Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES **0654/13**

Paper 1 Multiple Choice (Core) **October/November 2017**

45 minutes

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

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.

1 What type of substances are enzymes?

A carbohydrates

B fats

C lipids

D proteins

2 What are the raw materials and products of photosynthesis?

	raw materials	products
A	carbon dioxide + sugar	oxygen + water
B	carbon dioxide + water	oxygen + sugar
C	oxygen + sugar	carbon dioxide + water
D	oxygen + water	carbon dioxide + sugar

3 What is homeostasis?

A the maintenance of the body's external environment

B the maintenance of the body's internal environment

C the processes that produce heat in the body

D the removal of wastes from the body

4 In a species of plant, the allele for yellow flowers is dominant to the allele for red flowers.

Two heterozygous yellow-flowered plants are crossed.

Which offspring are produced?

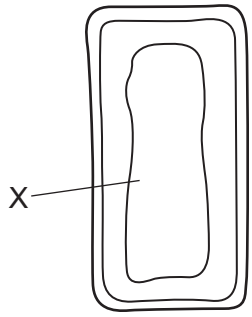
A 25% with yellow flowers, 75% with red flowers

B 50% with yellow flowers, 50% with red flowers

C 75% with yellow flowers, 25% with red flowers

D 100% with yellow flowers

5 The diagram shows parts of a mesophyll cell.



What is found in the part labelled X?

A chloroplasts and nucleus

B chloroplasts only

C nucleus only

D watery solution

6 What is meant by fertilisation?

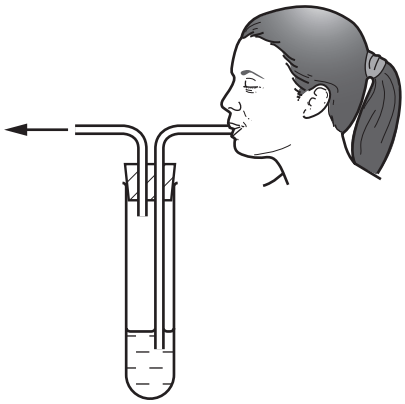
A combining of male and female nuclei

B joining of male and female sex organs

C movement of sperms through the uterus to an ovum

D reproduction

7 The diagram shows apparatus that could be used to show the presence of carbon dioxide in exhaled air.



Which liquid would be used in the test-tube?

A amylase solution

B limewater

C sugar solution

D water

8 Food tests are performed on four substances.

Which substance contains fat and protein?

	test reagent			
	Benedict's	biuret	ethanol	iodine
A	✓	✓	✗	✗
B	✓	✗	✗	✓
C	✗	✓	✓	✗
D	✗	✗	✓	✓

key

✓ = positive test result

✗ = negative test result

9 In the geotropic and phototropic responses of a plant shoot, does the shoot grow towards or away from the stimulus?

	geotropism	phototropism
A	away from	away from
B	away from	towards
C	towards	away from
D	towards	towards

10 Which blood vessel carries blood away from the liver?

A hepatic artery

B hepatic portal vein

C hepatic vein

D renal vein

11 The diagram shows a food chain.

mahogany tree → caterpillar → songbird → hawk

In this food chain, what is the mahogany tree?

A carnivore

B consumer

C herbivore

D producer

12 Which statements about X chromosomes in humans are correct?

	present in body cells in males	present in body cells of females	carry genes
A	✓	✓	✓
B	✓	✗	✓
C	✓	✗	✗
D	✗	✓	✗

13 The concentration of carbon dioxide in the atmosphere has increased during the last 200 years.

What has contributed to this change?

A burning large areas of forest

B increased use of pesticides

C planting more crops

D using fewer fossil fuels

14 Atoms are the smallest parts of ……1…… .

When atoms of the same type chemically join together, a ……2…… is formed.

When different types of atoms chemically join together, they form ……3……. .

Which words complete gaps 1, 2 and 3?

	1	2	3
A	elements	molecule	compounds
B	elements	molecule	mixtures
C	molecules	compound	mixtures
D	molecules	mixture	compounds

15 Which process is used to separate water from a salt solution?

A chromatography

B crystallisation

C distillation

D filtration

16 When solid zinc carbonate is heated, a different solid and a gas are formed.

Which type of change occurs?

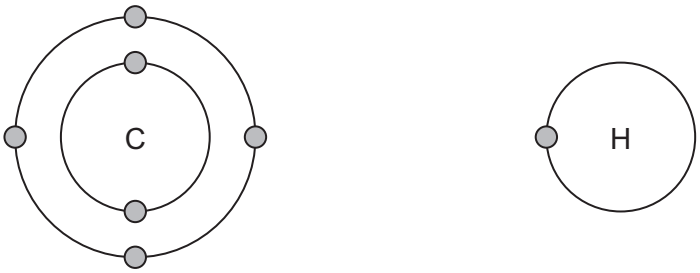
A chemical

B exothermic

C physical

D separation

17 The electronic structures of carbon and of hydrogen are shown.



What is the formula of a compound formed between carbon and hydrogen?

A CH_2 **B** CH_3 **C** CH_4 **D** C_4H

18 Aqueous copper chloride is electrolysed using inert electrodes.

What is produced at the cathode?

A chlorine

B copper

C hydrogen

D oxygen

19 Some white anhydrous copper(II) sulfate powder is put into a beaker of water and stirred.

Which observation shows that the process is exothermic?

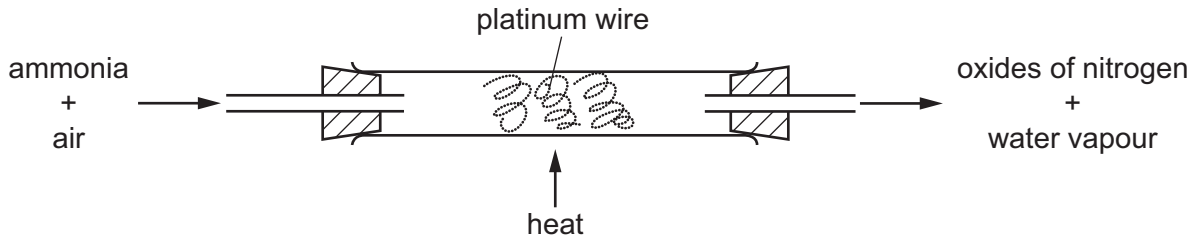
A A blue solution forms.

B A colourless solution forms.

C The beaker becomes cooler.

D The beaker becomes warmer.

20 Ammonia is oxidised as shown.



The platinum is chemically unchanged at the end of the reaction.

What is the reason for using platinum?

A to absorb the heat from the reaction

B to filter out oxygen from the air

C to increase the rate of the reaction

D to neutralise the ammonia

21 Which reaction involves both oxidation and reduction?

A calcium carbonate $\rightarrow$ calcium oxide + carbon dioxide

B copper oxide + carbon $\rightarrow$ copper + carbon dioxide

C silver nitrate + potassium chloride $\rightarrow$ silver chloride + potassium nitrate

D sulfuric acid + sodium hydroxide $\rightarrow$ sodium sulfate + water

22 Which substances react with dilute sulfuric acid to form a salt?

	magnesium	magnesium oxide	magnesium carbonate	magnesium chloride
A	✓	✓	✓	✗
B	✓	✓	✗	✓
C	✓	✗	✓	✓
D	✗	✓	✓	✓

23 An acid reacts with an alkali to produce an aqueous solution of a salt.

Which procedure is used to obtain crystals of the salt from the solution?

A Distil the solution.

B Evaporate the solution to dryness.

C Filter the solution.

D Partially evaporate the solution and leave it to cool.

24 The melting points of three elements in Group I and of three elements in Group VII are shown.

element	group	melting point (°C)
lithium	I	179
sodium	I	98
potassium	I	64
chlorine	VII	–101
bromine	VII	–7
iodine	VII	114

What is the trend in reactivity in each group as melting point increases?

	change in Group I reactivity	change in Group VII reactivity
A	less reactive	less reactive
B	less reactive	more reactive
C	more reactive	less reactive
D	more reactive	more reactive

25 What is warmed with a salt to test for ammonium ions?

A aqueous barium chloride

B aqueous litmus

C aqueous silver nitrate

D aqueous sodium hydroxide

26 Which word equation describes the manufacture of lime from limestone?

A calcium carbonate → calcium hydroxide + carbon dioxide

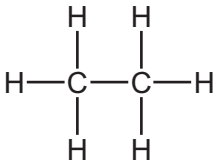
B calcium carbonate → calcium oxide + carbon dioxide

C calcium hydroxide → calcium oxide + water

D calcium oxide + carbon dioxide → calcium carbonate

27 The structures of four compounds are shown.

1



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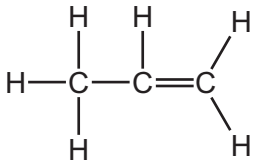

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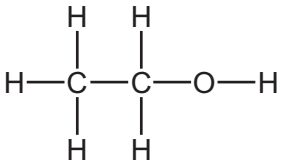

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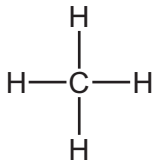


Which types of compound do these structures represent?

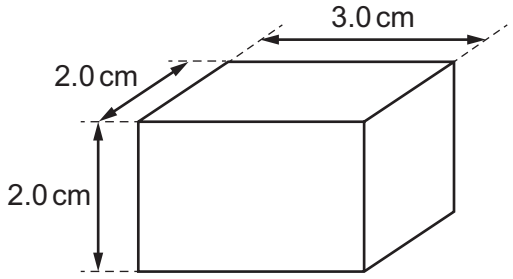
	1	2	3	4
A	alcohol	alkene	alkane	alcohol
B	alkane	alcohol	alkene	alkane
C	alkane	alkene	alcohol	alkane
D	alkene	alkane	alcohol	alkene

28 A car starts a short journey on a busy road. It travels 200 m in 1.0 minute, then stops for 2.0 minutes. Finally it travels 1300 m in a further 2.0 minutes.

What is the average speed of the car during the journey?

A 1.1 m/s **B** 1.8 m/s **C** 5.0 m/s **D** 300 m/s

29 The diagram shows a solid rectangular block made of material of density $2.0\,g/cm^3$.



What is the mass of the block?

A 2.0 g **B** 6.0 g **C** 14 g **D** 24 g

30 A worker carries bricks up a ladder.

The following quantities are known.

- the height the bricks are lifted up
- the time taken for the worker to lift the bricks
- the volume of the bricks
- the weight of the bricks

Which quantities are needed to calculate the useful power produced by the worker as he carries the bricks up the ladder?

A height, time and volume

B height, time and weight

C height, volume and weight

D time, volume and weight

31 Which statement about gas molecules is **not** correct?

A Increasing the temperature decreases the pressure of the gas at constant volume.

B Increasing the temperature makes the molecules move faster.

C Molecules of a gas are in constant random motion.

D The pressure of the gas is caused by the collision of molecules with the container.

32 Which two processes both require an input of energy?

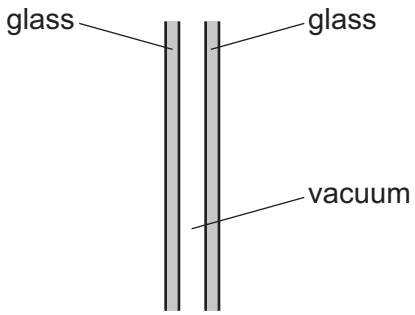
A boiling and condensation

B boiling and melting

C condensation and solidification

D melting and solidification

33 One type of double glazing consists of two panes of glass separated by a vacuum.



Which methods of energy transfer are prevented by the vacuum?

A conduction and convection only

B conduction and radiation only

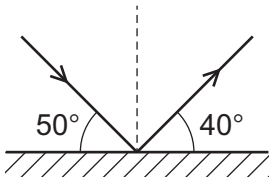
C convection and radiation only

D conduction, convection and radiation

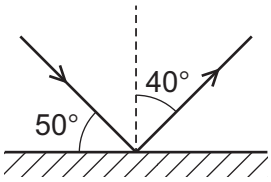
34 The diagrams represent a ray of light reflected by a plane mirror.

Which diagram shows possible values for two angles?

A

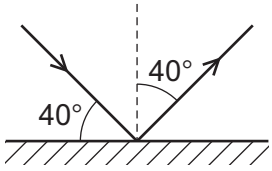


B

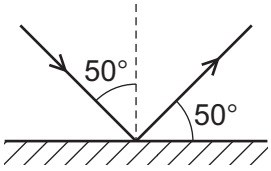


(not to scale)

C



D



35 Which radiations are included in the electromagnetic spectrum?

A α-particle radiation and β-particle radiation

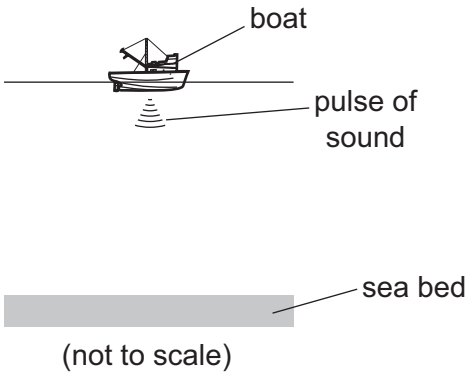
B α-particle radiation and γ-rays

C β-particle radiation and infra-red radiation

D γ-rays and infra-red radiation

36 A loudspeaker on a boat produces a pulse of sound in the sea. The pulse is reflected back to the boat by the sea bed.

The echo of the pulse is received back at the boat 3.0 s after it is produced. The depth of the sea under the boat is 2250 m.



From this information, what is the speed of sound in the sea water?

A 330 m / s **B** 750 m / s **C** 1500 m / s **D** 6750 m / s

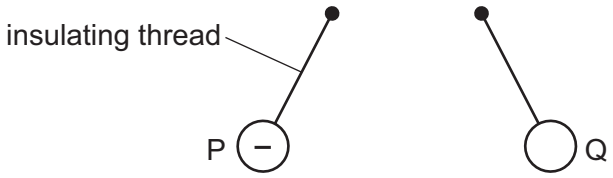
37 A student carries out four tests with a magnet.

Which result shown is **not** correct?

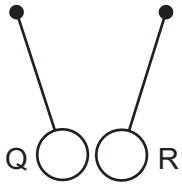
	test		result
A	S magnet N	iron bar	attracts
B	S magnet N	S magnet N	attracts
C	N magnet S	copper bar	no effect
D	N magnet S	N magnet S	repels

38 Three charged balls P, Q and R are suspended by insulating threads. Ball P is negatively charged.

Ball Q is brought close to ball P. The balls move away from each other.



Ball Q is now brought close to ball R. The balls move closer to each other.

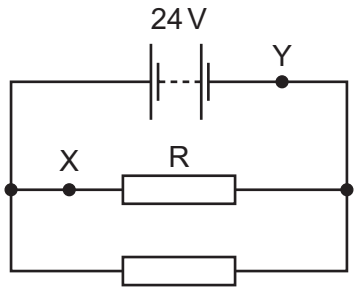


What are the signs of the charges on ball Q and ball R?

	ball Q	ball R
A	negative	negative
B	negative	positive
C	positive	negative
D	positive	positive

39 The diagram shows two identical resistors connected to a 24 V battery.

One resistor is labelled R.

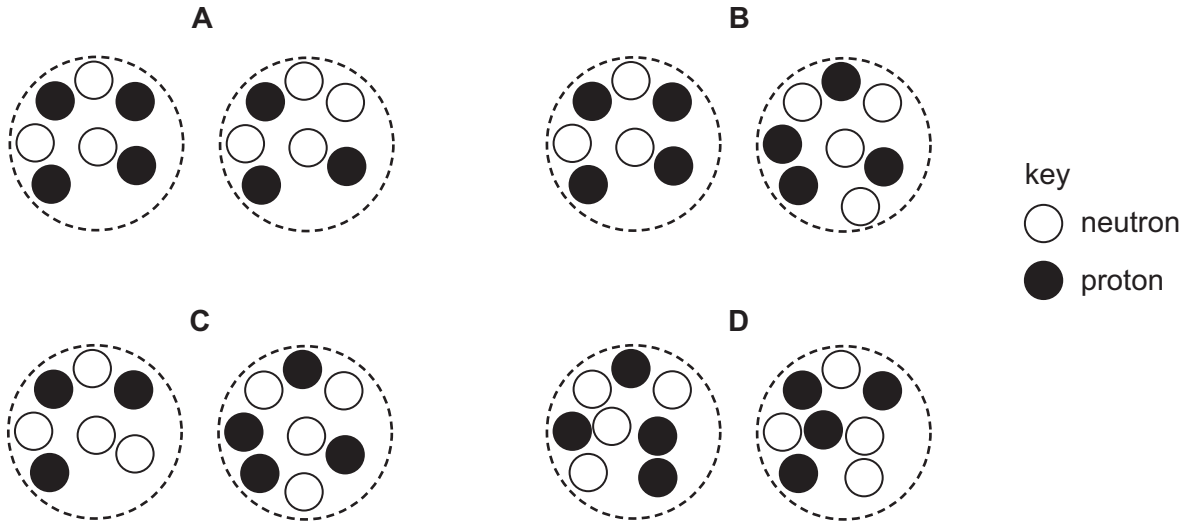


What is the potential difference (p.d.) across R, and at which labelled point, X or Y, is the current greater?

	p.d. across R / V	greater current
A	12	at X
B	12	at Y
C	24	at X
D	24	at Y

40 The diagrams represent pairs of nuclei of some atoms.

Which pair shows nuclei of different isotopes of the same element?



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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.).