Cambridge Assessment International Education

Science

Stage 9

Paper 1

2023

Cambridge Lower Secondary Progression Test

Name

Class

Date

45 minutes

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Write your answer to each question in the space provided.
- You should show all your working on the question paper.

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [ ].

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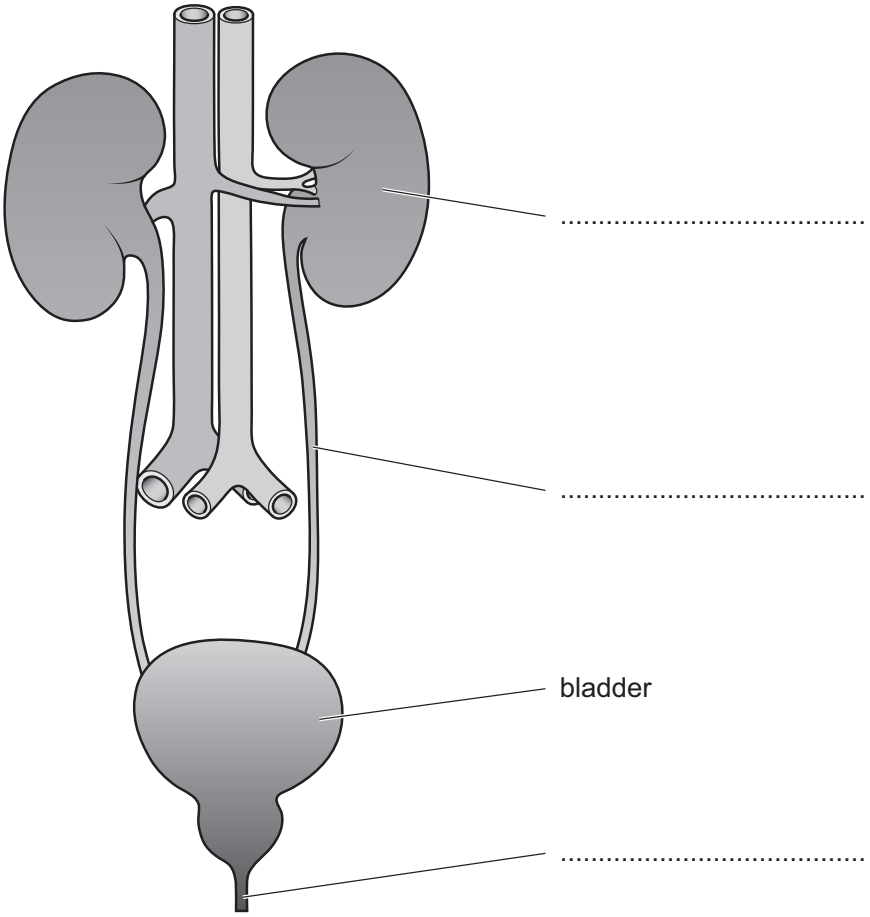
1 Look at the diagram of the human excretory (renal) system.



(a) Complete the labels on the diagram.

One has been done for you. [3]

(b) What is the function of the human excretory (renal) system?

.....

..... [1]

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2 The table shows information about elements.

atomic symbol	number of electrons in	
	one atom of the element	one ion of the element
Li	3	2
Mg	12	10
A*l*	13	10
C*l*	17	18
K	19	18
Ca	20	18

(a) (i) Which atom loses three electrons to form an ion?

Circle the correct answer.

Li **Mg** **A*l*** **C*l*** **K** **Ca** [1]

(ii) Which atom forms a negative ion?

.....

Explain your answer.

.....

.....

[2]

(iii) Two elements in the table are in Group 1.

Write down the atomic symbols of these **two** elements.

Use the Periodic Table on page 18 to help you.

..... and ..... [1]

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(b) Some elements make compounds with ionic bonds.

Describe what is meant by the words **ionic bond**.

.....

.....

..... [2]

3 This question is about heat and temperature.

(a) Describe the difference between heat and temperature.

.....

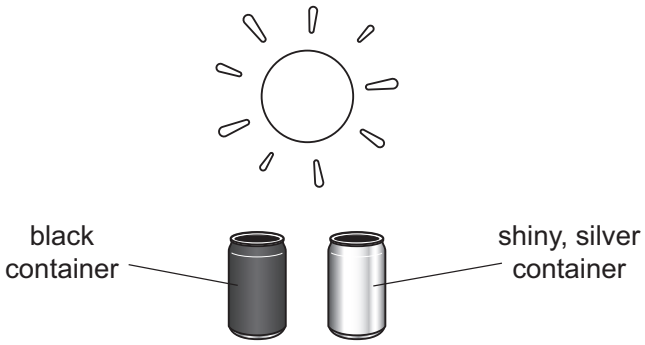
.....

..... [2]

(b) Rajiv investigates how the temperature of cold water increases in two different metal containers.

He puts the same volume of cold water in each container.

He puts the two containers in the sun.



(i) Name the equipment Rajiv uses to measure the temperature of the water.

..... [1]

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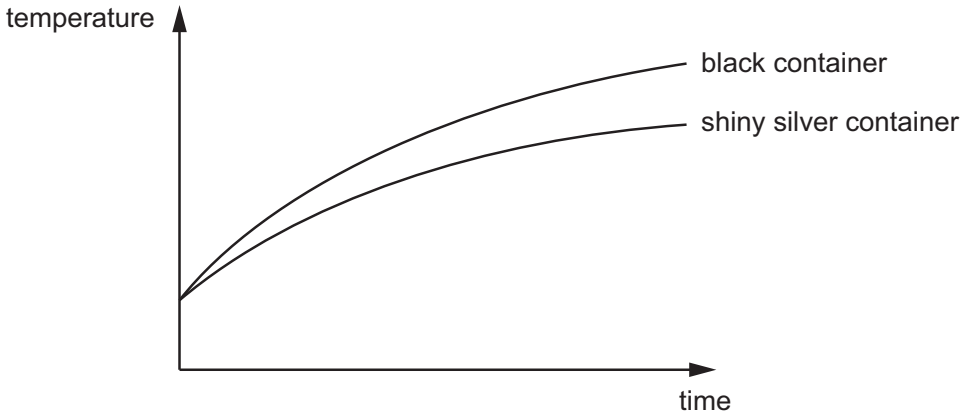
(ii) Look at the graph showing how the temperature of the water in each container increases with time.



The black container gains the most thermal energy.

Explain how you know from the graph.

.....

..... [1]

(iii) Explain why the black container gains more thermal energy by radiation.

.....

..... [1]

(c) Explain how the thermal energy travels **through** the metal containers.

Complete these sentences.

Thermal energy travels through the metal containers by the process of ..... .

The particles in the metal gain thermal energy and ..... more.

As energy passes through the metal the particles ..... with each other.

[2]

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4 There are different theories for the formation of the Moon.

Tick (✓) **one** correct statement about the **collision theory** for the formation of the Moon.

The Moon formed in another part of the Solar System and was later captured by Earth's gravity.	☐
The Moon was formed at the same time as the Earth was formed.	☐
The Moon formed when Earth hit another smaller planet, the debris collected in an orbit around the Earth.	☐
The Earth was spinning so fast that some material broke off and began to orbit the Earth.	☐

[1]

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5 Mia investigates displacement reactions.

In her first experiment she:

- puts some iron sulfate solution into a test-tube
- adds a piece of zinc to the iron sulfate solution
- records if a displacement reaction takes place.

Mia repeats the experiment, but this time uses different metals.

(a) Look at table showing Mia's results from the first experiment.

metal	**is there a displacement reaction?**
zinc	yes
magnesium	.....
copper	.....
iron	.....

Predict if a displacement reaction takes place with the other metals.

Write your predictions in the table. [1]

(b) Complete the word equation for the reaction between zinc and iron sulfate solution.

Look at the results.

..... + ... → ..... + ...

[2]

(c) Mia replaces the iron sulfate solution each time with a new sample.

Explain why Mia does **not** use the same sample of iron sulfate solution each time.

.....

..... [1]

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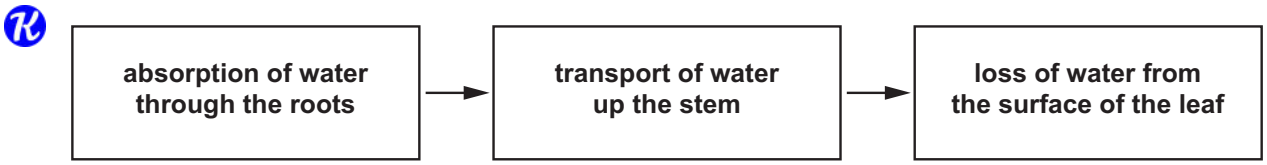
6 The diagram shows the pathway of water from the roots to a leaf in a flowering plant.



(a) (i) Name the cells in the root that absorb water from the soil.

.....[1]

(ii) Name the tube in the stem that transports water up the flowering plant.

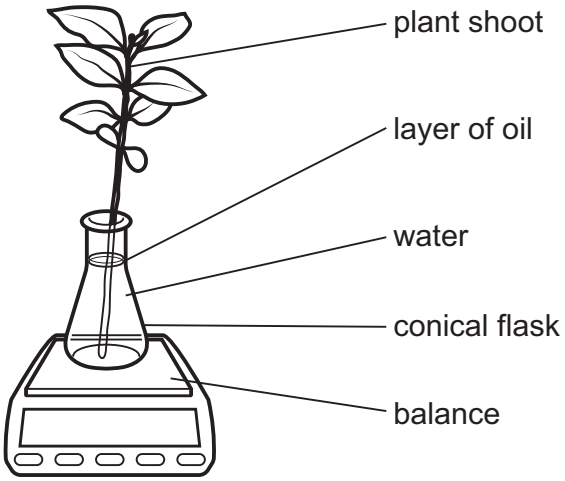
.....[1]

(iii) Name the process that causes the loss of water from the surface of the leaf.

.....[1]

(b) Carlos investigates water loss from a plant shoot.

Look at the equipment he uses.



At the start, Carlos measures the mass of the flask, its contents and the plant shoot.

After 24 hours he measures the mass of the flask, its contents and the plant shoot.

The change in mass is the mass of the water lost from the plant shoot.

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Here are his results.

mass at start in g	mass after 24 hours in g	mass of water lost in g
820	811	.....

(i) Calculate the mass of water lost by the plant shoot.

Write your answer in the table. [1]

(ii) Oil is waterproof.

Suggest why Carlos places a layer of oil on top of the water in the conical flask.

.....

..... [1]

(iii) Carlos wants to improve his experiment.

He repeats his experiment using a different balance.

Here are his results.

mass at start in g	mass after 24 hours in g	mass of water lost in g
820.3	811.4	8.9

Carlos thinks these results are better.

Explain why Carlos is correct.

.....

..... [1]

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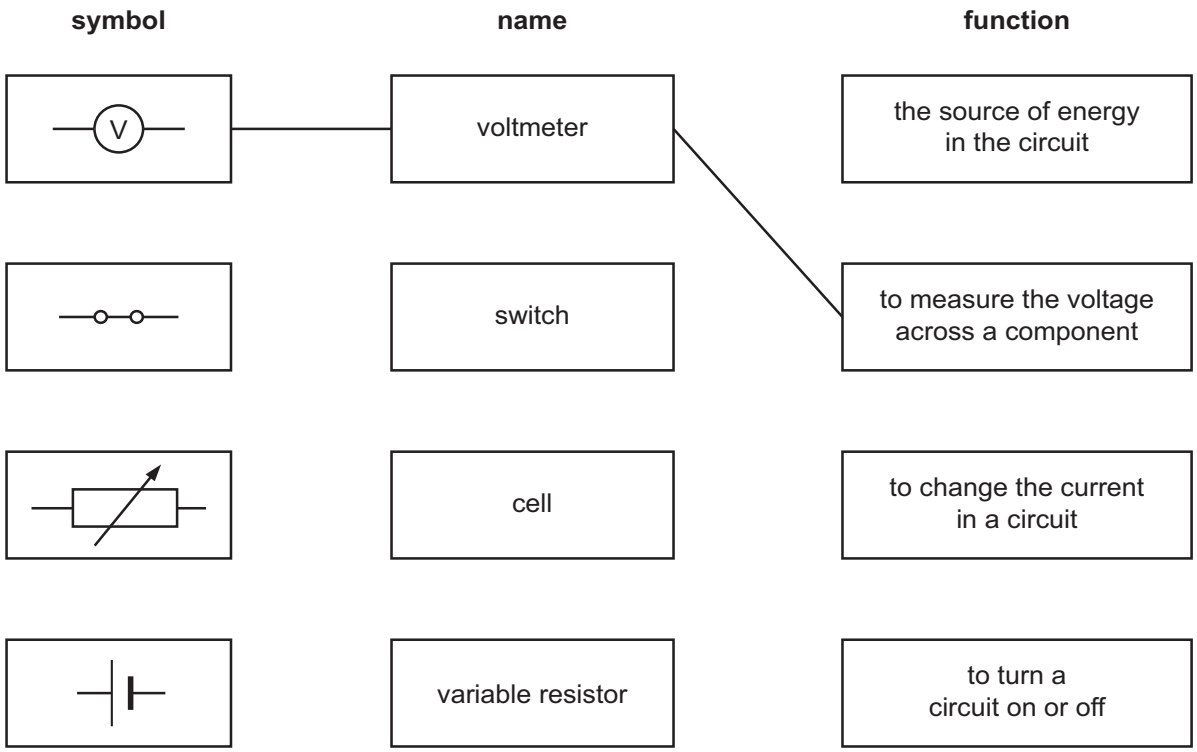
7 Draw a straight line from the **name** of the component to its correct **symbol** and **function**.

One has been done for you.



[3]

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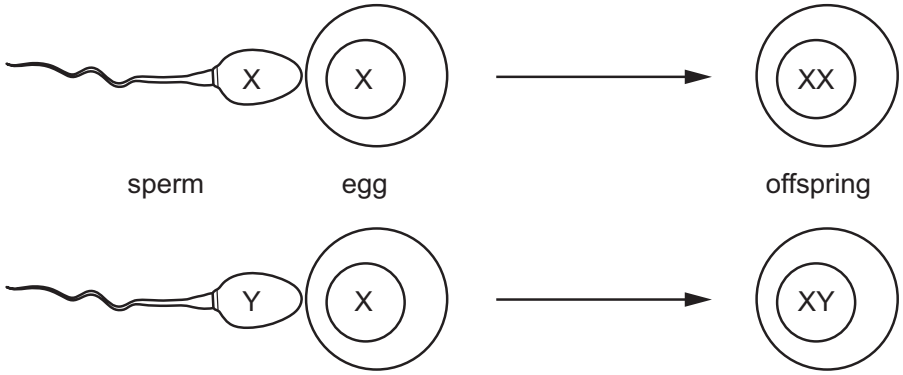
8 Offspring inherit characteristics from their parents when a sperm and an egg fuse together.

(a) Name the process that happens when a sperm and an egg fuse together.

.....[1]

(b) The sperm and the egg that fuse together determine the sex of the offspring.

Look at the diagram showing the chromosomes in the sperm and the egg which determine the sex of the offspring.



Explain why there is a 50% chance of the offspring being male.

Use the diagram to help you.

.....

.....

.....

.....[2]

(c) The offspring produced look similar but **not** identical to their parents.

Explain why the offspring produced will **not** look identical to their parents.

.....

.....

.....[1]

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9 Sixty-five million years ago an asteroid collided with Earth creating a large crater.

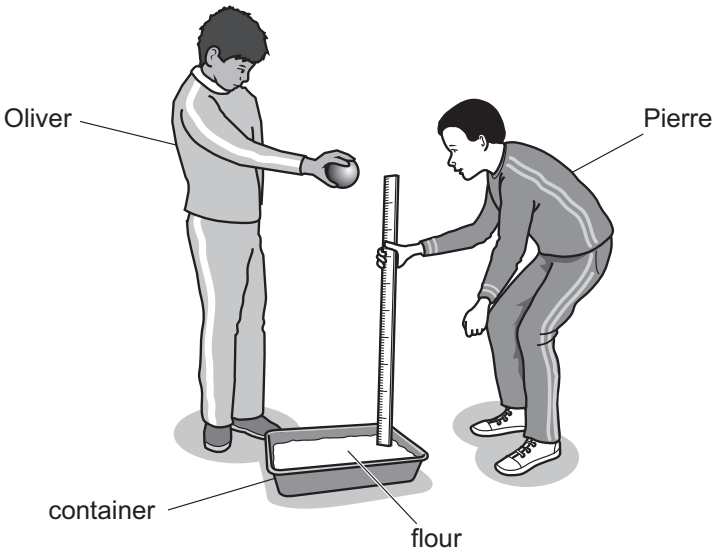
(a) Describe **two other** effects of this asteroid colliding with the Earth.

1 .....

2 .....

[2]

(b) Oliver and Pierre investigate the effect of the size of asteroids on the diameter of craters formed.



Oliver and Pierre:

- measure the diameter of a ball
- drop the ball into 5 cm depth of flour from a height of 1 m
- measure the diameter of the crater formed
- repeat the experiment four times.

Oliver and Pierre test four different sizes of ball.

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Here are their results.

diameter of ball in mm	diameter of crater in mm					mean diameter of crater in mm
8	12	11	12	12	12	11.8
10	14	13	12	13	14	13.2
40	37	36	35	36	37	36.2
50	46	48	45	47	48	46.8

Oliver and Pierre are discussing their results.

They think their results are reliable.

Write down **two** reasons why they are correct.

1 .....

.....

2 .....

.....

[2]

10 Magnesium reacts with dilute sulfuric acid to make magnesium sulfate solution and hydrogen gas.

(a) Complete these sentences about the rate of this reaction.

The rate of this reaction is increased by increasing the concentration **or**

the ..... of the dilute sulfuric acid.

One other way of increasing the rate of this reaction is to increase

the ..... of the magnesium.

[2]

(b) Describe how solid magnesium sulfate is made from magnesium sulfate solution.

..... [1]

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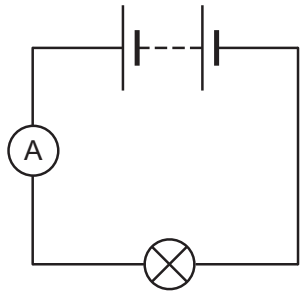
11 Angelique makes an electrical circuit.



lamp **K**

(a) The reading on the ammeter is 0.025 A.

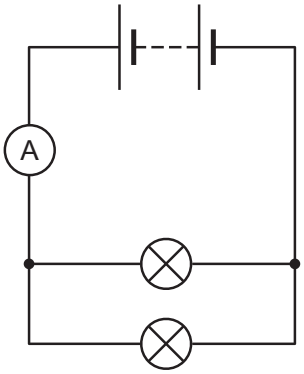
The voltage across lamp **K** is 3.0 V.

Calculate the resistance of lamp **K**.

resistance = ... Ω [2]

(b) Angelique makes another circuit with two lamps.

Look at the diagram of this circuit.



Describe what happens to the current as it flows through this circuit.

.....

.....

..... [2]

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12 This is a question about nebulae.

(a) Complete the sentences.

Nebulae are clouds of ..... and ..... .

New stars are formed in some nebulae called ..... .

[2]

(b) Stars can be classified according to their properties.

Look at the table of the properties of some star types.

star type	colour	relative mean mass (the Sun = 1)	relative mean radius (the Sun = 1)	relative mean luminosity (the Sun = 1)
O	blue	60	15	1 400 000
B	blue	18	7	20 000
A	blue	3.2	2.5	80
F	blue to white	1.7	1.3	6
G	white to yellow	1.1	1.1	1.2
K	orange to red	0.8	0.9	0.4
M	red	0.3	0.4	0.04

Look at the key used to identify a star type.

Identify the star types of the five stars **Antares**, **Arcturus**, **Capella**, **Lactera** and **Sirius**.

Write your answers in the correct star type in the key.

Lactera has been done for you.

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			star type
1	star colour is blue or blue to white	go to 2	
	star colour is **not** blue or blue to white	go to 3	
2	mean mass is 60 times greater than the mass of the Sun	**Lactera**	**O**
	mean mass is 3.2 times greater than the mass of the Sun	**Sirius**	.....
3	mean mass is greater than the mass of the Sun	**Capella**	.....
	mean mass is less than the mass of the Sun	go to 4	
4	mean radius is about half that of the Sun	**Antares**	.....
	mean luminosity is about half that of the Sun	**Arcturus**	.....

[2]

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