out if people were concerned about saving water before a drought started.

The results are shown in the graph.



CONCERN FOR SAVING WATER

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- (i) What percentage of people were concerned about saving water?
- (ii) Suggest ONE way technology may be used to save water.
- (iii) State ONE reason why people should be concerned about saving water.
- (iv) Design a poster that encourages people to save water.

End of question

QUESTION 23 Managing Natural Resources**Marks**

(a)



Koalas Extinct?

Time is running out for the koala. Scientists estimate that it could take as little as 30 years for the species to disappear completely from the NSW bush.

Loss of habitat due to development, car accidents and attacks by dogs mean that thousands of koalas are dying every year.

In an attempt to save the koalas, scientists are trying to see if koalas born in captivity can be successfully released into the wild.

© The Daily Telegraph

3

- (i) Animals, such as koalas, can be regarded as a non-renewable resource. Do you agree? Explain your answer.
- (ii) Name a resource you have studied. Describe TWO ways in which the supply of this resource can be sustained into the future.

(b)

Global Warming

All nations contribute to the problem of global warming, but the emissions of developing nations are low compared to those of a country like Australia.

A solution to global warming will not be found unless developing nations join the international effort to reduce greenhouse gas emissions.

6

- (i) What is the relationship between carbon dioxide levels and global warming (often called the greenhouse effect)?
- (ii) What is ONE predicted consequence of global warming?
- (iii) Do you think all countries should agree to reduce greenhouse gas emissions? Explain your answer.
- (iv) What are TWO ways Australians can reduce their greenhouse gas emissions? (Do NOT include geothermal systems in your answer.)

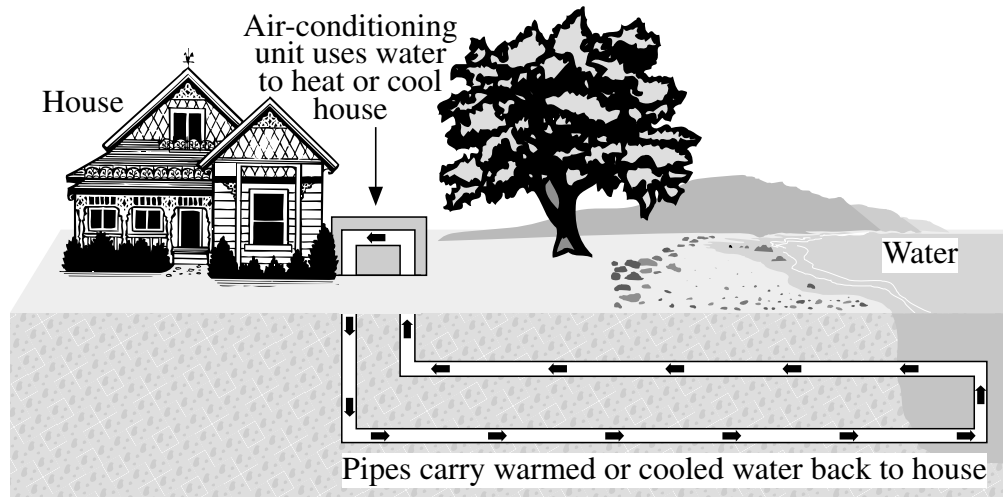
Question 23 continues on page 33

QUESTION 23 (Continued)

Marks

- (c) When it comes to heating and cooling your home, the clean, green answer lies beneath your feet. 6

Geothermal systems tap the energy below the Earth's surface and use it to heat and cool homes. They require little space and run silently. There are no emissions of greenhouse gases. The energy is available whether the sun shines or not and the temperature below the surface remains constant. The installation costs are high, but the running costs are virtually nil.



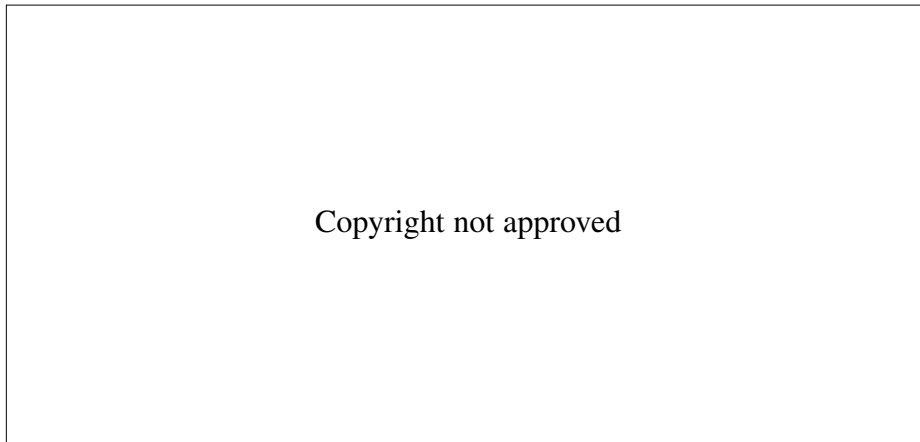
The choice of an energy source depends on many factors such as supply, cost, available technology and environmental consequences.

- (i) For geothermal systems, state ONE advantage of the energy source.
- (ii) State ONE disadvantage of this energy source.
- (iii) For another energy source you have studied, state TWO advantages and TWO disadvantages of this source.

End of question

QUESTION 24 Marine or River Studies**Marks**

- (a) The picture shows people fishing at a beach.

8

The table shows the number of fish each person caught.

<i>Person</i>	<i>Fish caught</i>
Kevin	8
Dong	0
Kim	4
Helen	2
Theo	3

- (i) Draw a column graph to show the number of fish each person caught.
- (ii) Theo used green weed to catch blackfish. He then used the blackfish as bait to catch flathead. He ate the flathead and said it tasted really good.
- Draw a flowchart to show this sequence of events.
- (iii) A recreation club used this beach for weekend activities.
- 1 Name TWO activities, other than fishing, that club members could have participated in at the beach.
 - 2 For ONE of these activities suggest how it may contribute to the pollution of the beach.

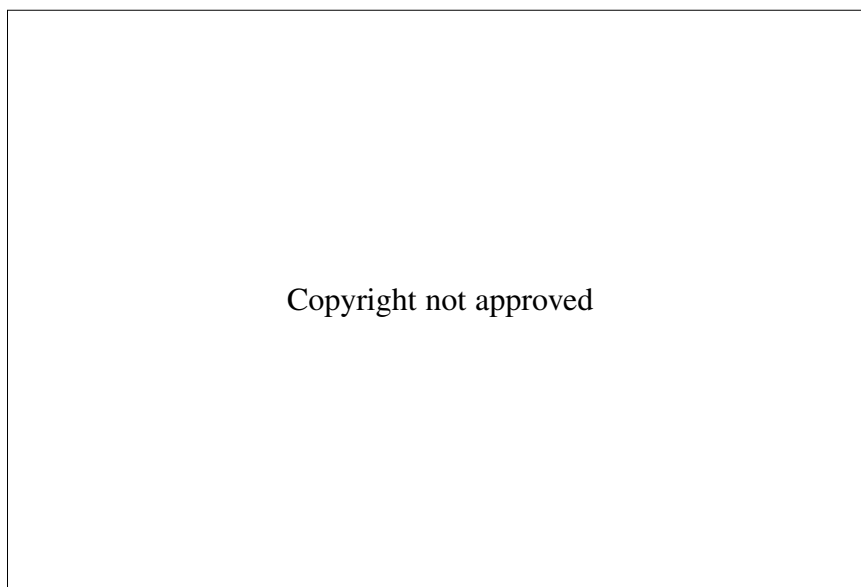
Question 24 continues on page 35

QUESTION 24 (Continued)

Marks

- (b) Two students tested water quality at a number of sites along a creek.

5



The results of their investigations are shown in the table.

HOW POLLUTED IS THE WATER?

	WATER QUALITY TEST				
	<i>Dissolved oxygen</i>	<i>Faecal coliforms</i>	<i>Turbidity</i>	<i>Nitrates</i>	<i>Phosphates</i>
% of sites with results outside acceptable levels	68	49	68	92	90
% of sites with results within acceptable levels	32	51	32	8	10

- (i) Which water quality test showed the greatest percentage of sites with results outside acceptable levels?
- (ii) Is the water polluted? Explain your answer.
- (iii) After the water had been treated to reduce pollution, the students retested it. Identify TWO ways the students could make sure that the retest was fair.

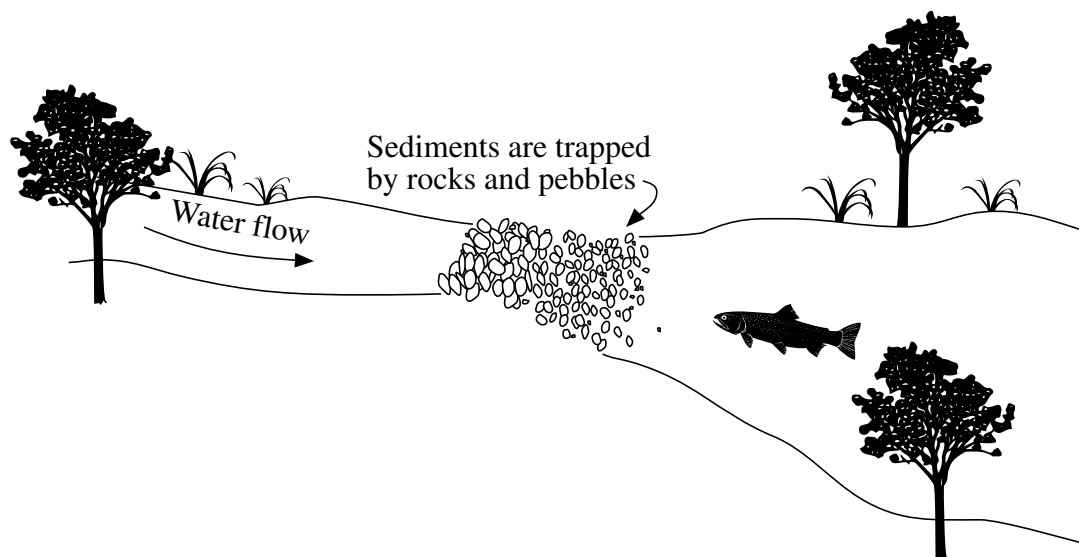
Question 24 continues on page 36

QUESTION 24 (Continued)

Marks

- (c) A local government built silt traps across creeks and waterways to stop sediments entering a lake. The lake contained no other pollutants. **2**

A silt trap slows down the flow of creek water and allows silt and sediments to be trapped.



After the silt trap had been installed, the number of fish in the lake increased.

What simple step could be taken to find out if the silt trap was responsible for the increase in the fish population?

End of question

QUESTION 25 Biotechnology**Marks**

- (a) A problem for the farming of prawns in ponds is that they can be infected by bacteria. This can lead to a loss of production. Antibiotics have been used to lower the levels of the disease-causing bacteria. **3**

A new alternative is to add non-disease-causing bacteria to the ponds. These compete with the disease-causing bacteria for space and food, reducing infection of the prawns.

The table below shows the results from an experiment testing the effects on prawn production when non-disease-causing bacteria are added to ponds.

	<i>Ponds with antibiotics added</i>		<i>Ponds with non-disease-causing bacteria added</i>	
	<i>Pond 1</i>	<i>Pond 2</i>	<i>Pond 3</i>	<i>Pond 4</i>
Survival (%)	70	75	90	98
Harvest (tonnes/ha)	4.8	6.0	7.2	8.6

- (i) What information in the table tells you that adding non-disease-causing bacteria is more effective than using antibiotics?
- (ii) Name ONE piece of extra information that the farmer would need in order to decide whether to use the non-disease-causing bacteria.

Question 25 continues on page 38

QUESTION 25 (Continued)

Marks

- (b) Biotechnology can be used to provide immunisation against viruses. To provide protection against HIV it is necessary to increase the number of killer T-cells in the blood. The process is being tested on monkeys and is illustrated below. **4**

Copyright not approved

- (i) How is HIV protein destroyed by the body?
- (ii) Describe ONE ethical problem associated with testing this technique on humans.
- (iii) For another biotechnology you have studied, outline ONE important ethical issue.
- (c) (i) For a biotechnology you have studied that applies to *plants*, describe how it is used to control, alter or repair a biological system. **4**
- (ii) Suggest ONE advantage this biotechnology has over traditional techniques used in this case.
- (iii) Suggest ONE disadvantage of this biotechnology compared to traditional techniques used in this case.

Question 25 continues on page 39

(d)

Soil Yields Cancer Cure

Common bacteria that grow in soil and water can be used to produce a family of chemicals. These chemicals are known as azinomycins and could be used to produce a new wave of anti-cancer drugs. Researchers have cloned azinomycins for use in the treatment of lung, breast and bowel cancers.

4

Some people suggest that cloned azinomycins should be widely released into the environment to help fight cancer. Others say that such biotechnology should be tightly controlled.

- (i) Suggest ONE reason why these bacteria should be widely released.
- (ii) Suggest ONE reason why they should not be released.
- (iii) Who should make this decision? Explain your answer.

End of question

QUESTION 26 Communications**Marks**

(a)

2

Clever Cash

New banknotes will include a tiny magnifying glass in a bid to beat the increasing sophistication of counterfeiters.

The plastic lens will allow consumers to 'read' tiny inscriptions printed elsewhere on the note, so that they can check that the note is real, and not a fake.

As technology diversifies, many communication systems need safeguards to protect users.

- (i) Describe a problem with a recently developed communication system you have studied.
- (ii) Explain ONE way the problem is being overcome.

(b) You wish to send secret messages to a friend. To do this you have to create a code that only you and your friend will know. **3**

- (i) Make up a code using any symbols you wish. Write down the key to your code in your Answer Book.
- (ii) Use your code to write the following message:

Meet you after school.

Question 26 continues on page 41

(c)

6

The Age of Light

Telephone systems used to carry their signals in copper cables, with pulses of electricity travelling along the wires. Not any more.

Nearly all the cities, towns and suburbs of Australia are now connected by long threads of glass called optical fibres.

When you speak to an interstate friend on the telephone, your voice will be converted from electric pulses to light for most of the long journey between cities.

All communication involves five important steps. For telephone communications using optical fibres, four of these steps are described in the table.

<i>Step</i>	1	2	3	4	5
<i>Name</i>					Minimise noise
<i>Description</i>	Sound changed to electric pulses	Electric pulses converted to light	Light converted to electric pulses	Electric pulses converted to sound	

- (i) In your Answer Book, write the missing names of the four steps shown in the table above.
- (ii) In your Answer Book, give a description of Step 5.
- (iii) List ONE form of communication other than the telephone that uses optical fibre technology.
- (iv) What are TWO advantages of using optical fibres to carry these messages?

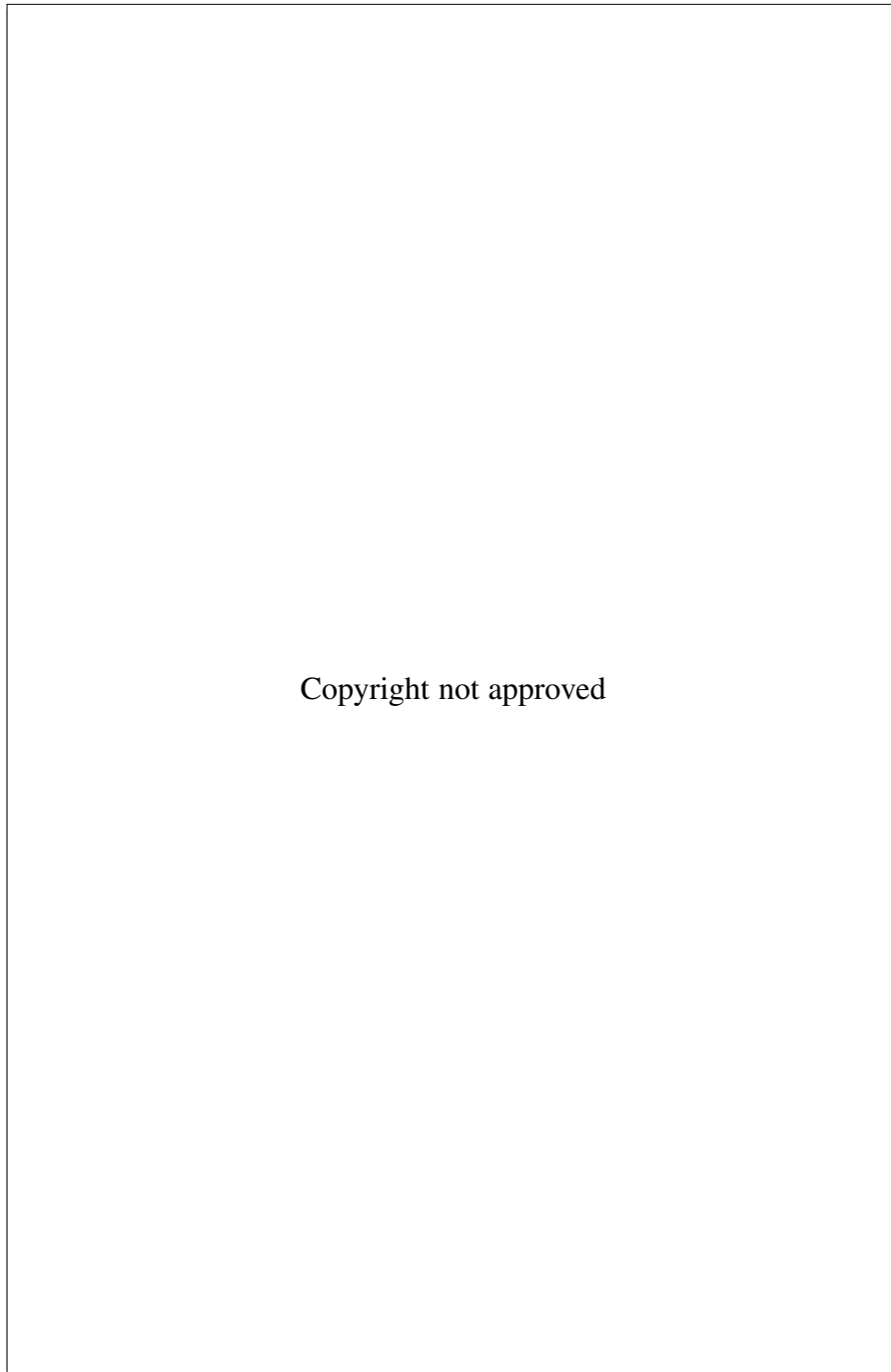
Question 26 continues on page 42

QUESTION 26 (Continued)

Marks

- (d) Advertising is a very important form of communication in today's society. Look at the advertisement below.

4

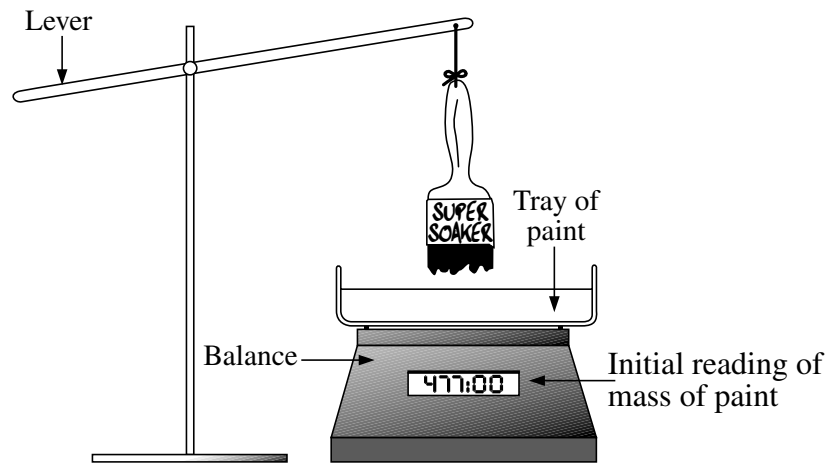


- (i) What is the purpose of this advertisement?
- (ii) How effective is this advertisement in achieving this purpose? Explain your answer.
- (iii) State ONE way that the Commonwealth Government could find out if this advertisement has been effective.

End of question

QUESTION 27 Consumer Science**Marks**

- (a) A student used the equipment in the diagram to test a paintbrush. The student was trying to prove that one brand of paintbrush was better than other brands in picking up paint. The student lowered the brush into the paint and raised it again. The new reading on the balance was then recorded. This was repeated for four different brands of paintbrush. **3**



*Englert, Stannard,
Williamson,
Science World 10
Workbook, Firefly
Press Buderim.
1998*

PAINTBRUSH TEST

- (i) Draw up a table that would be suitable for the results obtained by the student after testing all four brushes.
- (ii) Explain how the readings on the balance let the student calculate how much paint each brush picked up.
- (b) Explain how people's preferences for certain consumer items can affect resource usage in our society. **2**

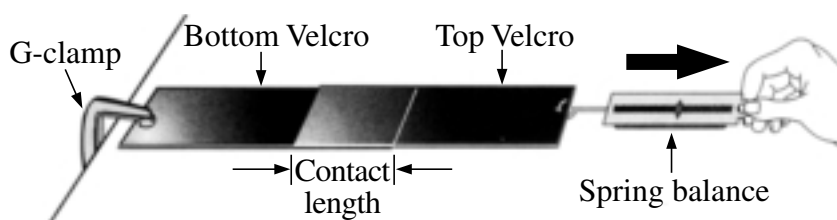
How can this effect be minimised?

Question 27 continues on page 44

QUESTION 27 (Continued)

Marks

- (c) A student conducted a test to measure the force needed to pull two pieces of Velcro apart. 4



Englert, Stannard, Williamson, Science World 10 Workbook, Firefly Press Buderim. 1998

The results of the test are shown in the table below.

<i>Length of Velcro in contact (cm)</i>	<i>Force needed (newtons)</i>
1	38
2	86
3	130
4	149
5	218
6	249
7	291
8	318
9	347

- (i) In your Answer Book, draw a graph of these results.
- (ii) From the graph, predict how much force would be needed to pull the Velcro pieces apart when their length of contact is 12 cm.

Question 27 continues on page 45

QUESTION 27 (Continued)

Marks

(d)

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3

Asbestos was used for many years in building homes and household products. We now know that tiny fibres flake off and can get into people's lungs. This can cause fatal diseases such as mesothelioma.

- (i) Name and describe a product you have studied, other than asbestos, which *was* widely used but has now been replaced or modified because of its detrimental effect on people or the environment.
- (ii) Explain how the original product was harmful.
- (iii) Describe ONE way in which the new or modified product is different from the old.
- (iv) Suggest how, in future, society can prevent harmful products reaching consumers.

(e)

<p>'Genetically engineering a new set of superfoods is the way of the future, say the <i>scientists</i>, and its pretty much here already. But consumers around the world are not so sure.</p> <p>... A set of fabulous scientific advances that will enable the human race to flourish as we face the twenty-first century challenges of food shortages, population explosion and global warming, or a go at playing God that will end in catastrophe . . .</p> <p>Many <i>scientists</i> are adamant: genetically modifying food is simply one more step along the path of improving the way we produce the stuff of life.'</p>

3

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Today's consumers must make many decisions about what they buy. They must decide for example whether or not to buy food that has been produced in the laboratory using genetic engineering.

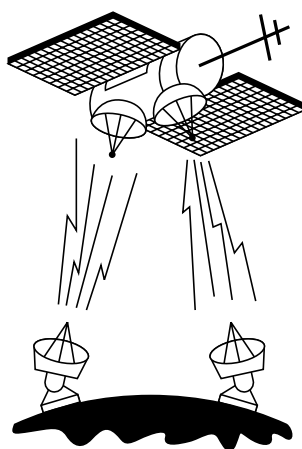
- (i) Explain why the mention of scientists in the article above might influence consumers in their decision.
- (ii) Suggest TWO reasons why consumer groups may be concerned about new technology used in the production of food *or* any other product *or* service you have studied.

End of question

QUESTION 28 Space Science**Marks**

- (a) For hundreds of years people have dreamt about visiting other planets. Space travel may make this dream a reality. **4**
- (i) List **THREE** scientific or technological developments that have made space travel possible.
 - (ii) Choose **ONE** of these developments and explain why it was an important step.
 - (iii) Explain why travel by people to other planets is still not a common event.

- (b) **2**



Thanks to space research, it is now possible to transmit radio and television around the world using satellites.

- (i) Explain the role played by satellites in transmitting information around the world.
 - (ii) Describe **ONE** advantage of transmitting information using satellites instead of cables.
- (c) At present some countries are spending huge amounts of money to build laboratories in space. **3**
- (i) Describe **ONE** benefit humans have derived from experimentation in space.
 - (ii)
 - 1 Give **ONE** reason why large amounts of money should be spent on space research.
 - 2 Give **ONE** reason why large amounts of money should **NOT** be spent on space research.

Question 28 continues on page 47

QUESTION 28 (Continued)

Marks

- (d) The time that astronauts spend in space has become much longer over the years. **3**
Some astronauts live in space laboratories for months.
- (i) List TWO essential functions that need to be carried out in order to keep people alive in space.
 - (ii) Choose ONE of these functions and explain how the spacecraft carries it out.
- (e) During the years of space travel many objects have been left behind in space. **3**
- (i) Describe ONE piece of space junk that may be found in space. Explain how this may have been left in orbit.
 - (ii) What danger could space junk cause for astronauts?
 - (iii) What may happen to space junk over a long period of time?

End of paper

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