BOARD OF STUDIES
NEW SOUTH WALES

HIGHER SCHOOL CERTIFICATE EXAMINATION

1998

GENERAL SCIENCE

2 UNIT

Time allowed—Three hours
(Plus 5 minutes reading time)

DIRECTIONS TO CANDIDATES

- Board-approved calculators may be used.

Section I—Core

- Attempt ALL questions.
- **Part A** 15 multiple-choice questions, each worth 1 mark.
  Complete your answers in blue or black pen, or in pencil on the Answer Sheet provided.
- **Part B** 10 questions, each worth 3 marks.
  Answer this Part in the Part B Answer Book.
- **Part C** 6 questions, each worth 5 marks.
  Answer this Part in the Part C 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—Electives

- Attempt ONE question.
- Each question is worth 25 marks.
- Answer the question in a SEPARATE Elective Answer Book.
- Write your Student Number and Centre Number on the cover of each Elective Answer Book.
- Write the Course, Elective Name and Question Number on the cover of each Elective Answer Book.
- You may ask for extra Elective Answer Books if you need them.

SECTION I—CORE

(75 Marks)

Attempt ALL questions.

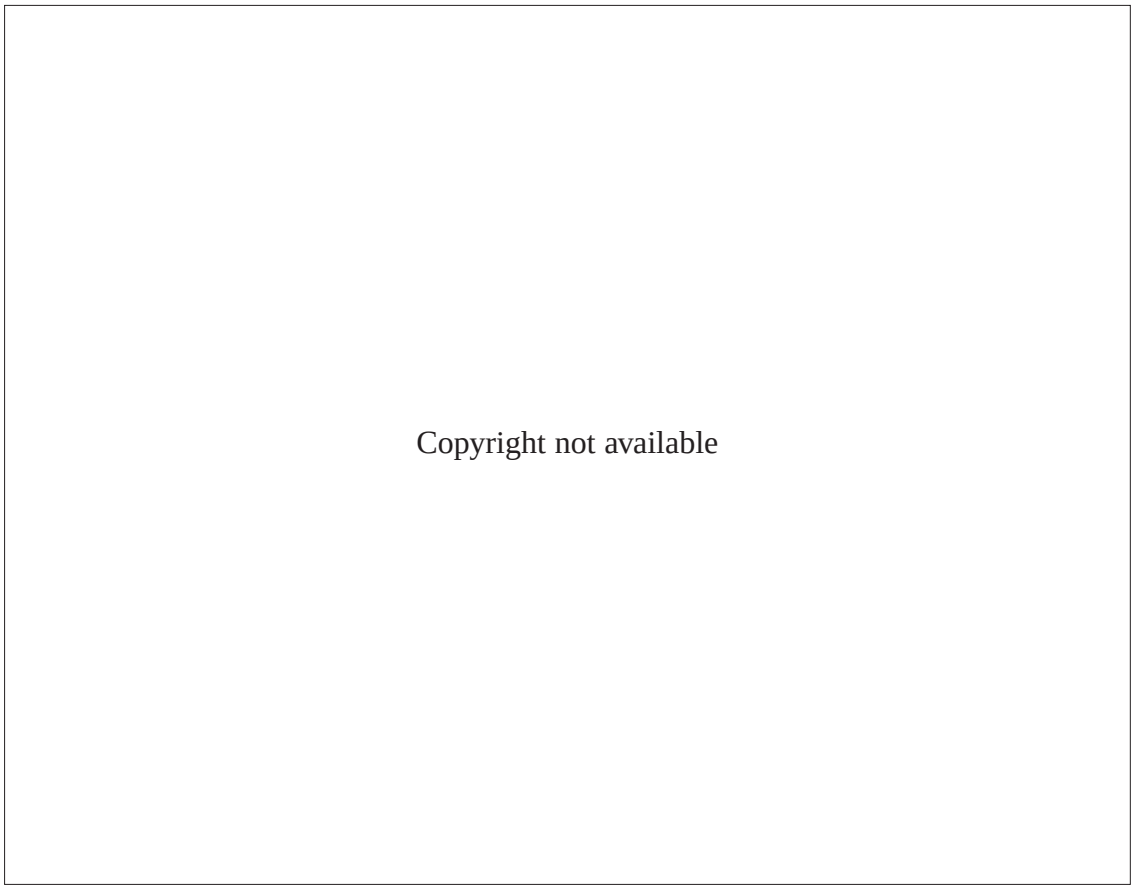
PART A

Questions 1–15 are worth 1 mark each.

Complete your answers in blue or black pen, or in pencil on the Answer Sheet provided.

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

1. The photograph below shows a total solar eclipse. It was taken on 11 July 1995 at San Jose del Cabo, Mexico.



During a solar eclipse

(A) the Sun casts a shadow over a part of the Earth.

(B) the Sun casts a shadow over a part of the Moon.

(C) the Earth casts a shadow over a part of the Moon.

(D) the Moon casts a shadow over a part of the Earth.

2. Galileo has been given credit for a number of important astronomical observations which include:

- the discovery of two satellites orbiting the planet Mars;
- the discovery and naming of four large satellites orbiting the planet Jupiter;
- an explanation of the phases of Venus.

These discoveries allowed other scientists to question the

(A) Earth-centred model as first proposed by Ptolemy.

(B) Sun-centred model as first proposed by Copernicus.

(C) Earth-centred model as first proposed by Newton.

(D) Sun-centred model as first proposed by Plato.

3. Which of the following is NOT influenced by the rotation of the Earth on its axis?

(A) The occurrence of day and night

(B) The occurrence of summer and winter

(C) The apparent movement of the stars across the night sky

(D) The apparent movement of the Moon across the night sky

4. Tycho Brahe's main contribution to the modern model of the solar system was

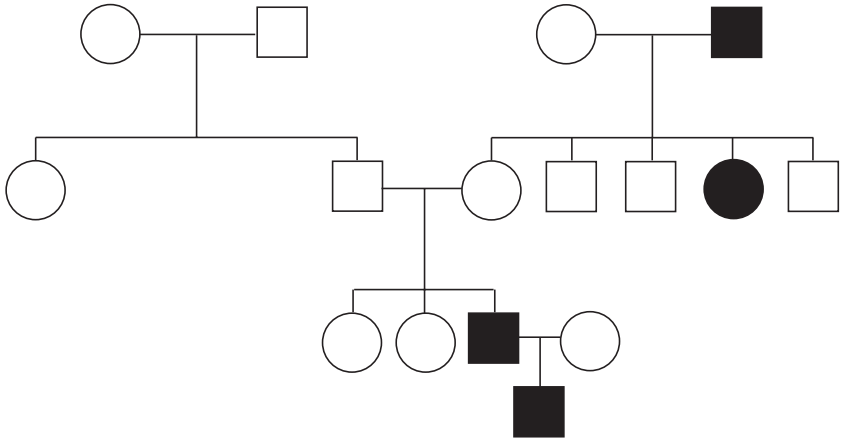
(A) the discovery of Pluto.

(B) the proposal of the Earth-centred model.

(C) that the planets travel on concentric spheres.

(D) accurate measurement of the motions of the planets.

5. The inheritance of a characteristic controlled by a single gene is shown in the family tree below.



KEY

Unaffected male

Affected male

Unaffected female

Affected female

We can say the characteristic must be determined by

(A) a dominant allele.

(B) a recessive allele.

(C) multiple alleles.

(D) a rare allele.

6. The diversity that exists within the human species is due to the fact that we

(A) receive only dominant alleles from our parents.

(B) pass on many mutations to our offspring.

(C) produce large numbers of offspring compared to all other primates.

(D) inherit a unique combination of alleles from our parents.

7. A student is breeding mice. She has a brown female mouse and wants to know if this mouse is pure bred (homozygous) or hybrid (heterozygous) for coat colour. In mice, the gene for brown coat colour is dominant over the gene for white. To answer her question, the student should mate her mouse with a male mouse which is

(A) white.

(B) brown.

(C) genetically identical to the female.

(D) genetically unrelated to the female.

8. Wool and cotton have a number of similarities that are related to the fact that they are both naturally occurring fibres. One major difference between these fibres is that

(A) cotton is made of carbohydrates, wool is made of protein.

(B) wool is made of long glucose chains, cotton is made of amino acids.

(C) cotton is a good insulator against heat, wool conducts heat.

(D) wool fibres increase in strength when wet, cotton fibres become elastic when wet.

9. In the construction of boats, composite materials such as fibreglass are often preferred to traditional materials such as timber or aluminium. This is because the composite materials are generally

(A) stronger and cheaper.

(B) cheaper and easier to make.

(C) stronger and lighter.

(D) easier to make and lighter.

10. A fossilised skeleton was discovered by scientists in Africa. Which of the following would be MOST useful in identifying the skeleton as human in origin?

(A) The size of the brain cavity

(B) The shape of the eye sockets

(C) The structure of the hands

(D) The structure of the toes

11. Scientific experiments frequently use an experimental control. A control is used to

(A) answer the aim of the experiment.

(B) improve the accuracy of scientific instruments.

(C) provide a comparison with the experimental data.

(D) ensure the experiment can be repeated at a later date.

12. A simple way of explaining what is meant by ‘survival of the fittest’ is that

(A) physical fitness ensures survival to old age.

(B) all mutations are good, resulting in a higher survival rate.

(C) an individual with a favourable adaptation is more likely to survive to breeding age.

(D) a physically fit parent is able to pass on this fitness to offspring.

13. Which of the following was used to argue AGAINST the Theory of Evolution by Natural Selection in the nineteenth century?

(A) The documented extinction of species in the fossil record.

(B) The Earth is too young (thousands of years) to account for the theory.

(C) The Alfred Russell Wallace theory of evolution.

(D) The claim that human alleles are different to animal alleles.

14. In a chemical experiment, two solutions at the same temperature were mixed together and the temperature of the mixture rose rapidly. An interpretation of this observation is that

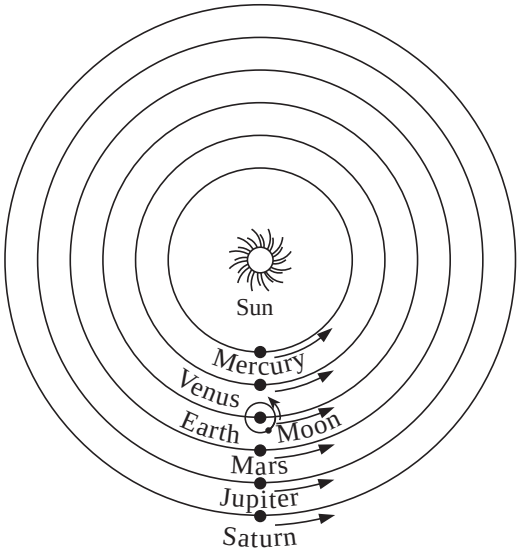
(A) stored energy has been converted to mechanical energy.

(B) heat energy has been converted to chemical energy.

(C) mechanical energy has been converted to stored energy.

(D) chemical energy has been converted to heat energy.

15. Below is one model of the solar system proposed by Copernicus.



One way in which Kepler's model is different from the model above is that

(A) the Earth is at the centre.

(B) the orbits are ellipses.

(C) all planets move in epicycles.

(D) nine planets were included.

PART B

Questions 16–25 are worth 3 marks each.

Answer this Part in the Part B Answer Book.

16. An observer, looking north, recorded the position and shape of the Moon at 7 pm every second night over two weeks, as shown below.

West East

Courtesy Scienceworks Museum

(a) Explain why the apparent shape of the Moon changes over that time.

(b) Explain why the position of the Moon in the diagram changes.

(c) When the full Moon is located as shown in the diagram, where would you expect the Sun to be located?

17. The diagram below shows an astronaut using a treadmill to exercise inside the Space Shuttle. His equipment is designed to cope with a special condition found on spacecraft.

Reproduced by permission of Oxford University Press Australia from Science for Life by Neilson, Ford and Doherty, 2nd, OUP, 1996, p 320

(a) What is the special condition?

(b) (i) What feature of the equipment deals with this condition?

(ii) Explain how this feature enables the astronaut to exercise more effectively.

18. Primates have binocular vision and opposable thumbs.

(a) Give ONE way in which EACH of these characteristics supports primate lifestyle.

(b) Give ONE OTHER distinguishing characteristic of primates.

19.

Metal	*Melting point*	*How it occurs naturally*
Gold	1064°C	Gold metal
Iron	1535°C	Iron oxide
Copper	1080°C	Copper metal, copper sulfide, copper carbonate
Tin	232°C	Tin oxide

(a) Choose ONE of the above metals and list TWO properties that have made it useful in modern society.

(b) Explain why gold and copper are found in nature as pure metals, while iron and tin are usually found as oxides.

(c) An alloy is a combination of two or more metals. Bronze, which is a combination of copper and tin, was one of the first alloys made by people. There is little evidence of the use of an alloy of iron and copper. Using the information in the table above, explain this observation.

20. The extraction of iron from its ore involves a two-step chemical process.

STEP ONE. $\text{Iron oxide} + \text{Carbon} \xrightarrow{\text{heat}} \text{Iron (impure)} + \text{Carbon dioxide}$

STEP TWO. $\text{Iron (impure)} + \text{Limestone} \xrightarrow{\text{heat}} \text{Slag (waste)} + \text{Carbon dioxide} + \text{Iron (pure)}$

(a) Name ONE raw material used in:

(i) Step One;

(ii) Step Two.

(b) Why is carbon necessary in Step One?

(c) What is the purpose of Step Two?

21. Synthetic polymers are now chosen for many uses instead of the natural polymers wool, cotton, and rubber. With reference to ONE of these natural polymers, answer the questions below.

(a) Name the natural polymer and give ONE advantage of using it.

(b) Give ONE advantage of using a synthetic polymer that can replace it.

(c) Using a labelled diagram, illustrate what a polymer is.

22. Read the following article, then answer the questions below.

RECYCLING PLASTICS

Most plastic containers remain unchanged when they are buried. An alternative to burying the empty plastic containers is to recycle them. However, recycling presents many problems. There are many types of plastics with different physical properties, and it is not easy to separate them.

Recycling of thermosetting polymers is difficult because they do not break down when heated and cannot be remoulded into new products. Thermoplastic polymers can be reused when softened by heat and remoulded into a new shape. There are many different thermoplastic polymers and each must be softened and remoulded at a different temperature. Only plastic that has been sorted by hand into different types of polymers has value to industry. Many companies find it cheaper to make products from new materials.

(a) State ONE reason for using thermoplastic polymers instead of thermosetting polymers.

(b) List TWO properties of plastics, other than those mentioned in the article, that make them useful in society.

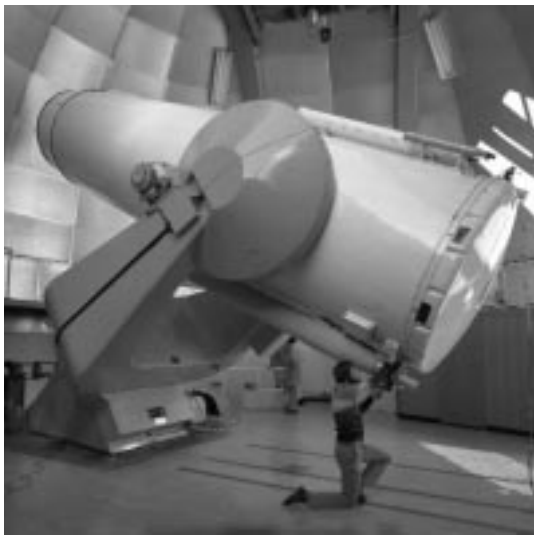
(c) Why are new materials often used instead of recycled polymers?

23. Fred wanted to investigate the Theory of Evolution by Natural Selection. He knew that farmers removed the tails of newborn lambs each year. Fred had heard that about one in every 1000 lambs is born without a tail, or with a shorter tail. Fred wondered if removing the tails caused future generations of lambs to be born without a tail.

(a) How would you test Fred’s hypothesis?

(b) Use the Theory of Evolution by Natural Selection to explain why some lambs are born without a tail.

24. The two instruments shown below are used to gather information about the universe.



© Anglo – Australian observatory/Royal Oservatory, Edinburgh

A

The Department of Foreign Affairs and Trade

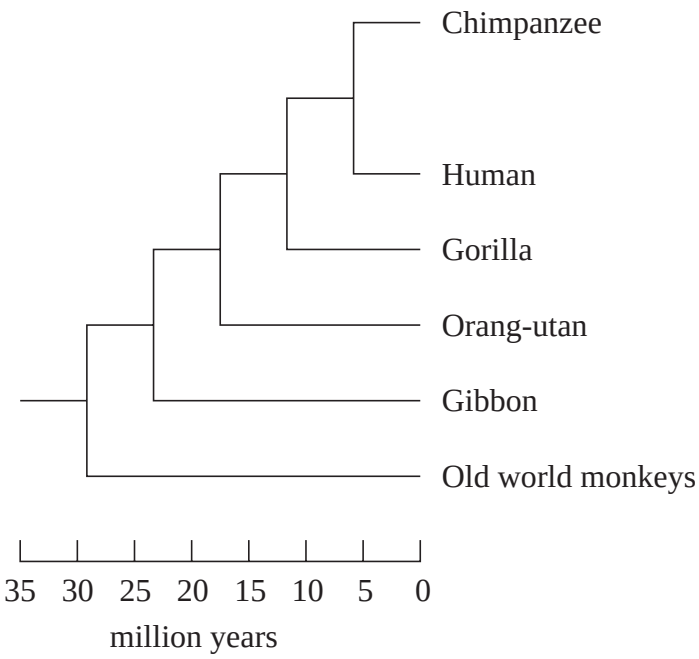
B

(a) The instrument shown in diagram *A* is an optical telescope. Explain why this instrument is best located in high places, or even in space.

(b) (i) Name the instrument shown in diagram *B*.

(ii) Explain why this instrument does not need to be located in high places.

25. The following diagram shows the evolutionary relationship between some primates.



(a) Using the diagram, estimate when gorillas and gibbons diverged.

(b) Which primates in this diagram are classified as apes?

(c) State ONE reason why chimpanzees are NOT classified as humans.

PART C

Questions 26–31 are worth 5 marks each.

Answer this Part in the Part C Answer Book.

26. Newspapers publish astronomical data daily. For 25 December 1996, the following information for Sydney was published.

	Rises	*Sets*
Sun	5.43 am	8.07 pm
Moon	8.11 pm	5.59 am
Venus	4.10 am	6.16 pm

(a) At 5.50 am, in which compass direction would you have looked in the sky to see

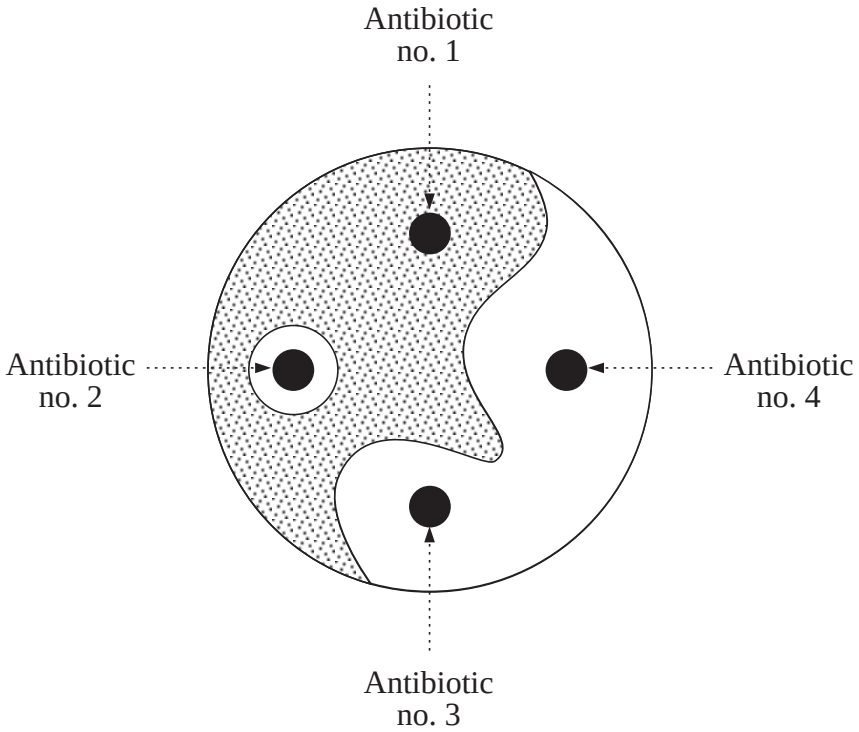
(i) the Sun?

(ii) the Moon?

(b) Venus is often called the ‘morning star’. State ONE reason why this description is misleading.

(c) During your studies you carried out an investigation of planetary movement. Explain TWO ways in which you distinguished a planet from the background stars.

27. The diagram below shows the results of an experiment designed to study the action of antibiotics on the growth of bacteria. This experiment involved covering an agar plate evenly with a bacterial culture. Four discs, each containing a different antibiotic, were placed on the agar plate. The plate was left in an incubator for two days.



(a) Write TWO conclusions you could draw from these results.

(b) State ONE safety precaution you need to take when carrying out experiments on bacterial growth.

(c) Why are scientists continually trying to develop new antibiotics?

(d) Describe ONE contribution antibiotics have made to modern society.

28. A student prepared forty copies of a survey to find out whether people thought a range of scientific discoveries had helped or harmed society. Part of this survey is shown below.

1.	What age are you?	<15	16–20	21–30	31–40	41–50	51–60	>60
2.	Male or female?	Male	Female					
3.	Do you think the scientists who made the following discoveries helped society?							
	• Splitting the atom (nuclear fission)	YES / NO						
	• Pesticides	YES / NO						
	• The internal combustion engine (burning fossil fuel)	YES / NO						
	• Genetic engineering	YES / NO						

(a) Describe a method that this student could use to obtain a random sample of the community for the survey.

(b) With reference to ONE of the scientific discoveries listed above, describe ONE impact it has had on society.

(c) Provide ONE argument why scientists involved in a discovery

(i) should be held accountable for the consequences of the discovery.

(ii) should NOT be held accountable for the consequences of the discovery.

29. Fossilised remains and artefacts have been used to construct the story of the origin of human beings and their culture.

(a) Draw a diagram showing the evolutionary relationship of known species of humans from early to modern times.

(b) Choose ONE species of early humans from your diagram in part (a).

(i) Describe fossil evidence that would help you to identify the remains of this species.

(ii) Describe ONE part of human culture that this species of early humans did NOT have.

30. Susie collected data on the inheritance of eye colour in her family. She classified eye colour as either blue or brown. Susie's record of her experiment is shown below.

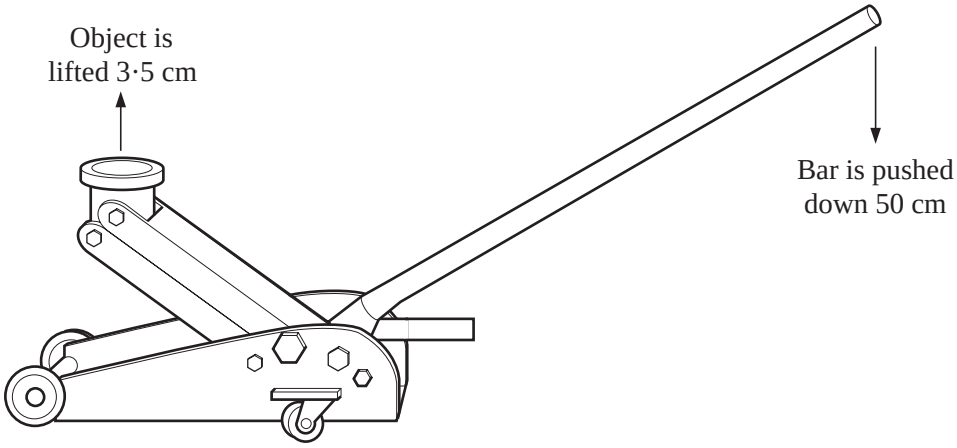
Family member	Eye colour
Dad's father	brown
Dad	brown
Dad's brother	blue
Dad's mother	brown
Me	blue
My brother Jack	brown
Mum	brown
Mum's father	brown
Mum's mother	unknown

(a) Draw a family tree to represent the inheritance of eye colour in Susie's family.

(b) From the data collected, Susie concluded that the allele for blue eyes must be recessive. Describe the evidence that supports Susie's conclusion.

(c) If Susie's mother and father had another child, what is the chance of this child being blue-eyed? Show all working.

31. A trolley jack is a simple machine that can be used to lift heavy objects. Each time the bar is pushed down through 50 cm the object is lifted 3·5 cm.



(a) Calculate the efficiency of the jack if a downward force (effort) of 100 newtons (N) on the handle is needed to lift a load of 1000 N. Show all working.

(b) State the First Law of Thermodynamics.

(c) Using the First Law of Thermodynamics, explain why simple machines such as the trolley jack are not one hundred per cent efficient.

(d) Suggest ONE way to make a machine more efficient.

SECTION II—ELECTIVES

(25 Marks)

Attempt ONE question.

Answer the question in a SEPARATE Elective Answer Book.

Write your Student Number and Centre Number on the cover of each Elective Answer Book.

Write the Course, Elective Name and Question Number on the cover of each Elective Answer Book.

QUESTION 32. Colour **Marks**

(a) Scientific experiments usually involve observing how something reacts under different conditions. In designing an experiment, it is best that only ONE factor is allowed to vary, while other factors are kept constant. **6**

(i) Describe ONE experiment you carried out in your study of colour.

(ii) Explain how your experimental design followed the scientific method described above.

(iii) What did you conclude from your experiment?

(b) Laboratory work relies on scientific equipment or procedures to improve our understanding. Many experimental procedures require the use of a control. **7**

Choose ONE investigation, other than that described in part (a), that used scientific equipment or procedures. Describe:

(i) what you were trying to find out;

(ii) the equipment you used;

(iii) the experimental control you used (if no control was used, explain why it was not necessary);

(iv) any problems you had, or allowed for, in the investigation;

(v) the results you obtained from the experiment.

(c) You have used a number of scientific terms in your study of colour that help describe what you have learnt. **6**

(i) Explain the meaning of the TWO terms below:

1. camouflage;

2. absorption.

(ii) List TWO other terms used in your study, and explain what EACH term means.

(d) Apart from information discussed in parts (a), (b) and (c), discuss THREE items of information you learnt from your study of the perception of colour. You may include diagrams and tables in your answer. **6**

QUESTION 33. Metals in the Service of People **Marks**

(a) Scientific experiments usually involve observing how something reacts under different conditions. In designing an experiment, it is best that only ONE factor is allowed to vary, while other factors are kept constant. **6**

(i) Describe ONE experiment you carried out in your study of metals in the service of people.

(ii) Explain how your experimental design followed the scientific method described above.

(iii) What did you conclude from your experiment?

(b) Laboratory work relies on scientific equipment or procedures to improve our understanding. Many experimental procedures require the use of a control. **7**

Choose ONE investigation, other than that described in part (a), that used scientific equipment or procedures. Describe:

(i) what you were trying to find out;

(ii) the equipment you used;

(iii) the experimental control you used (if no control was used, explain why it was not necessary);

(iv) any problems you had, or allowed for, in the investigation;

(v) the results you obtained from the experiment.

(c) You have used a number of scientific terms in your study of metals in the service of people that help describe what you have learnt. **6**

(i) Explain the meaning of the TWO terms below:

1. electrolysis;

2. corrosion.

(ii) List TWO other terms used in your study, and explain what EACH term means.

(d) Apart from information discussed in parts (a), (b) and (c), discuss THREE items of information you learnt from your study of the properties of metals compared with the properties of alternative materials. You may include diagrams and tables in your answer. **6**

QUESTION 34. Optics **Marks**

(a) Scientific experiments usually involve observing how something reacts under different conditions. In designing an experiment, it is best that only ONE factor is allowed to vary, while other factors are kept constant. **6**

(i) Describe ONE experiment you carried out in your study of optics.

(ii) Explain how your experimental design followed the scientific method described above.

(iii) What did you conclude from your experiment?

(b) Laboratory work relies on scientific equipment or procedures to improve our understanding. Many experimental procedures require the use of a control. **7**

Choose ONE investigation, other than that described in part (a), that used scientific equipment or procedures. Describe:

(i) what you were trying to find out;

(ii) the equipment you used;

(iii) the experimental control you used (if no control was used, explain why it was not necessary);

(iv) any problems you had, or allowed for, in the investigation;

(v) the results you obtained from the experiment.

(c) You have used a number of scientific terms in your study of optics that help describe what you have learnt. **6**

(i) Explain the meaning of the TWO terms below:

1. angle of incidence;

2. polarisation.

(ii) List TWO other terms used in your study, and explain what EACH term means.

(d) Apart from information discussed in parts (a), (b) and (c), discuss THREE items of information you learnt from your study of modern developments in optics. You may include diagrams and tables in your answer. **6**

QUESTION 35. Petroleum and its Compounds **Marks**

(a) Scientific experiments usually involve observing how something reacts under different conditions. In designing an experiment, it is best that only ONE factor is allowed to vary, while other factors are kept constant. **6**

(i) Describe ONE experiment you carried out in your study of petroleum and its compounds.

(ii) Explain how your experimental design followed the scientific method described above.

(iii) What did you conclude from your experiment?

(b) Laboratory work relies on scientific equipment or procedures to improve our understanding. Many experimental procedures require the use of a control. **7**

Choose ONE investigation, other than that described in part (a), that used scientific equipment or procedures. Describe:

(i) what you were trying to find out;

(ii) the equipment you used;

(iii) the experimental control you used (if no control was used, explain why it was not necessary);

(iv) any problems you had, or allowed for, in the investigation;

(v) the results you obtained from the experiment.

(c) You have used a number of scientific terms in your study of petroleum and its compounds that help describe what you have learnt. **6**

(i) Explain the meaning of the TWO terms below:

1. distillation;

2. impervious.

(ii) List TWO other terms used in your study, and explain what EACH term means.

(d) Apart from information discussed in parts (a), (b) and (c), discuss THREE items of information you learnt from your study of the production of other chemicals from petroleum and their uses. You may include diagrams and tables in your answer. **6**

QUESTION 36. Physiology of the Senses **Marks**

(a) Scientific experiments usually involve observing how something reacts under different conditions. In designing an experiment, it is best that only ONE factor is allowed to vary, while other factors are kept constant. **6**

(i) Describe ONE experiment you carried out in your study of physiology of the senses.

(ii) Explain how your experimental design followed the scientific method described above.

(iii) What did you conclude from your experiment?

(b) Laboratory work relies on scientific equipment or procedures to improve our understanding. Many experimental procedures require the use of a control. **7**

Choose ONE investigation, other than that described in part (a), that used scientific equipment or procedures. Describe:

(i) what you were trying to find out;

(ii) the equipment you used;

(iii) the experimental control you used (if no control was used, explain why it was not necessary);

(iv) any problems you had, or allowed for, in the investigation;

(v) the results you obtained from the experiment.

(c) You have used a number of scientific terms in your study of physiology of the senses that help describe what you have learnt. **6**

(i) Explain the meaning of the TWO terms below:

1. receptors;

2. synapse.

(ii) List TWO other terms used in your study, and explain what EACH term means.

(d) Apart from information discussed in parts (a), (b) and (c), discuss THREE items of information you learnt from your study of the structure and function of the main sense organs. You may include diagrams and tables in your answer. **6**

QUESTION 37. Reproduction in Animals and Plants **Marks**

(a) Scientific experiments usually involve observing how something reacts under different conditions. In designing an experiment, it is best that only ONE factor is allowed to vary, while other factors are kept constant. **6**

(i) Describe ONE experiment you carried out in your study of reproduction in animals and plants.

(ii) Explain how your experimental design followed the scientific method described above.

(iii) What did you conclude from your experiment?

(b) Laboratory work relies on scientific equipment or procedures to improve our understanding. Many experimental procedures require the use of a control. **7**

Choose ONE investigation, other than that described in part (a), that used scientific equipment or procedures. Describe:

(i) what you were trying to find out;

(ii) the equipment you used;

(iii) the experimental control you used (if no control was used, explain why it was not necessary);

(iv) any problems you had, or allowed for, in the investigation;

(v) the results you obtained from the experiment.

(c) You have used a number of scientific terms in your study of reproduction in animals and plants that help describe what you have learnt. **6**

(i) Explain the meaning of the TWO terms below:

1. pollination;

2. asexual.

(ii) List TWO other terms used in your study, and explain what EACH term means.

(d) Apart from information discussed in parts (a), (b) and (c), discuss THREE items of information you learnt from your study of evolutionary trends in methods of reproduction. You may include diagrams and tables in your answer. **6**

QUESTION 38. The Insects **Marks**

(a) Scientific experiments usually involve observing how something reacts under different conditions. In designing an experiment, it is best that only ONE factor is allowed to vary, while other factors are kept constant. **6**

(i) Describe ONE experiment you carried out in your study of the insects.

(ii) Explain how your experimental design followed the scientific method described above.

(iii) What did you conclude from your experiment?

(b) Laboratory work relies on scientific equipment or procedures to improve our understanding. Many experimental procedures require the use of a control. **7**

Choose ONE investigation, other than that described in part (a), that used scientific equipment or procedures. Describe:

(i) what you were trying to find out;

(ii) the equipment you used;

(iii) the experimental control you used (if no control was used, explain why it was not necessary);

(iv) any problems you had, or allowed for, in the investigation;

(v) the results you obtained from the experiment.

(c) You have used a number of scientific terms in your study of the insects that help describe what you have learnt. **6**

(i) Explain the meaning of the TWO terms below:

1. thorax;

2. biological success.

(ii) List TWO other terms used in your study, and explain what EACH term means.

(d) Apart from information discussed in parts (a), (b) and (c), discuss THREE items of information you learnt from your study of the behaviour and communication of insects that live in communities. You may include diagrams and tables in your answer. **6**

QUESTION 39. The Science of Food Technology **Marks**

(a) Scientific experiments usually involve observing how something reacts under different conditions. In designing an experiment, it is best that only ONE factor is allowed to vary, while other factors are kept constant. **6**

(i) Describe ONE experiment you carried out in your study of the science of food technology.

(ii) Explain how your experimental design followed the scientific method described above.

(iii) What did you conclude from your experiment?

(b) Laboratory work relies on scientific equipment or procedures to improve our understanding. Many experimental procedures require the use of a control. **7**

Choose ONE investigation, other than that described in part (a), that used scientific equipment or procedures. Describe:

(i) what you were trying to find out;

(ii) the equipment you used;

(iii) the experimental control you used (if no control was used, explain why it was not necessary);

(iv) any problems you had, or allowed for, in the investigation;

(v) the results you obtained from the experiment.

(c) You have used a number of scientific terms in your study of the science of food technology that help describe what you have learnt. **6**

(i) Explain the meaning of the TWO terms below:

1. pickling;

2. decay.

(ii) List TWO other terms used in your study, and explain what EACH term means.

(d) Apart from information discussed in parts (a), (b) and (c), discuss THREE items of information you learnt from your study of physical and chemical effects of cooking on food. You may include diagrams and tables in your answer. **6**

QUESTION 40. The Scientific Basis of Photography **Marks**

(a) Scientific experiments usually involve observing how something reacts under different conditions. In designing an experiment, it is best that only ONE factor is allowed to vary, while other factors are kept constant. **6**

(i) Describe ONE experiment you carried out in your study of the scientific basis of photography.

(ii) Explain how your experimental design followed the scientific method described above.

(iii) What did you conclude from your experiment?

(b) Laboratory work relies on scientific equipment or procedures to improve our understanding. Many experimental procedures require the use of a control. **7**

Choose ONE investigation, other than that described in part (a), that used scientific equipment or procedures. Describe:

(i) what you were trying to find out;

(ii) the equipment you used;

(iii) the experimental control you used (if no control was used, explain why it was not necessary);

(iv) any problems you had, or allowed for, in the investigation;

(v) the results you obtained from the experiment.

(c) You have used a number of scientific terms in your study of the scientific basis of photography that help describe what you have learnt. **6**

(i) Explain the meaning of the TWO terms below:

1. fixer;

2. shutter speed.

(ii) List TWO other terms used in your study, and explain what EACH term means.

(d) Apart from information discussed in parts (a), (b) and (c), discuss THREE items of information you learnt from your study of the structure and working of a simple camera. You may include diagrams and tables in your answer. **6**

QUESTION 41. Water **Marks**

(a) Scientific experiments usually involve observing how something reacts under different conditions. In designing an experiment, it is best that only ONE factor is allowed to vary, while other factors are kept constant. **6**

(i) Describe ONE experiment you carried out in your study of water.

(ii) Explain how your experimental design followed the scientific method described above.

(iii) What did you conclude from your experiment?

(b) Laboratory work relies on scientific equipment or procedures to improve our understanding. Many experimental procedures require the use of a control. **7**

Choose ONE investigation, other than that described in part (a), that used scientific equipment or procedures. Describe:

(i) what you were trying to find out;

(ii) the equipment you used;

(iii) the experimental control you used (if no control was used, explain why it was not necessary);

(iv) any problems you had, or allowed for, in the investigation;

(v) the results you obtained from the experiment.

(c) You have used a number of scientific terms in your study of water that help describe what you have learnt. **6**

(i) Explain the meaning of the TWO terms below:

1. solvent;

2. surface tension.

(ii) List TWO other terms used in your study, and explain what EACH term means.

(d) Apart from information discussed in parts (a), (b) and (c), discuss THREE items of information you learnt from your study of the effects of water on the Earth's crust. You may include diagrams and tables in your answer. **6**

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