Cambridge Assessment International Education

Cambridge Lower Secondary Progression Test

Science paper 2

Stage 9

9854418526

45 minutes

Name .....

Additional materials: Calculator
Ruler

READ THESE INSTRUCTIONS FIRST

Answer **all** questions in the spaces provided on the question paper.

You should show all your working on the question paper.

The number of marks is given in brackets [ ] at the end of each question or part question.

The total number of marks for this paper is 50.

For Teacher's Use	
Page	**Mark**
1	
2	
3	
4	
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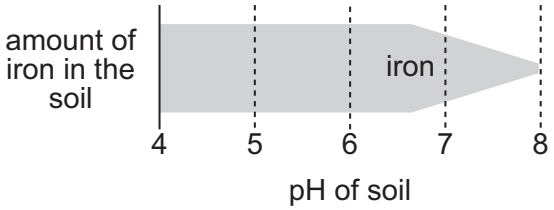
8	
9	
10	
11	
12	
13	
14	
15	
16	
Total	

1 To grow well, plants need to absorb minerals from the soil.

These minerals contain chemical elements.

(a) Most soils have a pH between 4 and 8.5.

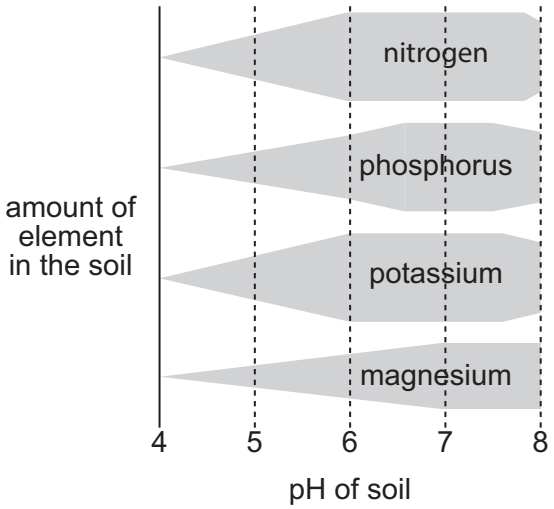
The diagram shows how pH affects the amount of iron in the soil.



The diagram shows that between pH 4 and 6.7 the soil contains the greatest amount of iron.

Above pH 6.7 the amount of iron decreases.

The diagram below shows how pH affects the amount of other elements in the soil.



(i) Use the information in the diagram to answer the questions.

Explain why plants grow well at pH 7.

.....

Explain why plants do **not** grow well at pH 4.

.....

[2]

For Teacher's Use

(ii) Which element is in least amount when the soil pH is greater than 7?

Choose from

iron

nitrogen

phosphorus

potassium

magnesium

answer.....[1]

(b) The soil can be improved by adding decayed plant material or animal waste.

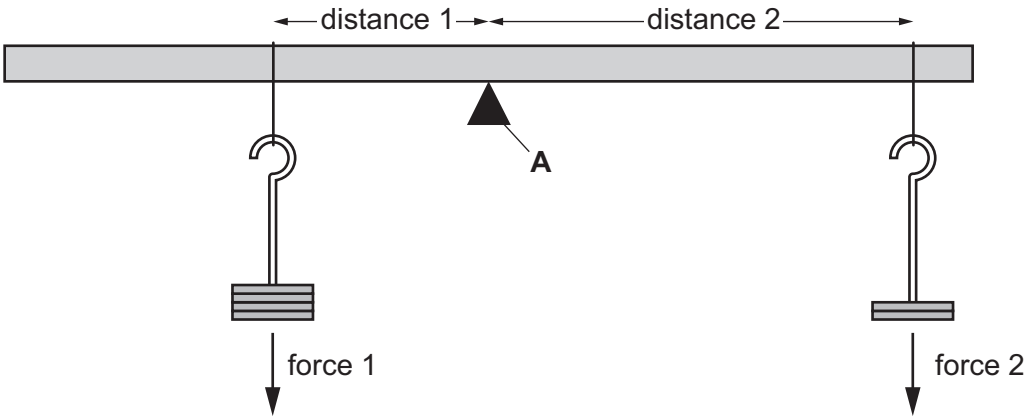
(i) Which group of organisms cause decay?

.....[1]

(ii) Explain why adding decayed plant material or animal waste improves soil.

.....[1]

2 Forces can make objects turn.



Complete the sentences.

The part labelled **A** in the diagram is the ..... .

Look at the formula.

Z = force × distance

Z is called a ..... . [2]

For Teacher's Use

3 A teacher shows his students the reactions of some metals with water.

He starts by adding small amounts of some metals to a bowl containing water.

The table shows the observations his students make.

metal	chemical symbol	observation
lithium	Li	fizzes slowly
sodium	Na	fizzes quickly
potassium	K	fizzes very quickly and bursts into flames

(a) When the teacher does the experiment he needs to keep himself and his students safe.

Write down **one** way he could do this.

.....[1]

(b) A gas is made when these metals react with water.

What is the **name** of this gas?

Circle the correct answer.

carbon dioxide **hydrogen** **nitrogen** **oxygen**

[1]

(c) All the metals the teacher uses are in Group 1 of the Periodic Table.

(i) Which of the three metals is the **most** reactive?

.....[1]

(ii) Rubidium is also in Group 1.

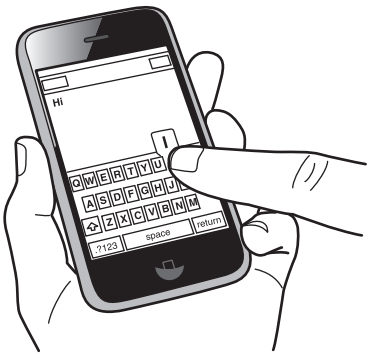
It is beneath potassium in the Periodic Table.

Predict what happens when **rubidium** is added to water.

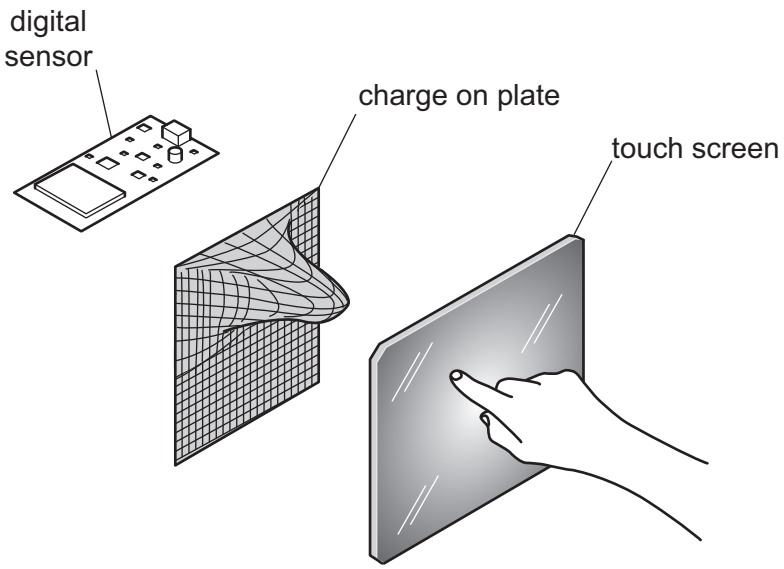
.....[1]

4 Many computers and mobile phones have touch screens.

For Teacher's Use



Touch screens work using electric charge.



Put these statements in the **correct** order.

Use numbers **1**, **2**, **3**, **4** and **5**.

One has been done for you.

statement	order
the touch screen pushes onto the plate behind	
the charge on this part of the plate changes	
you choose the letter you want on the phone	**1**
the change in charge is detected by the digital sensor	
you touch the screen with your finger	

[1]

For Teacher's Use

5 Charles Darwin is famous for his theory of natural selection.

He developed this theory by making observations and drawing conclusions.

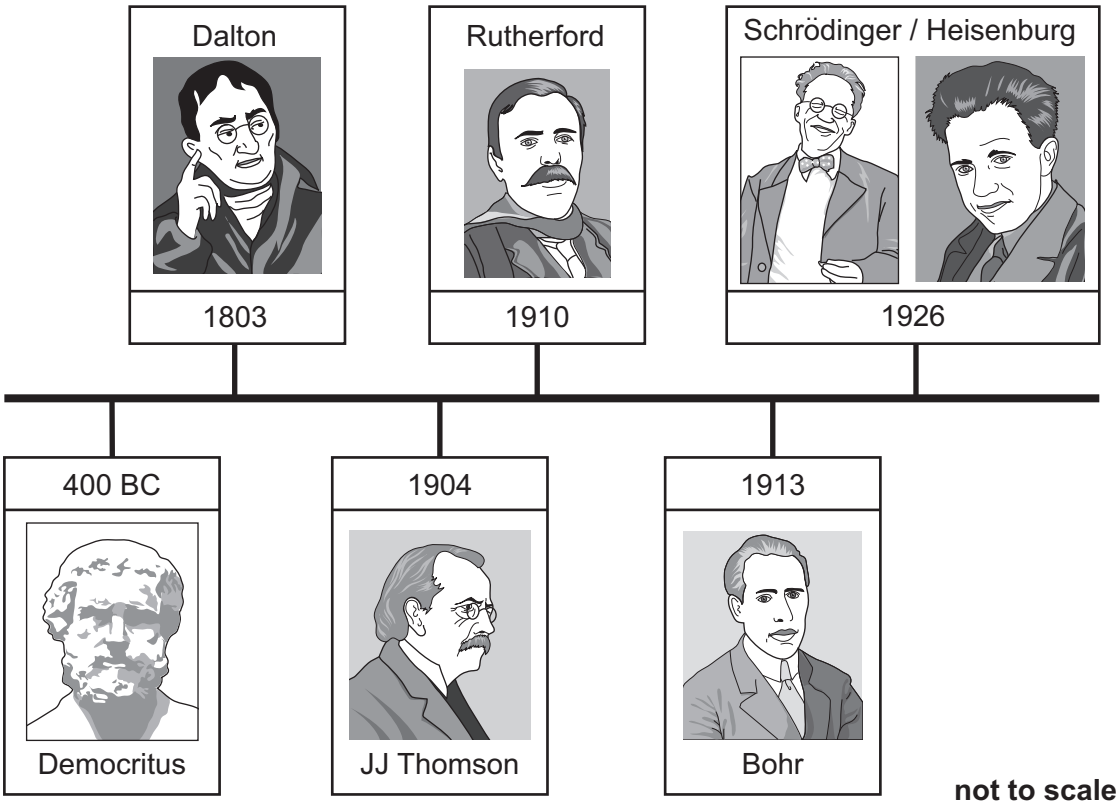
Draw a line from each **observation** to the correct **conclusion**.

observation	**conclusion**
Offspring of a species have small differences.	The small differences make some offspring better adapted than others.
Over time the population of a species stays roughly the same.	The small differences are inherited.
The small differences can be seen in the parent and the offspring.	Darwin called this evolution.
Over time, the appearance of a species changes.	The weakest die and the best adapted survive.

[2]

6 The timeline shows when some scientists made suggestions about the structure of the atom.

For Teacher's Use



not to scale

(a) Rutherford was the first scientist to suggest the modern day model of an atom.

(i) The idea of elements being made of atoms was also suggested by a scientist just over 100 years before Rutherford's suggestion.

Use the timeline to name this scientist.

.....[1]

(ii) The atomic model made famous by JJ Thomson in 1904 was called the plum pudding model.

Rutherford's suggestions meant the plum pudding model was no longer used.

Use the timeline to calculate how long the plum pudding model of the atom was used.

..... years [1]

(b) The model first suggested by Rutherford has changed over time.

Why has this model changed?

.....

.....

.....[1]

7 Rajiv uses the internet.

He finds information about different energy sources used in the **USA** in the year 2008.

energy source	percentage (%) use in the USA
coal	23
natural gas	24
nuclear electric power	9
petroleum	37
renewable	7

(a) What is the best way to present the information in the table?

.....

Explain your answer .....

.....

[2]

(b) The information was for the year 2008.

Rajiv wants to predict the **world's** (global) energy use for the year 2025.

Describe why the information in the table is **not** very useful for this prediction.

.....

.....

.....[2]

(c) Name a **renewable** energy source.

.....[1]

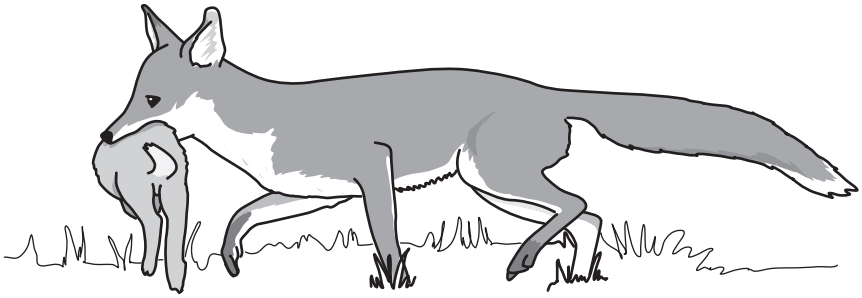
(d) Coal is a fossil fuel.

Explain why coal is a **non-renewable** energy source.

.....

.....[1]

8 Foxes are predators that eat rabbits.



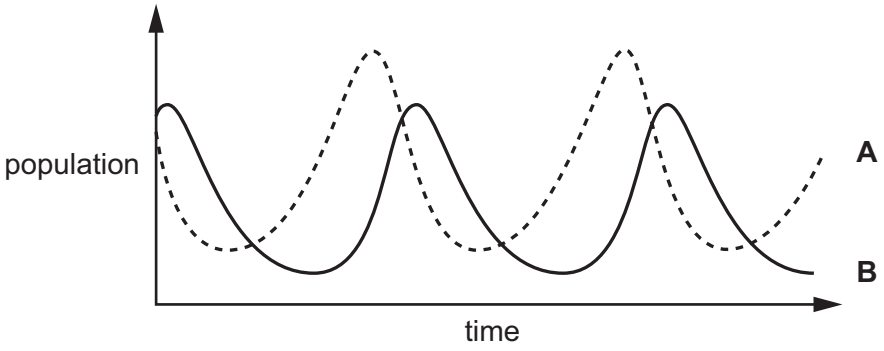
(a) State **two** factors, other than predation, that affects the size of the rabbit population.

1 .....

2 .....

[2]

(b) The graph shows how the populations of rabbits and foxes change over time.



Which line, **A** or **B**, represents the size of the fox population? .....

Explain your answer.

.....

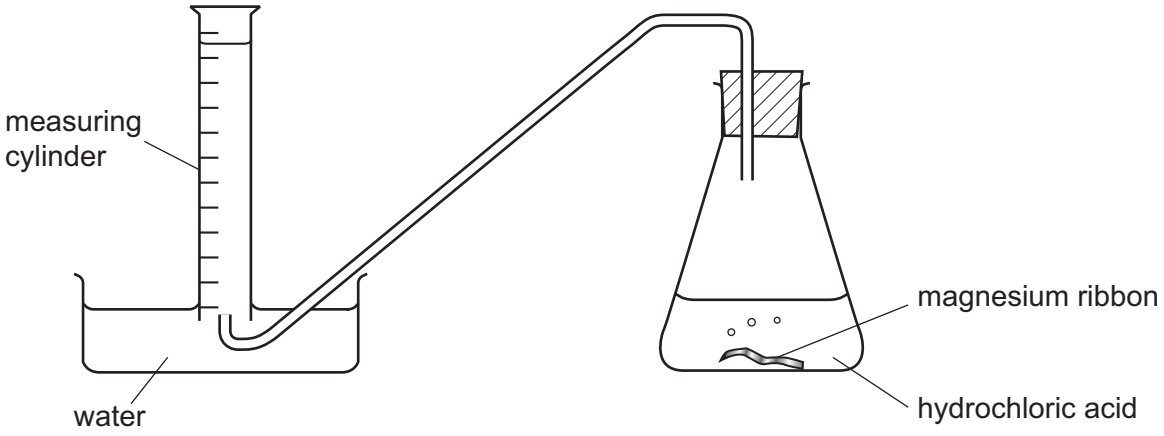
.....

[1]

For Teacher's Use

9 Jamila and Ahmed investigate the rate of reaction between hydrochloric acid and magnesium.

The diagram shows the apparatus they use.



The flask contains 1 cm length of magnesium ribbon and 25 cm^3 of hydrochloric acid.

Jamila and Ahmed measure the volume of gas made in two minutes.

They repeat the experiment using different concentrations of acid.

Here is their results table.

relative concentration of acid	volume of gas collected in cm^3
1	5
2	12
3	29
4	25
5	27

Jamila tells Ahmed that one result is an anomaly.

(a) Which result is the anomaly?

.....[1]

(b) How could they check if this result is an anomaly?

.....[1]

(c) Jamila and Ahmed want to improve their experiment to get more **accurate** results.

For Teacher's Use

What improvement should they make?

Tick (✓) the correct answer.

Replace the acid with an alkali. ☐

Replace the conical flask with a beaker. ☐

Use a gas syringe instead of a measuring cylinder. ☐

Use iron instead of magnesium. ☐ [1]

10 Yuri wants to measure the **current** and **voltage** in an electrical circuit.

Complete the gaps in the table.

	current	**voltage**
unit	amps	.....
measured with	ammeter in series	..... in .....
circuit symbol for the measuring device		

[3]

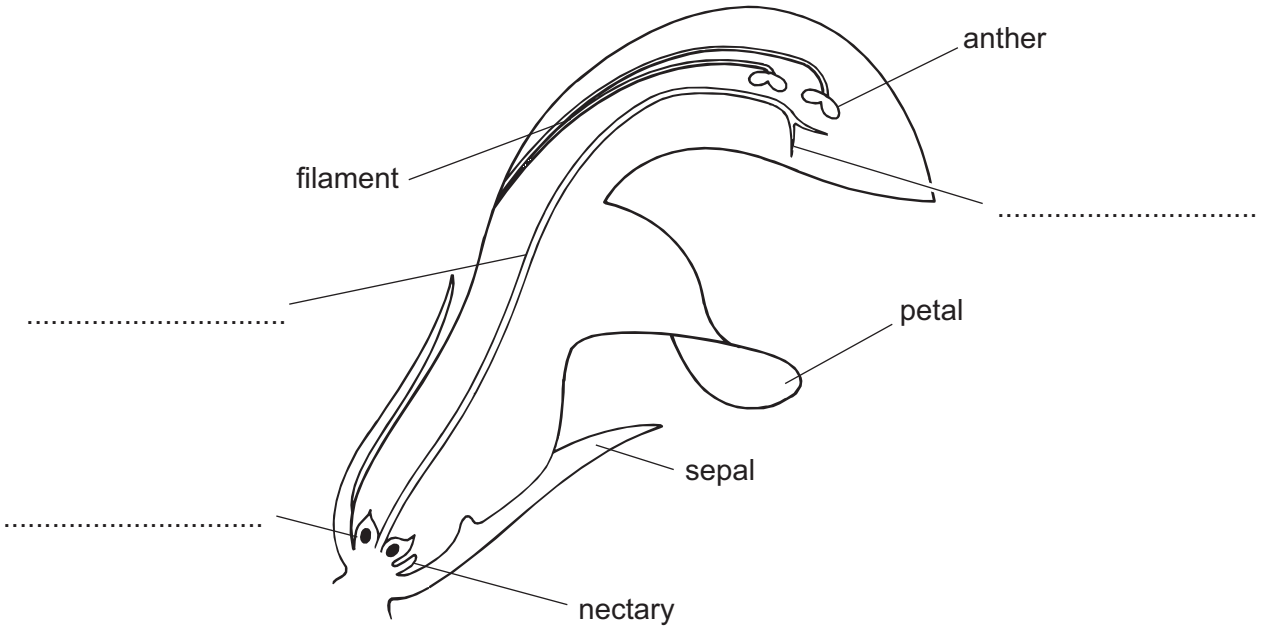
For Teacher's Use

11 Look at the diagram of the inside of a flower.

(a) Complete the labelling on the diagram.

Choose words from this list.

leaf **ovary** **pollen** **stamen** **stigma** **style**



[3]

(b) The table describes the processes involved in sexual reproduction in flowering plants.

They are **not** in the correct order.

Complete the table to give the name of each process.

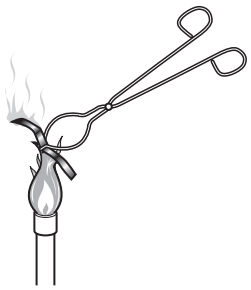
The first one has been done for you.

description of process	name of process
ovule develops into a seed	seed formation
pollen fuses with the ovule	.....
pollen transferred onto plant	.....
wind carries seed away	.....

[3]

12 Mike investigates the metal magnesium.

For Teacher's Use



(a) He burns a piece of magnesium in a Bunsen burner flame.

Burning (combustion) releases energy.

Write down the word used to describe a reaction that releases energy.

.....[1]

(b) Mike places a piece of magnesium into hydrochloric acid.

The acid starts to fizz.

(i) Which gas is made?

.....[1]

(ii) This reaction also makes a salt.

Circle the name of this salt.

magnesium chloride	**magnesium hydride**	**magnesium hydroxide**	**magnesium sulfate**

[1]

(c) Mike puts a piece of magnesium into water.

There is a very slow reaction.

Circle the name of the metal that reacts much faster with water than magnesium does.

calcium	**copper**	**gold**	**silver**

[1]

For Teacher's Use

13 Priya plans an investigation into the density of different salt solutions.

She does some preliminary experiments.

Priya

- puts different masses of salt into 100 cm^3 water
- measures the mass and volume of the salt solution.

Here are her preliminary results.

mass of salt in g	mass of salt solution in g	volume of salt solution in cm^3
1	101	100.4
5	105	101.3
20	120	103.6
40	140	103.9
100	200	104.0

(a) What range of masses of salt would give Priya the **biggest** range of **volumes**?

Tick (✓) the correct answer.

0–1 g ☐

1–5 g ☐

1–20 g ☐

20–100 g ☐ [1]

(b) What pattern is shown by the preliminary results?

.....

.....[1]

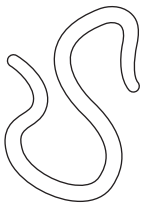
(c) Priya does just one set of preliminary results.

Why is it important to repeat each set of results in the actual investigation?

.....[1]

14 Use the key to identify the invertebrate in the diagram.

For Teacher's Use

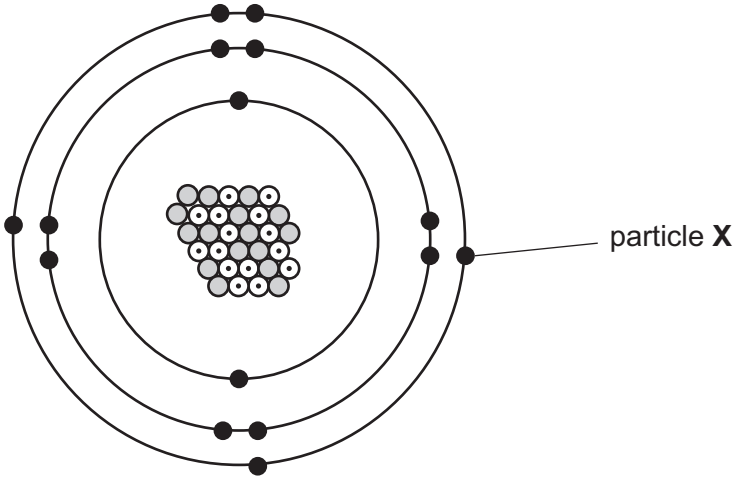


1	has a segmented body	**go to 2**
	does not have a segmented body	**go to 4**
2	has legs	**go to 3**
	does not have legs	**earthworm**
3	has enlarged pincers (claws) at front of body	**crayfish**
	does not have pincers (claws) at front of body	**dragonfly nymph**
4	length is more than three times its width	**roundworm**
	length is less than three times its width	**flatworm**

The invertebrate is .....[1]

15 The diagram shows an atom of phosphorus.

For Teacher's Use



(a) What is the name of particle **X**?

.....[1]

(b) What is the number of **particles** in the nucleus of this phosphorus atom?

.....[1]

16 Energy from the Sun reaches the Earth.

(a) Which process transfers thermal (heat) energy from the Sun to the Earth?

Circle the correct answer.

conduction **convection** **evaporation** **radiation**

[1]

(b) Explain why energy from the Sun can only be transferred to the Earth by this process.

.....

.....[1]