Name

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS General Certificate of Education Ordinary Level

COMBINED SCIENCE

5129/02

Paper 2

May/June 2004

2 hours 15 minutes

Candidates answer on the Question Paper. No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in. Write in dark blue or black pen in the spaces provided on the Question Paper. You may use a soft pencil for any diagrams, graphs, tables or rough working. Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer all questions.

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 20.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

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Total

This document consists of **20** printed pages.

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[Turn over

[4]

- - (b) Fig. 1.1 shows a cell.

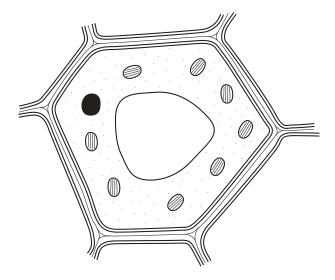


Fig. 1.1

State whether this is a plant cell or an animal cell.

[1

2 Fig. 2.1 shows an extension – load graph for an elastic band.

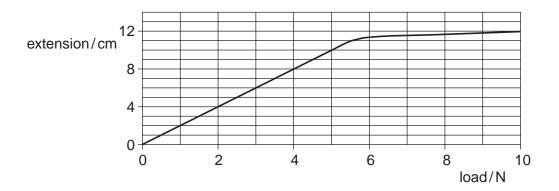


Fig. 2.1

- (b) The length of the elastic band with no load is $8.0\,\mathrm{cm}$.

What load gives the elastic band a length of 14.0 cm?

.....N [2]

(c) Draw a labelled diagram of the apparatus that may be used to obtain an extension – load graph for an elastic band.

[2]

3 Fig. 3.1 represents the particles in different substances at room temperature.

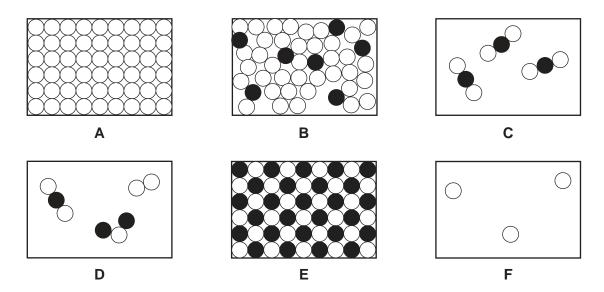


Fig. 3.1

Which diagram could represent

(a)	a gaseous element,	
(b)	an alloy,	
(c)	a gaseous mixture,	
(d)	sodium chloride,	
(e)	air?	

[5]

4 Fig. 4.1 shows a ray of light from a pin. The light is incident on a plane mirror.

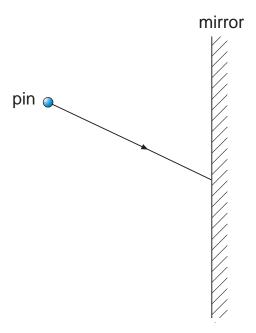


Fig. 4.1

- (a) On Fig. 4.1,
 - (i) draw the reflected ray,
 - (ii) mark with an X the position of the image of the pin.

[3]

(b) Fig. 4.2 shows a ray of light passing from air into a glass block. The normal to the surface of the glass is shown.

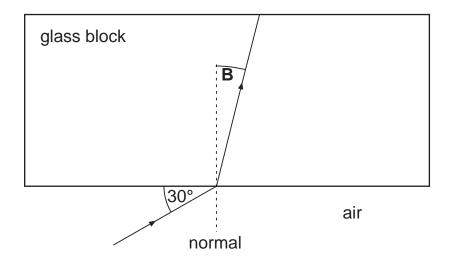


Fig. 4.2

(i) Calculate the angle of incidence.

(ii) Name angle B. [2]

5 Fig. 5.1 shows a seedling with its roots in a coloured dye solution. The dye travels slowly up the stem to the leaves.

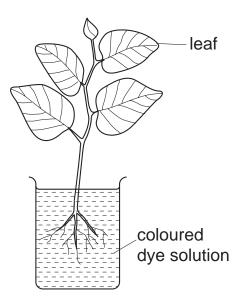
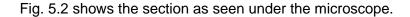


Fig. 5.1

(a) After four hours, a section of one of the leaves is examined under a microscope.



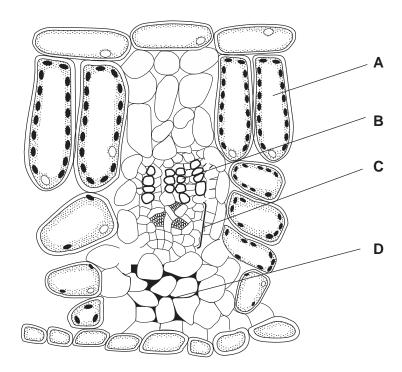


Fig. 5.2

(i)	In which region, A , B , C or D will the coloured dye be seen?	
ii)	Name the tissue chosen in (a)(i).	••••
		[2]

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(b)	(i)	Name the chemical process for which the leaf uses water.
	(ii)	Suggest two other uses for water in a plant.
		1
		2
(c)	A he	ealthy seedling is growing in a sunny place, but there is not enough water around its s.
	(i)	Describe how the appearance of the seedling changes after several hours.
	(ii)	Explain why the changes in (c)(i) take place.
		[3]

6 Fig. 6.1 shows a balanced uniform metre rule. The knife edge is at the 50.0 cm mark and the 0.1 N weight is at the 20.0 cm mark.

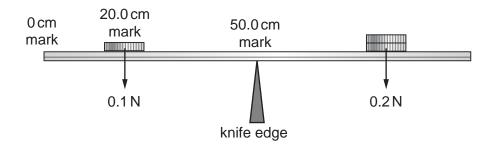


Fig. 6.1

(a) Calculate the anticlockwise moment of the 0.1 N weight about the knife edge.

.....Ncm [2]

(b) Calculate the distance of the 0.2 N weight from the knife edge.

.....cm [2]

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7 Fig. 7.1 shows a blast furnace for the extraction of iron from haematite, Fe_2O_3 .

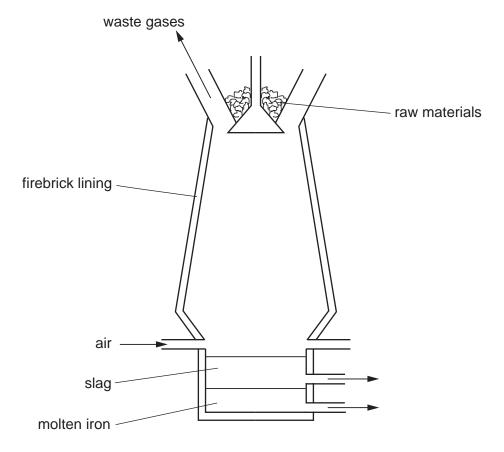


Fig. 7.1

(a)	Nar	ame the raw materials put in at the top of the blast furnace with the haematite.		
		and[2]		
(b)	(i)	Balance the following equation for the reduction of haematite to iron.		
		$Fe_2O_3 \ + \ \dots \dots \ CO \ \longrightarrow \ \dots \dots Fe \ + \ \dots \dots \ CO_2$		
	(ii)	Carbon monoxide acts as a reducing agent in the reaction. Explain the meaning of the term <i>reducing agent</i> .		
		[2]		
(c)	(i)	Name the two substances that cause iron to rust.		
		and		
	(ii)	State what is meant by <i>galvanising</i> and explain how it prevents iron from rusting.		
		[4]		

8 Fig. 8.1 shows a longitudinal section through a blood vessel.

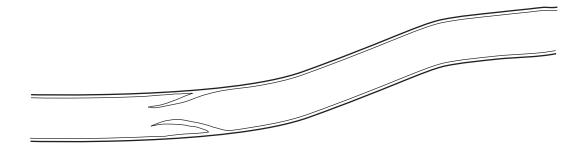


Fig. 8.1

(a)	State whether Fig. 8.1 shows an artery or a vein and give a reason for your choice.
	[1]
(b)	State two other differences between arteries and veins. 1
	1
	2
	[2]

(c) Fig. 8.2 shows blood flowing towards the small intestine and away from it, during digestion of a meal.

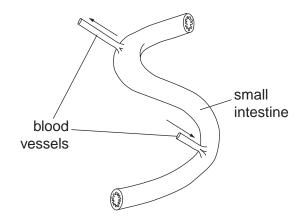


Fig. 8.2

The blood leaving the intestine has changed. State **one** change that has taken place in

the oxygen content of the blood,
the pressure of the blood,
the concentration of glucose dissolved in the blood.

9	(a)	Heat is transferred in solids by conduction. Explain how the molecules in a solid are involved in conduction.	
		[2]	

(b) Fig. 9.1 shows a convector heater in a room. This produces a convection current in the air in the room.

Draw arrows on Fig. 9.1 to show the directions of the flow of air in the room.

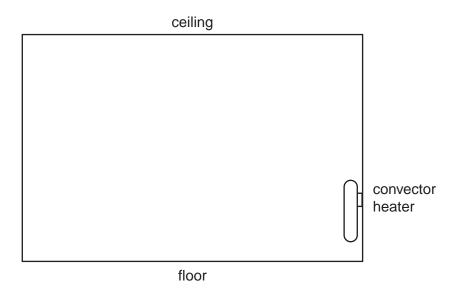


Fig. 9.1

[2]

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10	Argon is an element in Group 0 of the Periodic Table. One isotope of argon is represented below.		
		⁴⁰ ₁₈ Ar	
	(a)	How do isotopes of an element differ from one another?	
		[1]	
	(b)	How many neutrons are present in one atom of $^{40}_{18}\mathrm{Ar}?$	
		[1]	
	(c)	Explain why argon has no chemical reactions.	
		[2]	
	(d)	State one use of argon.	

11 The ammeter in Fig. 11.1 reads 0.2 A.

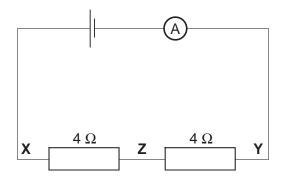


Fig. 11.1

- (a) State the current at **Z**.[1]
- **(b)** Calculate the potential difference between
 - (i) X and Z,

(ii) X and Y.

[3]

12 Fig. 12.1 shows the female reproductive system.

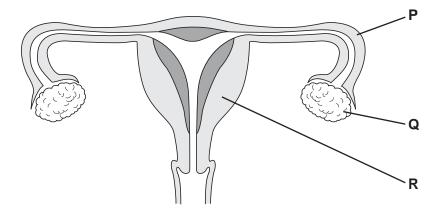


Fig. 12.1

(a))	Name and	state the	function o	f the parts	labelled P ,	Q and R .
-----	---	----------	-----------	------------	-------------	---------------------	-------------------------

Р	name	
	function	
Q	name	
	function	
R	name	
	function	
		[6]

(b) On Fig. 12.1

- (i) label with an X the place where sperm are deposited,
- (ii) label with a Y where eggs are normally fertilised.

[2]

(c)	A woman begins to menstruate on July 1st.
	When is the next date that she is likely to ovulate?

[1]

13	(a)	Sta	te the difference between magnetic and non-magnetic materials.	
	(b)	b) Insulated wire is wrapped round a core as shown in Fig. 13.1. A current is pathrough the wire to form an electromagnet.		
			coil	
			Fig. 13.1	
		(i)	Suggest a suitable material for the core.	
		(ii)	State two ways by which the strength of the electromagnet may be increased.	
			1	
			2	
			[3]	
14	(a)		me two gases that pollute the atmosphere. each one, state a source of the pollutant.	
		gas	1	
		sou	rce	
		gas	2	
		sou	rce	
			[4]	
	(b)	Des	scribe an effect of one of these gases on the environment.	
			[1]	

15	Alpha-pa	articles, beta-particles and gamma-rays are three types of radioactive emissions.		
	(a) Sta	te which type is		
	(i)	the most penetrating,		
	(ii)	the most ionising,		
	(iii)	part of the electromagnetic spectrum. [3]		
(b) State what is meant by the half-life of a radioactive material.				

(c) A radioactive material emits beta-particles. Fig. 15.1 shows the number of beta-particles emitted in one second at two different times.

time/hours	number of particles emitted in one second
0	400
24	100

Fig. 15.1

Calculate the half-life of the radioactive material.

[2]

)		ene, C ₂ H ₄ , is an unsaturated hydrocarbon.	
	(a)	Explain what is meant by unsaturated.	
			[1]
	(b)	State the general formula of the alkenes.	
			[1]
	(c)	Ethanol, C ₂ H ₅ OH, can be produced by reacting ethene with steam.	
		(i) State one condition required for this reaction.	
		(ii) Deduce the equation for the reaction.	
			[2]
	(d)	Ethene undergoes polymerisation to form poly(ethene). Draw the structure of the polymer molecule.	

[2]

17	(a) Name the products of digestion of protein. [1]			
	(b)	Suggest two uses of protein in the body. 1.		
		2		
		[2]		
	(c)	Some molecules from the digestion of protein are not used by the body. They are changed into urea.		
		(i) In which organ does this change occur?		
		(ii) What happens to the urea that is formed?		
		[2]		
18	Stu	dy the following reaction scheme.		
		copper heat in air black powder A		
		add acid B		
		copper(II) sulphate + liquid C		
	(a)	Identify substances A, B and C.		
		black powder A		
		acid B		
		liquid C [3]		
	(b)	Liquid C has a pH value of 7.		

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What is the colour of Universal Indicator in this liquid?

(c) What type of reaction does copper undergo when heated in air?

the University of Cambridge.

	DATA SHEET	The Periodic Table of the Elements
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		0	4 He lium		40 Ar Argon	84 Kr Krypton	131 Xe Xenon	Radon	
		IIV	N	19 F Fluorine 10	35.5 C1 Chlorine 18	36	127 I lodine 54	At Astatine 85	
		IN		16 Oxygen 9	32 S Sulphur 6	Selenium	128 Te Tellurium 52	Po Polonium 84	
		^		14 N itrogen 7	31 Phosphorus 15	75 AS Arsenic	122 Sb Antimony 51	209 Bi Bismuth	
		ΛΙ		12 C Carbon	28 Si Silicon	73 Ge Germanium	119 Sn Tin	207 Pb Lead 82	
		III		11 Boron 5	27 A1 Aluminium 13	70 Ga Gallium 31	115 In Indium 49	204 T1 Thallium	
ıts						65 Zn Zinc 30	112 Cd Cadmium 48	201 Hg Meraury 80	
The Periodic Table of the Elements						64 Cu Copper	108 Ag Silver 47	197 Au Gold	
le of the	Group					Nickel	106 Pd Palladium 46	195 Pt Platinum 78	
dic Tab	G			1		59 Co Cobalt 27	103 Rh Rhodium 45	192 Ir Iridium 77	
he Perio			T Hydrogen			56 Fe Iron 26	Ru Ruthenium 44	190 Os Osmium 76	
_						55 Mn Manganese 25	Tc Technetium 43	186 Re Rhenium 75	
						52 Cr Chromium 24	96 Mo Molybdenum 42	184 W Tungsten 74	
						51 V Vanadium 23	Niobium 41	181 Ta Tantalum 73	
						48 Ti Titanium 22	91 Zr Zirconium 40	178 Hf Hafnium 72	
						45 Scandium 21	89 Y	139 La Lanthanum 57 *	227 AC Actinium +
		=		9 Be Beryllium	24 Mg Magnesium	40 Ca Calcium	Strontium	137 Ba Barium 56	226 Ra Radium 88
		_		7 Li thium	23 Na Sodium	39 K Potassium 19	85 Rb Rubidium 37	133 Cs Caesium 55	Fr Francium 87
200)4					5129/02	2/M/J/04		

5 C ium	r ncium
175 Lu Lutetium 71	Lr Lawrencium 103
173 Yb Ytterbium 70	Nobelium 102
169 Tm Thulium	Md Mendelevium 101
167 Er Erbium 68	Fm Fermium 100
165 Ho Holmium 67	Es Einsteinium 99
162 Dy Dysprosium 66	Cf Californium 98
159 Tb Terbium 65	BK Berkelium 97
157 Gd Gadolinium 64	Curium 96
152 Eu Europium 63	Am Americium 95
Sm Samarium 62	Pu Plutonium 94
Pm Promethium 61	Np Neptunium 93
144 Nd Neodymium 60	238 U Uranium 92
141 Pr Praseodymium 59	Pa Protactinium 91
140 Ce Cerium 58	232 Th Thorium 90

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

b = proton (atomic) number

a = relative atomic mass X = atomic symbol

а **×**

Key

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