Cambridge Assessment International Education

Cambridge IGCSE™

CO-ORDINATED SCIENCES **0654/12**

Paper 1 Multiple Choice (Core) **February/March 2021**

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

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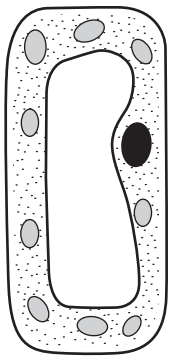
[Turn over

1 Which row about characteristics of living things is correct?

	name of process	definition of process
A	excretion	the ability to detect and respond to changes in the environment
B	nutrition	the removal of excess substances and toxic materials
C	respiration	the breaking down of substances to release energy
D	reproduction	the taking in of materials for energy, growth and development

2 The diagram shows an incomplete plant cell.



Which structure is **not** shown?

A cell membrane

B cell wall

C chloroplast

D vacuole

3 What are the molecules that make up fats and oils?

A amino acids and glycerol

B fatty acids and glycerol

C glucose and amino acids

D glucose and fatty acids

4 What are biological catalysts?

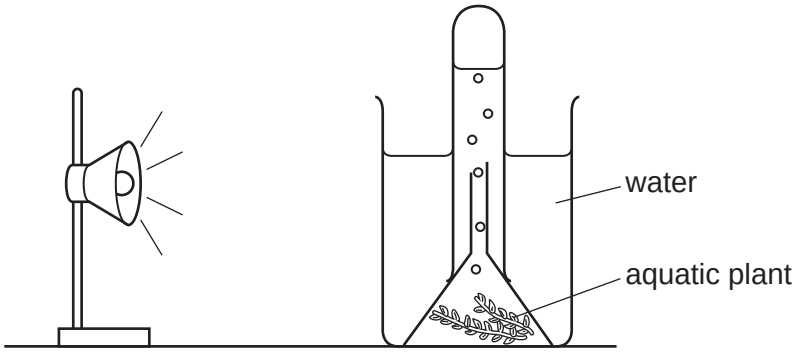
A antibodies

B enzymes

C hormones

D platelets

5 The rate of photosynthesis was measured by counting the number of bubbles of oxygen produced by a submerged aquatic plant at different light intensities as shown.



Which two variables need to be kept constant?

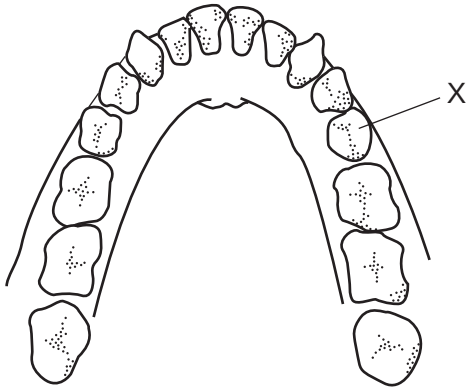
A size of plant used and temperature of the water

B light intensity and size of the boiling tube

C size of plant used and size of the boiling tube

D temperature of the water and light intensity

6 The diagram shows human teeth in the lower jaw.



What type of tooth is X?

A canine

B incisor

C molar

D premolar

7 In which weather conditions is the rate of transpiration fastest?

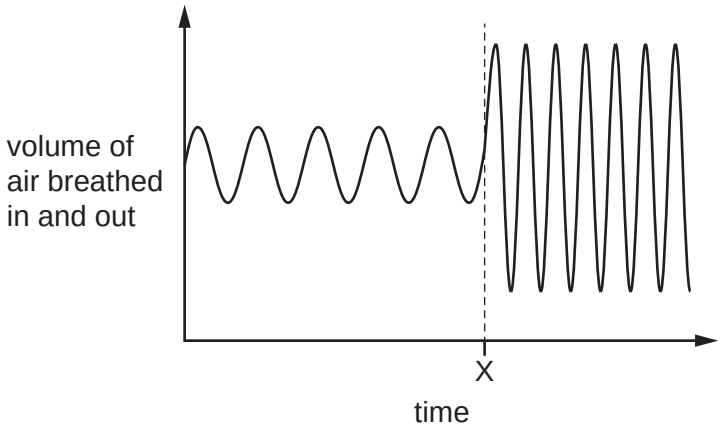
A cold and dry

B cold and wet

C warm and dry

D warm and wet

8 The graph shows the volume of air breathed in and out over a period of time.



What happens after time X?

	breathing rate	breathing volume
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

9 What is the effect of adrenaline on the body?

	pulse rate	size of pupil
A	decreased	large
B	decreased	small
C	increased	small
D	increased	large

10 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

11 Which statement about human gametes is correct?

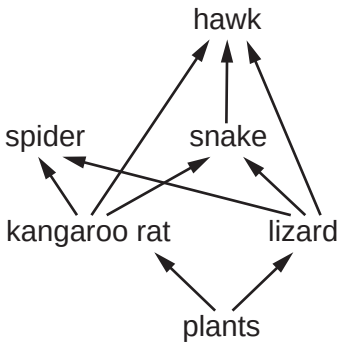
A There is an X chromosome in all egg cells.

B There is a Y chromosome in all egg cells.

C There is an X chromosome in all sperm cells.

D There is a Y chromosome in all sperm cells.

12 The diagram shows a food web.



How many consumers are in this food web?

A 1 **B** 2 **C** 4 **D** 5

13 What could be a result of deforestation?

A a decrease in flooding because there are less tree roots present

B an increase in carbon dioxide because there are less tree leaves respiring

C a decrease in soil erosion because there are less tree roots present

D an increase in extinction because there are less habitats present

14 Which process is used to separate a mixture of coloured compounds?

A chromatography

B distillation

C evaporation

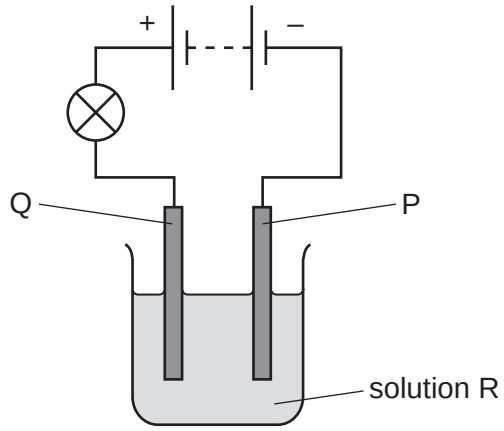
D filtration

15 Copper hydroxide contains one copper atom, two hydrogen atoms and two oxygen atoms.

What is the correct formula of copper hydroxide?

A CuH_2O_2 **B** CuO_2H_2 **C** $Cu(OH)_2$ **D** H_2O_2Cu

16 An experiment is set up to test the effect of electricity on solution R.



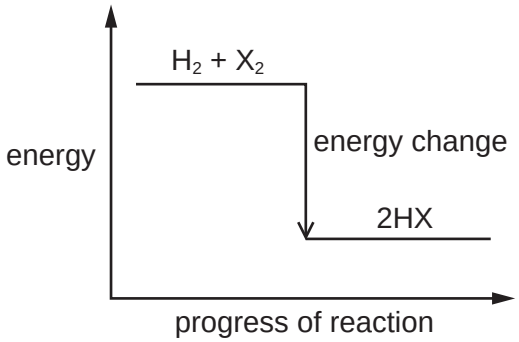
What are the names of P, Q and R?

	P	Q	R
A	anode	cathode	electrode
B	anode	cathode	electrolyte
C	cathode	anode	electrode
D	cathode	anode	electrolyte

17 The diagram shows the energy change for the reactions between hydrogen and the halogens.

The reaction is $H_2 + X_2 \rightarrow 2HX$.

The size of the energy change is different for each halogen.



The diagram shows that the reactions are ……1…… .

The most reactive halogen is ……2…… and therefore the energy change for this element is ……3…… .

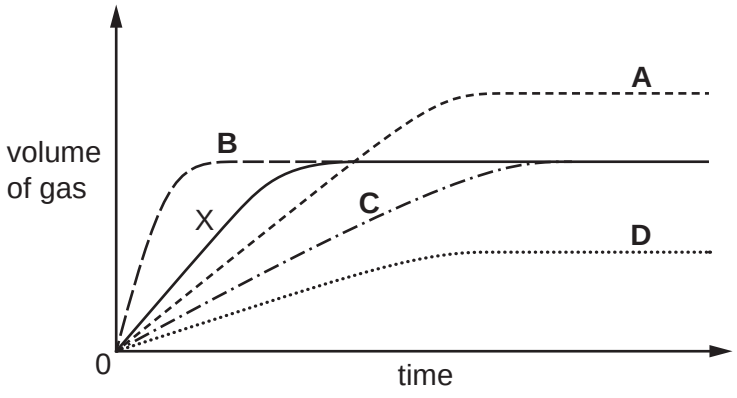
Which words complete gaps 1, 2 and 3?

	1	2	3
A	endothermic	fluorine	least
B	endothermic	iodine	least
C	exothermic	fluorine	greatest
D	exothermic	iodine	greatest

18 In an experiment, a 2 g piece of calcium carbonate is added to 50 cm^3 of dilute hydrochloric acid at 21 °C.

The volume of gas produced is measured over time and is shown as solid line X on the graph.

Which line is obtained when the experiment is repeated using 50 cm^3 of the same acid at 35 °C?



19 In which word equation is the underlined substance being oxidised?

A carbon dioxide + carbon → carbon monoxide

B carbon monoxide + iron oxide → carbon dioxide + iron

C copper oxide + magnesium → magnesium oxide + copper

D magnesium oxide + hydrochloric acid → magnesium chloride + water

20 A label from a packet of indigestion tablets is shown.

Each tablet contains:	
magnesium carbonate	120 mg
magnesium hydroxide	15 mg
magnesium oxide	62 mg
magnesium sulfate	47 mg

Which substance does **not** neutralise stomach acid?

A magnesium carbonate

B magnesium hydroxide

C magnesium oxide

D magnesium sulfate

21 Substance X is insoluble in water.

It reacts with dilute nitric acid to produce solution Y and a gas which turns limewater milky.

A white precipitate is formed when aqueous sodium hydroxide is added to solution Y. This precipitate remains when excess sodium hydroxide is added.

What is substance X?

A calcium carbonate

B calcium chloride

C zinc carbonate

D zinc chloride

22 Which elements in the Periodic Table form coloured compounds?

A Group I metals

B halogens

C noble gases

D transition metals

23 Which metal reacts most vigorously with dilute hydrochloric acid?

A aluminium

B copper

C magnesium

D zinc

24 Both anhydrous cobalt(II) chloride and anhydrous copper(II) sulfate are used as chemical tests for water.

Which row describes the effect of water on the colour of anhydrous cobalt(II) chloride and anhydrous copper(II) sulfate?

	anhydrous cobalt(II) chloride	anhydrous copper(II) sulfate
A	blue to pink	blue to white
B	blue to pink	white to blue
C	pink to blue	blue to white
D	pink to blue	white to blue

25 Which row about carbon dioxide and methane is correct?

	carbon dioxide	methane
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = greenhouse gas

✗ = not a greenhouse gas

26 Naphtha is obtained from petroleum.

What is a use for naphtha?

A cooking

B making chemicals

C heating

D making roads

27 Which statements about ethanol are correct?

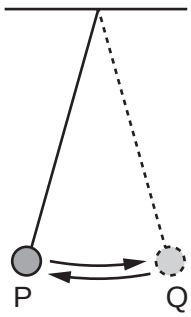
1 The combustion of ethanol is exothermic.

2 Ethanol is used as a solvent.

3 Ethanol is produced by fermentation.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

28 The diagram shows a pendulum swinging backwards and forwards between points P and Q.



The pendulum takes 34 seconds to swing from P to Q and back to P again 20 times.

What is the period of the pendulum?

A 0.85 s **B** 1.7 s **C** 3.4 s **D** 34 s

29 Which property of a body **cannot** be changed by the application of a force?

A mass

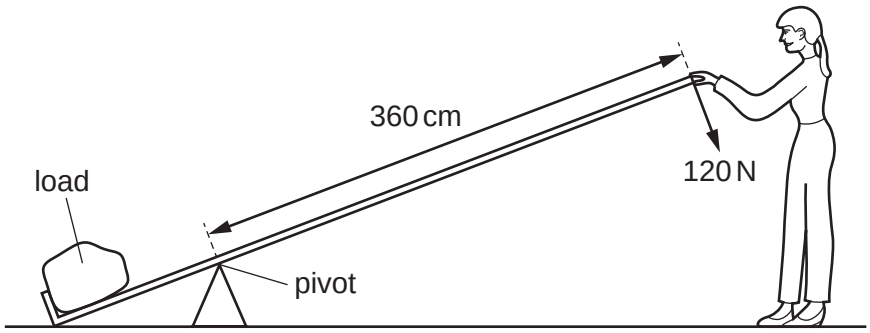
B motion

C shape

D size

30 A scientist uses a lever to lift a heavy load.

She applies a force of 120 N at a distance of 360 cm from a pivot.



What is the moment about the pivot of the force applied by the scientist?

A 3.0 N m **B** 33.3 N m **C** 432 N m **D** 43 200 N m

31 A force acts on an object and moves it through a distance.

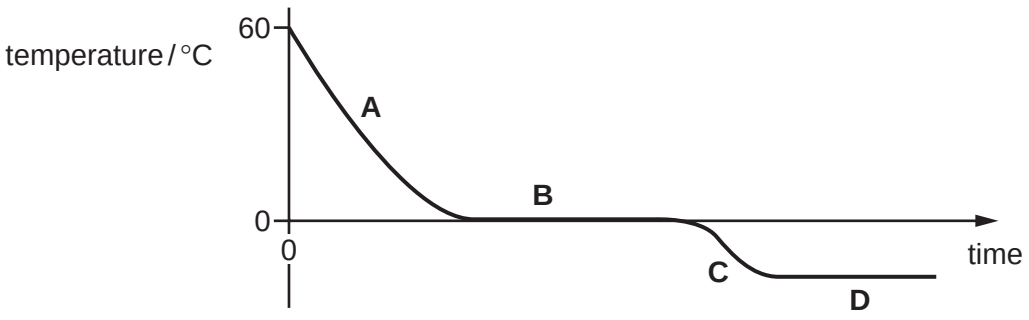
Which force does the least amount of work?

	force / N	distance / m
A	1.0	1.0
B	1.0	10.0
C	10.0	1.0
D	10.0	10.0

32 A beaker of water at 60 °C is placed in a freezer.

The graph shows how the temperature of the water changes with time.

In which labelled section of the graph are both water and ice present in the beaker?



33 There is a vacuum in the space between the Sun and the Earth.

How is thermal energy transferred from the Sun to the Earth?

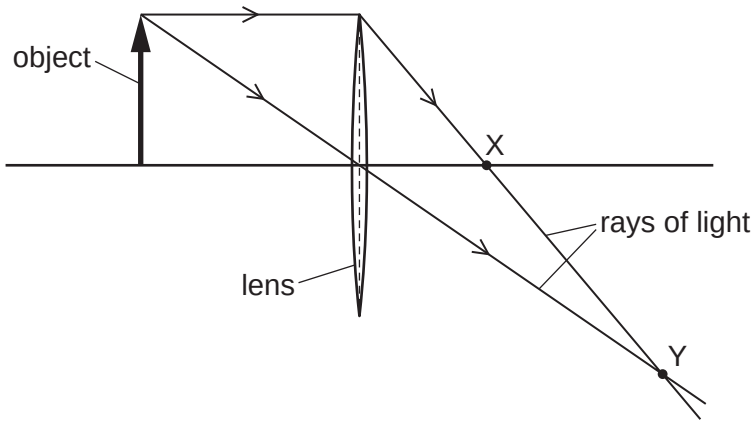
A by conduction only

B by convection only

C by radiation only

D by convection and radiation only

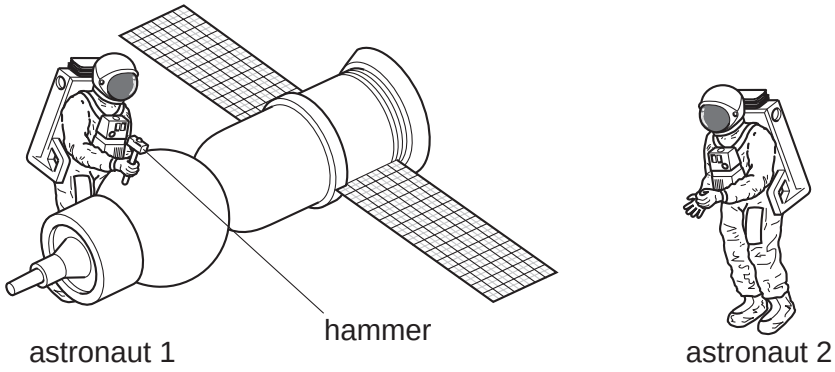
34 The diagram shows two rays of light that have passed from an object through a converging lens.



Which labelled point X or Y is a principal focus of the lens, and how does the size of the image compare with the size of the object?

	principal focus	size of image
A	X	larger than object
B	X	smaller than object
C	Y	larger than object
D	Y	smaller than object

35 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

36 What is used to measure potential difference (p.d.)?

A ammeter

B newton meter

C variable resistor

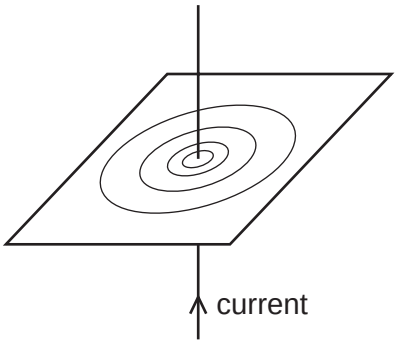
D voltmeter

37 Which symbol represents a fuse?

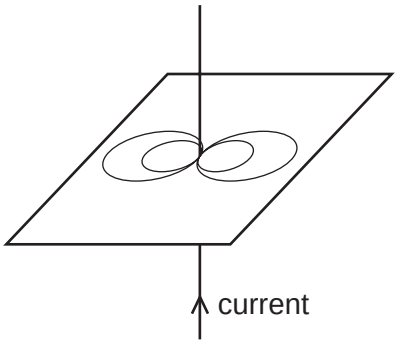
A **B** **C** **D**

38 Which diagram shows the pattern of the magnetic field due to a current in a straight wire?

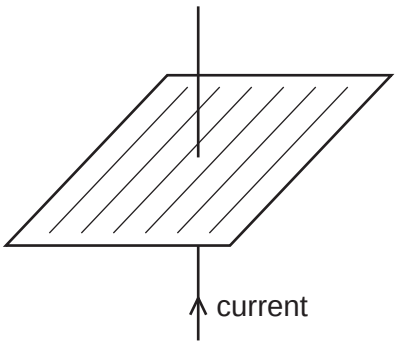
A



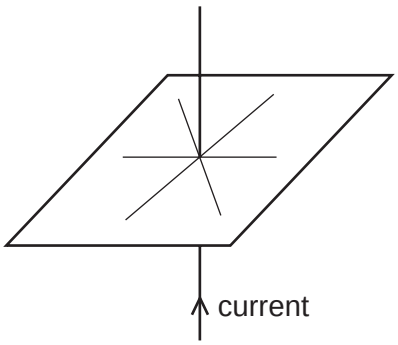
B



C



D



39 The table compares an atom of carbon-13 and an atom of nitrogen-14.

	carbon-13	nitrogen-14
nucleon number *A*	13	14
proton number *Z*	6	7

What do the neutral atom of carbon-13 and the neutral atom of nitrogen-14 have the same number of?

A electrons

B ions

C neutrons

D protons

40 α, β and γ radiation can all penetrate materials and ionise atoms.

Which row compares the different types of radiation?

	least penetrating	least ionising
A	α	β
B	α	γ
C	γ	α
D	γ	β

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.).