Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES **0654/22**

Paper 2 Multiple Choice (Extended) **May/June 2017**

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

0853189877

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
Electronic calculators may be used.

This document consists of **14** printed pages and **2** blank pages.

1 Which structural feature is found in a plant cell but **not** in an animal cell?

A cell membrane

B cell wall

C cytoplasm

D nucleus

2 What is an effect of tar on the gas exchange system?

A paralysis of the cilia

B speeds up the build-up of cholesterol

C stimulates the production of adrenaline

D stops oxygen combining with haemoglobin

3 Which characteristic of living organisms involves chemical reactions that break down nutrient molecules to release energy?

A excretion

B nutrition

C reproduction

D respiration

4 In a plant, what leads to offspring that are identical to the parent?

A asexual reproduction

B insect pollination

C seed germination

D sexual reproduction

5 Which statement about all food chains is correct?

A All the carnivores are producers.

B All the consumers are carnivores.

C All the herbivores are consumers.

D All the producers are herbivores.

6 What is the function of microorganisms in yoghurt making?

A They make the sugar in milk become solid.

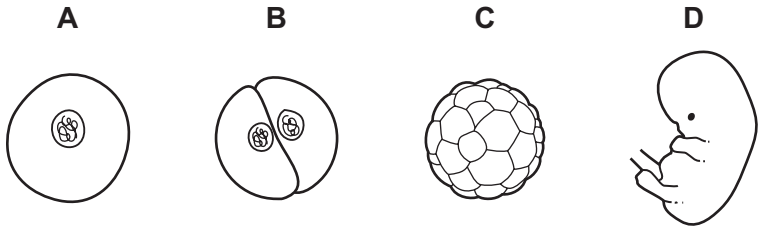
B They produce lactic acid.

C They raise the pH of the mixture.

D They reduce the fat content of the milk.

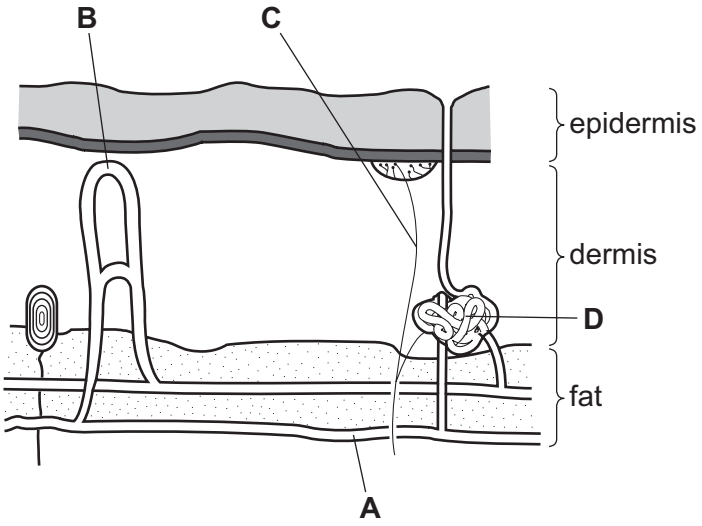
7 The diagram shows stages in the development of a fertilised zygote.

Which stage becomes implanted in the wall of the uterus?



8 The diagram shows a section through human skin.

Which structure undergoes vasodilation to increase heat loss from the skin?



9 The list shows some effects of human activities.

P global warming

Q loss of fossil fuels

R water pollution

S flooding

Which effects can be the result of deforestation?

A P and Q **B** P and S **C** Q and R **D** R and S

10 In plants, water is absorbed from the soil into root hair cells.

Why does this occur?

A The concentration of salts is higher in the soil than inside the cells.

B The concentration of water is lower in the soil than inside the cells.

C The water potential of the soil is higher than inside the cells.

D The water potential of the soil is lower than inside the cells.

11 Much of the internal surface of the human small intestine is covered with villi.

What is the function of villi?

A excretion of waste into the intestine

B secretion of enzymes into the intestine

C to improve blood circulation in the intestine walls

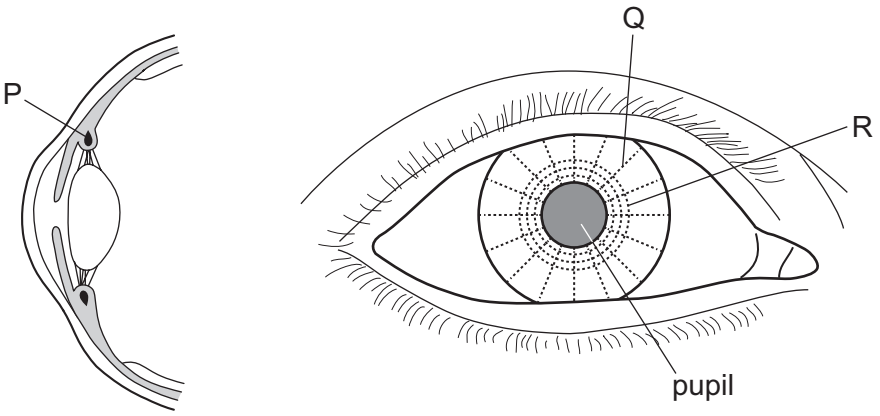
D to increase the internal surface area of the intestine

12 A scientist took a single living cheek cell from each of 30 different people. 15 of these people were male and 15 were female. He stained each cell so that the sex chromosomes could be observed.

How many X chromosomes would the scientist observe?

A 15 **B** 30 **C** 45 **D** 60

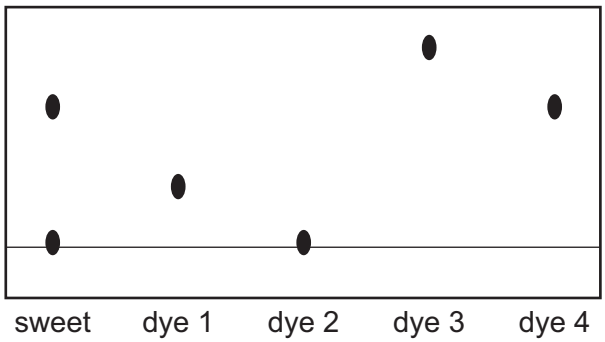
13 The diagram shows a section through the front of the eye and a front view of the eye.



Which muscles contract when viewing a distant object in dim light?

A P and R **B** P only **C** Q and R **D** Q only

14 The dyes in a sweet are separated using chromatography.



Which dyes are present in the sweet?

A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

15 Which covalent molecule contains the most shared pairs of electrons?

A CH_4 **B** CO_2 **C** C_2H_4 **D** NH_3

16 How many atoms of metals and of non-metals are shown in the formula Na_2SO_4?

	atoms of metals	atoms of non-metals
A	1	1
B	1	2
C	2	4
D	2	5

17 Molten zinc bromide and aqueous zinc bromide are electrolysed using inert electrodes.

In which rows do the electrode products match the electrolyte?

	electrolyte	cathode product	anode product
1	aqueous zinc bromide	hydrogen	bromine
2	aqueous zinc bromide	zinc	bromine
3	molten zinc bromide	hydrogen	bromine
4	molten zinc bromide	zinc	bromine

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

18 Aqueous sodium thiosulfate reacts with dilute hydrochloric acid.

Increasing the concentration of sodium thiosulfate increases the rate of reaction.

Which statement explains this observation?

A The particles are closer together and collide more frequently.

B The particles are closer together and collide with more energy.

C The particles have a greater surface area and collide more frequently.

D The particles have more energy and collide more frequently.

19 The pH of water changes when ammonia is bubbled into it.

What happens to the pH and why?

	pH	ammonia is
A	decreases	acidic
B	decreases	alkaline
C	increases	acidic
D	increases	alkaline

20 Some properties of gas Y are listed.

1 It burns to produce only one product.

2 It has no effect on damp litmus paper.

3 It is a covalent compound containing two different elements.

What is gas Y?

A carbon dioxide

B carbon monoxide

C chlorine

D methane

21 Element X is in Group II of the Periodic Table.

Which row describes X?

	type of element	number of outer-shell electrons
A	metal	2
B	metal	6
C	non-metal	2
D	non-metal	6

22 Which metal is extracted from its ore by heating with carbon?

A copper

B magnesium

C potassium

D sodium

23 Which statement explains how oxides of nitrogen are formed in a car engine?

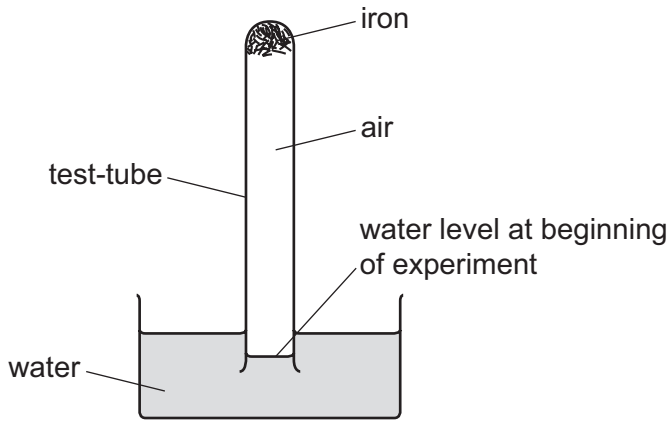
A Nitrogen in the air reacts with the fuel.

B Oxygen and nitrogen in the air react together.

C Oxygen in the air reacts with nitrogen impurities in the fuel.

D Oxygen in the air reacts with the fuel.

24 The diagram shows an experiment about the rusting of iron.



The apparatus is left for one week.

After one week the water level has risen up the test-tube by ……1…… because the ……2…… in the air reacts with the iron.

Which row completes gaps 1 and 2?

	1	2
A	20%	nitrogen
B	20%	oxygen
C	79%	nitrogen
D	79%	oxygen

25 Why do farmers add lime to soil?

A It acts as a fertiliser.

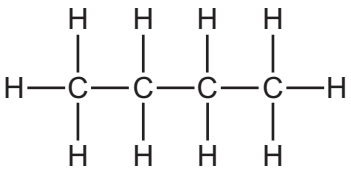
B It adds nitrogen to the soil.

C It decreases the pH of the soil.

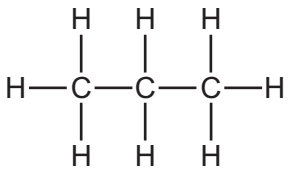
D It increases the pH of the soil.

26 Which structure represents a molecule of butane?

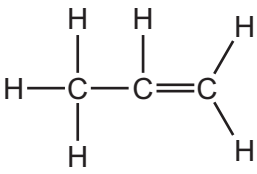
A



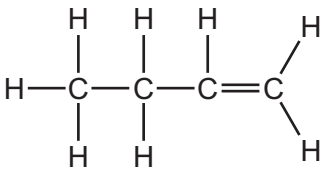
B



C



D



27 Collagen is a protein.

Boiling collagen with dilute acid produces amino acids.

What is the name of this process?

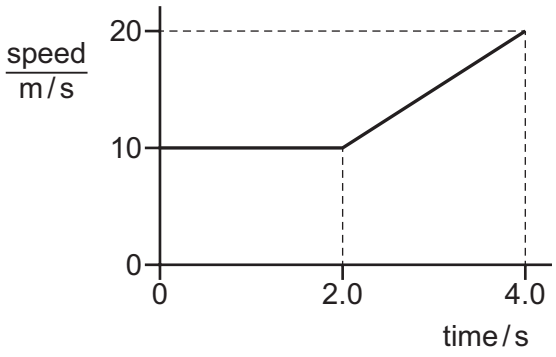
A condensation

B cracking

C hydrolysis

D polymerisation

28 The diagram is a speed-time graph for a moving object.



What is the distance travelled by the object in 4.0 s?

A 30 m **B** 40 m **C** 50 m **D** 80 m

29 On Earth an astronaut has a mass of 80 kg and weighs 800 N.

In deep space the gravitational field is very weak.

What is the mass and what is the weight of the astronaut in deep space?

	mass / kg	weight / N
A	less than 80	less than 800
B	less than 80	800
C	80	less than 800
D	80	800

30 A spring of unstretched length 5.0 cm has a spring constant k of 20 N / cm. A load is suspended from the spring and its new length is 8.5 cm.

What is the weight of the load?

A 0.70 N **B** 1.7 N **C** 70 N **D** 170 N

31 A body of mass m moving with speed v has kinetic energy E.

A second body, also of mass m, moves with speed $\frac{v}{2}$.

What is the kinetic energy of the second body?

A $\frac{E}{4}$ **B** $\frac{E}{2}$ **C** E **D** $2E$

32 A gas is trapped in a sealed container of constant volume.

The gas molecules collide with the container walls to produce a pressure.

The temperature of the gas increases. This causes the pressure of the gas to increase.

Which row explains why the pressure increases, in terms of the gas molecules?

	speed of molecules	number of collisions each second
A	increases	increases
B	increases	remains constant
C	remains constant	increases
D	remains constant	remains constant

33 Gardeners protect plants from low temperatures by leaving them in a greenhouse with large containers of water.

During the day the water temperature increases very little and at night it decreases very little.

Which property explains why this change in temperature is very small?

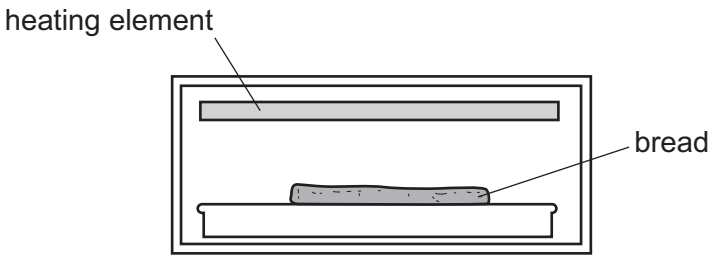
A The water has a high thermal capacity.

B The water has a low thermal capacity.

C Water is a good thermal conductor.

D Water is a poor thermal conductor.

34 Bread can be cooked by placing it below a heating element.



Which process transfers thermal energy from the heating element to the bread?

A conduction

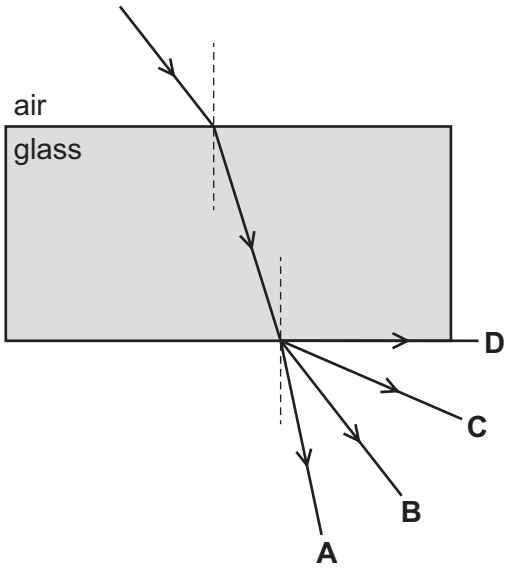
B convection

C evaporation

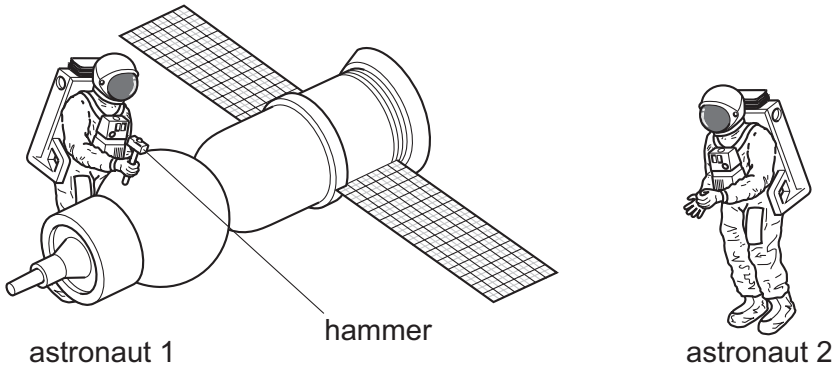
D radiation

35 The diagram shows a ray of light in air entering and passing through a glass block.

Which labelled arrow shows the direction of the ray after it leaves the glass block?



36 Astronaut 1 uses a hammer to mend a satellite in space. Astronaut 2 is nearby. There is no air in space.



What does astronaut 2 hear compared with the sound heard if they were working on Earth?

A a louder sound

B a quieter sound

C a sound of the same loudness

D no sound at all

37 There is a current I in a resistor.

Which equation gives the charge Q passing through the resistor in time t?

A $Q = \frac{I}{t}$ **B** $Q = I \times t$ **C** $Q = I + t$ **D** $Q = I - t$

38 Two identical resistors are connected in series.

Their combined resistance is 40 Ω.

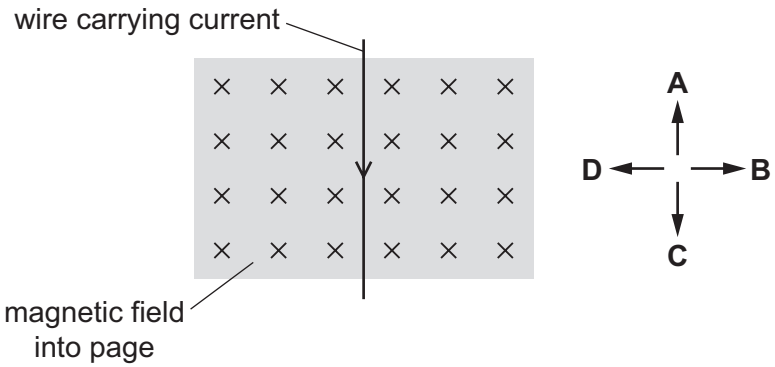
What is their effective resistance when connected in parallel?

A 10 Ω **B** 20 Ω **C** 40 Ω **D** 80 Ω

39 The diagram shows a wire carrying an electric current in the direction shown. The wire is at right angles to a magnetic field that is directed into the page.

A force acts on the wire because of the current and the magnetic field.

In which labelled direction does this force act?



40 Which row compares the number of protons and the number of neutrons in atoms of different isotopes of an element?

	number of protons	number of neutrons
A	different	different
B	different	the same
C	the same	different
D	the same	the same

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The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –		114 Fl flerovium –		116 Lv livermorium –		

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –

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