BOARD OF STUDIES
NEW SOUTH WALES

**HIGHER SCHOOL CERTIFICATE EXAMINATION**

# 1996

# 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 3 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 Module in a *separate* Module Answer Book.
- Write your Student Number and Centre Number on the cover of each Module Answer Book.
- Write the Course, Module Name, and Question Number on the cover of each Module Answer Book.
- You may ask for extra 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.

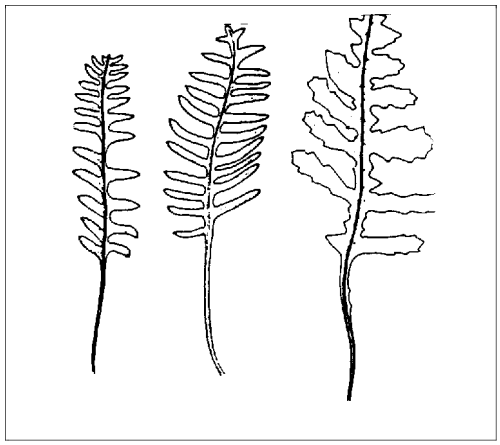
Select the alternative A, B, C, or D that best answers the question.

Mark your answers in pencil on the Answer Sheet provided.

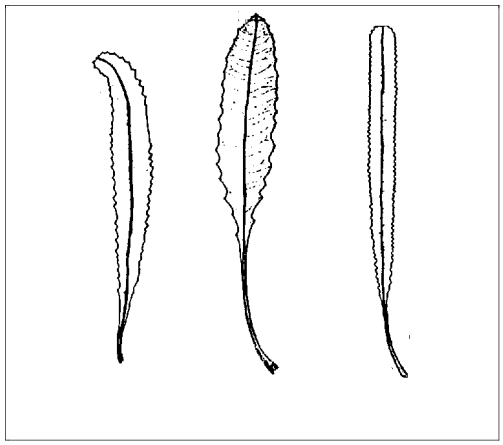
**1 .** A bushwalker wants to identify this leaf.

The bushwalker has a book which shows leaves classified by their shape. To which of the groups shown below would this leaf belong?

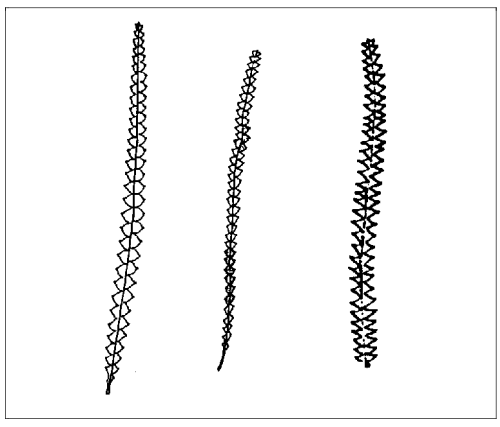
(A)



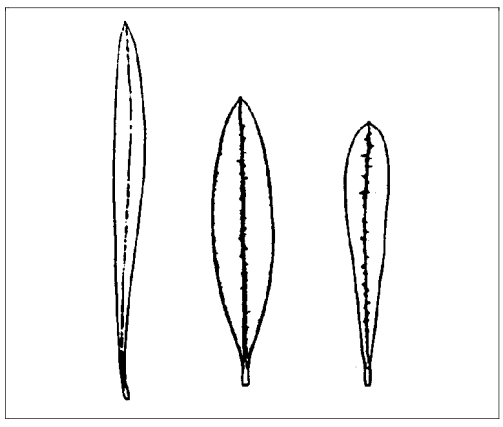
(B)



(C)



(D)



**2 .** The table below shows the incidence and possible causes of cancer.

| *Cancer type* | *New cases, Victoria 1987** | *Known or suspected link*† |
|---|---|---|
| Breast | 1786 | Hormones, lack of fibre |
| Lung | 1721 | Tobacco |
| Colon | 1493 | Animal fat, lack of fibre |
| Prostate | 1117 | Hormones |
| Rectum | 758 | Animal fat, lack of fibre |
| Leukemia | 695 | X-rays |
| Bladder | 663 | Tobacco |
| Stomach | 534 | Salty food, tobacco |
| Melanoma | 523 | Ultraviolet light |
| Oral cavity and pharynx | 517 | Tobacco, alcohol |
| Non-Hodgkin's lymphoma | 509 | AIDS virus |
| Pancreas | 334 | Tobacco, animal fat, sugar |

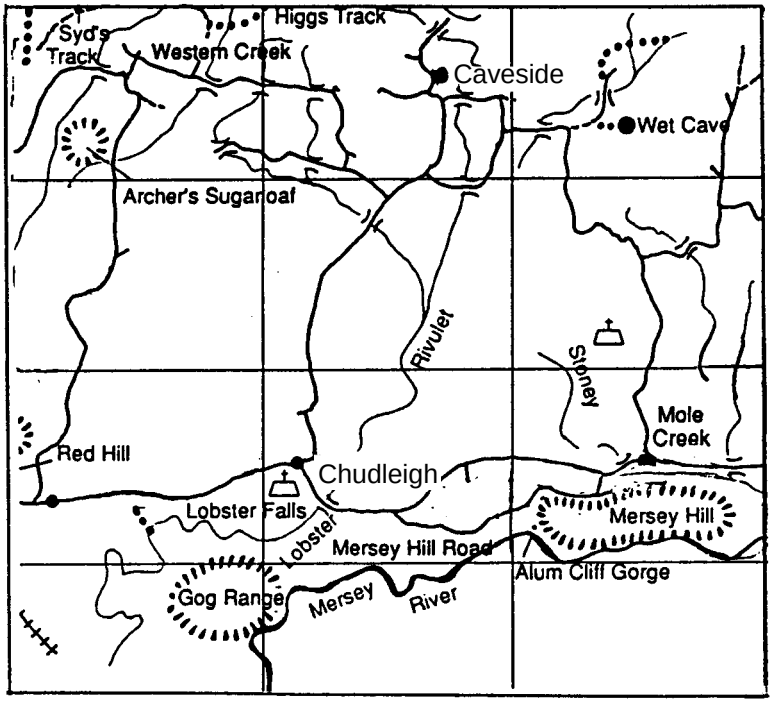
* Anti-Cancer Council of Victoria
† CSIRO Division of Human Nutrition, and National Institutes of Health, USA

Which known or suspected link is involved in most *types* of cancer?

(A) lack of fibre
(B) animal fat
(C) hormones
(D) tobacco

**3 .**

MOLE CREEK




SCALE

0 2 4 6 8 10

kilometres

KEY

- Major road
- Minor road
- Railway
- Bridge
- Walking-track
- Cemetery

Courtesy Mole Creek progress Association.

Kim is on holiday, staying at Chudleigh, and wants to drive to Caveside.

The distance Kim would have to drive is closest to

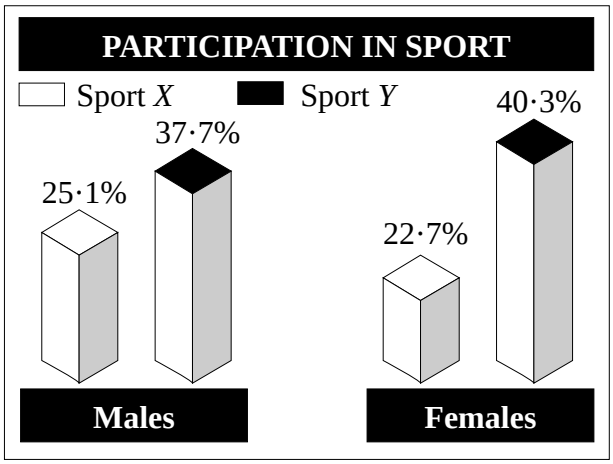
(A) 3 km

(B) 6 km

(C) 9 km

(D) 12 km

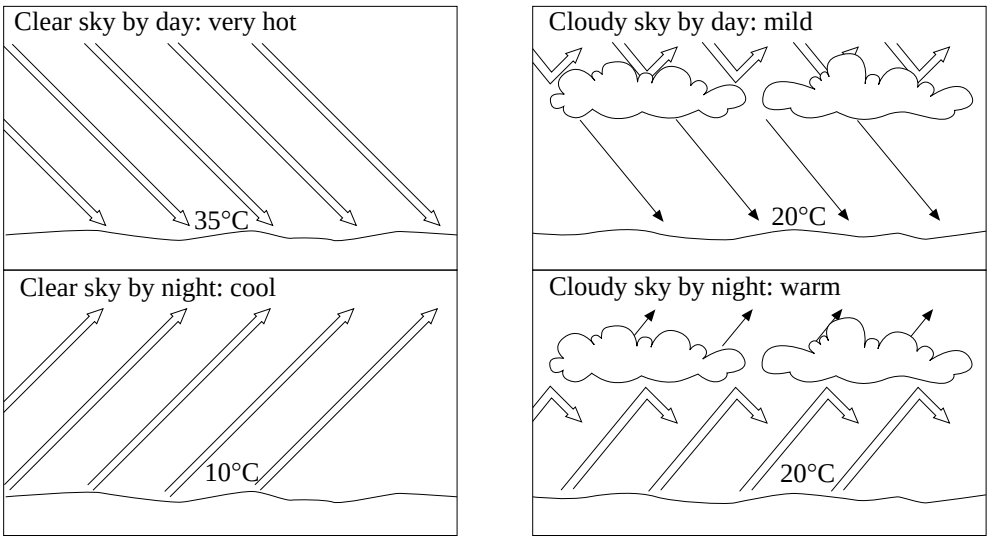
**4 .** The table below gives information on a group of people's participation in sport.




The information shows that among this group of people

(A) females are less likely to play sport *Y* than are males.
(B) more males play sport *Y* than do females.
(C) males are less likely to play sport *Y* than are females.
(D) about 62·8% of these people play sport *X*.

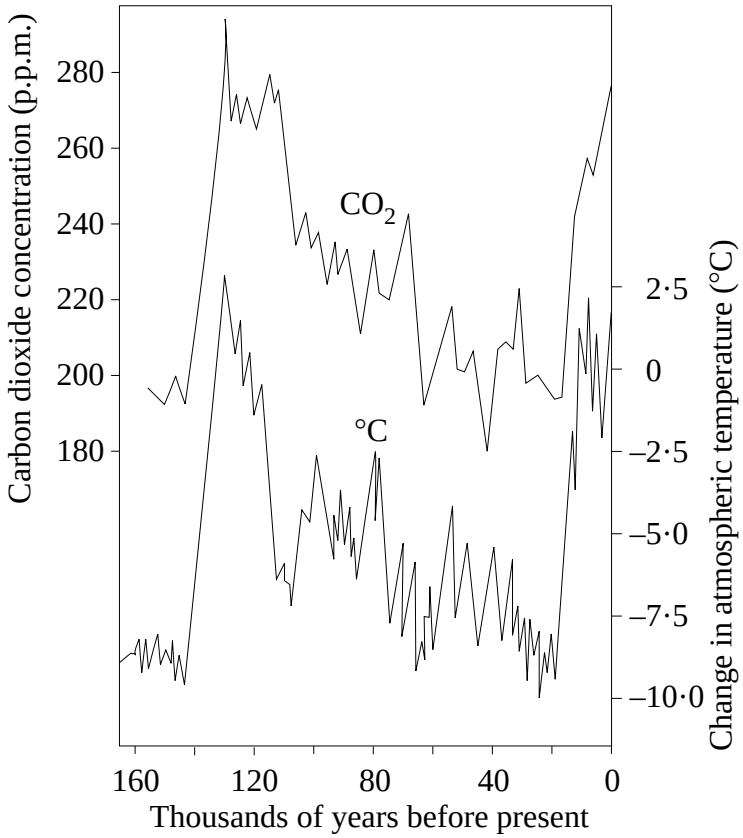
**5 .** The table below shows the influence of clouds on *ground* temperatures.




These diagrams show that

(A) when the weather is cloudy, the ground temperature stays fairly constant.
(B) when there are no clouds, the ground temperature is very hot.
(C) very hot days are often followed by thunderstorms in the evening.
(D) you should wear sun protection, even on cloudy summer days.

**6 .** The graphs below show some changes in the Earth's atmosphere.




From the information in the graph, it is reasonable to state that

(A) the amount of carbon dioxide in the Earth's atmosphere decreased between 80 and 40 years ago.

(B) there is no relationship between the amount of carbon dioxide in the atmosphere and the temperature of the atmosphere.

(C) for most of the last 160 thousand years the amount of carbon dioxide in the atmosphere has been decreasing.

(D) the temperature on Earth 160 thousand years ago ranged from 10°C to 8°C.

**7 .** The deadly calici rabbit virus escaped from Wardang Island in South Australia in early October 1995. By mid-November 1995 it had arrived at the NSW border near Broken Hill. Scientists claim it is spreading at 10 kilometres per day. The distance from Broken Hill to Sydney is 1200 kilometres.

From this information, how many days would the virus take to travel from Broken Hill to Sydney?

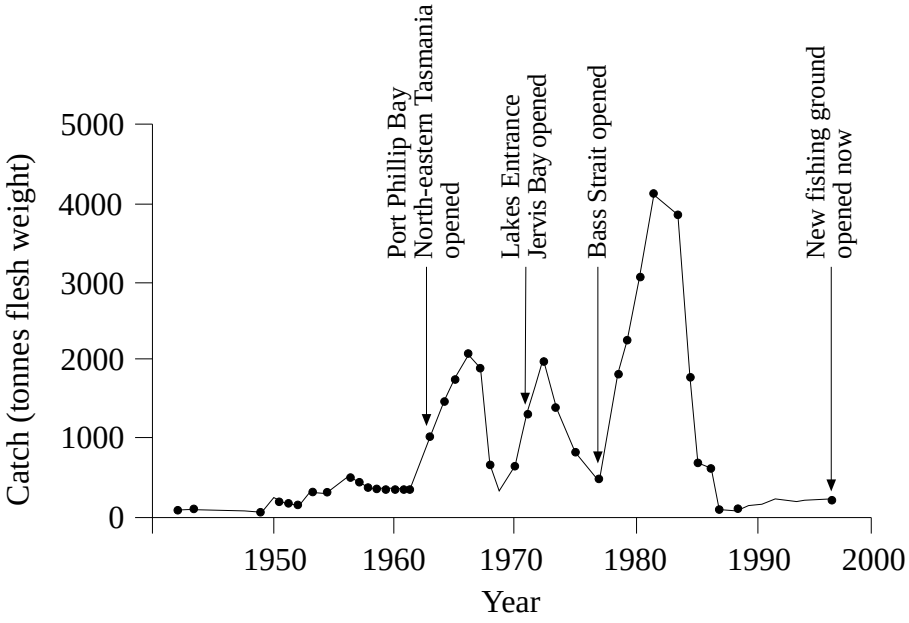
(A) 12 days

(B) 120 days

(C) 1200 days

(D) 12 000 days

8. The graph below shows the opening of fishing grounds, and total annual scallop catches.




If the new fishing ground is opened now, what total annual scallop catch would you expect near the year 2006?

It would be

(A) less than 1000 tonnes.

(B) between 2000 and 3000 tonnes.

(C) between 4000 and 5000 tonnes.

(D) more than 10 000 tonnes.

**9 .** There are many reports about the health risks of magnetic fields. These risks include changed behaviour, effects on learning ability, disturbance of sleep patterns, and reproductive problems.

The table below shows the magnetic field around some appliances at three different distances.

| APPLIANCE | MAGNETIC FIELD (mG) | | |
|---|---|---|---|
| | *At 30 mm* | *At 300 mm* | *At 1000 mm* |
| Computer monitor | 10–50 | 0·5–2 | 0·1 |
| Hair-drier | 60–20 000 | 0·1–70 | 0·1–2·5 |
| Colour TV | 130–500 | 10–20 | 0·8–1 |
| Vacuum cleaner | 2000–8000 | 20–200 | 1·3–20 |

If each appliance is used normally, which one might have the greatest risk for humans?

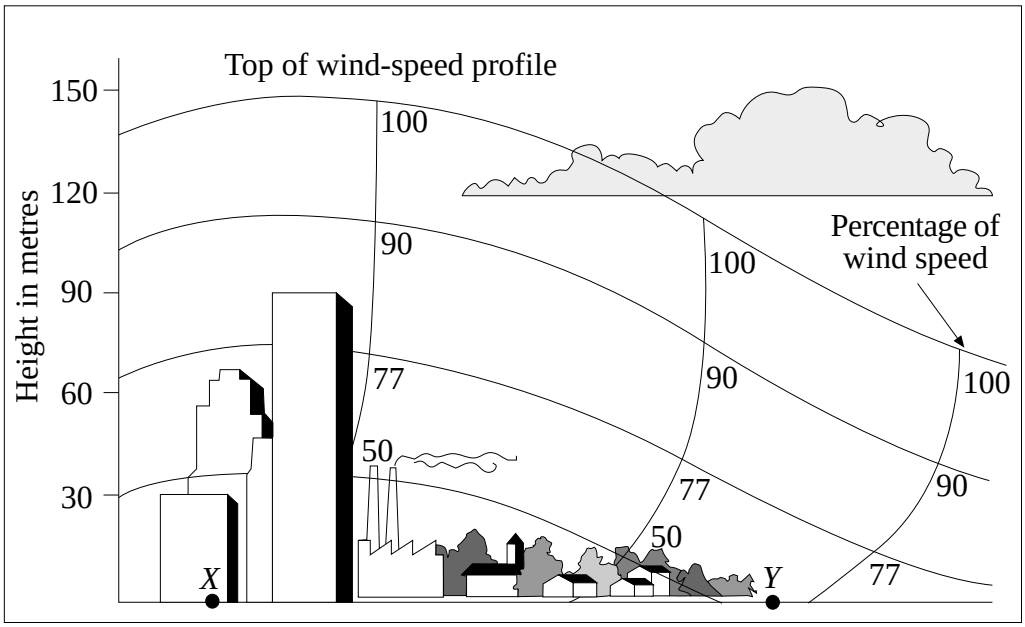
(A) computer monitor

(B) hair-drier

(C) colour TV

(D) vacuum cleaner

**10.** Wind energy depends on wind speed.




A 10-metre high windmill has been built at *Y*. Approximately how high would a windmill have to be built at point *X* to collect the same amount of energy?

(A) 20 metres

(B) 40 metres

(C) 60 metres

(D) 80 metres

## 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 shows information about the average mass of infants at different ages.

| *Age* (months) | *Mass* (kg) |
|---|---|
| 1 | 4·5 |
| 2 | 5·0 |
| 3 | 5·7 |
| 4 | 6·3 |
| 6 | 7·5 |
| 8 | 8·3 |
| 10 | 9·0 |
| 12 | 9·6 |
| 16 | 10·7 |
| 20 | 11·5 |
| 24 | 12·0 |

(a) Graph the data on the grid provided in your Answer Book.

(b) Between which ages do children gain mass most rapidly?

(c) Estimate the average mass of children at age 18 months.

**12.** Sun protection factors (SPF) are often quoted in advertisements for clothing, creams, or lotions. The SPF indicates the protection provided by these products.

If you normally get sunburnt after 15 minutes, then with a cream of SPF4 you would get as badly burnt after 60 minutes. That is, it takes four times as long.

(a) If you normally get sunburnt after 20 minutes, how long would it take you to get as badly burnt when using SPF15 cream?

(b) You want to work out how long you can stay in the sun until you get burnt. What information do you need?

(c) Suggest ONE reason why clothing has a much higher SPF than creams.

**13.**

CHILD DISEASE RAGING

Rubella (German measles) is on the increase. In 1991, there were 620 reported cases. In 1994, there were 3300 cases. 'The main risk with rubella is with pregnant women, whose children can be born deaf or with heart problems', said a paediatrician, Professor W. Zeller. The rise in rubella cases, experts claim, is due to fewer children being immunised.

Sun Herald 12 november 1995

Design a poster to encourage immunisation against rubella.

**14.**

MANHOOD DWINDLING

The sperm count of men has declined since 1940. The average sperm count in 1940 was 113 million per millilitre of seminal fluid. By 1990, it had fallen an astounding 50 per cent.

Scientists believe these trends could be linked to the chemicals used in our society. These chemicals include industrial chemicals and female hormones used in food production.

(a) What is the hypothesis suggested in this passage to explain the falling sperm count in males?

(b) From the information in the passage, calculate the average sperm count in males in 1990.

(c) Suggest ONE reason why scientists would be concerned about falling sperm count in males.

**15.** This information shows the nutritional information for one standard serving from some breakfast-cereal packets.

| BUBBLES | | LOOPS | |
|---|---|---|---|
| Protein | 6·4 g | Protein | 5·5 g |
| Niacin | 18·6 mg | Niacin | 9·3 mg |
| Vitamin $B_6$ | 1·9 mg | Vitamin $B_6$ | 1·8 mg |
| Riboflavin ($B_2$) | 2·6 mg | Riboflavin ($B_2$) | 1·3 mg |
| Thiamine ($B_1$) | 1·86 mg | Thiamine ($B_1$) | 0·93 mg |
| Folic acid | 270 $\mu$g | Folic acid | 245 $\mu$g |
| Vitamin D | 4·2 $\mu$g | Vitamin D | 3·9 $\mu$g |
| Vitamin $B_{12}$ | 1·5 $\mu$g | Vitamin $B_{12}$ | 1·5 $\mu$g |
| Iron | 16·6 mg | Iron | 8·5 mg |
| **FLAKES** | | **POPS** | |
| Protein | 7·6 g | Protein | 7·6 g |
| Niacin | 9·2 mg | Niacin | 9·3 mg |
| Vitamin $B_6$ | 1·8 mg | Vitamin $B_6$ | 1·8 mg |
| Riboflavin ($B_2$) | 1·4 mg | Riboflavin ($B_2$) | 1·3 mg |
| Thiamine ($B_1$) | 0·92 mg | Thiamine ($B_1$) | 0·93 mg |
| Folic acid | 250 $\mu$g | Folic acid | 245 $\mu$g |
| Vitamin D | 3·8 $\mu$g | Vitamin D | 3·9 $\mu$g |
| Vitamin $B_{12}$ | 1·7 $\mu$g | Vitamin $B_{12}$ | 1·5 $\mu$g |
| Iron | 8·3 mg | Iron | 8·3 mg |

(a) Draw up a table that compares the amount of niacin, thiamine, and iron in each of these cereals.

(b) What is ONE disadvantage of using the units grams (g), milligrams (mg), and micrograms ($\mu$g) on the one packet?

## SECTION II—MODULES

(45 Marks)

Attempt THREE Modules.

Each Module is worth 15 marks.

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

**QUESTION 16. Fashion and Science** **Marks**

(a) Car design is influenced both by current fashion and by science and technology. **6**

The photographs show two cars—one car was built in 1956 and the other in 1996.

1956 CAR

1996 CAR

(i) From these photographs, list TWO design changes that can be seen.

(ii) For ONE of these design changes, explain how science and technology have helped to make it possible.

(iii) Both cars produce exhaust gases that are harmful to the environment. What is ONE *other* detrimental effect on the environment that BOTH cars have?

(iv) 1. Name an item of fashion, *other than cars*, that you have studied.

2. Use labelled diagrams to show how cultural heritage has influenced changes in this item.

(b) Many popular T-shirts show the designer's name on the outside. **4**

T-shirts can also be purchased *without* these names showing.

(i) Some people prefer to buy T-shirts with designer names on the outside. Give TWO reasons for this.

(ii) Describe how you could find out why people may prefer to buy these T-shirts.

QUESTION 16. (Continued) **Marks**

(c) Rainwater tanks have been made from corrugated iron for the last 100 years. In the last 10 years rainwater tanks have also been manufactured from plastic. **2**

(i) Name a fashion in which the materials used have changed.

(ii) Describe ONE change in materials which has occurred in this fashion.

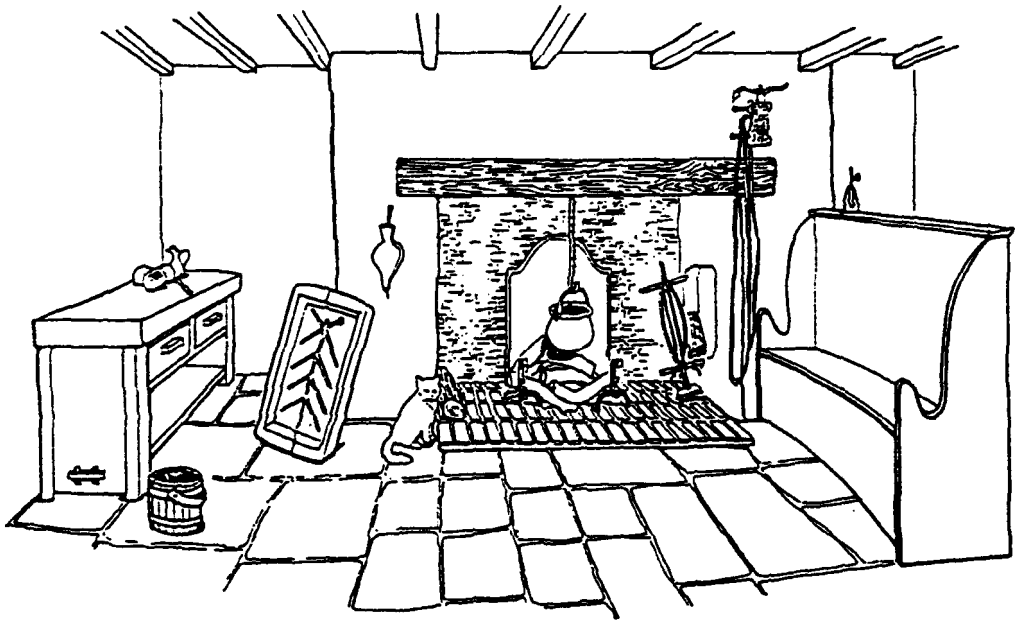
(iii) What is ONE advantage of this change in materials?

(iv) What is ONE disadvantage of this change in materials?

(d) **3**

A FARMHOUSE KITCHEN IN THE 1780s

In the 1780s preparing a meal was hard work. Water came from a stream or well, and wood for the fire had to be collected and chopped. Meat and vegetables were usually boiled over the fire in a cauldron. Food was preserved for the winter by drying, salting, smoking, or pickling, and had to be stored away from the reach of rats and mice.



(i) Name TWO methods used in the 1780s to prevent the decay of food.

(ii) 1. Name ONE method of cooking described in the passage.

2. Name a different method of cooking used now.

3. Which of these methods of cooking is more harmful to the environment?

4. Give ONE reason for your answer.

**QUESTION 17. Horticulture** **Marks**

(a) **7**

'Harvesting nature's diversity', World Food Day Secretariat, FAO, p5.

FARMING DIVERSITY IN THE DEVELOPING WORLD

Four broad agro-ecological zones account for 90 per cent of agricultural production in developing countries: drylands; humid lowlands; irrigated areas; and hill and mountain areas. Each of these zones has a range of farming systems.

**Humid lowlands**

Population: 1000 million

Area: 3100 million ha

Features: mostly forested areas; environmental deterioration, mainly caused by the loss of tree cover; high soil erosion; high rainfall; reliable food production.

**Major systems:**

- shifting cultivation
- plantations (e.g. rubber)
- extensive grazing (mainly in Latin America)

**Hill and mountain areas**

Population: 500 million

Area: 1000 million ha

Features: many areas with slopes of more than 30 per cent gradient; most forms of environmental deterioration evident, particularly soil erosion; food production is becoming less reliable.

**Major systems:**

- hill farming (e.g. in the Himalayan and Andean zones)
- dairying and grazing (e.g. in Latin America)

**Irrigated areas**

Population: 1000 million

Area: 215 million ha

Features: limitations include high costs, waterlogging, salinisation, and pollution of groundwater; essential area for reliable food production.

**Major systems:**

- lowland rice-based
- irrigated farming (many crops)
- aquaculture (minor)
- intensive animal production

**Drylands**

Population: 500 million

Area: 3400 million ha

Features: less than 500 mm rainfall in drylands or semi-humid with light erratic rainfall; some 6 million hectares lost annually through desertification; unreliable food production.

**Major systems:**

- pastoral
- upland cereal-based
- some plantations (e.g. sisal)
- small irrigated areas

(i) From this information:

1. name ONE major system that is NOT part of horticulture;

2. give ONE reason for your answer.

QUESTION 17. (Continued) **Marks**

(ii) 1. For humid lowlands, state ONE problem for plant production.

2. Suggest ONE way in which this problem could be overcome.

3. For drylands, state ONE problem for plant production.

4. Suggest ONE way in which this problem could be overcome.

(iii) Food production in hill and mountain areas is becoming less reliable. Suggest ONE reason for this.

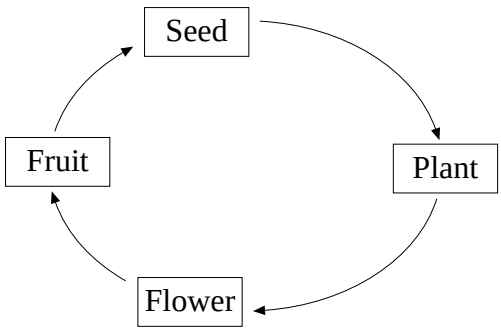
(iv) Population density is the number of people per hectare (population per hectare).

1. Name the zone with the highest population density.

2. Give ONE reason why this zone supports the highest population density.

(b) Some house plants need water more often than others. Design an experiment to test whether differences in leaf size affect the amount of water a plant needs. **3**

(c) The life cycle of a plant can be represented by the following diagram. **5**




Choose a plant that you have studied.

(i) Name the plant.

(ii) Select ONE of the four stages shown in the life cycle above. List TWO benefits or uses of this stage of the plant for humans.

(iii) For this same stage, draw a labelled diagram.

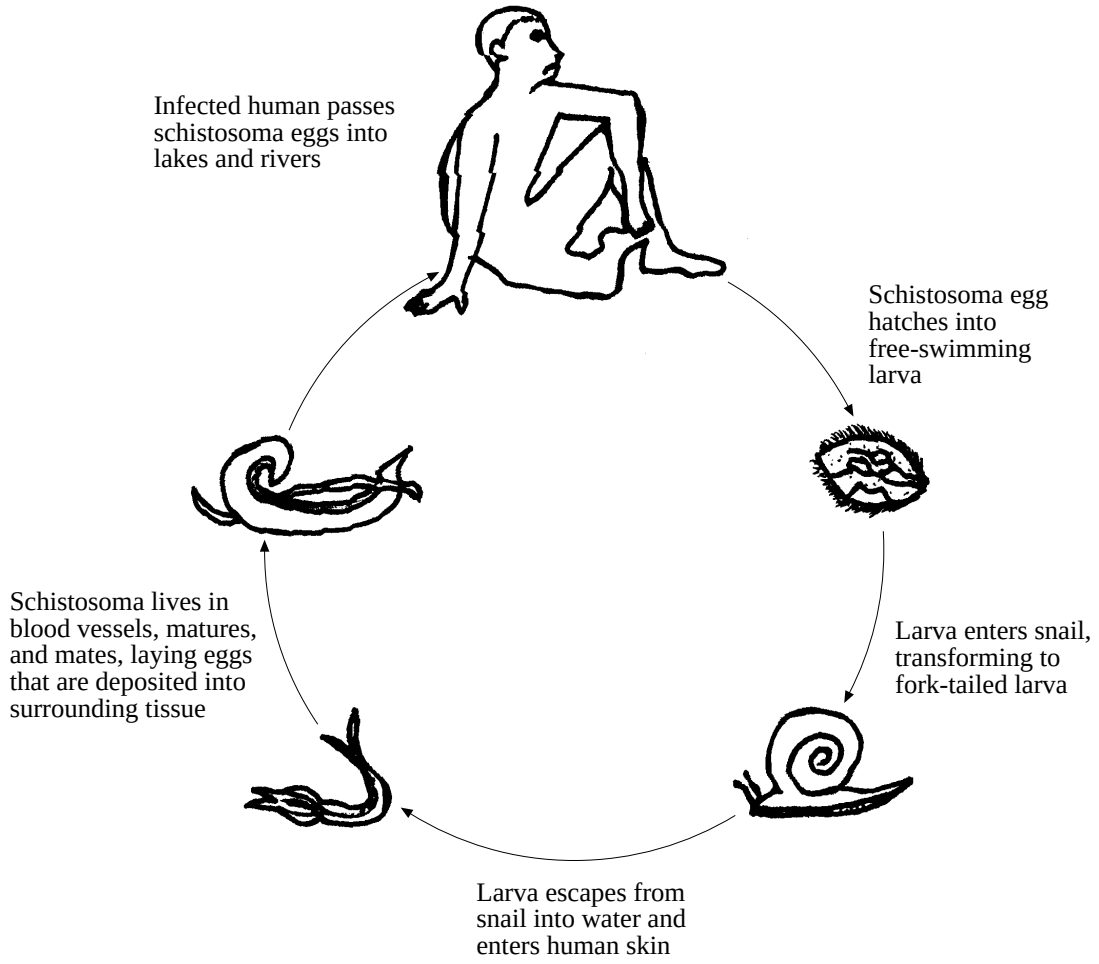
(iv) For ONE other stage in the plant's life cycle:

1. state ONE problem with growing the plant, e.g. a disease or predator that affects this stage of the plant's life cycle;

2. state ONE way in which this problem can be reduced.

**QUESTION 18. The Human Body** **Marks**

(a) The diagram below shows the life cycle of the schistosoma worm, which causes the disease schistosomiasis. **4**




Schistosomiasis is a disease that leaves humans weak, in constant pain, and with a swollen and inflamed liver and bladder.

From the information in the life cycle:

(i) Suggest TWO ways in which the disease could be prevented.

(ii) Where do schistosoma worms mate?

(iii) Suggest why schistosomiasis is rare in Australia.

QUESTION 18. (Continued) **Marks**

(b) Draw a table in your Answer Book to show: **3**

(i) THREE stages of development in humans;

(ii) TWO characteristics of humans at each stage.

(c) It has been suggested that people should take ginkgo to prevent the memory loss that sometimes occurs with old age. **3**

Design an experiment to test the suggestion that memory loss is prevented by taking ginkgo tablets.

(d) (i) Suggest ONE way in which lifestyle affects physical health. **2**

(ii) Suggest ONE way in which lifestyle affects mental health.

(e) (i) What is the biosphere? **3**

(ii) Describe ONE way in which your own behaviour has an impact on the biosphere.

(iii) Suggest ONE way in which you could change your own behaviour to reduce this impact.

**QUESTION 19. Science Fiction** **Marks**

(a) Read the passage below describing a beast on Mars. **5**

WARRIOR OF MARS

I got up and looked across the sea of purple ferns.

I gasped.

My whole sight must somehow have been altered!

Eating the ferns, with a line of yellowish hills in the background, was a beast twice as large as an elephant (about 8 m tall) and of roughly the same proportions as a horse. Yet here the similarity to any beast I knew ended. This creature was shades of mauve and light green. It had three long, white horns curling from its flat, almost catlike head. It had twin, somewhat reptilian, tails spreading to the ground behind it, and it had one huge eye covering at least half the area of its face.

'Warrior of Mars', Michael Moorcock, NEL, 1971 p.23.

(i) Draw a labelled scale diagram of the beast described.

(ii) This animal might have problems surviving on Earth. Suggest TWO characteristics of the beast that could disadvantage it on Earth.

(iii) Suggest ONE reason to explain the disadvantage of *each* characteristic.

(b) **2**

**DUE TO COPYRIGHT LIMITATIONS, THIS IMAGE COULD NOT BE REPRODUCED HERE. PLEASE SEE HARD COPY OF EXAMINATION PAPER.**

This extract describes a spacesuit sometime in the future.

(i) Identify ONE feature of the spacesuit that is not available in spacesuits used today.

(ii) Suggest ONE function for the 'small backpack'.

QUESTION 19. (Continued) **Marks**

(c) Extraterrestrials often feature in science fiction. In the film *The Day the Earth Stood Still*, an extraterrestrial comes to Earth to warn humans against the use of nuclear weapons. He has difficulty communicating with the leaders on Earth. To impress them with his power, he stops all vehicles and industry on Earth. **3**

(i) 1. What are TWO difficulties, *other than communication*, that extraterrestrials might experience in their interaction with humans?

2. Why might they have these difficulties?

(ii) What is ONE benefit that an extraterrestrial might obtain from contact with humans? Explain your answer.

(d) Name a science-fiction book or film, other than *The Day the Earth Stood Still*, that you have studied. In what way was it: **2**

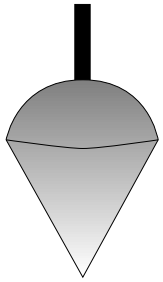
(i) fictitious?

(ii) scientific?

(e) Design an investigation to find out what people think would happen if extraterrestrials landed on Earth. **3**

**QUESTION 20. Science of Toys** **Marks**

(a) Children have played with spinning-tops for centuries. **2**



(i) Name a toy.

(ii) Describe TWO ways in which science has improved the way the toy works.

(iii) Describe TWO ways in which science has made the toy safer.

(b) Manufacturers put warning labels on some toys. **3**

(i) Name a toy that would need a warning label.

(ii) Write a suitable warning label for this toy.

(iii) Give TWO reasons for putting this warning label on this toy.

(c) 'There are more toys available for children today than thirty years ago.' **1**

(i) Give ONE example of a toy that has been invented in the last thirty years.

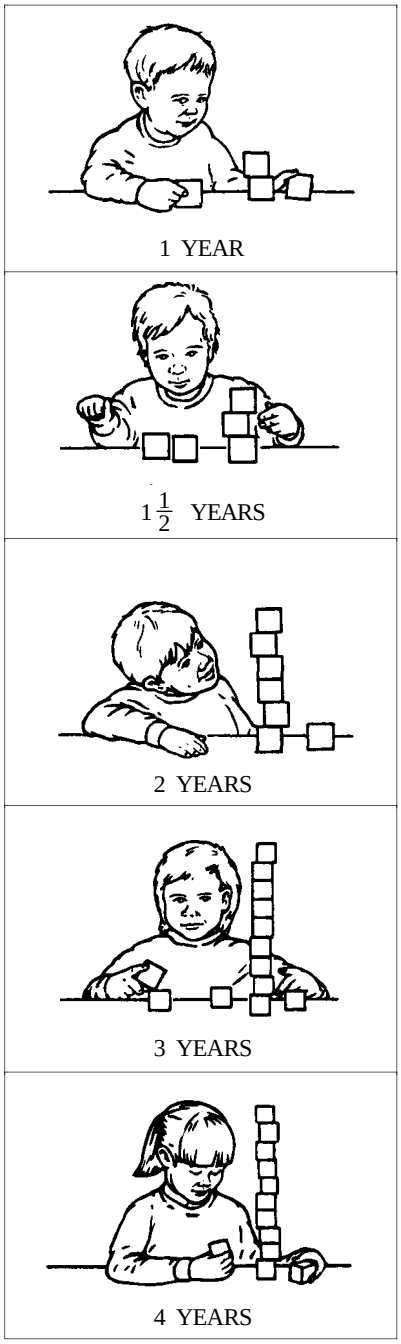
(ii) State ONE development in science and technology in the last thirty years that has made this toy available.

(d) Many manufacturers produce toys for adults. **3**

Design an investigation to find out why there has been an increase in the range of toys produced for adults.

QUESTION 20. (Continued) **Marks**

(e) The diagrams show children playing with blocks. **2**




State TWO conclusions about child development that you could make from this information.

(f) (i) Draw a scale diagram of a toy *other than blocks*. **4**

(ii) On your diagram, label AT LEAST TWO features of the toy and say how these would help a child's development.

**QUESTION 21. Sport Science** **Marks**

(a) Sophie and Kurt are in training for National Championships. **3**

Kurt trains every day and eats a lot of fast foods.

Sophie follows a strict diet and trains two days a week.

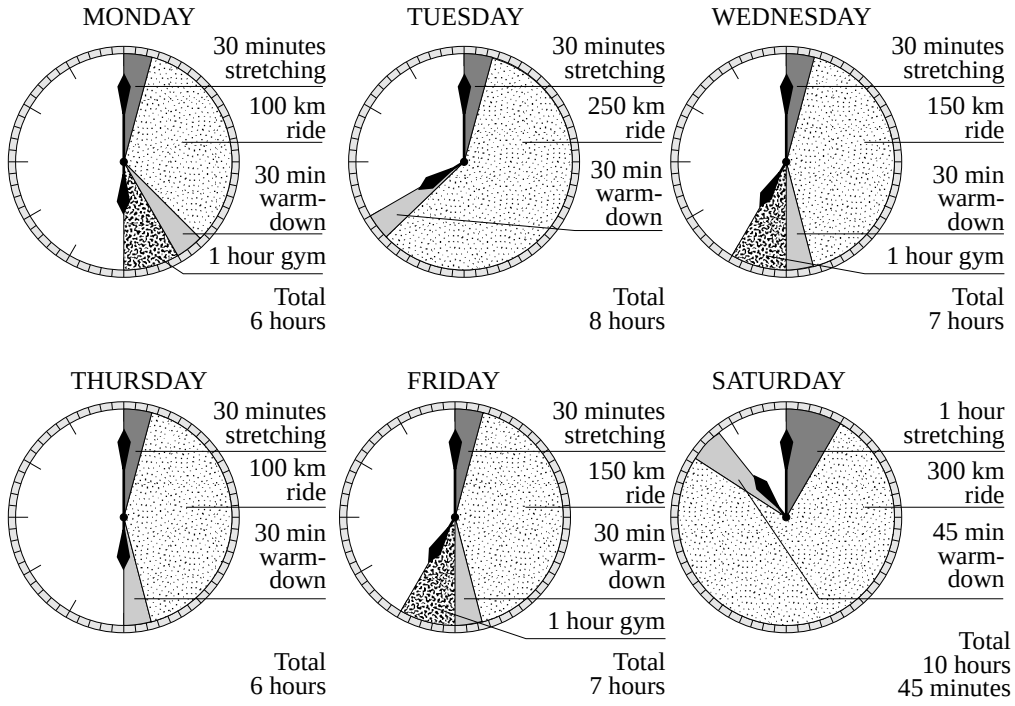
(i) State ONE way Sophie's physical fitness can be improved. Give a reason for your answer.

(ii) State ONE way Kurt's physical fitness can be improved. Give a reason for your answer.

(b) **5**

Sun herald february 4 1996

A WEEK IN THE LIFE OF BRADLEY McGEE




SUNDAY: Rest day Total—1050 km, 44 hours 45 minutes.

(i) Suggest ONE reason why Bradley McGee stretches for 30 minutes before a 250 km ride on Tuesday, but stretches for one hour before a 300 km ride on Saturday.

(ii) Draw up a table that summarises all the information shown in the diagram above.

(iii) Below is a table showing some of Bradley's results.

| *Year* | *Event* | *Distance* | *Time* |
|---|---|---|---|
| 1993 | Junior teams pursuit | 3000 m | 3 min 25·733 s |
| 1994 | Junior teams pursuit | 4000 m | 4 min 17·710 s |

Suggest TWO reasons why Bradley trains long distances over many hours if his races are short.

QUESTION 21. (Continued) **Marks**

(c) **5**

**DUE TO COPYRIGHT LIMITATIONS, THIS IMAGE COULD NOT BE REPRODUCED HERE. PLEASE SEE HARD COPY OF EXAMINATION PAPER.**

Megan is 14 years old. She wants her mother, who is 50 and overweight, to join her exercising at the gym. Her mother says, 'No, I won't be able to keep up. Find me a better way to exercise'.

(i) 1. Is it important for Megan's mother to exercise? Give ONE reason for your answer.

2. Design a suitable exercise program for Megan's mother.

(ii) Name ONE physical activity that you have studied and describe:

1. the body type it suits;

2. the age-group it suits.

(d) Loren is a freestyle skater who never understood why she should bring her arms in to her body so she could spin faster. Her coach said 'It's all due to physics'. **2**

For ONE sport you have studied, show how linking the principles of physics to body movement can improve skilled movements.

**QUESTION 22. Disasters** **Marks**

(a) You have been put in charge of organising the emergency-response team. When a disaster occurs, this team is expected to be among the first to arrive. **5**

(i) What range of skills should the members of an emergency-response team have?

(ii) Select TWO of these skills and explain why they are necessary.

(iii) Which members of the team would you send into the disaster area first? Give ONE reason for your decision.

(b) Disasters may result from failures of people, materials, or technology. **2**

A spy-satellite the size of a car is slowly falling from orbit. It is expected to crash to Earth early in 1997. The problem is that the crash location is not known.

(i) What would have to happen for the satellite crash to be a disaster? Give ONE reason for your answer.

(ii) There are many satellites orbiting Earth and some will eventually crash back to Earth. How could disasters caused by satellite crashes be avoided?

(c) Natural disasters have always affected the Earth. **1**

(i) Name ONE natural disaster.

(ii) How do scientists know that events of this type affected the Earth thousands of years ago?

(d) Cyclone Barry was the most severe cyclone to hit the Cape York Peninsula in twenty years. **3**

When it was known that Karumba was in the direct path of the cyclone, its residents moved 30 km inland. Fifty years ago, residents of Karumba would not have found out about the cyclone in time to move.

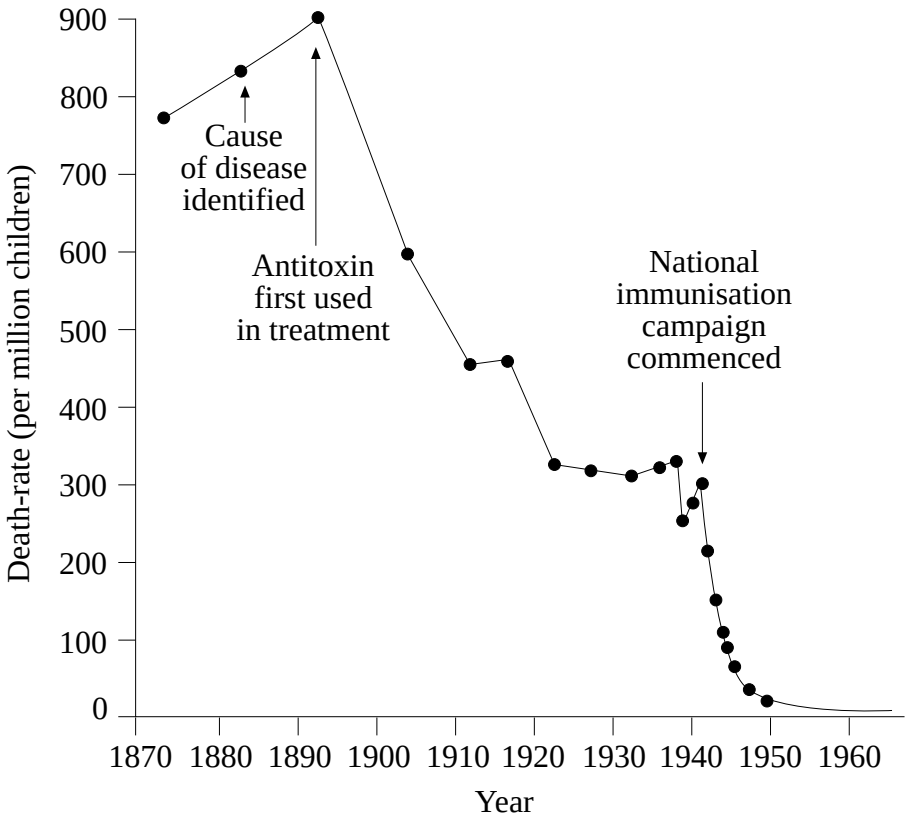
(i) Is Cyclone Barry an example of a disaster? Explain your answer.

(ii) Name a disaster.

(iii) What TWO technological advances helped prevent loss of life in this disaster?

QUESTION 22. (Continued) **Marks**

(e) The graph below shows the number of deaths per million children caused by diphtheria between 1870 and 1960. **4**




(i) From the graph, what event was most important in reducing death-rates from diphtheria. Explain your answer.

(ii) Since 1970, death-rates from diphtheria have begun to increase.

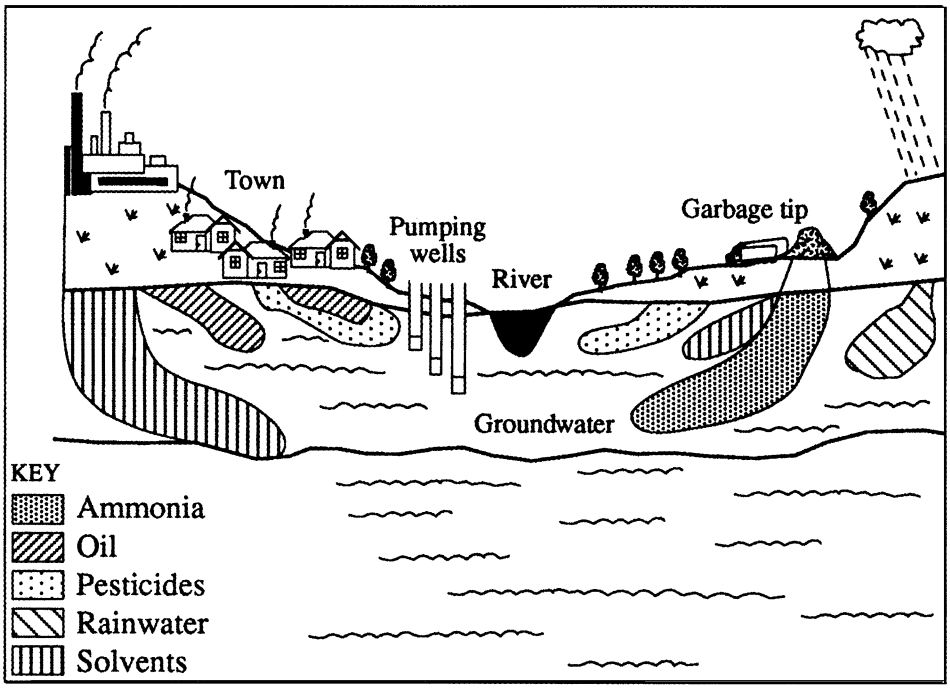
1. Suggest ONE possible cause for this increase in death-rates from diphtheria.

2. Would you describe this increase as a disaster? Explain your answer.

(iii) The vertical axis is labelled, ‘Death-rate (per million children)’. What does this label mean?

**QUESTION 23. Managing Natural Resources** **Marks**

(a) **6**




'Water', M O'Toole, Cambridge University Press 1995, fig. 5.9, p.63.
Reprinted with the permission of Cambridge University Press.

Answer parts (i) and (ii) by copying and completing the table below in your Answer Book.

| *Pollutant* | *Source of pollutant* |
|---|---|
| | |

(i) List the pollutants that are flowing into the groundwater.

(ii) Use the diagram to help you suggest the most likely source of each pollutant.

(iii) Townspeople are concerned about the high levels of pesticides in their drinking-water. Suggest TWO solutions to this problem.

(b) Here is a list of resources that can be used to produce electricity. **3**

- wind
- sun
- oil
- water
- coal
- wood

(i) Which of these resources listed are renewable?

(ii) The resources listed above are NOT equally accessible to all people.

1. Name ONE resource.

2. This resource is NOT equally accessible to all people. Give ONE reason for this.

QUESTION 23. (Continued) **Marks**

(c) **6**

VIRUS OPTION TO HELP FIGHT EUROPEAN CARP

A virus which could wipe out the European carp and leave native fish untouched is being investigated.

The European carp is the biggest threat to the freshwater fishing industry. It is estimated that there are more than 200 million carp in Australian inland waterways. They are blamed for muddying rivers, reducing native fish numbers, and increasing algal blooms which kill many aquatic organisms. Spring Viraemia virus of carp (SVC) is common in Europe but has never appeared in Australia.

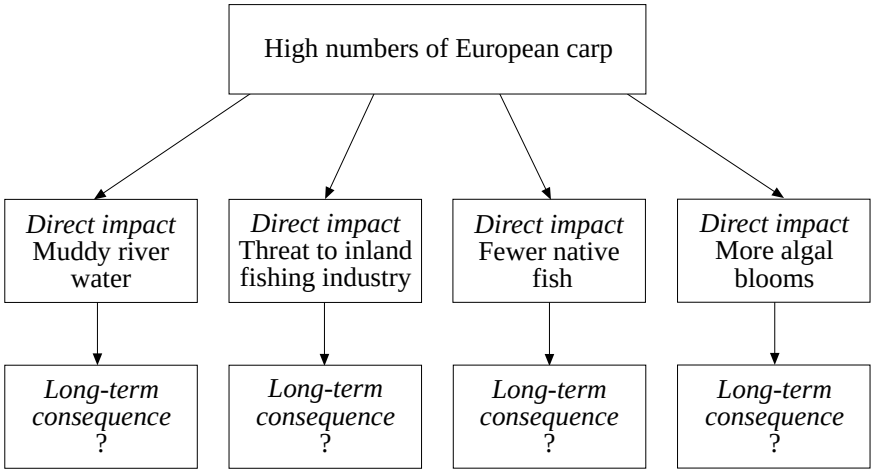
Dr John Harris said the release of the virus was at least five years away and many tests would be conducted beforehand. 'We have to make sure release is a safe option', he said.

SUN HERALD JANUARY 1996

(i) It is claimed that the SVC virus will 'leave native fish untouched'.

Design an experiment to test this claim.

(ii) Look at the diagram below. It summarises the four direct impacts of European carp in Australian inland waterways.




For each of the direct impacts there are long-term consequences.

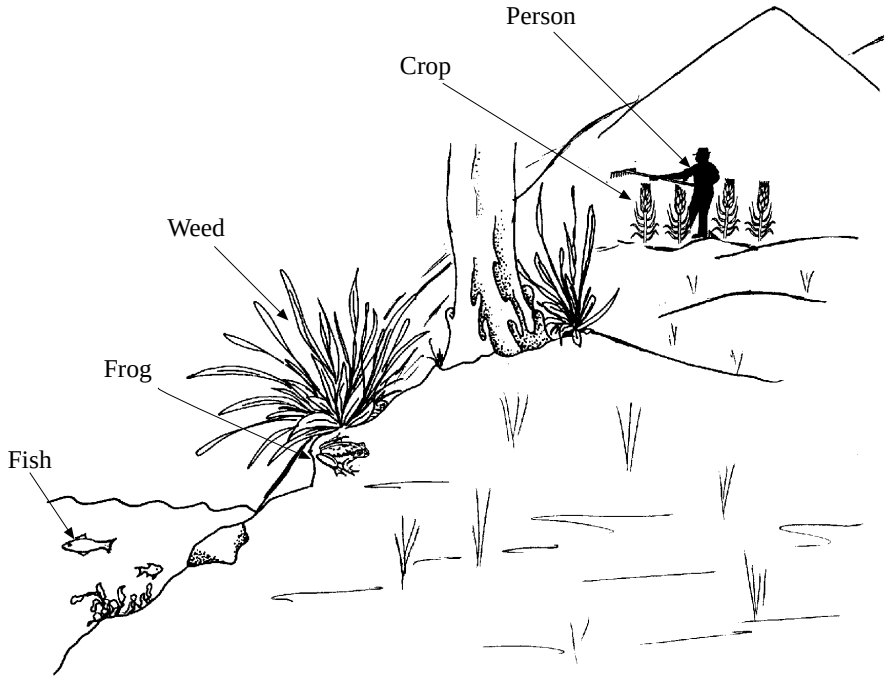
In your Answer Book:

1. list THREE direct impacts;

2. suggest a different possible long-term consequence for EACH direct impact.

**QUESTION 24. Marine or River Studies** **Marks**

(a) The diagram below shows five living organisms. Each organism needs clean water in order to survive. **2**




(i) Name ONE of the organisms from the diagram.

(ii) Explain how this organism relies on water to live.

(iii) Describe ONE possible effect on this organism if the water becomes polluted.

(b) In a creek, the number of tadpoles decreased over the last few years. You notice that there are many more overhanging trees than there were before. **5**

(i) Suggest TWO ways the increase in trees could have reduced the tadpole population.

(ii) Design an experiment to test ONE of these suggestions.

(c) (i) Name ONE food-production industry. **2**

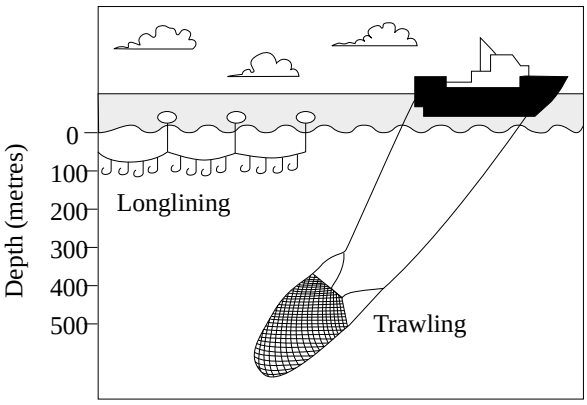
(ii) Describe ONE way in which water is used by that industry to produce food.

(iii) Explain how the industry ensures it has a reliable water supply.

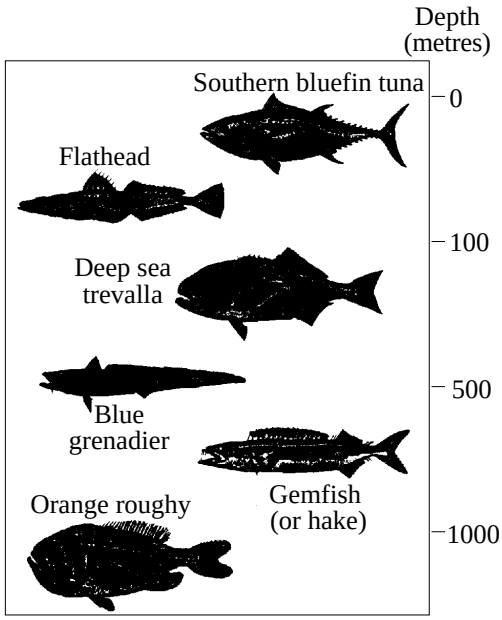
QUESTION 24. (Continued) **Marks**

(d) The diagrams below give information about fishing. **3**

COMMERCIAL METHODS OF FISHING




THE DEPTH AT WHICH DIFFERENT FISH ARE FOUND




Courtesy CSIRO Australia.

(i) Explain factors that may help people decide which method of fishing to use.

(ii) Which method would give greater control over the size and type of fish caught? Give ONE reason for your answer.

(iii) Which fish would be more likely to be caught by longlining? Give ONE reason for your answer.

(e) Sydney Harbour gets badly polluted at times. Items that can be found in the water or on the foreshores include: **3**

- oil
- grease
- used syringes
- food containers
- dead animals
- sewage.

(i) Name ONE of these pollutants.

(ii) How could this pollutant have entered the water of the harbour?

(iii) How could this pollutant be a problem for people using the harbour for recreation?

**QUESTION 25. Biotechnology** **Marks**

(a) **5**

ENCOURAGING MORE OIL TO FLOW

Production from an oil reservoir usually stops when only about 30% of the oil it contains has been brought to the surface.

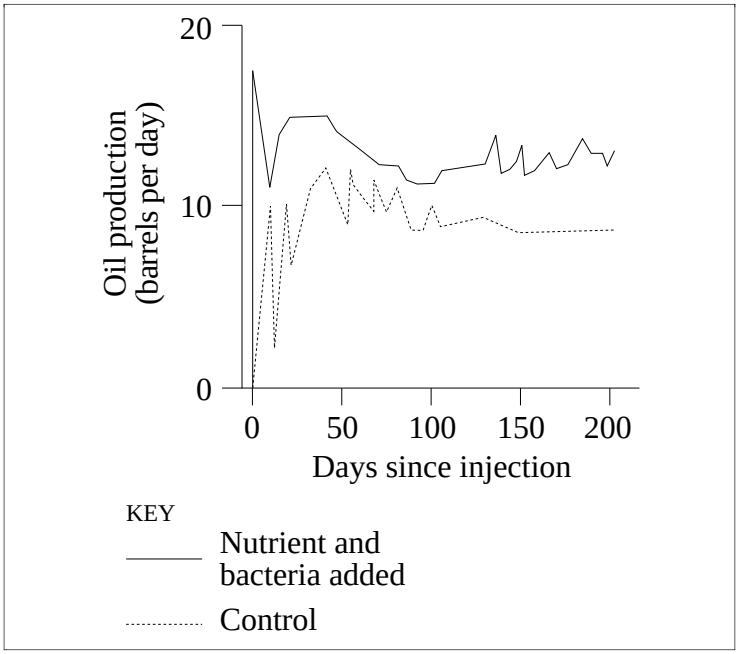
The popular idea that you only need to drill a hole into an oil field and oil will gush is rarely correct. Even if you have a geyser to start with, the pressure will quickly drop so low that you will soon need to push the oil out. This is done by injecting water or gas into the oil reservoir to force oil out. The major problem with this technique is that oil and water don't mix. The oil droplets tend to stay lodged in the rock.

For a number of years CSIRO researchers have been examining the value of introducing special strains of bacteria to the wells. The bacteria produce surfactants. Surfactants are chemicals that allow the oil and water to mix. This allows the oil to flow more easily.

The latest improvement has been to add nutrient solutions to encourage the bacteria to grow.

Courtesy CSIRO Australia.

RESULT FROM CSIRO EXPERIMENT ON OIL PRODUCTION




(i) Why does production from oil reservoirs usually stop after about 30% of the oil has been obtained?

(ii) How do bacteria help to overcome the 'major problem' with the technique of adding water to the oil?

(iii) What is ONE conclusion that could be drawn from the information in the graph.

(iv) In the experiment to investigate oil production, list TWO features of the 'control'.

QUESTION 25. (Continued) **Marks**

(b) The Human Genome Project is identifying the inherited factors (genes) in humans. From this technology, scientists hope to be able to predict which people will develop problems such as heart-disease or high blood pressure later in life. **4**

(i) Suggest TWO possible advantages this technology may have for people.

(ii) 1. Suggest ONE ethical issue that could arise from this technology.

2. Suggest ONE way in which society could deal with this issue.

(c) Some snails create problems for farmers by climbing to the top of plants and staying there. This damages the crop. **3**

Scientists are not sure whether the snails are attracted by a smell at the top of the plant or whether they prefer to be high off the ground. The snails tend to move only after rain.

Two new types of plants are genetically engineered. One produces a different smell. The other does not grow as tall.

Design an experiment to find out whether snails are attracted by the plant smell or plant height.

(d) Three applications for biotechnology are: **3**

- oil extraction
- Human Genome Project
- altering plant smell and height.

Describe ONE *other* application of biotechnology. In your description, comment on ONE advantage and ONE disadvantage of the biotechnology.

**QUESTION 26. Communications** **Marks**

(a) Your best friend, who is deaf, has just given you some good news. **3**

(i) How can you show how pleased you are, *without* saying any words?

(ii) How would you know that your friend received your message?

(iii) Good communication involves minimising noise. Describe ONE form of noise which could affect your communication with your friend.

(b) Choose ONE sign below. **3**

*P*

*Q*

*R*

*S*

(i) Write its corresponding letter in your Answer Book.

(ii) Explain what the sign could mean. Give ONE reason for your answer.

(iii) Why would this sign be used rather than a written message?

(c) A newspaper reports that most people feel that modern technology has led to people talking less to each other. **4**

(i) What evidence should the newspaper have for publishing this report?

(ii) Design an investigation to test the suggestion made in the newspaper.

(d) Television cameras can be made so small that they could fit into a tube of toothpaste. This means they can be easily hidden from people. **2**

(i) Give ONE advantage of this small size. Explain your answer.

(ii) Give ONE disadvantage of this small size. Explain your answer.

QUESTION 26. (Continued) **Marks**

(e) The diagram below shows a scholar copying a book hundreds of years ago. This was very slow, but it was the only method of getting more copies of written information. The invention of the printing-press made copying written material much faster and allowed more people to receive the information. **3**

(i) Name ONE other, more recent method of passing on information to large numbers of people.

(ii) Briefly describe how the process works.

(iii) Explain the major advantage of the new method of passing on information.

**QUESTION 27. Consumer Science** **Marks**

(a) Consumer demand can cause changes in resource usage. **3**

> THE GREAT LOO PAPER CAPER ROLLS ON AND ON
>
> The search for the perfect roll of toilet-paper is causing a few giggles in the Community College.
>
> In the interest of saving time, saving money, and being environmentally sound, the Community College decided to rethink what type of toilet-paper it used in its 300 toilets.
>
> Officials thought they may be better served by stocking the toilets with larger rolls. But finding the perfect larger rolls proved difficult.

(i) Suggest ONE way in which using larger toilet-rolls could save the College money?

(ii) Suggest ONE way in which toilet-paper could be produced so that it has a smaller impact on the environment.

(iii) Suggest ONE feature of toilet-paper that would influence how well it works. Give ONE reason for your answer.

(b) Consumers are increasingly concerned that the use of some technology can cause problems for the environment. **2**

(i) Name ONE example of a technology that has caused problems for the environment.

(ii) State ONE way in which this technology can affect the environment.

(iii) Suggest an alternative method of achieving the same purpose, which will cause fewer problems for the environment.

(c) **3**

**DUE TO COPYRIGHT LIMITATIONS, THIS IMAGE COULD NOT BE REPRODUCED HERE. PLEASE SEE HARD COPY OF EXAMINATION PAPER.**

There are many weight-loss schemes for sale, but this one involves ear-clips and nothing else.

How would you scientifically test ONE claim made about ACU-MAG 2000?

QUESTION 27. (Continued) **Marks**

(d) Advertising sometimes uses ‘experts’ to convince you of the quality of a product or service. **4**

(i) Name ONE product or service.

(ii) You are trying to decide which brand of this product (or service) to buy. Name TWO features of the product you would investigate before deciding which brand to buy. Give ONE reason for investigating each feature.

(iii) You want ‘expert’ advice from someone before making your final decision on which brand to buy.

1. Who would you consider to be a suitable expert to ask for advice?

2. What is ONE question you would ask this person to help you decide if he or she is an expert? Explain your answer.

(e) Many of the products available today have resulted from advances in science and technology. **3**

In your Answer Book, copy and complete the table below. Give THREE more examples showing how people’s needs have been met by different products over the last 100 years. Give ONE reason for each change. One line has been completed for you as an example.

| *Purpose* | *Product used in 1896* | *Product used in 1996* | *Reason* |
|---|---|---|---|
| Writing | Quill pen dipped in ink | Ball-point pen | The ink is less likely to spill |
| | | | |
| | | | |
| | | | |

**QUESTION 28. Space Science** **Marks**

(a) You have been put in charge of the new Australian space mission to leave Cape York in the year 2005. Assume all the technical details like a spacecraft, rocket, and fuel have been solved. You have to train the astronauts and organise all their needs for a trip which will last five years. **4**

(i) Name FOUR problems that have to be solved for the astronauts.

(ii) For EACH problem, describe a possible solution.

(b) Not all material sent into space comes back to Earth. **2**

(i) Describe ONE piece of material that is unlikely to come back to Earth.

(ii) Where is this material now?

(iii) What do you think will happen to this piece of material? Explain your answer.

(c) **6**

**DUE TO COPYRIGHT LIMITATIONS, THIS IMAGE COULD NOT BE REPRODUCED HERE. PLEASE SEE HARD COPY OF EXAMINATION PAPER.**

(i) Why is carbon monoxide poisonous to people?

(ii) Describe how the chemical produced by NASA acts on carbon monoxide?

(iii) Suggest ONE reason why this chemical would be useful when painted on wallpaper.

(iv) Design an experiment to find out whether it is better to place the chemical produced by NASA in filters, or paint it on wallpaper.

(d) **3**

SECRET LIFE OF MARS

The discovery of a rock in Antarctica is giving scientists hope that they may be able to prove life does exist on Mars and that life on Earth also came from Mars.

This year there will be a series of unmanned U.S. space probes. These will look for fossil evidence of Martian life. The probes will report back in 2005.

(i) How will the probes report to Earth if they are unmanned?

(ii) Many people believe these space probes are important. Suggest TWO ways in which these probes may be important to humans.

BLANK PAGE

BLANK PAGE