Cambridge Assessment International Education

Science

Stage 9

Paper 2

2022

Cambridge Lower Secondary Progression Test

Name

Class

Date

45 minutes

No additional materials are needed.

INSTRUCTIONS

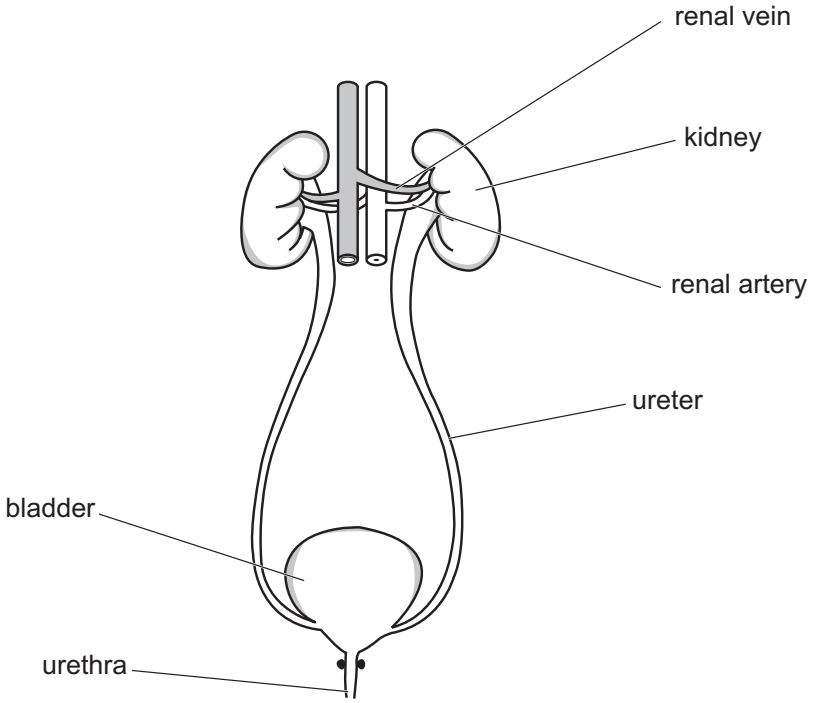
- Answer **all** questions.
- Write your answer to each question in the space provided.
- You should show all your working on the question paper.

INFORMATION

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

1 Look at the diagram.

It shows the human excretory (renal) system.



(a) Look at the table about what happens in different parts of the excretory (renal) system.

Complete the table.

The first row has been done for you.

part	what happens
renal artery	blood enters excretory (renal) system
kidney	.....
.....	urine travels through this tube to be stored
.....	urine is stored here before excretion from body

[3]

(b) Kidney failure causes a build-up of a toxic substance in the blood.

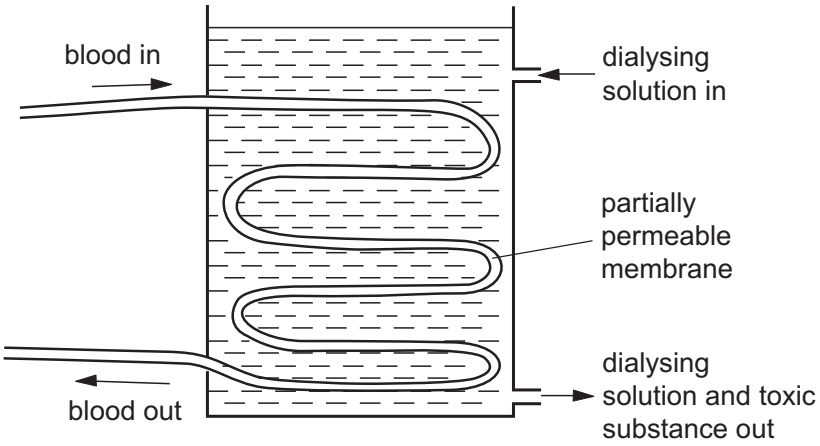
Write down the name of this toxic substance.

..... [1]

(c) Artificial kidneys prevent the build-up of toxic substances in the blood.

Artificial kidneys use a process called dialysis.

Look at the diagram of an artificial kidney.



Use the model to describe how dialysis works.

.....

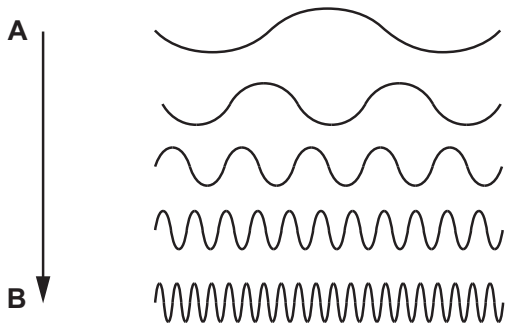
.....

.....

..... [2]

2 Look at the diagram.

It shows different sound traces on an oscilloscope.



(a) Complete the sentences to describe what is happening to the sound from **A** to **B**.

Choose from the list.

decreases **increases** **stays the same**

The loudness of the sound ..... .

The frequency of the sound ..... .

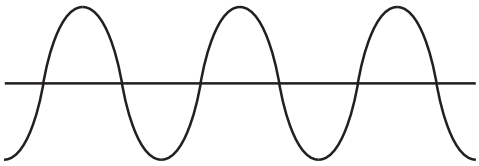
[2]

(b) This question is about combining sound waveforms.

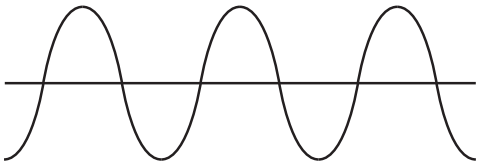
The diagram shows two waveforms, wave **1** and wave **2**, that combine together.

It also shows the new waveform made.

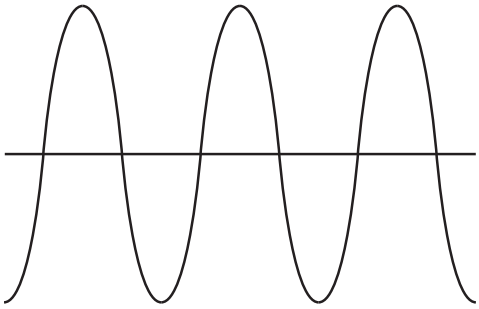
wave **1**



wave **2**



wave **1** + wave **2**

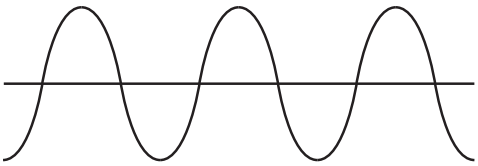


(i) Write down the word that describes how wave **1** and wave **2** combine together.

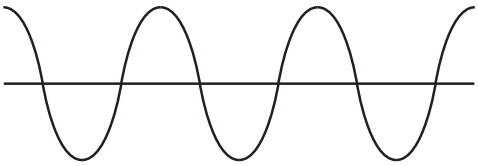
..... [1]

(ii) Two more waveforms, wave **3** and wave **4**, combine together.

wave **3**



wave **4**



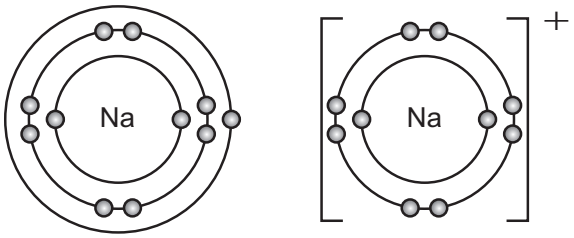
wave **3** + wave **4**

Write down the word that describes how wave **3** and wave **4** combine together.

..... [1]

3 Look at the diagrams.

They show the electronic structures of a sodium atom and of a sodium ion.



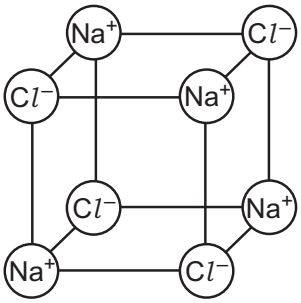
sodium atom sodium ion

(a) Describe how a sodium ion is made from a sodium atom.

.....[1]

(b) Look at the diagram.

It shows the structure of sodium chloride.



(i) Write down the name of the **type** of bonding in sodium chloride.

.....[1]

(ii) The bonding between sodium ions and chloride ions is strong.

Explain why.

.....

.....[1]

(iii) Sodium chloride has a giant structure.

Circle the melting point of sodium chloride.

–50 °C **0 °C** **52 °C** **801 °C**

[1]

4 This question is about tectonic plates.

(a) Tectonic plates float on molten magma in the mantle.

(i) Write down the name of the layer of the Earth made of tectonic plates.

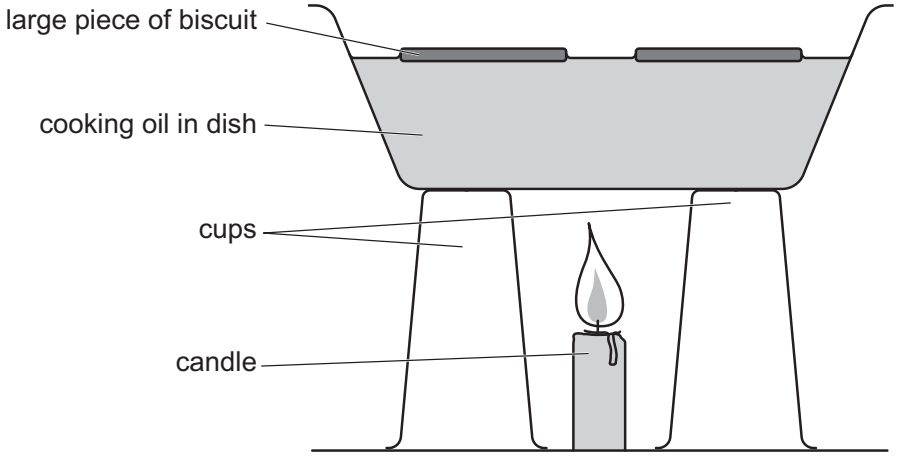
.....[1]

(ii) Explain why tectonic plates float on the mantle.

.....[1]

(b) Yuri models what happens at the boundary between two tectonic plates.

Look at the diagram of Yuri's model.



Each large piece of biscuit models a tectonic plate.

The large pieces of biscuit float on the cooking oil.

The cooking oil models the magma in the mantle.

(i) Which part of the Earth does the lighted candle in the model represent?

.....[1]

(ii) Predict what will happen to the pieces of biscuit.

Explain your answer.

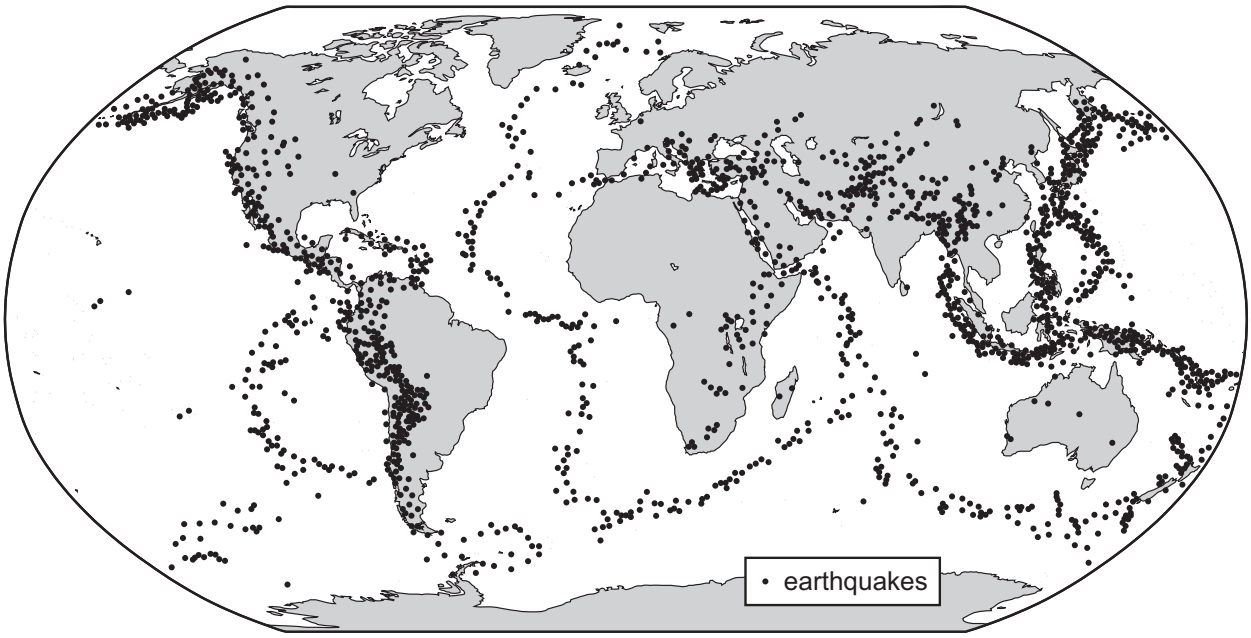
prediction .....

explanation .....

.....

[2]

(iii) The map shows the positions of earthquakes on the Earth's surface.



Explain how the positions of earthquakes are used as evidence for tectonic plates.

.....

.....

.....

..... [2]

(iv) Write down **two other** features that are used as evidence for tectonic plates.

1 .....

2 .....

[2]

(c) There have been five times in the Earth's history when most of the organisms living became extinct. This is called a mass extinction.

Scientists think that enormous volcanic eruptions caused these mass extinctions.

Explain why.

.....

..... [1]

5 Priya finds some information about the effect of smoking on fetal development.

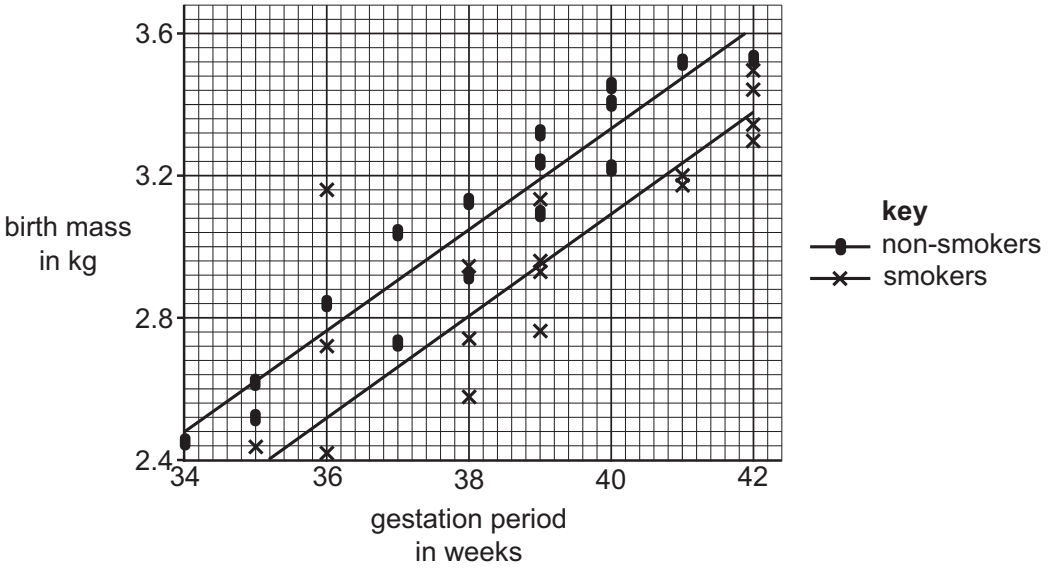
Look at the graph.

It shows the birth mass of:

- 16 babies born to non-smokers
- 16 babies born to smokers.

The graph also shows the gestation period.

This is the time period between fertilisation of an egg and the birth of a baby.



(a) (i) Look at the birth masses for a gestation period of 36 weeks.

One of the birth masses is anomalous.

Circle the anomalous birth mass on the graph. [1]

(ii) Suggest **one** possible conclusion from the data.

..... [1]

(b) Describe **one** way the evidence collected could be made more reliable.

.....

..... [1]

6 Look at the information about Group 1 elements.

element	melting point in °C	boiling point in °C
sodium	98	883
potassium	64	759
rubidium	39	688

(a) Lithium is **above** sodium in the Periodic Table.

Predict the melting point of lithium.

..... °C [1]

(b) Caesium is **below** rubidium in the Periodic Table.

Predict the boiling point of caesium.

..... °C [1]

(c) Which of the **three** elements in the table is the **most** reactive?

..... [1]

7 Aiko is in a hot room.

She starts to produce perspiration on her skin.

Perspiration is a watery liquid.

The perspiration helps Aiko to control her body temperature.

Complete the sentences to explain how.

Choose from the list.

boil	**chemical**	**condense**	**cool**
decreases	**electrical**	**evaporate**	**increases**
melts	**potential**	**stays the same**	**thermal**

The water in the perspiration begins to .....

During this process the water absorbs ..... energy from the skin.

The temperature of the skin ..... .

[3]

8 This question is about inheritance in humans.

Reproduction is important for the survival of the species.

(a) A fertilised human egg cell contains 46 chromosomes.

How many chromosomes are there in a sperm cell?

.....

Explain your answer.

.....

.....

[2]

(b) Human sperm production is damaged by temperatures 2 °C above normal body temperature.

This could affect the survival of the human species.

Suggest how an increase in the temperature of the environment affects the ability of humans to reproduce.

.....

.....

.....

..... [2]

(c) Write down the word that describes the total number of individuals of the same species.

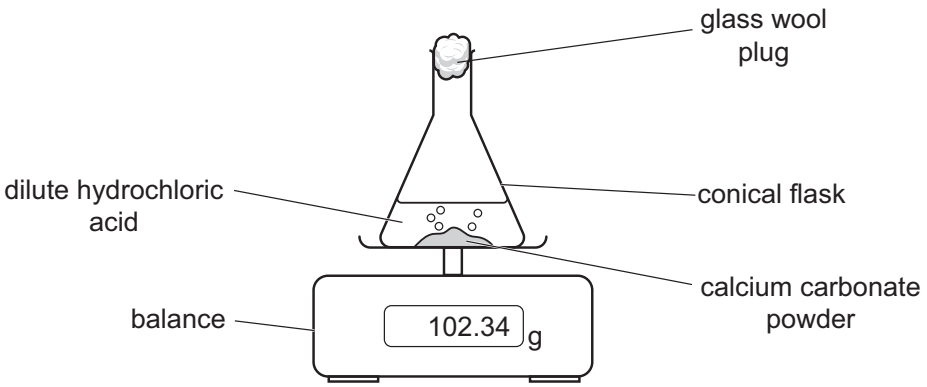
..... [1]

9 Chen investigates the rate of reaction between calcium carbonate and dilute hydrochloric acid.

Look at the word equation for the reaction.

calcium carbonate + hydrochloric acid → calcium chloride + carbon dioxide + water

Look at the equipment Chen uses.



(a) Predict what happens to the mass reading on the balance during the reaction.

.....

Explain your answer.

.....

.....

[2]

(b) Chen finds that the rate of the reaction is greater when he uses powdered calcium carbonate rather than lumps of calcium carbonate.

Explain why using the particle model.

.....

.....

..... [2]

(c) Describe **one** safety precaution Chen must take during his investigation.

.....

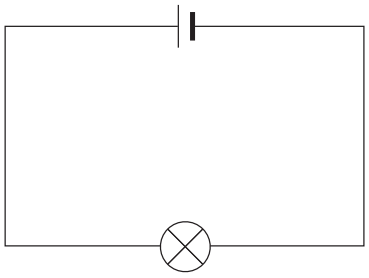
Explain why he takes this safety precaution.

.....

[2]

10 Angelique wants to measure the current and voltage in a circuit.

(a) Look at the circuit diagram.



(i) Angelique measures the current using an ammeter.

Draw the position of the ammeter on the circuit diagram.

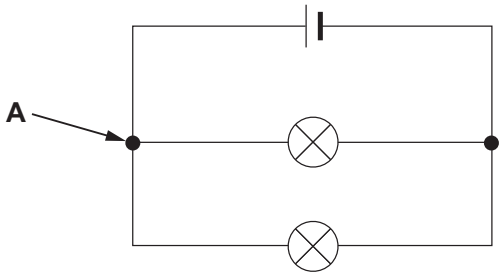
Use the correct symbol for the ammeter. [1]

(ii) Angelique measures the voltage across the lamp using a voltmeter.

Draw the position of the voltmeter on the circuit diagram.

Use the correct symbol for the voltmeter. [1]

(b) Angelique builds another circuit.



Describe what happens to the current in the circuit at point **A**.

..... [1]

11 Hassan investigates if objects float or sink when placed in cooking oil.

Look at the table of densities.

material	density in g / cm^3
brick	2.1
cork	0.2
wood	0.7
ice	0.9
steel	8.1
aluminium	2.7
polystyrene	0.3
modelling clay	1.7
cooking oil	0.9

(a) Hassan uses the diagram and the data in the table to make a hypothesis about which objects float and which objects sink in cooking oil.

He wants to link the density of an object to if it floats or sinks in cooking oil.

Suggest the hypothesis Hassan makes.

.....

.....

..... [1]

(b) Hassan investigates if objects made from plastics of different densities will float in **water**.

Describe his investigation.

.....

.....

.....

..... [2]