Centre Number	Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
CAMBRIDGE INTERNATIONAL EXAMINATIONS

COMBINED SCIENCE 0653/2

PAPER 2

MAY/JUNE SESSION 2002

1 hour

Candidates answer on the question paper.
No additional materials are required.

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.
A copy of the Periodic Table is printed on page 16.

FOR EXAMINER'S USE	
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	

This question paper consists of 14 printed pages and 2 blank pages.

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate
[Turn over

1 Fig. 1.1 shows a section through a human heart, seen from the front.

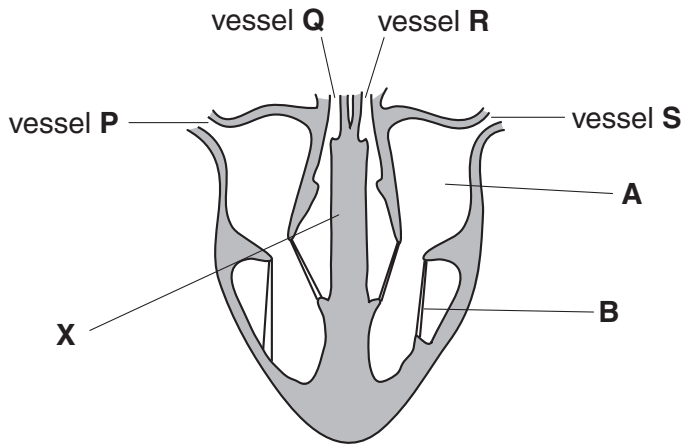


Fig. 1.1

(a) Name the parts labelled **A** and **B**.

A .....

B ..... [2]

(b) **(i)** Give the letter of the vessel that brings blood to the heart from the lungs.

..... [1]

(ii) Give the letter of the vessel that takes blood from the heart to the body tissues.

..... [1]

(iii) Sometimes, a child is born with a hole in the place marked **X**. This means that blood can pass directly from one side of the heart to the other.

Explain why this might result in less oxygen being carried to the body tissues.

.....

.....

..... [2]

2 **(a)** The chemical symbols of some elements are shown below.

Al Fe K I Ne P S

Choose one of the symbols from the list which shows one atom of:

potassium .....

an element in the same group of the Periodic Table as oxygen .....

an element with eight electrons in its outer shell .....

a transition metal .....

an element that normally exists as diatomic molecules ..... [5]

(b) When a mixture of iron and sulphur is heated, the compound iron sulphide forms in an exothermic reaction.

(i) What does the term *exothermic* mean?

.....

..... [1]

(ii) Describe **one** difference between a mixture and a compound.

.....

..... [1]

[Turn over

3 Fig. 3.1 shows an athlete.

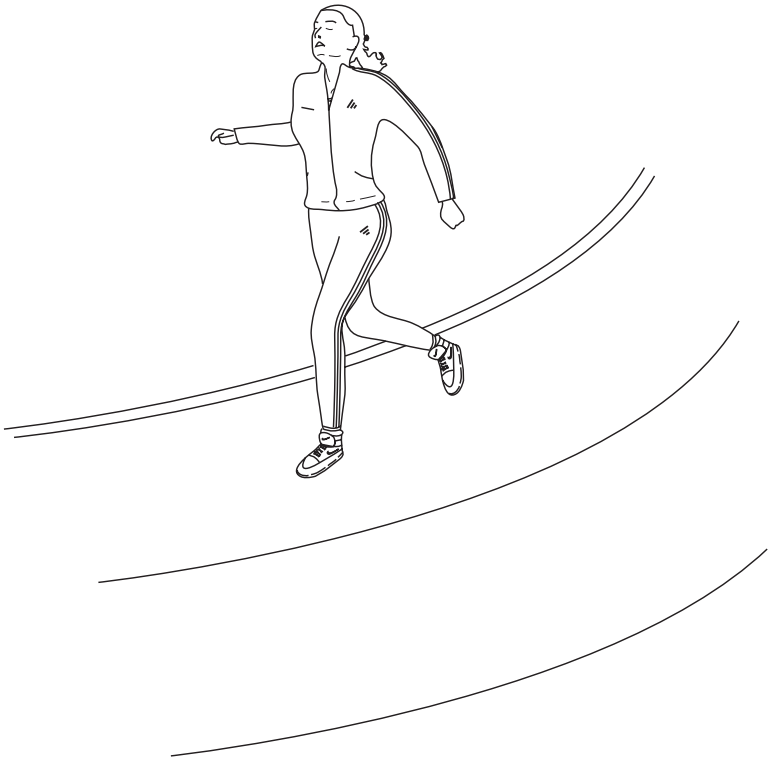


Fig. 3.1

(a) Complete this sentence by choosing suitable words.

As the athlete runs, the ..... energy in the food that she has eaten changes to ..... energy and ..... energy. [3]

(b) Fig. 3.2 shows how the athlete's speed varies during part of a training run.

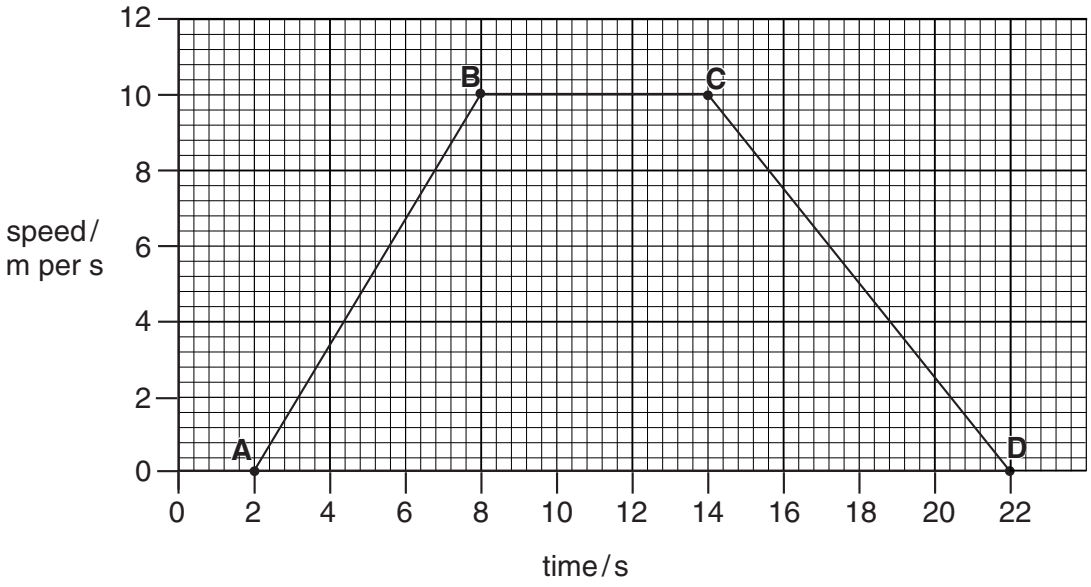


Fig. 3.2

(i) At which two points on the graph was she standing still?

..... [1]

(ii) Describe her motion between **B** and **C**.

.....

..... [2]

(iii) Describe her motion between **C** and **D**.

.....

..... [1]

4 Although the Namib desert in south west Africa is very hot and dry, it is the habitat for a large community of animals and plants. Plants such as grasses and stone plants are able to grow in the dry ground. They are eaten by grasshoppers and beetles. Lizards eat the grasshoppers and beetles. Lizards are eaten by jackals.

(a) Explain the meaning of each of the following words.

(i) habitat

.....

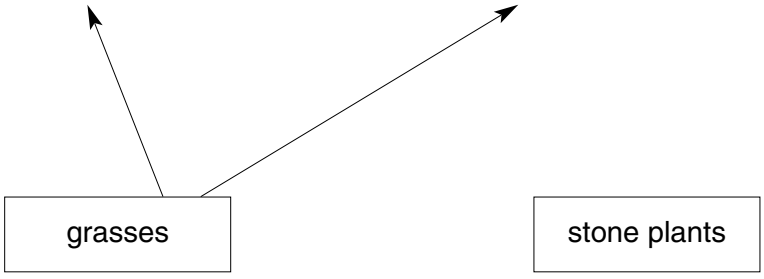
..... [1]

(ii) community

.....

..... [1]

(b) **(i)** Complete the food web to include all of the plants and animals mentioned at the beginning of this question.



[3]

(ii) What do the arrows represent in the food web that you have drawn?

..... [1]

(iii) Name **one** organism in the food web which is a producer.

..... [1]

5 Fig. 5.1 shows a barbecue which is used for cooking food.

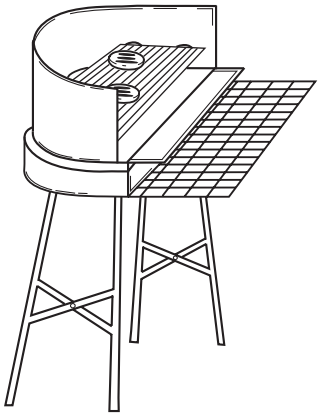


Fig. 5.1

The heat used to cook the food is produced by the reaction between charcoal and oxygen from the air. Charcoal is a form of carbon.

(a) **(i)** Complete the **word** equation for the reaction between carbon and oxygen from a good supply of air.

carbon + oxygen $\longrightarrow$ ..... [1]

(ii) Suggest why the charcoal used on the barbecue is usually broken up into small pieces.

.....

.....

..... [2]

(b) The wind shield on the barbecue is made from mild steel which has been painted to prevent it from rusting.

(i) Name the main metallic element in steel.

..... [1]

(ii) Name **two** substances needed in order for steel to rust.

.....

..... [2]

[Turn over

6 **(a)** Fig. 6.1 shows a parallel sided block of glass.

A ray of light strikes the block at **L**.

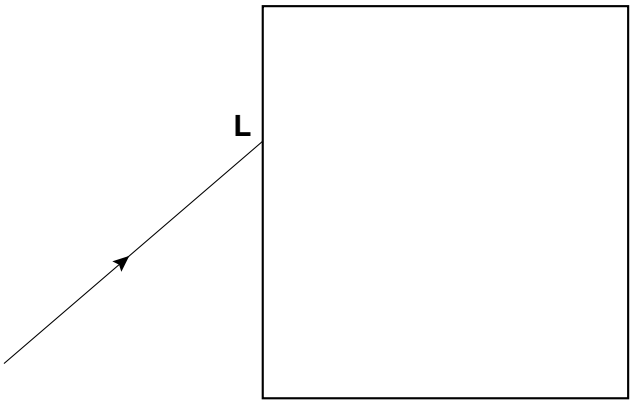


Fig. 6.1

On the diagram:

(i) draw the path of the ray as it passes through the block, [1]

(ii) draw the path of the ray as it comes out of the other side of the block, [1]

(iii) mark the angle of refraction at **L**. [1]

(b) The ray of light is produced by an electric lamp. The voltage applied across the lamp is 12 V and the current passing through it is 2 A.

Calculate the resistance of the lamp.

Show your working and state any formula that you use.

..... Ω [3]

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7 **(a)** Fig. 7.1 shows the percentage of carbon dioxide in the atmospheres of three planets **A**, **B** and **C**, in the solar system.

planet	% carbon dioxide
A	96
B	0.03
C	95

Fig. 7.1

State which planet, **A**, **B** or **C**, is the Earth.

..... [1]

(b) On Earth, volcanoes emit many gases, including sulphur dioxide, into the atmosphere.

Explain why rain which falls through air polluted by sulphur dioxide may cause damage to the walls of stone buildings.

.....

.....

..... [2]

(c) The use of motor vehicles causes increased levels of the pollutant carbon monoxide, especially in large cities.

(i) Explain briefly why the use of motor vehicles causes increased levels of carbon monoxide.

.....

..... [1]

(ii) Explain why high levels of carbon monoxide in cities are undesirable.

.....

..... [1]

(d) **(i)** One of the other gases in the Earth's atmosphere is argon, Ar. Explain briefly why argon in the atmosphere is not harmful to humans.

.....

..... [1]

(ii) Fig. 7.2 shows an incomplete diagram of one atom of argon, proton number 18.

Complete the diagram to show how all of the electrons are arranged.

The first two electrons have already been drawn.

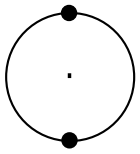

Fig. 7.2 [2]

8 Fig. 8.1 shows a human egg cell. Its nucleus contains 23 chromosomes.

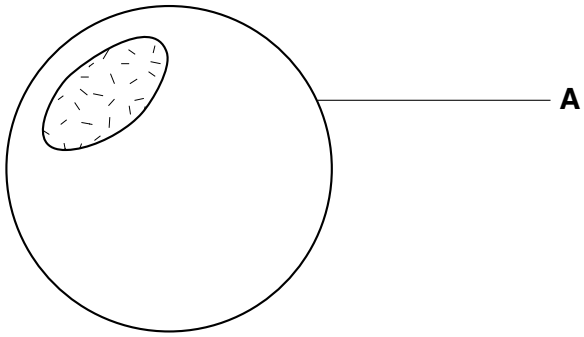

Fig. 8.1

(a) Name structure **A**, and describe its function.

.....

..... [2]

(b) Egg cells are much larger than sperm cells. Explain why egg cells are so large.

.....

..... [1]

(c) The egg cell is fertilised by a sperm cell, to form a zygote.

(i) Where in the human body does this take place?

..... [1]

(ii) State the number of chromosomes in the nucleus of the zygote.

..... [1]

(d) The zygote develops into a fetus, which grows in the mother's uterus.

Describe how the growing fetus obtains its nutrients.

.....

.....

.....

..... [2]

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9 A scientist placed three radioactive sources **A**, **B** and **C**, at the same distance from a Geiger-Müller tube. He placed different sheets of absorbing material in the path between each source and the Geiger-Müller tube as shown in Fig. 9.1.

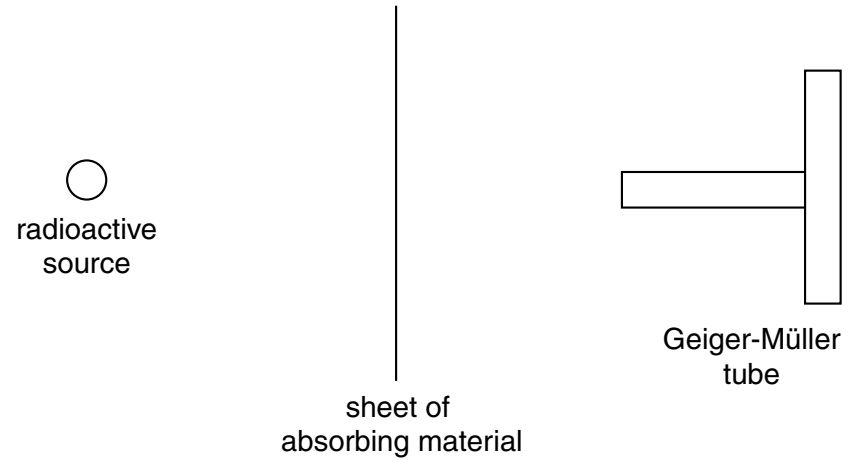

Fig. 9.1

In each case he noted the count rate. The results are shown in Fig. 9.2.

absorbing material	count rate / counts per minute		
	source **A**	source **B**	source **C**
none	79	197	172
0.5 cm of lead foil	20	22	106
0.2 cm of aluminium foil	20	103	149
one sheet of paper	20	182	171

Fig. 9.2

(a) What difference did the lead foil make to the readings from source **B**?

.....

..... [1]

(b) Use the results to identify the radiation from each of the sources **A** and **C**. Explain your answers.

Source **A** .....

.....

.....

Source **C** .....

.....

..... [4]

(c) The scientist put the sources away. He observed that the Geiger-Müller tube was still recording 20 counts per minute.

Explain this observation.

.....

..... [1]

DATA SHEET
The Periodic Table of the Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 H Hydrogen 1										4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

*58-71 Lanthanoid series
†90-103 Actinoid series

Key: a = relative atomic mass; X = atomic symbol; b = proton (atomic) number

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).