



HIGHER SCHOOL CERTIFICATE EXAMINATION

1995

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.
Mark your answers in pencil on the Answer Sheet provided.
- **Part B** 5 questions, each worth 5 marks.
Answer this Part in the Part B Answer Book.
- Write your Student Number and Centre Number on each Answer Book.
- You may keep this Question Book. Anything written in the Question Book will NOT be marked.

Section II—Modules

- Attempt THREE Modules.
- Each Module 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 Module Number on the cover of each Module Answer Book.
- You may ask for extra Module Answer Books if you need them.
- Board-approved calculators may be used.

SECTION I—GENERAL

(25 Marks)

PART A

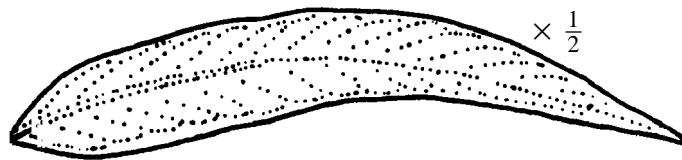
Attempt ALL questions.

Each question is worth 1 mark.

Select the alternative A, B, C, or D that best answers the question.

Mark your answers in pencil on the Answer Sheet provided.

1. A scale diagram of the Spotted Gum tree leaf is shown below.



The actual size of the Spotted Gum leaf is closest to

- (A) 4.5 cm
 - (B) 9.0 cm
 - (C) 13.5 cm
 - (D) 18.0 cm
2. Read this newspaper clipping.

Pacific Rubber manufactures a heart pacemaker. In November 1994, they estimated that 4200 of the 35 000 pacemakers implanted in patients were faulty.

Pacific Rubber plans to spend \$40 million to help patients with the faulty pacemaker.

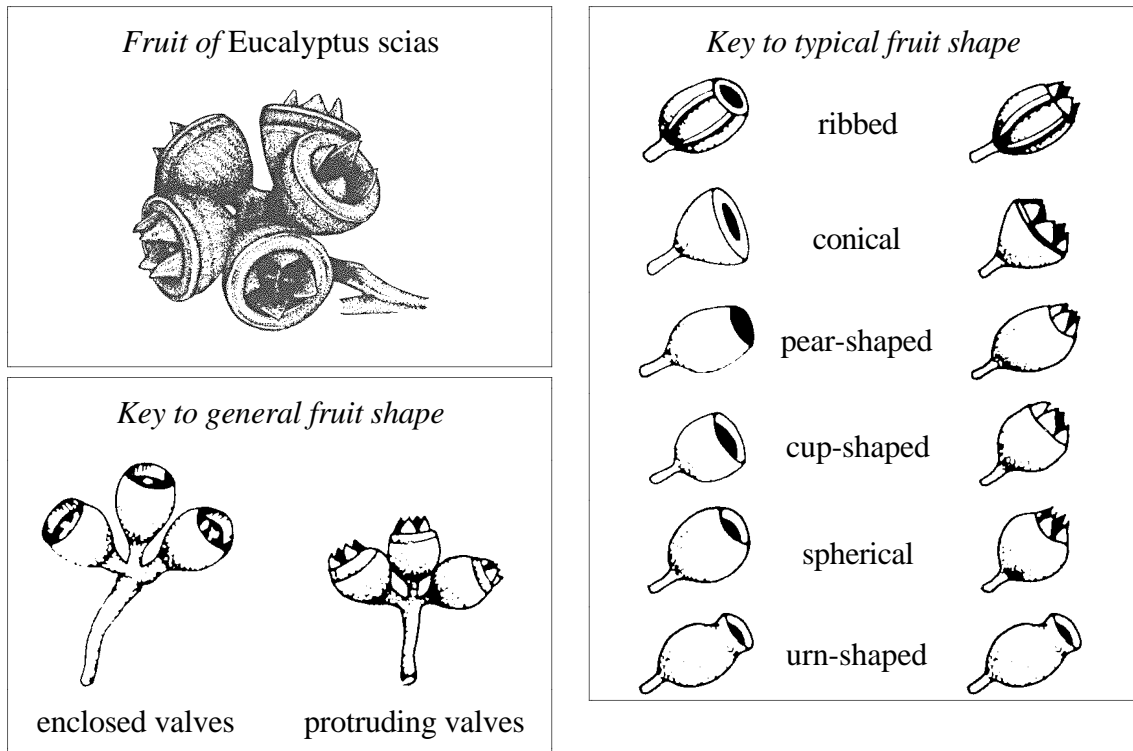
The value of the company Pacific Rubber has dropped since this fault was discovered.

Derived from an article in The Weekend Australian, January 28-29 1995, p 36, by Peter Sproull.

This information clearly shows that

- (A) all the pacemakers made by Pacific Rubber in 1994 will need to be replaced.
- (B) science and technology do not benefit people.
- (C) Pacific Rubber has accepted responsibility for the quality of its products.
- (D) companies lose value if they make pacemakers.

3. Look at the information below.



'Eucalypts - A Bushwalkers Guide', G Leonard, UNSW Press, 1993.

KEY FOR DESCRIBING SOME FRUITS OF THE GENUS *EUCALYPTUS*

The description of the fruit of *Eucalyptus scias* is:

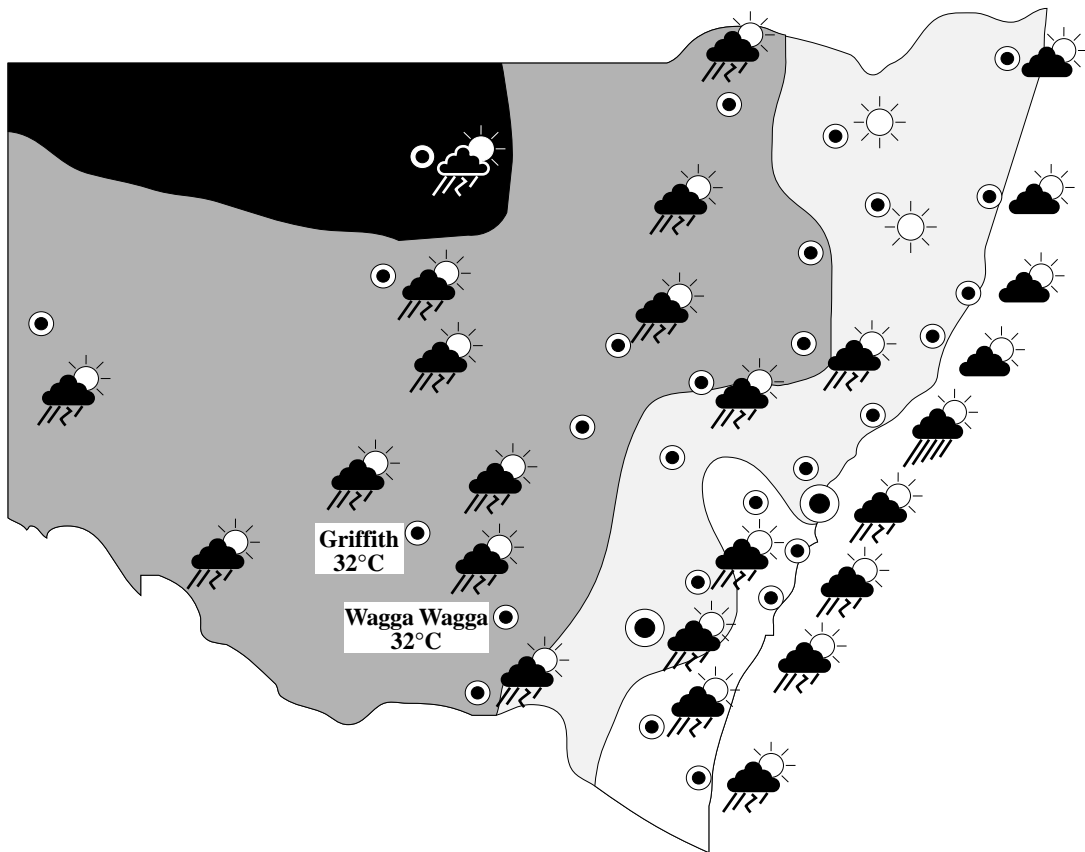
- (A) protruding valves, urn-shaped.
 (B) enclosed valves, cup-shaped.
 (C) protruding valves, conical.
 (D) enclosed valves, urn-shaped.
4. The measurement of volume can be written in many ways. The table below shows some of these ways and the relationship between the units used.

litre (L)	cubic centimetre (cm ³)	cubic metre (m ³)	cubic decimetre (dm ³)
1	1×10^3	1×10^{-3}	1
10	1×10^4	1×10^{-2}	1×10^1
100	1×10^5	1×10^{-1}	1×10^2





Use this information to express 5 litres as cubic metres.

- (A) 5 m^3
 (B) $5 \times 10^1 \text{ m}^3$
 (C) $5 \times 10^2 \text{ m}^3$
 (D) $5 \times 10^{-3} \text{ m}^3$






5. Look at the weather-forecast map below.



TEMPERATURE (°C)

	35°+
	30°–35°
	25°–30°
	under 25°

KEY

	thunderstorms
	showers
	clouds
	sunshine
	towns or cities

According to this weather map of NSW, people living between Griffith and Wagga Wagga can expect

- (A) 32°C temperatures and sunshine.
 (B) 30°–35°C temperatures and thunderstorms.
 (C) 30°–35°C temperatures and showers.
 (D) 25°–30°C temperatures and showers.

6. Look at the following diagrams.

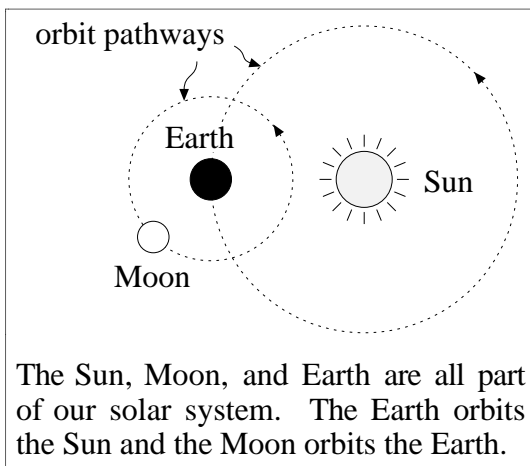


FIG. 1

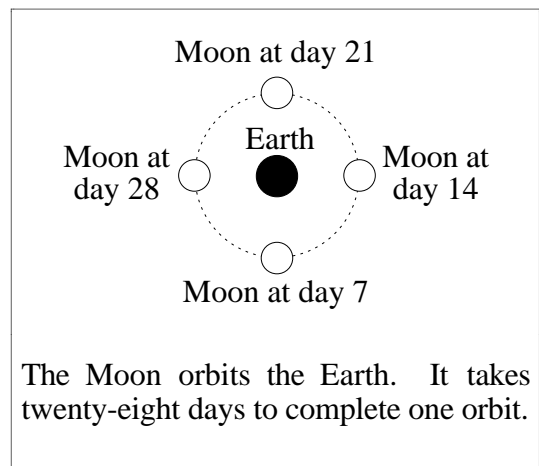


FIG. 2

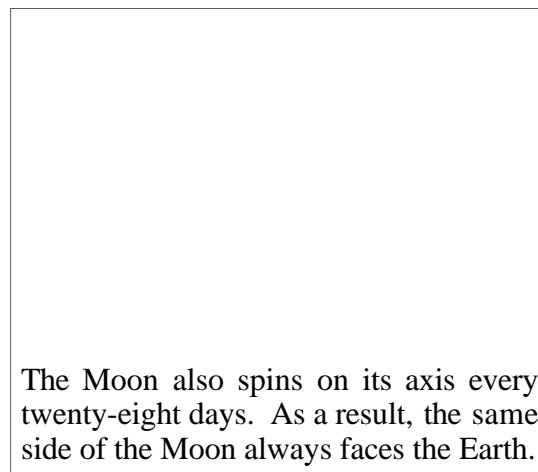
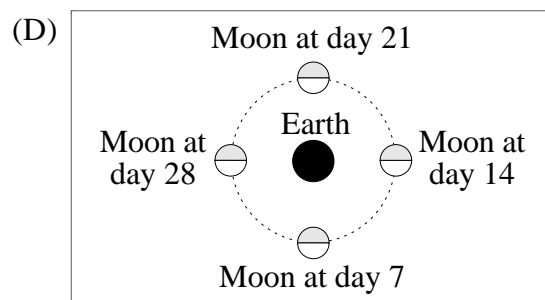
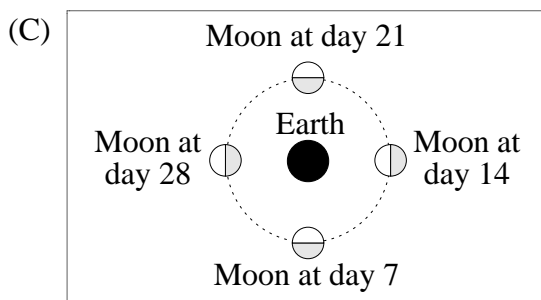
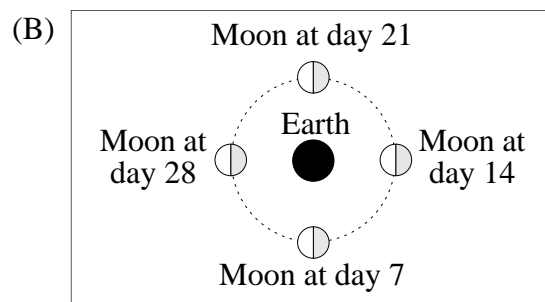
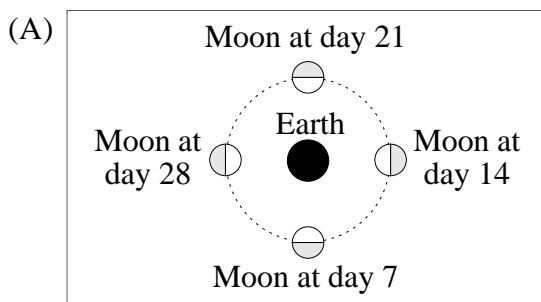


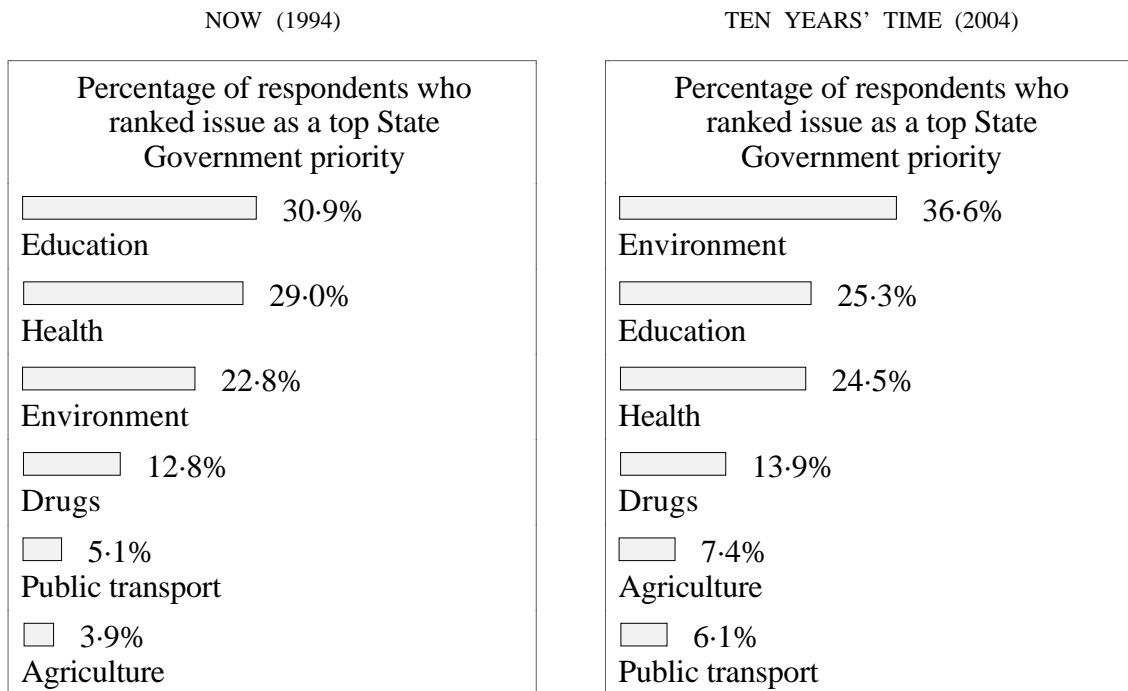
FIG. 3

A suitable diagram for the empty space in Figure 3 would be



7. In a survey conducted in 1994, people were asked: ‘What are the most important issues for the State Government—now and in ten years’ time?’.

The results are shown below.



EPA NSW, 1994.

Some of the issues people think will be *more* important in ten years’ time are

- (A) the environment, agriculture, and drugs.
 (B) education, health, and public transport.
 (C) public transport, health, and agriculture.
 (D) education, the environment, and public transport.
8. Read this newspaper clipping.

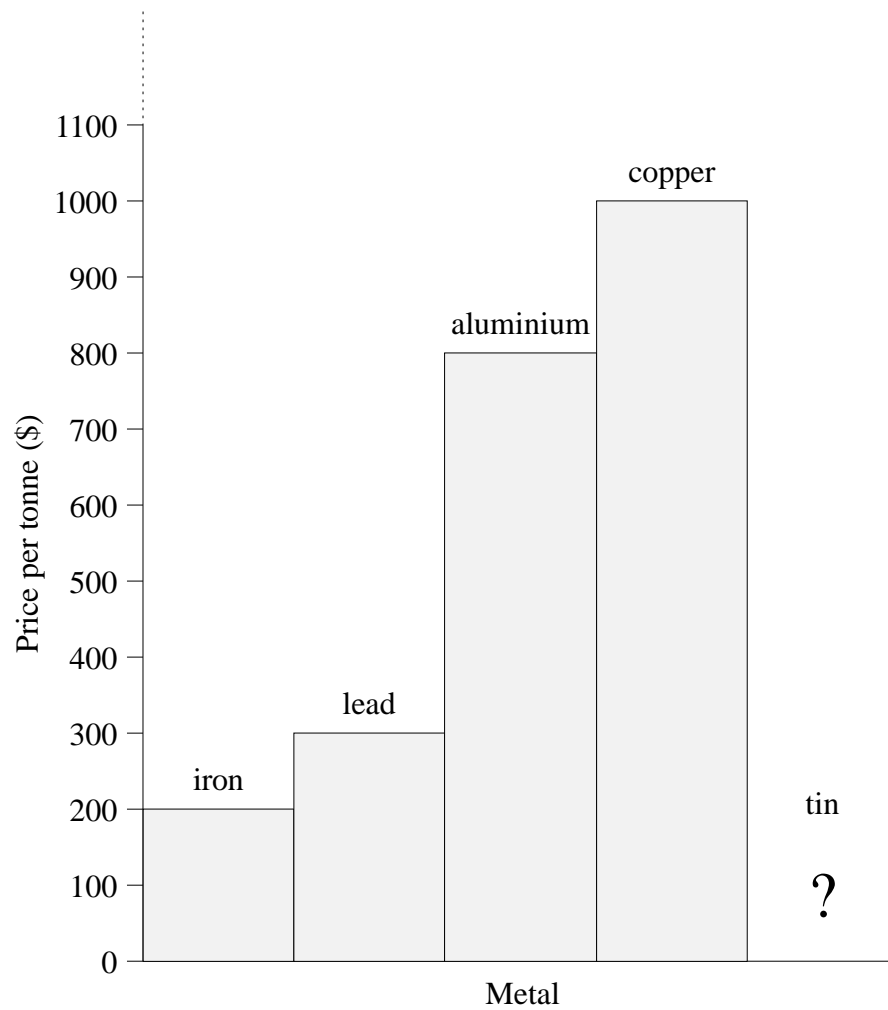
Researchers found that changes in immunity were associated with stress-causing events, including divorce, a death in the family, and sitting for examinations.

Sun Herald, January 1995

From the information above, it is reasonable to say that

- (A) doing an examination will be as stressful as a death in the family.
 (B) students will not be stressed if they do examinations.
 (C) stress may cause immunity.
 (D) immunity may be changed by stress.

9. The graph below shows the price per tonne of different metals.

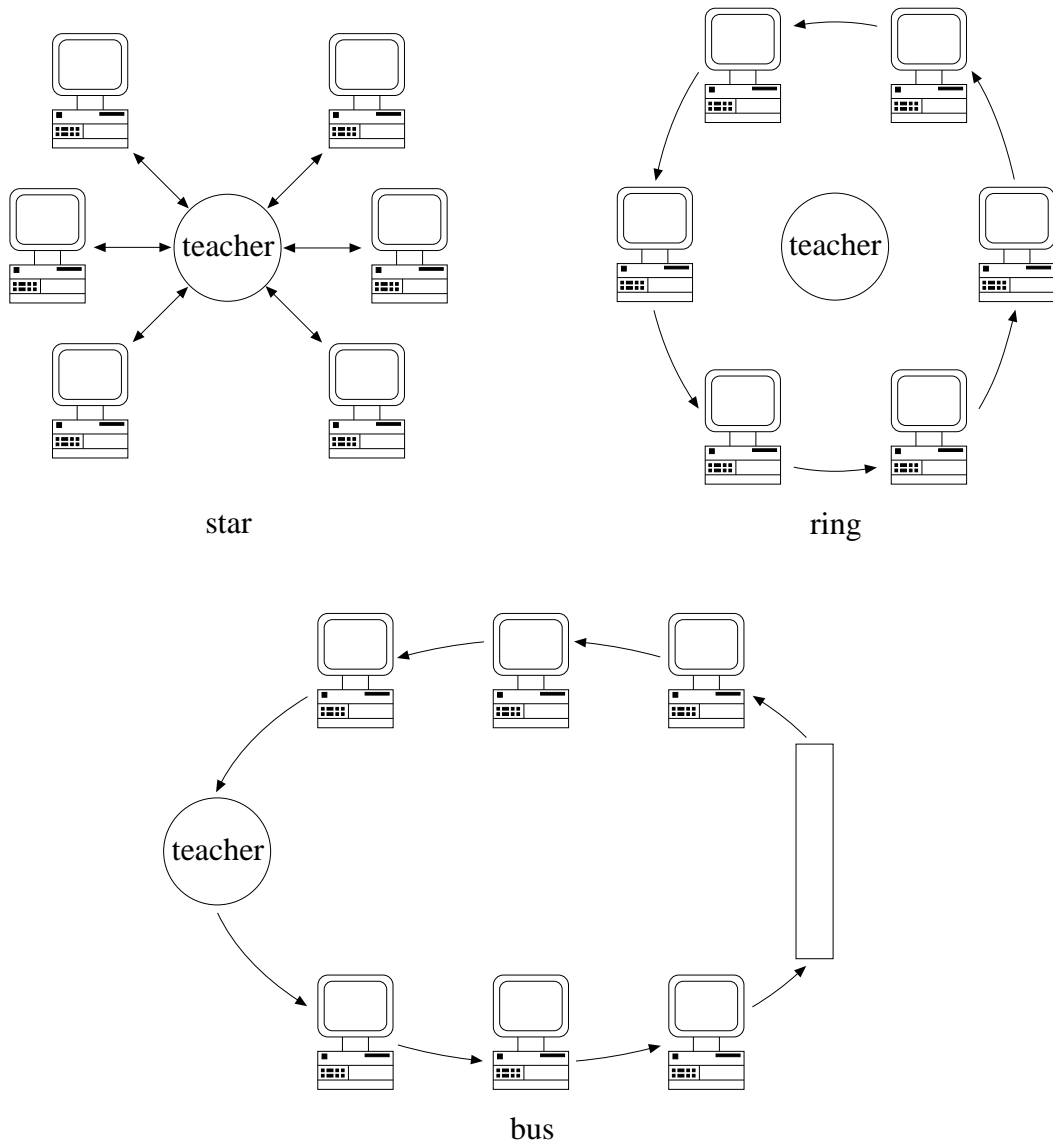


Tin costs \$20 000 per tonne.

On this graph, what would be the height of the column for tin?

- (A) 2 cm
- (B) 20 cm
- (C) 200 cm
- (D) 20 000 cm

10. These diagrams show three different ways to connect a network of computers.



Which network system(s) would allow a teacher to give *different* instructions by computer to each student?

- (A) ring and bus
- (B) star only
- (C) star and ring
- (D) ring only

PART B

Attempt ALL questions.

Each question is worth 3 marks.

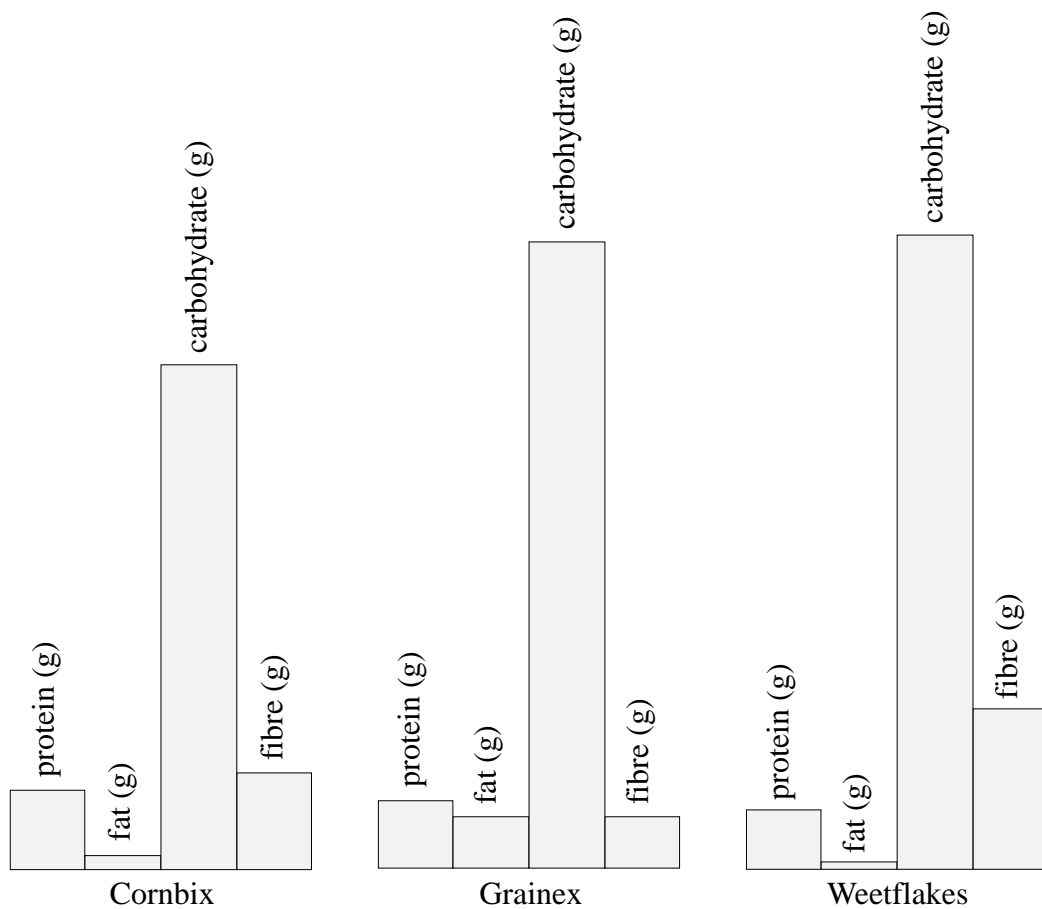
Answer all questions in the Part B Answer Book provided.

11. The table below gives details of Martin's breakfast and also what 100 g of three types of breakfast cereal contain.

BREAKFAST CEREALS' FOOD VALUE

	<i>Martin's breakfast</i>	<i>Cornbix</i>	<i>Grainex</i>	<i>Weetflakes</i>
protein (g)	13	11	9	8
fat (g)	14	2	7	1
carbohydrate (g)	100	67	73	84
fibre (g)	6	13	7	28

- (a) On the graph paper in your Answer Book, draw a column graph showing Martin's breakfast of protein, fat, carbohydrate, and fibre.
- (b) Look at the graphs for the three cereals below.



Which cereal *most closely* matches Martin's breakfast?

12. Read the following.

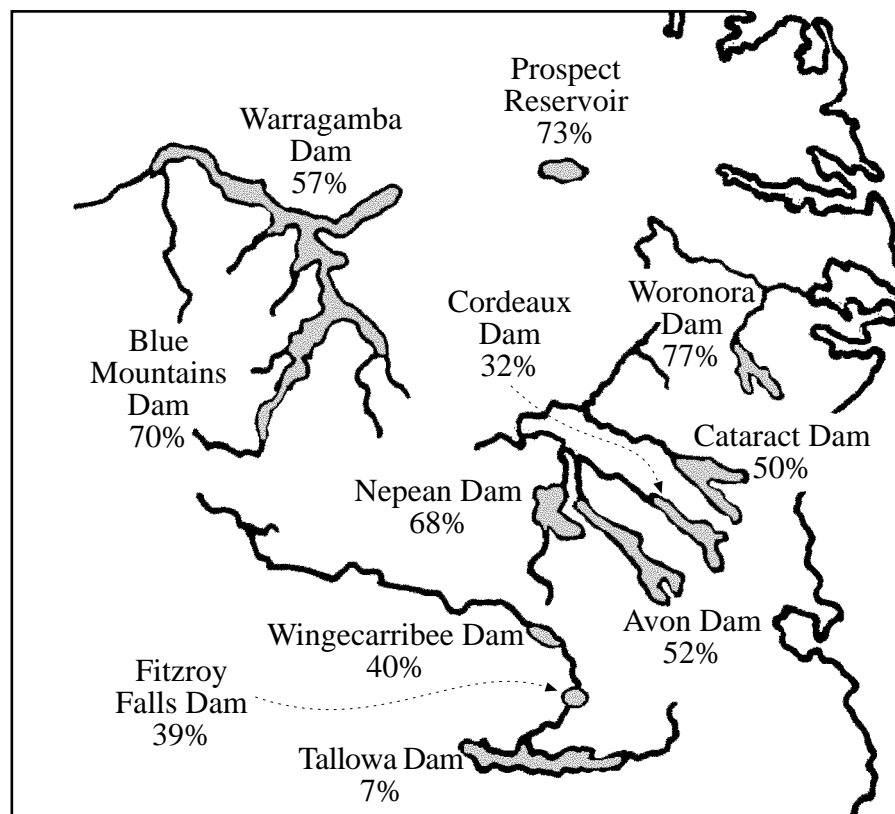
A DEADLY VIRUS ESCAPES: CONCERNS ABOUT LABORATORY SECURITY

A laboratory technician was handling a test-tube containing a virus. In an accident, the test-tube broke and the virus splashed into the technician's eyes. He did not report the accident and contracted an illness from the virus through his eyes. On an overseas trip, he passed the disease on to five other people.

Summary of *Time* magazine report

- (a) Suggest TWO safe laboratory practices that could have helped prevent this accident.
- (b) (i) Describe ONE safe laboratory practice used in a school laboratory that is *different* from those suggested in part (a).
- (ii) Explain why this safety precaution is necessary.

13. The map below shows how full some dams in NSW were in January 1995.



Sun Herald, January 1995. Courtesy Geoff Richardson.

- (a) Vicki suggested that the greatest amount of rain fell near Woronora Dam. Give ONE piece of evidence to support her suggestion.
- (b) Some students found that the greatest amount of rain fell near Tallowa Dam. Give TWO reasons that could explain why the Tallowa Dam was not full.

14. A vacuum cleaner is a household appliance that lifts dirt from carpets and furniture using air movement.

The air carries the dirt into a dust bag. The larger particles of dust are trapped in the dust bag. The air then escapes from the dust bag. This air still carries fine particles of dust. As people do not want this fine dust back in their houses, this air then passes through two filters. These filters trap the fine dust particles. The clean air then passes out through an exhaust.

Prepare a flowchart to show the pathway of air through a vacuum cleaner.

15. Read the newspaper clipping below.

NASAL SPRAY OR SLEEP SPRAY

Two doctors report the experience of a 26-year-old Melbourne woman who had been prescribed a nasal spray containing the hormone oxytocin to help her to breast-feed; the hormone causes milk to be released.

Two hours after using the nasal spray she felt very tired and fell asleep, they told the British Medical Journal. She reported that each time she used the spray she fell asleep.

The doctors speculate that her experience was due to a combination of hormones—she was also taking a progestogen-only pill. Once she stopped the pill, her sleeping pattern returned to normal.

- (a) (i) Did the two doctors mentioned in this report carry out a scientific investigation?
- (ii) Give ONE reason for your answer.
- (b) (i) Would all women using nasal sprays have the same experience as this Melbourne woman?
- (ii) Give TWO reasons for your answer.

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SECTION II—MODULES

(45 Marks)

Attempt THREE modules.

Each module is worth 15 marks.

Answer each module in a *separate* Module Answer Book.

	Page
M1 Fashion and Science	14
M2 Horticulture	16
M3 The Human Body	19
M4 Science Fiction	22
M5 Science of Toys	25
M6 Sport Science	27
M7 Disasters 30	
M8 Managing Natural Resources	32
M9 Marine or River Studies	34
M10 Biotechnology	37
M11 Communications	39
M12 Consumer Science	42
M13 Space Science	45

M1. FASHION AND SCIENCE**Marks**
4**16.** Read the newspaper clipping below.

SAFETY IN A STICK

Wearing lipstick during summer is good for the lips, stopping them drying out and suffering from the effects of the sun.

A new creamy formulation gloss stick from Lippy—the Lippy Moisture Lipstick—conditions, moisturizes, and protects the lips from harsh elements, both outdoors and in, and is available in six shades.

Northern District Times, January 1995

- (a) State ONE claim made for wearing lipstick that has some scientific basis.
- (b) Design an investigation to test this claim.

17.**3**

Good Weekend, February 1995. Courtesy Fairfax group.

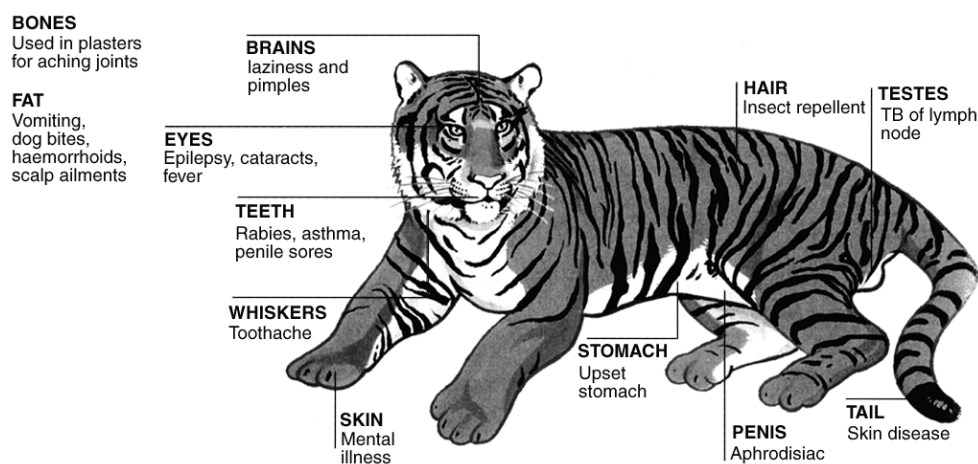
- (a) Do you think this hair-style is appropriate for everyday living? Give TWO reasons for your answer.
- (b) A hair-style like the one shown could become popular. Give ONE cultural reason for this.
- 18.** (a) Briefly name or describe ONE fashion you have studied. **2**
- (b) State ONE way science or technology has affected this fashion in the past.
- (c) State ONE way science or technology may affect this fashion in the future.

M1. FASHION AND SCIENCE. (Continued)

Marks

19. The following diagram shows tiger parts used in some folk medicines.

6



FOLK MEDICINES CURE ALL

Good Weekend, February 11 1995. Courtesy Fairfax Group.

- (a) Are the above folk medicines a fashion? Give ONE reason for your answer.
- (b) (i) Name ONE illness or problem people might have that is mentioned in the diagram.
- (ii) Name the part of the tiger's body that is thought to cure this illness or problem.
- (iii) From your everyday experiences, suggest ONE other treatment for this illness or problem.
- (iv) Suggest ONE environmental advantage of using this other treatment.
- (v) Suggest ONE reason why different medicines might develop in different cultures to cure the same illness.

M2. HORTICULTURE

Marks

20. Read the advertisement below.

5



Feed and Mulch

2 for

\$16

Rich in organics and nutrients. Feed and Mulch is an ideal surface mulch to help retain moisture and feed your plants. 60-litre bag. ~~\$9.95~~



Pot Mix

\$9⁹⁵

Your plants will grow faster and require less frequent watering. This is a great price for a great product. 30 litres.

Lawn Feed

Gives greener, healthier, and more luxurious lawns in the shortest possible time.

\$16⁹⁵



- (a) (i) What is ONE claim made in this advertisement that is difficult to test scientifically?
- (ii) Explain why it would be difficult to test this claim.
- (b) (i) State ONE other claim made in the advertisement.
- (ii) Design an experiment to test this claim.

M2. HORTICULTURE. (Continued)


Marks

21. People grow plants in different ways. Copy and complete the following table in your Answer Booklet.

2

<i>Way of growing plants</i>	<i>Advantage</i>	<i>Disadvantage</i>

22.

<p>Downdead[®] Herbicide</p> <p>Downdead[®] herbicide kills weeds, unwanted grasses, and vegetation, in garden beds, rockeries, driveways, school grounds, parks, and gardens.</p> <p>Accidental contact must be hosed with water immediately to reduce injury to plant.</p> <p><i>Storage and Disposal</i></p> <ul style="list-style-type: none"> • Store in the closed original container. Avoid prolonged storage in direct sunlight. • Dispose of empty container by wrapping in paper, placing in a plastic bag, and putting in the garbage. <p><i>Safety Directions</i></p> <ul style="list-style-type: none"> • Avoid contact with eyes and skin. • Wash hands after use. 	<p><i>First Aid</i></p> <ul style="list-style-type: none"> • If poisoning occurs, contact a doctor or Poisons Information Centre. • If swallowed, DO NOT induce vomiting. Give a glass of water. • If skin contact occurs, remove contaminated clothing and wash skin thoroughly. • If in eyes, hold eyes open, flood with water for at least 15 minutes, and see a doctor. <p style="text-align: center;">WARNING</p> <p style="text-align: center;">KEEP OUT OF REACH OF CHILDREN READ SAFETY DIRECTIONS BEFORE OPENING</p> <div style="text-align: center;">  <p>Downdead[®] Herbicide</p> </div> <p>Active constituent: 360 g/L glyphosate (Present as the isopropylamine salt)</p>
---	--

5

- (a) What type of pesticide is Downdead?
- (b) (i) Where at your place would you store Downdead?
(ii) Give TWO reasons for selecting this place to store the Downdead.
- (c) Describe TWO things you would do if you spilt some Downdead on the front of your shirt.

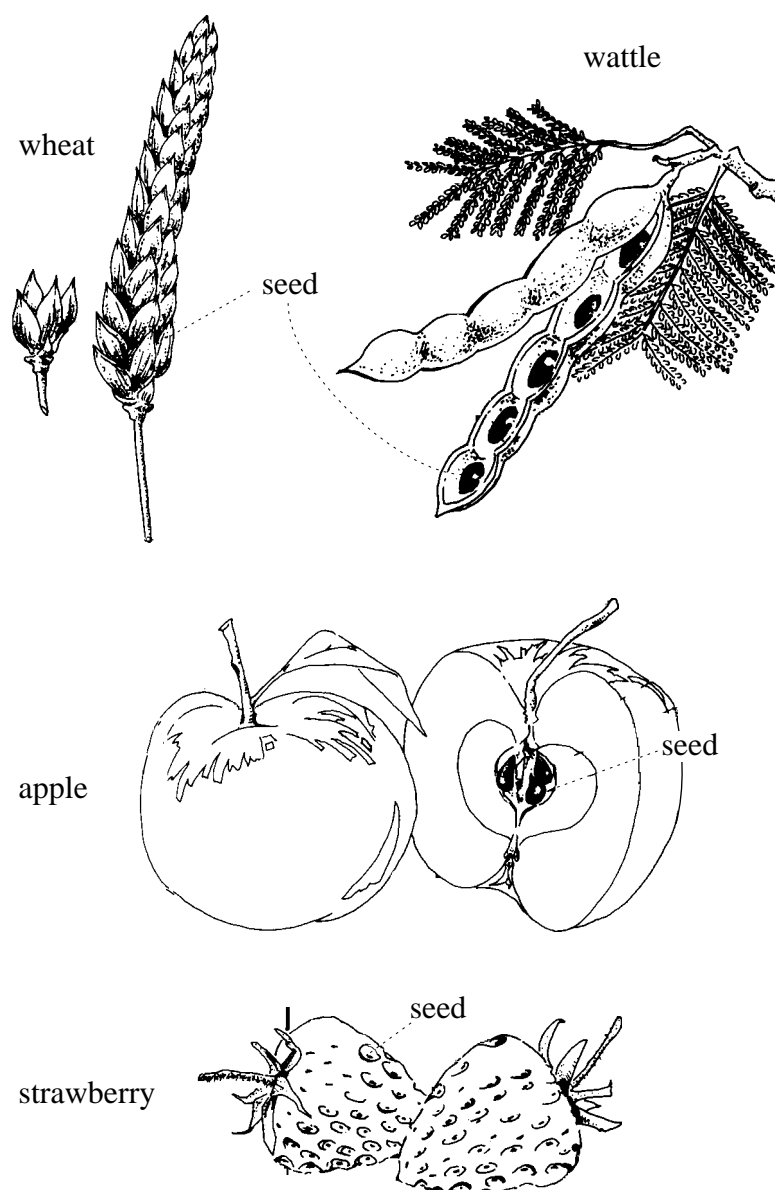
Source: 'Roundup' label. Monsanto Australia Ltd.

M2. HORTICULTURE. (Continued)

Marks

23. Look at the diagrams below.

3



'Growing with horticulture', Victorian State Schools Nursery, CUP'88.
Reprinted with the permission of Cambridge University Press.

- (a) Name ONE of the plants shown above *or* ONE from your own studies.
- (b) Draw a labelled diagram of this plant's life cycle.
- (c)
 - (i) On your diagram, circle ONE part of the plant that humans could sell for profit.
 - (ii) Describe ONE use for this part of the plant.

M3. THE HUMAN BODY**Marks**

24. The table below shows the average height of students.

3

AVERAGE HEIGHT OF STUDENTS

<i>Age</i> (years)	<i>Boys' height</i> (cm)	<i>Girls' height</i> (cm)
7	121	117
8	122	120
9	130	127
10	135	132
11	137	140
12	145	145
13	150	152
14	160	157
15	162	160
16	165	160
17	172	160
18	175	160

- (a) What are TWO differences between the patterns of height growth for boys and girls?
- (b) Explain how researchers may have found the average height of 18-year-old girls.

25. In the time it takes you to answer this Module, the world's population will have increased by 6000 individuals. 5400 of them will be born in poor countries.

2

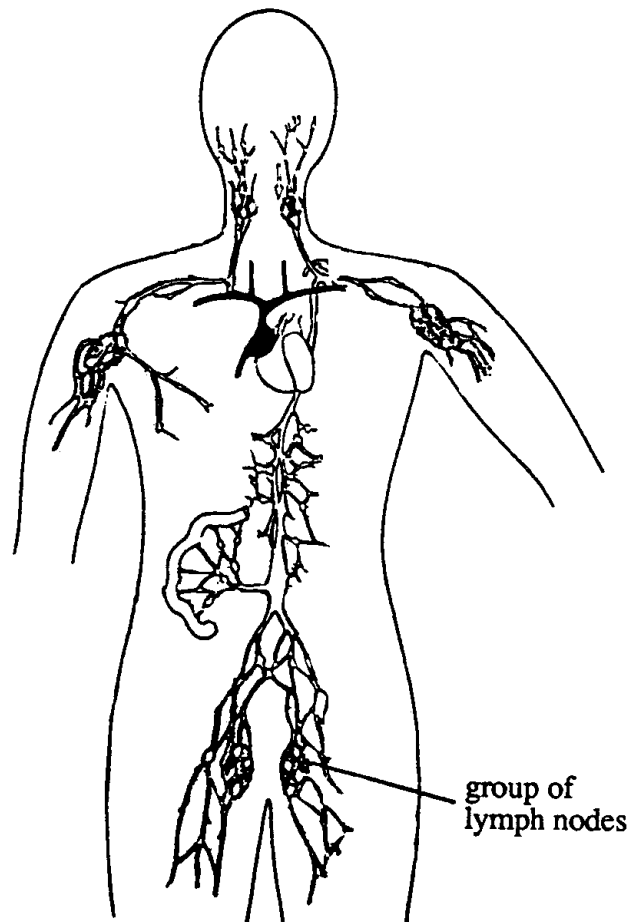
What are TWO effects of human population growth on the biosphere?

M3. THE HUMAN BODY. (Continued)

Marks

26. Look at the diagram below.

2



THE LYMPHATIC SYSTEM

'New Core Biology', Mudie and Brotherton, Heinemann, 1993.

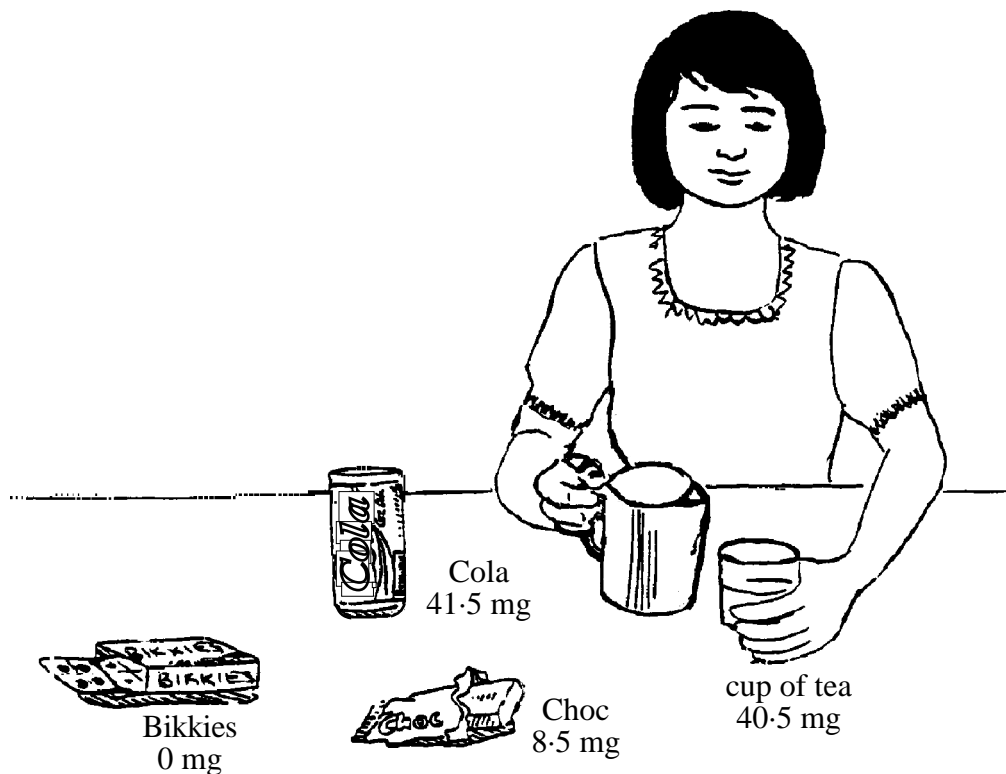
- The lymphatic system helps the body fight disease.
 - Lymphocytes move to the lymph nodes in large numbers when the body is infected.
- (a) Why do nodes often swell during an infection?
- (b) In what TWO places on your body could you feel swollen lymph nodes?

M3. THE HUMAN BODY. (Continued)

Marks

27. The diagram below shows the amount of caffeine in some foods.

2



Caffeine is a drug that acts as a stimulant.

- The girl had a cup of tea, two chocolate bars, and one can of Cola for a snack. How many milligrams of caffeine would enter her body?
- What is ONE disadvantage of this snack?

28. Read the information below.

3

HAZARDS OF TRAVELLING

Researchers have shown that people often change their behaviours when travelling, and this can lead to illness and poor health. Such behaviours include over-eating, drinking too much alcohol, lack of sleep, drug-taking, and over-exposure to the sun.

Design an investigation to find out why people change their behaviours while travelling.

- Name a disease. What is the cause of the disease?
- Describe ONE effect this disease has on a person's health.
- Briefly describe how this disease is transmitted.
- Explain how this disease can be controlled.

3

M4. SCIENCE FICTION**Marks****30.** Read the newspaper clipping below.**4**

SURGERY IN CYBERSPACE

Herald Tribune, November 2009

Coming soon to an operating-room near you: a remote-controlled robot that operates on a flesh-and-bone patient while kilometres away the human surgeon uses a computer to cut with virtual-reality scalpels.

Some surgeons are troubled by the ethical and technological problems that will have to be solved. For example:

- What if an electrical circuit in the robot's arm or surgeon's computer develops a fault?
- What if blood gets on the camera lens?

- (a) List TWO things in this article that are already part of everyday life in 1995.
- (b) For each thing you have listed, describe ONE way it is used in today's world.
- (c) Suggest ONE way the problem caused by blood on the camera lens could be solved.

31. Many inventions in science fiction do NOT exist in today's world.**2**

- (a) Give ONE example of such an invention.
- (b) Describe how this invention would change people's lives today if it did exist in today's world.

M4. SCIENCE FICTION. (Continued)

Marks
3

32. Read the summary below.

ALIENS KIDNAP PEOPLE

Professor Back (Harvard University) reported that aliens have kidnapped people. Huge controversy rages over this report.

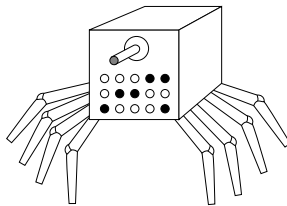
Professor Back did not believe in aliens until he researched more than seventy cases. These cases involved people he believed were mentally and emotionally stable. He reported that aliens subjected victims to long, painful, and horrible experiments.

Professor Know (also from Harvard University) strongly disagrees with Professor Back. He believes Professor Back is mentally ill, along with all the people who claim to have been kidnapped.

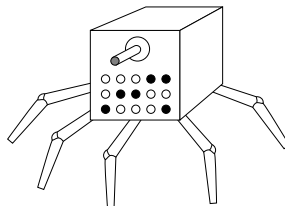
Summary of *60 Minutes* report, 1994

- (a) What is ONE piece of evidence that would support the view held by:
- Professor Back?
 - Professor Know?
- (b) State ONE way that contact with aliens who have kidnapped people could influence our civilization.

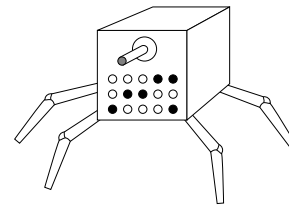
33.



eight legs



five legs



four legs

2

Design an experiment to test the idea that eight-legged robots move faster than robots with fewer legs.

34.

LAWS OF ROBOTICS

- Law 1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
- Law 2. A robot must obey orders given to it by human beings, except where those orders would conflict with the first law.
- Law 3. A robot must protect its own existence, except where such protection would conflict with with the first and second laws.

'I, Robot', Isaac Asimov, Signet 1956. Courtesy Bantam Doubleday Dell Publishing, US.

2

- (a) (i) Choose ONE of the three laws of robotics.
- (ii) Explain why it is a good law.
- (b) Why would it be difficult for a robot to obey the first law of robotics if the robot saw one person about to kill another person?

M4. SCIENCE FICTION. (Continued)

Marks

35.

2

Due to copyright limitations, this image could not be reproduced here. Please see hard copy of examination paper.

‘Whoa! Mr Lewis! We don’t know what that thing is or where it came from, but after what happened to the dog last week, we advise people not to touch it.’

Sydney Morning Herald, February 1995

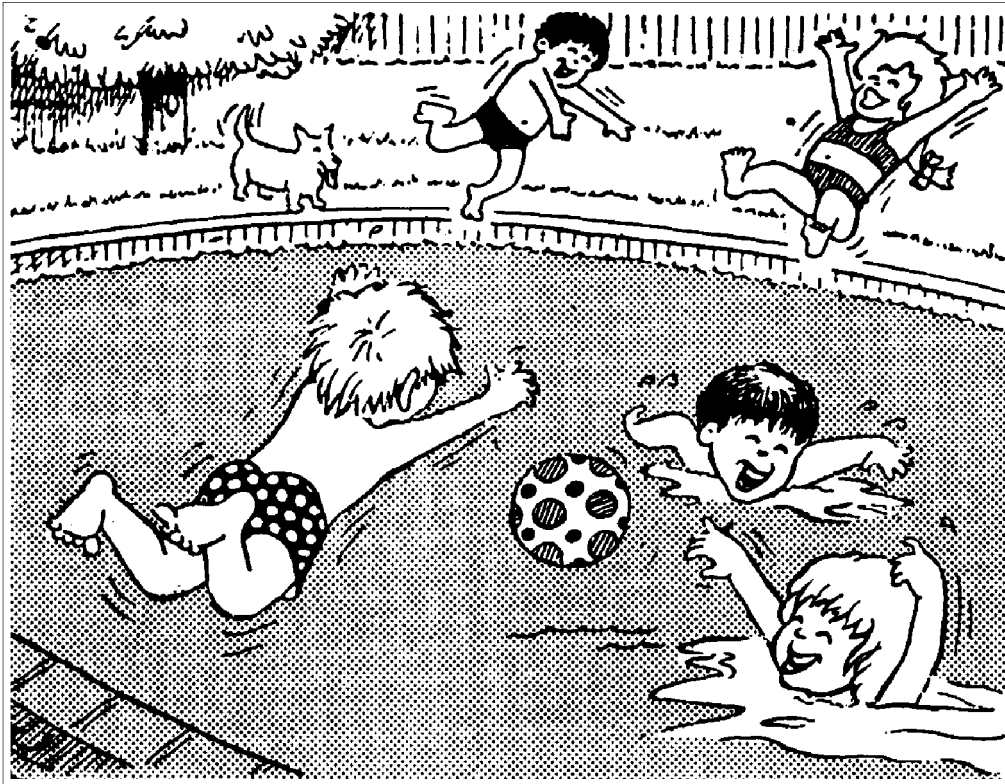
- (a) Is it likely that an alien would eat the dog? Give ONE reason for your answer.
- (b) How would you decide whether the organism shown in the cartoon came from Earth or space?

M5. SCIENCE OF TOYS

Marks

36.

5



Sun Herald, February 1995

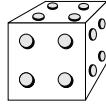
Autumn Solar Magic Pty Ltd.

- (a) (i) Would you classify a swimming-pool as a toy?
- (ii) Give ONE reason for your answer.
- (b) The play shown in the picture above may assist in the mental and physical development of children.
- (i) What is ONE form of mental development that might occur in children?
- (ii) How could it be developed by this play?
- (iii) What is ONE physical development that might occur in children?
- (iv) How could it be developed by this play?

M5. SCIENCE OF TOYS. (Continued)

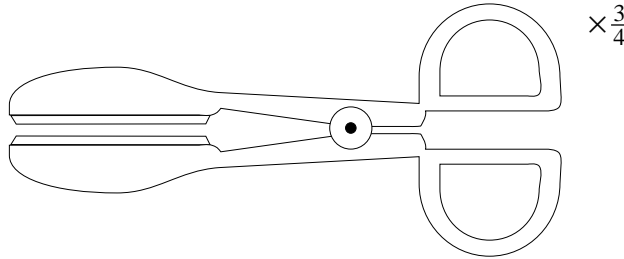
Marks

- 37.** (a) Building blocks like Briko are recommended for children over the age of five years. **5**



Briko (actual size)

- (i) What are TWO reasons why the manufacturer of these blocks would make this recommendation?
- (ii) Suggest ONE reason why some people above the age of five might have difficulty playing with Briko.
- (b)



What TWO features make these scissors appropriate for primary-school students?

- 38.** ‘You can’t give him that toy. It’s a toy for girls!’ **3**

Design an investigation to test the idea that boys and girls like different types of toys.

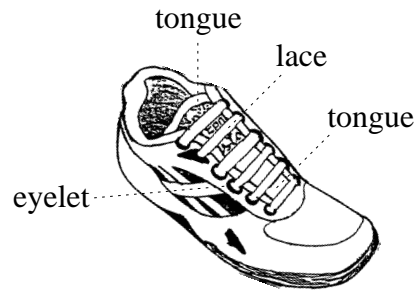
- 39.** (a) Name a toy. **2**
- (b) Give TWO ways in which science has contributed to the design of this toy.

M6. SPORT SCIENCE

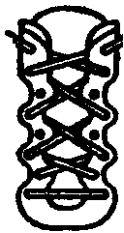
Marks

40.

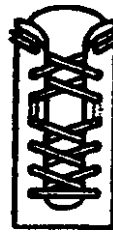
3



Science is now tying a better bootlace. A researcher has discovered that people can avoid foot aches if they lace their shoes to suit their foot shape.



People with narrow feet should thread wider-set eyelets for a snug fit.



Skip an eyelet if a bump on the top of the foot or a high arch causes pain.



Those with wide feet should use eyelets closer to the tongue.



People with high arches might want to lace shoes without a criss-cross pattern.



Two sets of laces, one ending at the bottom, best suit a foot with a wide ball but narrow heel.



For hammertoes or corns, string one end of the lace from the toe eyelet to the top and pull that lace to lift the front end of the shoe.

Sydney Morning Herald, January 1995

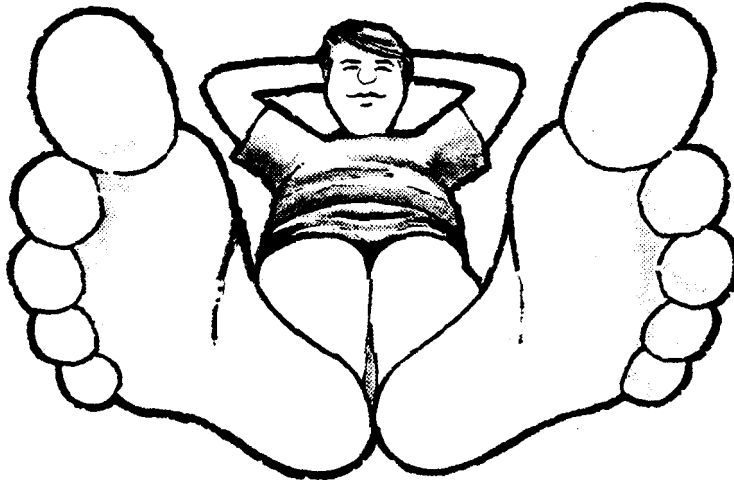
- According to this article, which way should you lace your own shoes? Give ONE reason for your choice.
- Give ONE reason why this research on shoelaces is beneficial.
- Why would people with narrow feet and high arches find it difficult to choose a way to lace their shoes?

M6. SPORT SCIENCE. (Continued)

Marks

41.

3



'I'd like to get fit . . . but I can think of too many excuses.'

Sydney Morning Herald, January 1995

Design a poster that uses scientific reasons to persuade this person to get fit through sport.

42. It has been claimed that drugs pose a big threat to the ideals and fairness of sporting events such as athletics. 2

- (a) Name ONE drug used in sport.
- (b) How does this drug affect physical fitness?
- (c) Would you advise against using this drug? Give ONE reason.

43. It has been suggested that stretching after exercises reduces muscle soreness. 3

Design an experiment to test this suggestion.

44. Almost every day, you see people power-walking, jogging, cycling, lifting weights, playing basketball, or playing football. 2

Name ONE sport you have studied.

- (a)
 - (i) Describe a person for whom it would be *suitable*.
 - (ii) Give ONE reason for your answer.
- (b)
 - (i) Describe a person for whom it would be *unsuitable*.
 - (ii) Give ONE reason for your answer.

M6. SPORT SCIENCE. (Continued)

Marks

45.

THE MOUNTAINEER'S DREAM

2

Watch functions



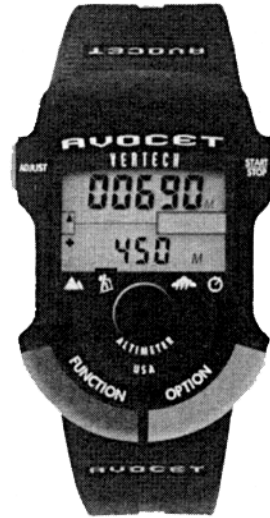
- Altitude/time function.
Displays altitude, temperature, and time.



- Alpine function.
Records daily climb and vertical rate of ascent.



- Weather function.
Displays barometric pressure, temperature.



Macson trading company Pty Ltd.

This equipment is designed to provide mountaineers with helpful information when they are climbing.

For a sport you have studied, other than mountaineering:

- describe ONE function you would like to have on a watch while you are participating in the sport;
- give ONE reason why this function would help your performance.

M7. DISASTERS**Marks**

- 46.** In July 1994, the remains of a comet crashed into the planet Jupiter. **1**
- (a) Was this a natural disaster?
- (b) Give ONE reason to support your answer.
- 47.** (a) Name a disaster and say where it occurred. **4**
- (b) What caused this disaster?
- (c) How has human behaviour contributed to the effects of this disaster?
- (d) How could science or technology reduce the effects of this disaster?
- 48.** Following a disaster, emergency-service people are called in to assist those people directly affected by the disaster. For example, doctors and nurses help to reduce the pain and suffering of those people hurt in the disaster. **3**
- (a) Give TWO other examples of service people you would find at a disaster situation.
- (b) For each example, state their role or purpose.
- 49.** The following report appeared in the *Telegraph Mirror* newspaper, in November 1994. **3**

ARE VIRGOS A DISASTER?

Virgos, beware—drivers born between mid-August and mid-September were more likely than any others to be at the wheel in a road accident, police said yesterday.

Aquarians caused the second-largest number of accidents.

Daily Telegraph Mirror, November 1994

YOUR STAR GUIDE

Aquarius (21 Jan. – 19 Feb.)	Leo (24 July – 23 Aug.)
Pisces (20 Feb. – 20 Mar.)	Virgo (24 Aug. – 23 Sept.)
Aries (21 Mar. – 20 Apr.)	Libra (24 Sept. – 23 Oct.)
Taurus (21 Apr. – 21 May)	Scorpio (24 Oct. – 22 Nov.)
Gemini (22 May – 21 June)	Sagittarius (23 Nov. – 21 Dec.)
Cancer (22 June – 23 July)	Capricorn (22 Dec. – 20 Jan.)

Design an investigation to test the idea that star signs influence car accidents.

M7. DISASTERS. (Continued)

Marks

50.

I SURVIVED KILLER QUAKE

4

On the morning of the quake, Paul woke up in his tiny second-floor apartment with a sense of foreboding.

‘It was freezing cold—and black’, Paul says. ‘I could hear the rumble; I’ll never forget that sound. It was a terrible, deep rumble. I knew something awesome was happening.

‘It felt like a huge giant had got hold of the apartment in his hand, that he was adjusting his grip. Then when he got a good grip he shook it like hell.

‘It was like riding a bucking bronco. Every thought in my head was wiped out, I was completely numb. The only thing I remember thinking was that there was a definite possibility I could die. It was so scary. Then it stopped.’

New Idea, February 1995

Paul’s behaviour might have been different if he had known what to expect in an earthquake. Brochures or posters are often used to inform people about how to cope in a disaster.

Choose a disaster, and design a poster to tell people:

- (a) what to expect when the disaster occurs;
- (b) how to behave during the disaster.

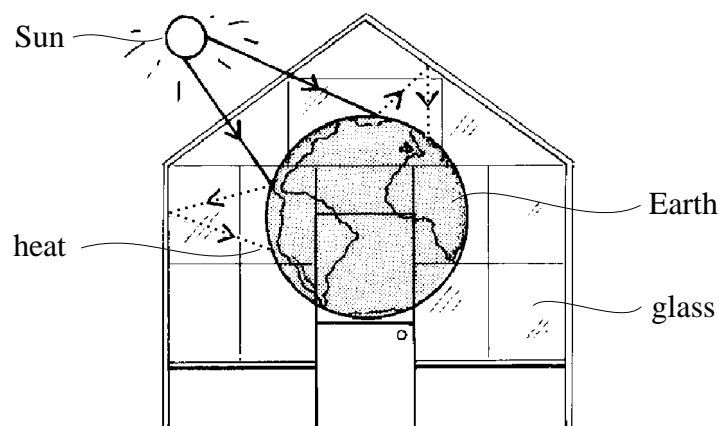
M8. MANAGING NATURAL RESOURCES**Marks**

51. A student described the greenhouse effect as follows.

6

- The Sun's rays reach the Earth through the atmosphere. The rays then reflect back off the Earth.
- Some of the heat reflected from the Earth cannot escape through the gases in the atmosphere.
- These gases act as an insulator.
- Humans have increased the amount of gases that stop the heat from escaping. This may result in the Earth's temperature increasing.

The student copied the following diagram about the greenhouse effect.



J. SOLOMON,
Exploring the Nature of Science

- In the diagram, what represents the atmosphere?
- Why do the dotted arrows NOT go back out through the glass?
- Why is it hotter inside than outside the glasshouse?
- Carbon dioxide is one gas in the atmosphere that stops the heat escaping. Some people think plants will grow better if there is more carbon dioxide in the atmosphere.

Design an experiment to test the idea that plants grow better if they have more carbon dioxide.

M8. MANAGING NATURAL RESOURCES. (Continued)

Marks

52. 5

WORMS ARE GOOD BUSINESS

Last year, Melbourne City Council bought more than six million worms to munch through the waste created at the Queen Victoria Market. Leftovers are fed to the worms, which then produce rich worm castings, one of the purest fertilizers available. That fertilizer, which is produced cheaply, is then spread across the city's parks and gardens.

'They'll eat anything that was once living, so I give them paper, cardboard, old telephone books, lawn clippings, manure, and tree mulch', the worm farmer says.

New Idea, February 1995

- (a) State TWO arguments you could use to persuade your local council to set up a similar project in your area.
- (b) Worms are a rich source of protein and could be used as food.
- (i) Suggest TWO problems that may exist in using worms as a food for people.
 - (ii) What strategy would you use to solve ONE of these problems?
 - (iii) Protein-rich food is not equally accessible to all people. Give ONE reason for this.

53. 2

- Oil, as a fossil fuel, is a non-renewable resource.
- North America uses about 18 000 million tonnes of oil in a year.
- Africa uses about 2000 million tonnes of oil in a year.
- The population in America is increasing at a rate of 0.6% per year.
- The population of Africa is increasing at a rate of 2.5% per year.

Based on this information, what advice would you give politicians about planning for the future in:

- (a) North America?
- (b) Africa?

54. 2

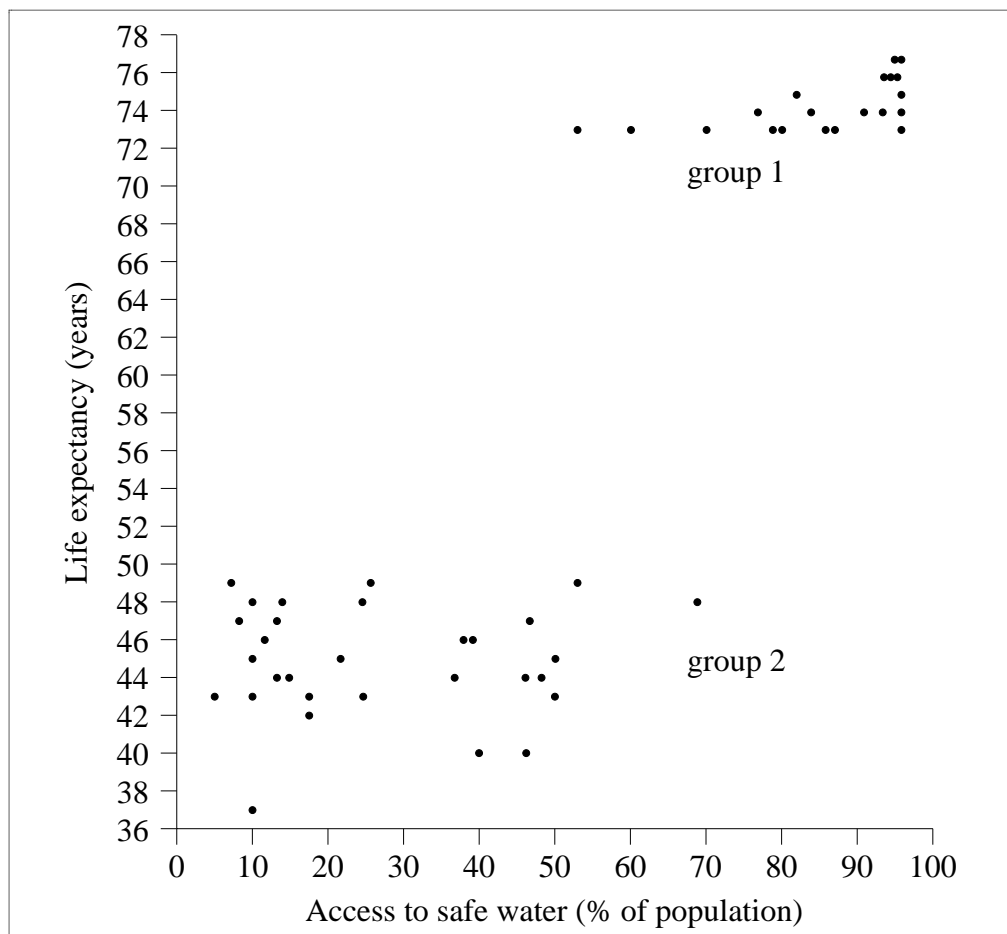
'The use of resources requires an understanding of the interdependence of all components of the environment.'

In your own words, explain what this statement means.

M9. MARINE OR RIVER STUDIES

Marks

55. The graph below shows how life expectancy is influenced by access to safe water. Each dot on the graph represents a different country. 3

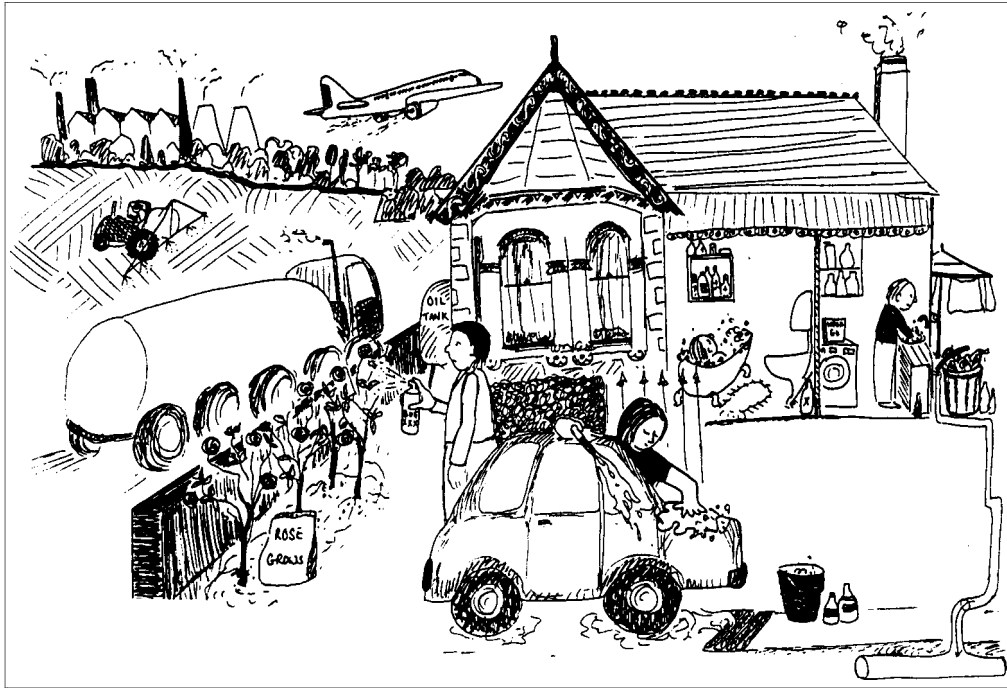


'Earthrights', Greig, Pike & Selby, WWF, Kogan Page.

- (a) Write ONE conclusion that you can make from this information.
- (b) (i) Would you expect Australia to be with the countries in group 1 or group 2?
 (ii) Give ONE reason for your answer.
- (c) What is ONE reason for presenting the data as a scatter graph rather than a line graph?
56. (a) Give ONE example of how humans exploit water for food production. 3
- (b) Give ONE example of how humans exploit water as a raw material for industry.
- (c) (i) In which situation, part (a) or part (b) above, would you expect the damage to the environment to be greater?
 (ii) Give ONE reason for your decision.

57.

3



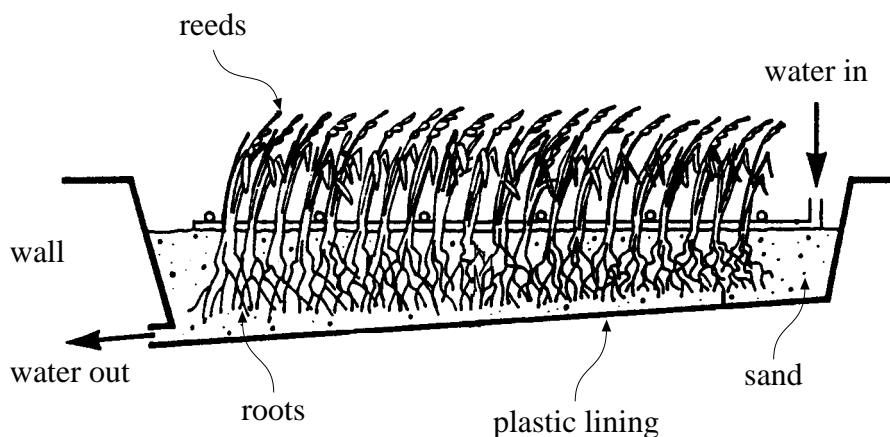
HOW POLLUTION AFFECTS YOUR WATERWAYS

K. PLUMMER, *Water*, 1991

- (a) Describe TWO ways in which the people in the drawing are polluting the waterways.
- (b) For ONE of these ways, suggest ONE alternative way of doing the job without polluting the waterways.

58. The diagram below shows a water-cleaning system.

3



WATER-CLEANING SYSTEM

Design an experiment to find out which part of this system is responsible for cleaning the water.

M9. MARINE OR RIVER STUDIES. (Continued)

Marks

- 59.** Copy the table below into your Answer Book. Answer the following questions in this table. **3**

<i>Environment</i>	<i>Recreational activity</i>	<i>Reason why recreational activity is suited to environment</i>
1.		
2.		

- (a) Select TWO environments from the following list:
- beach
 - harbour
 - lake *or* dam
 - river.
- (b) Name ONE water recreational activity for each environment you selected.
- (c) Give ONE reason why each recreational activity is suited to the environment you have chosen.

M10. BIOTECHNOLOGY

Marks

60. **HANDY HINTS** **Stop tree roots in drains** 2
- No more blockages in sewer pipes!
- DRAINZYME cleans up the dead roots, grease, fat, paper, soap, hair, etc. that cause smells and other drain problems.

'Actizyme' advertisement. Southern Cross Laboratories.

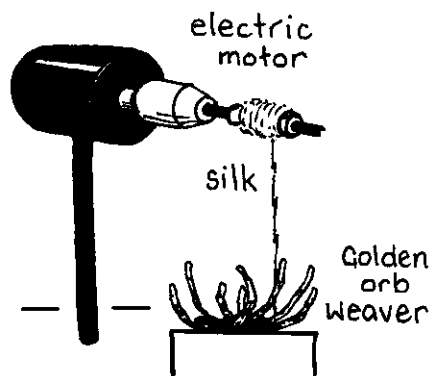
Write TWO questions you could ask to find out if Drainzyme is an example of biotechnology.

61. The table below describes a possible beneficial biotechnology. 3

<i>Situation</i>	<i>Change required</i>	<i>How the change is made</i>
E.g. defective gene causes cystic fibrosis.	E.g. reduce congestion in lungs.	E.g. defective gene is replaced by normal gene.

- (a) Draw a table with the same headings (Situation, Change required, How the change is made) in your Answer Book.
- (b) Complete the table with another biotechnology used to benefit humans.

62. **WARDING OFF BULLETS BY A SPIDER'S THREAD** 5
- The article on which this question was based was taken from the New Scientist of November 1992. The article was about research being undertaken by the US Army into using spider's thread for making bullet-proof vests. Spider's thread is stronger than the current material, Kevlar. One of the researchers is quoted as saying this is because spider's thread can stretch nearly four times as much as Kevlar. This means that a vest made of spider's thread is better at containing the impact of a projectile, such as a bullet, without tearing.



New Scientist, November 1992

- (a) Give ONE reason for using spider silk rather than Kevlar in bullet-proof vests.
- (b) The diagram shows how silk is obtained from the spider. Use the diagram above to write a brief description of how spider silk is obtained.
- (c) Describe an experiment to test the suggestion that it is better to use spider silk than Kevlar in bullet-proof vests.

M10. BIOTECHNOLOGY. (Continued)

Marks

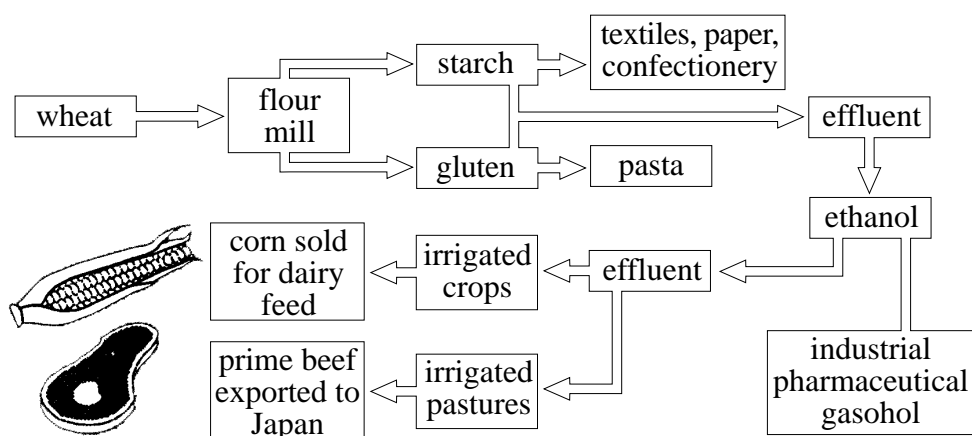
63. The following is part of a student's summary of an article 'Brave New Embryos' from *Time*, August 1994. 3

For some years, scientists in the U.S. conducted experiments on human embryos and aborted foetal tissue.

There are now strict limits, which I think is a good idea, on this kind of research, such as: no studies on embryos are allowed after twenty days when the tube of cells forming the brain and spine closes off; no embryos are allowed to develop for more than fourteen days; no cloning to create duplicate babies; no splitting identical embryos and implanting them in a woman's uterus; and no copies of adult body cells to store genetic information.

- (a) (i) State ONE rule suggested in the summary above to address concerns about ethics.
- (ii) Why could breaking this rule be wrong?
- (b) Suggest ONE way in which this student's summary could be improved.

64. The flowchart shows a system for using wheat and wheat products. 2


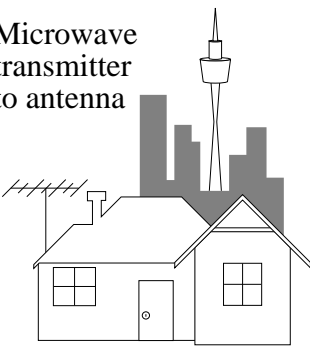



Sydney Morning Herald, 7/3/94 p 7.

- (a) Give ONE benefit of this system to the environment.
- (b) Identify ONE process in this flowchart that may use biotechnology.

M11. COMMUNICATIONS**Marks**

- 65.** The picture below shows ways of receiving Pay TV. There are good reasons for choosing each. **4**

Satellite transmission	Microwave transmitter to antenna	Coaxial cable into home
		
<p>Satellite</p> <ul style="list-style-type: none"> – Installation: \$500 + \$50/month – 10 channels – Satellite operators: Milkyway 	<p>MDS</p> <ul style="list-style-type: none"> – Installation: \$300 + \$50/month – 8 channels – MDS operators: Austral 	<p>Cable</p> <ul style="list-style-type: none"> – Installation: \$300 + \$40 – – 48 channels – Cable operators: Optcom
<ul style="list-style-type: none"> If subscribers who live in valleys, behind large buildings, or outside the sight of the transmitter tower can't pick up the MDS signal of Austral, then the signal will be transmitted via satellite. Milkyway will offer both satellite and MDS, depending on where subscribers live. In 1995, cable will only be laid in major cities. 		

PAY TV—A USER'S GUIDE

Sun Herald, January 1995. Courtesy Les Hewitt.

What type of Pay TV would best suit the following people?

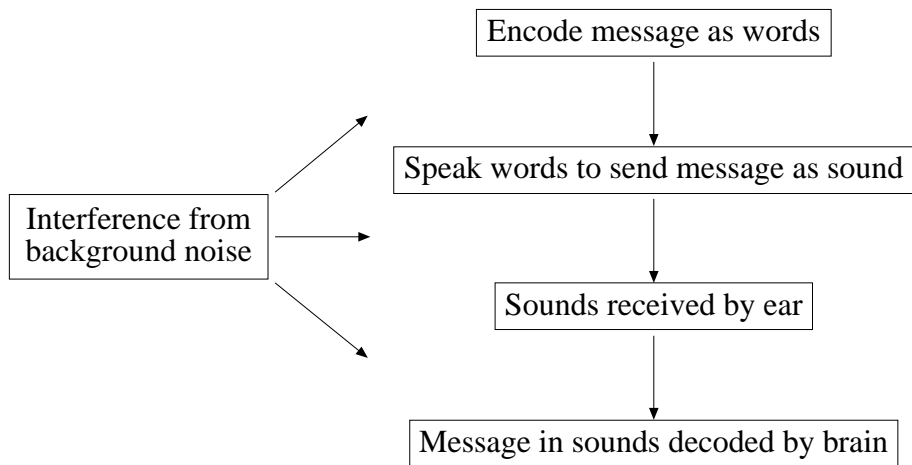
- (a) A person living in a small country town surrounded by hills. Give TWO reasons for this answer.
- (b) A person living in the city. Give TWO reasons for this answer.
- 66.** Give ONE example of how lasers have improved communication. **1**

M11. COMMUNICATIONS. (Continued)

Marks

67. The flowchart below shows how communication occurs by speaking.

3



- (a) Name another type of communication.
- (b) Draw a flowchart to show how this other type of communication occurs.

68. You are going on a camping trip for five days in the desert.

4

- (a) Name THREE communication technologies you should take.
- (b) Give ONE reason for taking each.

M11. COMMUNICATIONS. (Continued)

Marks

69.

3



Photo:
John Weiner
Malaysia



Photo:
Tony Gordon



Photo: John Weiner
Mauritius

Smiling can mean being happy, but researchers discovered that people smile for many different reasons.

Apparently many people cannot pick the emotions that are behind another person's smile.

Describe how you would find out how many messages people can communicate when they smile.

"The Smile Book"
Shree Media Productions P/L

In Association with UN Australia.

M12. CONSUMER SCIENCE

Marks

70.

7



Jenny Coopes. *Sun Herald*, 5/2/95.

In the past, nappies were made of cotton and were reused. Today, many parents prefer to use disposable nappies.

- (a) Write TWO survey questions you could ask to find out about the use of disposable nappies.
- (b) What resource is being used to make disposable nappies?
- (c) Many parents prefer to use disposable nappies. Give ONE reason for this.
- (d) Give TWO environmental problems caused by using disposable nappies.
- (e) Suggest ONE possible solution to ONE of the problems given in part (d) above.

M12. CONSUMER SCIENCE. (Continued)

Marks

71.

ANOTHER KIND OF EXTREME

3

There's more to dressing for hot weather than undressing. Dambo has developed air-conditioned clothes nearly as technical as clothes made for the cold and wet, and as comfortable as being naked without compromising modesty, custom, or the health of your skin.


For a free 120-page catalogue of our complete line of technical clothing, layering systems, and sportswear, call at our new store.

Out There magazine, 1994 –95

Clothing is one product that has been changed by advances in science and technology.

- Name a product you have studied that has been changed by advances in science and technology.
- List TWO changes in this product since it was first developed.
- For each change, state how science or technology was involved.

72.



Water-based technology since 1982

HAPPY CAMPERS ...

... stay dry all year round with Sealit waterproofing products. Use on all your equipment for comfortable, worry-free camping in any weather.

Sealit is designed to preserve and protect outdoor gear. Easy to use and friendly to the environment.

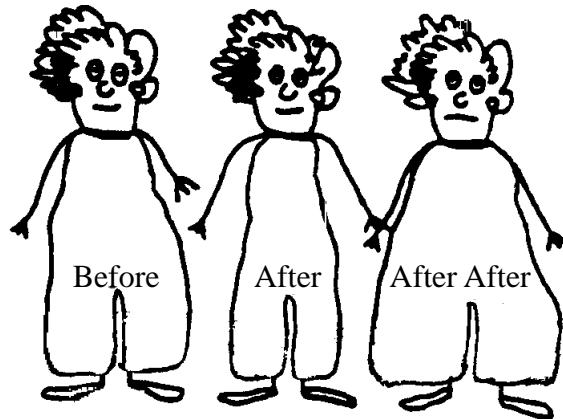
3

Out There magazine, 1994 –95

- State ONE claim made about Sealit in this advertisement.
- Design an investigation to test this claim.

73.

2



THE *REAL* DIET STORY

Dieting only makes you fatter! All a diet does is control the food you eat and create feelings of guilt and deprivation. When you eat from habit, stress, or emotion, a diet can't help.

Skin 'n' Bones is a totally diet-free program developed by a psychologist to help you find your natural weight. It will change your attitudes and your thinking about eating and food.

- (a) Write ONE statement from this advertisement that is unscientific.
- (b) Why is this statement unscientific?

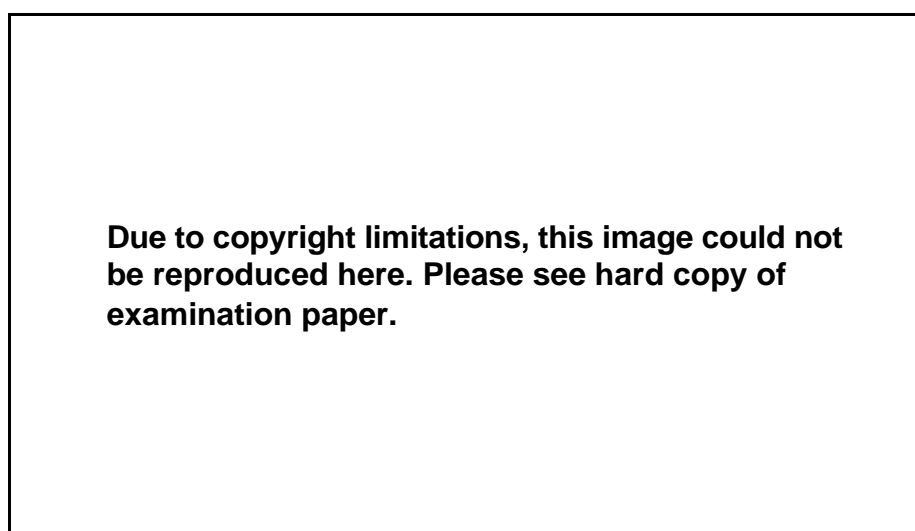
M13. SPACE SCIENCE**Marks**

74. Satellites and probes have been used to increase our knowledge of Earth and space. **4**

- (a) Give ONE example of a satellite.
- (b) Describe TWO ways in which satellites increase our knowledge of Earth.
- (c)
 - (i) Give ONE example of an event that has occurred recently in space.
 - (ii) Describe ONE way in which satellites or probes assisted with our observations of this event.

75.

2



MEANWHILE, ON JUPITER

Funny cartoons often show real events in ridiculous situations.

- (a) Describe ONE real event in this cartoon.
- (b) Describe ONE ridiculous situation in this cartoon.

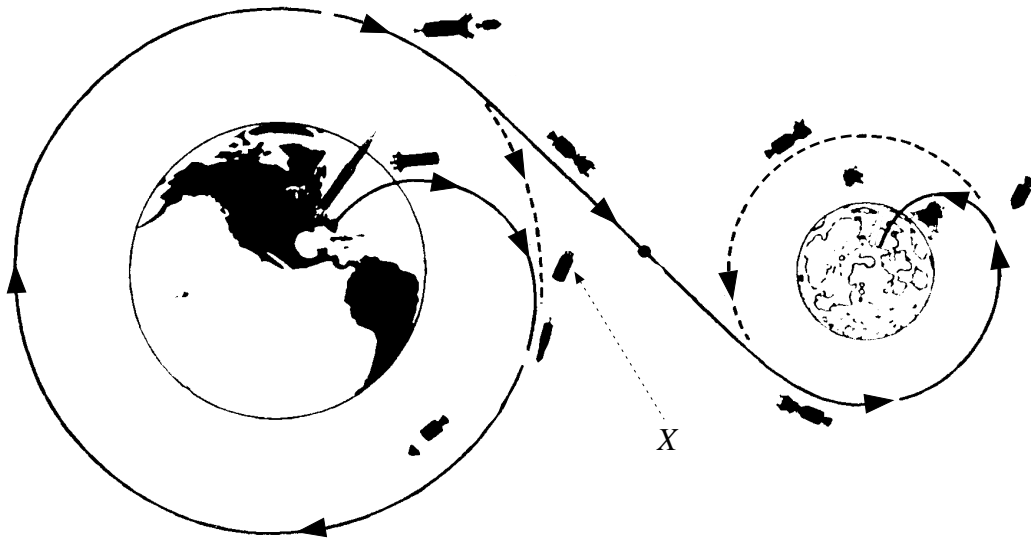
76. Teflon is a substance developed for spacecraft. It is now used in everyday things such as frying-pans and trousers. **6**

- (a)
 - (i) Name TWO other things developed for the space program that are now in everyday use.
 - (ii) Explain the advantage of using ONE of the things you have named.
- (b) At a fashion house in Paris, it is claimed that Teflon prevents trousers from creasing. Design an experiment to test this claim.

M13. SPACE SCIENCE. (Continued)

Marks

77. The diagram below shows the path taken by Apollo 11 on its way to the Moon. 3



Man on the moon', Sky and Space Magazine, 1994

- (a) Suggest what happens to the piece of Apollo 11 labelled X.
- (b) (i) What are TWO problems that astronauts experience during a flight to the Moon?
- (ii) How is ONE of these problems overcome?

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