



# Cambridge IGCSE™

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## CO-ORDINATED SCIENCES

0654/11

Paper 1 Multiple Choice (Core)

October/November 2024

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)

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### 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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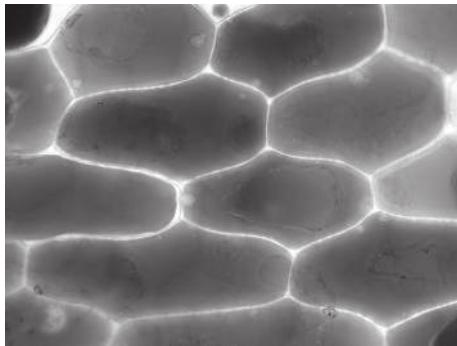
This document has **16** pages. Any blank pages are indicated.

1 Which characteristic of living things is described as the removal of toxic materials and substances in excess of requirements?

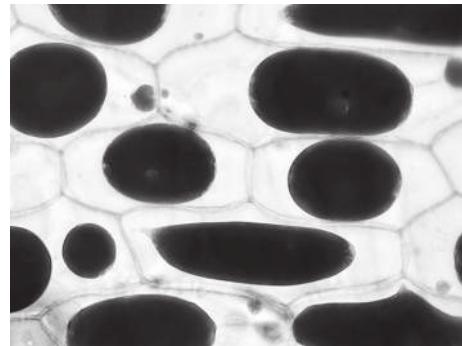
A excretion  
 B homeostasis  
 C nutrition  
 D respiration

2 The photographs show some onion cells before and after being placed in a concentrated solution of glucose.

before



after



What explains the appearance of the onion cells after placing them into the concentrated solution of glucose?

A Glucose has entered the cells by osmosis.  
 B Glucose has left the cells by diffusion.  
 C Water has entered the cells by diffusion.  
 D Water has left the cells by osmosis.

3 Three food tests are carried out on a sample of food. The results are shown.

food test	final colour
Benedict's	blue
biuret	blue
iodine	blue-black

From these results, which nutrient is in the food?

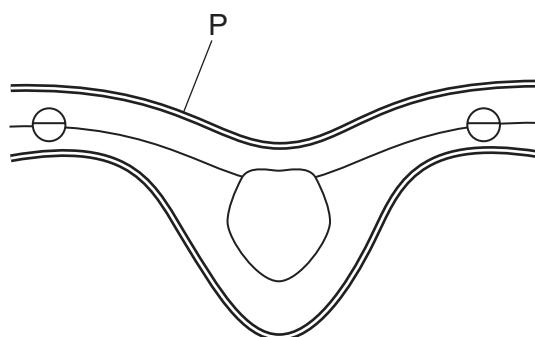
A reducing sugar  
 B protein  
 C starch  
 D fat

4 One method of preventing food spoilage is to store it at 4 °C in a refrigerator.

Why does storing food at low temperatures help to prevent food spoilage?

- A It decreases enzyme activity.
- B It denatures enzymes.
- C It increases enzyme production.
- D It kills cells.

5 The diagram shows a plan of the cross-section of a dicotyledonous leaf.



What is the name of the part labelled P?

- A palisade mesophyll
- B spongy mesophyll
- C upper epidermis
- D vascular bundle

6 What is the dietary importance of fibre?

- A It builds and repairs tissue.
- B It builds strong bones and teeth.
- C It helps to prevent constipation.
- D It provides a source of iron.

7 Selexipag is a drug used to treat a condition where the blood pressure going to the lungs is too high. The drug works by widening the blood vessel leading to the lungs to reduce the pressure.

Which blood vessel going to the lungs is selexipag widening?

- A aorta
- B pulmonary artery
- C pulmonary vein
- D vena cava

8 The list shows some processes that occur in the body.

- 1 cell division
- 2 oxygen diffusion
- 3 protein synthesis
- 4 temperature regulation

Which processes use energy released by respiration?

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

9 In which order does an impulse pass along neurones during a reflex action?

**A** motor → relay → sensory  
**B** motor → sensory → relay  
**C** sensory → motor → relay  
**D** sensory → relay → motor

10 Before fertilisation in flowering plants, which structure must the pollen nucleus pass through to reach the nucleus in the ovule?

**A** filament  
**B** petal  
**C** stamen  
**D** style

11 Albinism is a genetic condition which results in an absence of pigment in the skin, hair and eyes.

If two black mice produce an albino offspring, which Punnett square shows the correct cross?

A

	B	b
B	BB	Bb
B	BB	Bb

B

	B	b
B	BB	Bb
b	Bb	bb

key

B dominant allele for black

b recessive allele for albinism

C

	B	b
b	Bb	bb
b	Bb	bb

D

	b	b
b	bb	bb
b	bb	bb

12 What is the correct order for the food chain from the information given?

- beetles are herbivores
- mice eat the beetles
- owls are the tertiary consumers
- the leaves of a plant are the producer

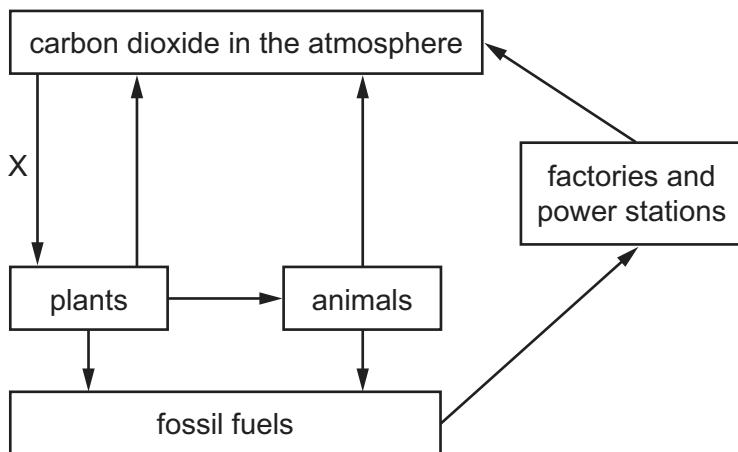
A beetles → mice → owl → leaves

B leaves → beetles → mice → owl

C leaves → beetles → owl → mice

D owl → mice → beetles → leaves

13 The diagram shows part of the carbon cycle.



Which process does X represent?

A combustion  
 B decomposition  
 C photosynthesis  
 D respiration

14 A student adds 5 g of magnesium ribbon to 20 cm<sup>3</sup> of dilute hydrochloric acid in a beaker.

The student measures how long it takes for the effervescence to stop.

Which pieces of apparatus does the student use in this experiment?

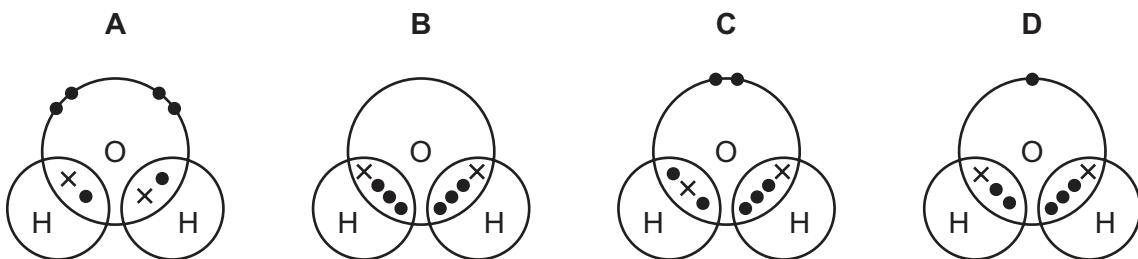
	balance	measuring cylinder	stop-clock	thermometer	
A	✓	✓	✗	✓	key
B	✓	✗	✓	✓	✓ = uses the apparatus
C	✓	✓	✓	✗	✗ = does not use the apparatus
D	✗	✓	✓	✓	

15 Sea water is a mixture that contains sodium chloride dissolved in water.

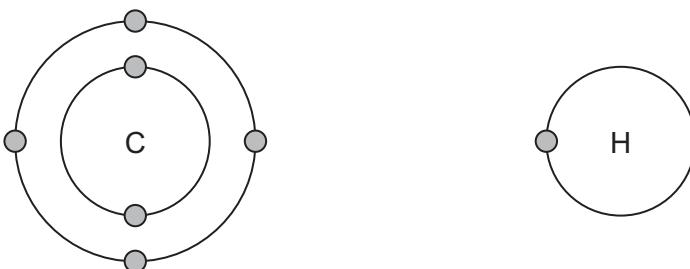
Which row describes sea water?

	solvent	solute	solution
A	water	sea water	sodium chloride
B	sea water	sodium chloride	water
C	water	sodium chloride	sea water
D	sodium chloride	water	sea water

16 What is the dot-and-cross diagram for a water molecule?



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



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

**A**  $\text{CH}_2$

**B**  $\text{CH}_3$

**C**  $\text{C}_4\text{H}$

**D**  $\text{CH}_4$

18 Which elements are formed at the electrodes during the electrolysis of concentrated aqueous sodium chloride?

	anode	cathode
<b>A</b>	chlorine	sodium
<b>B</b>	chlorine	hydrogen
<b>C</b>	hydrogen	chlorine
<b>D</b>	sodium	chlorine

19 Four different substances are added to the same acid of the same concentration in reactions W, X, Y and Z.

The initial temperature of the acid before each reaction is 21 °C.

The final temperatures of the mixtures are measured.

The results are shown.

reaction	W	X	Y	Z
final temperature / °C	28	19	26	17

Which row is correct?

	most endothermic reaction	most exothermic reaction
A	W	Z
B	Z	W
C	X	Y
D	Y	X

20 Dilute hydrochloric acid reacts with solid calcium carbonate.

Which change decreases the rate of the reaction?

- A decreasing the concentration of the hydrochloric acid
- B decreasing the size of the calcium carbonate pieces
- C increasing the surface area of the calcium carbonate
- D increasing the temperature of the acid

21 Which statement about oxidation is correct?

- A It occurs when an element or compound chemically combines with oxygen.
- B It occurs when an element or compound forms a mixture with oxygen.
- C It occurs when an element or compound is separated from a mixture with oxygen.
- D It occurs when a compound loses oxygen.

22 Which substance is classified as an acidic oxide?

- A calcium oxide
- B carbon dioxide
- C lithium oxide
- D sodium oxide

23 The results of two tests on compound P are shown.

test	observation
flame test	red flame
addition of acidified silver nitrate	white precipitate

What is P?

- A lithium bromide
- B lithium chloride
- C sodium bromide
- D sodium chloride

24 What is **not** a property of transition elements?

- A form coloured compounds
- B good electrical conductivity
- C high melting point
- D low density

25 What is the order of reactivity of metals, from highest to lowest?

- A aluminium → calcium → copper → iron
- B calcium → iron → copper → aluminium
- C calcium → magnesium → iron → copper
- D aluminium → magnesium → iron → copper

26 A colourless liquid is tested with blue cobalt(II) chloride paper.

The blue paper turns pink.

What does this test prove that the liquid contains?

- A an acid
- B an alkali
- C ethanol
- D water

27 What are the products of the complete combustion of ethanol?

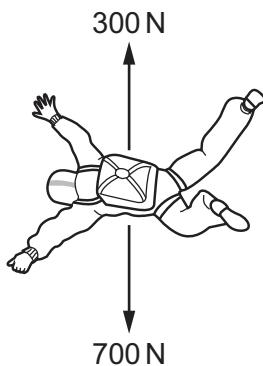
- A carbon and hydrogen
- B carbon dioxide and hydrogen
- C carbon dioxide and water
- D carbon monoxide and water

28 A person runs 5000 m in 1200 s and then walks a further 3000 m in 1800 s.

What is their average speed for this journey?

- A 1.7 m/s
- B 2.7 m/s
- C 2.9 m/s
- D 5.8 m/s

29 The diagram shows the two forces acting on a skydiver.



What is the resultant force on the skydiver?

- A 400 N downwards
- B 400 N upwards
- C 1000 N downwards
- D 1000 N upwards

30 When a ball is kicked vertically upwards, its initial kinetic energy is 12 J. When the ball arrives back at its starting point, its kinetic energy is 8.0 J.

Which statement explains the change in the kinetic energy of the ball?

- A 4.0 J of work is done to increase the gravitational potential energy of the ball.
- B 4.0 J of work is done to overcome air resistance.
- C 20 J of work is done to increase the gravitational potential energy of the ball.
- D 20 J of work is done to overcome air resistance.

31 A motor lifts a load vertically upwards at constant speed.

The weight of the load is known.

Which of the other quantities in the table must be known to determine the useful power output of the motor?

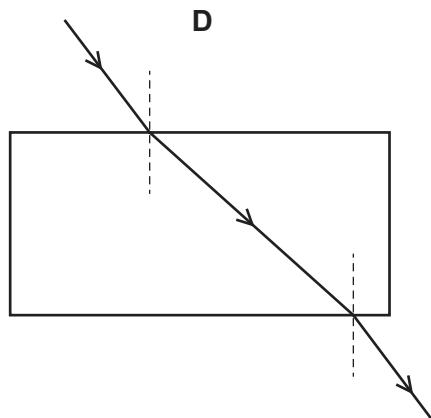
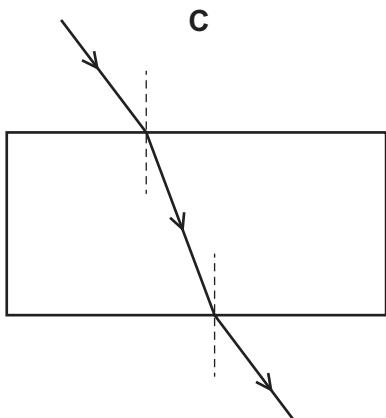
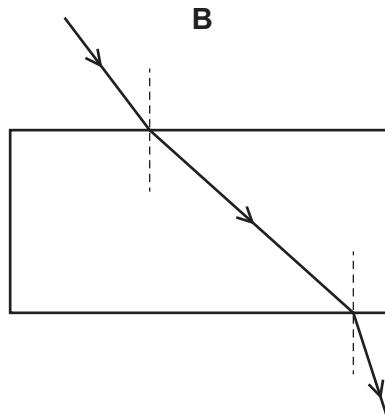
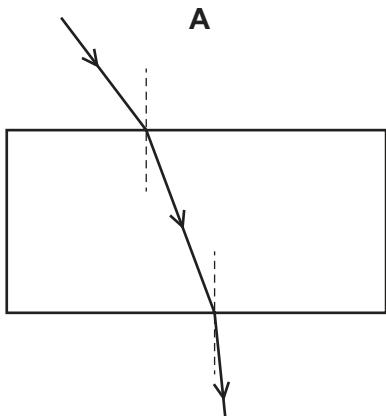
	height lifted	time to lift the load	
A	✓	✓	key
B	✓	✗	✓ = this quantity is needed
C	✗	✓	✗ = this quantity is <b>not</b> needed
D	✗	✗	

32 Which material is a poor thermal conductor?

- A air
- B aluminium
- C copper
- D iron

33 A ray of light travels from air into a parallel-sided glass block and then back into air.

Which diagram shows the path of the light?



34 Which electromagnetic waves have the lowest frequency?

- A** gamma
- B** infrared
- C** ultraviolet
- D** radio

35 Object P is positively charged and object Q is negatively charged.

Which row describes the force between P and Q and explains how they became charged?

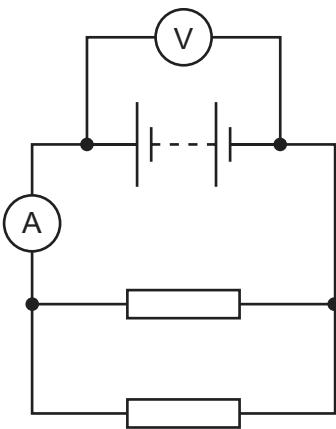
	force between P and Q	charge on P caused by	charge on Q caused by
<b>A</b>	attractive	gaining electrons	losing electrons
<b>B</b>	attractive	losing electrons	gaining electrons
<b>C</b>	repulsive	gaining electrons	losing electrons
<b>D</b>	repulsive	losing electrons	gaining electrons

36 A lamp is connected to a 3.0 V battery. The resistance of the lamp is  $60\ \Omega$ .

What is the current in the lamp?

A 0.050 mA      B 20 mA      C 50 mA      D 180 mA

37 The diagram shows two resistors connected in parallel to a battery. The circuit contains a voltmeter and an ammeter.

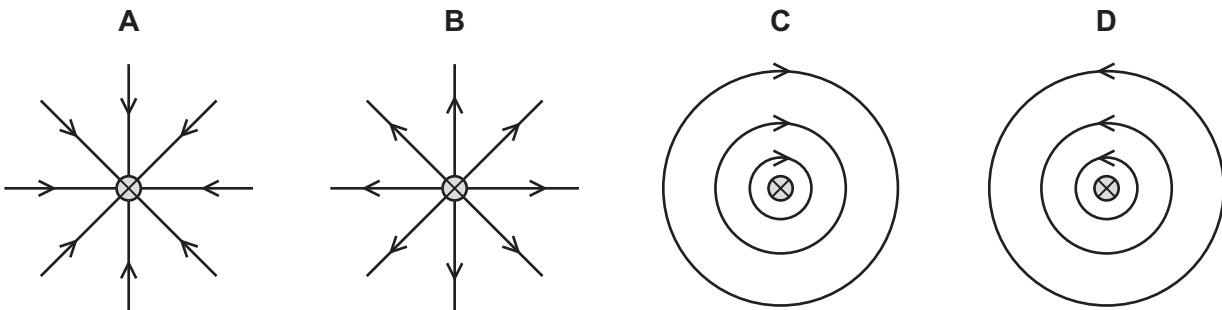


A third resistor is now connected in parallel with these two resistors.

What happens to the voltmeter reading and what happens to the ammeter reading?

	ammeter reading	voltmeter reading
A	decreases	increases
B	decreases	stays the same
C	increases	increases
D	increases	stays the same

38 Which diagram shows the pattern and the direction of the magnetic field around a straight wire that is carrying a current into the page?

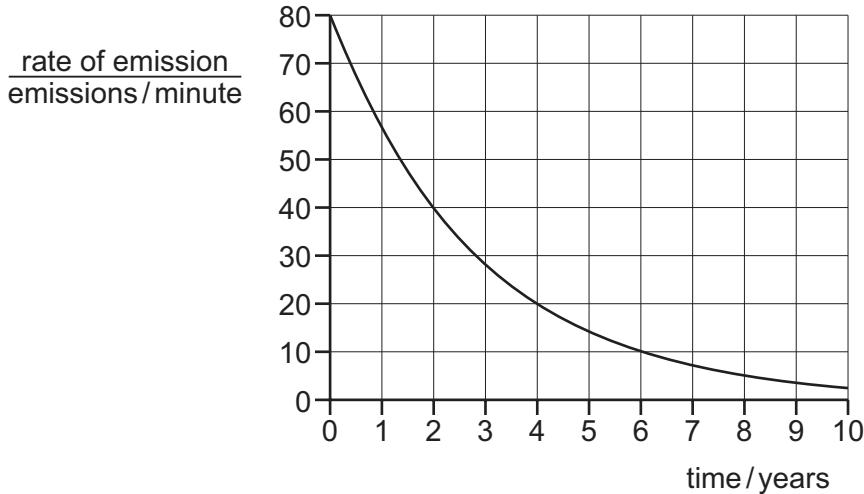


39 An element has two isotopes.

Which statement about the nuclei of atoms of these isotopes is correct?

- A They have equal numbers of neutrons but different numbers of electrons.
- B They have equal numbers of neutrons but different numbers of protons.
- C They have equal numbers of protons but different numbers of electrons.
- D They have equal numbers of protons but different numbers of neutrons.

40 The graph shows how the rate of emission of radiation from a radioactive sample changes with time.



What is the half-life of this sample?

- A 40 minutes
- B 2.0 years
- C 5.0 years
- D 10 years

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## The Periodic Table of Elements

		Group																			
		I			II		III			IV		V		VI		VII		VIII			
Key		atomic number				atomic symbol															
		name				relative atomic mass															
3	Li	4	Be	beryllium	9		1	H	hydrogen	1								2	He		
7	lithium																	4	helium		
11	Na	12	Mg	magnesium	24		20	21	Sc	titanium	48	22	Ti	titanium	45	23	Cr	chromium	52	1	neon
23	sodium																	20	20		
19	K	Ca	calcium	40	39	45	20	21	Sc	scandium	45	22	V	vanadium	51	23	Cr	chromium	52	20	20
39	potassium																				
37	Rb	Sr	strontium	88	38	39	40	41	Zr	yttrium	89	42	Nb	niobium	93	43	Mn	manganese	55	39	39
85	rubidium																				
55	Cs	Ba	barium	137	56	57-71	72	73	Ta	lanthanoids	178	74	W	tungsten	184	75	Re	rhodium	186	55	56
133	caesium																				
87	Fr	Ra	actinoids	—	88	89-103	104	105	Db	rutherfordium	—	106	107	Bh	bohrium	—	108	Hs	meitnerium	—	87
—	francium																				

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