Write your name here

| Surname | Other names |
|---|---|
| | |

**Pearson Edexcel International Lower Secondary Curriculum**

| Centre Number | Candidate Number |
|---|---|
| | |

# Science

## Year 9
## Achievement Test

Wednesday 3 June 2015 – Afternoon
**Time: 1 hour 20 minutes**

Paper Reference
**LSC01/01**

**You may need:**
Ruler

Total Marks

## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

## Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Candidates may use a calculator.

## Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

*Turn over* ▶

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P 4 4 9 6 3 A 0 1 3 2

PEARSON

## SECTION A

**Answer ALL questions**

**For questions 1 – 10 put a cross in one box ☒ to indicate your answer.**
**If you change your mind, put a line through the box ☒ and then put a cross in another box ☒.**
**Each question is worth one mark.**

**1** Metals allow heat to pass through them easily. This is because metals are

☒ **A** conductors.

☒ **B** ductile.

☒ **C** insulators.

☒ **D** malleable.

**(Total for Question 1 = 1 mark)**

**2** Which is the correct symbol for the element copper?

☒ **A** Co

☒ **B** CO

☒ **C** Cu

☒ **D** CU

**(Total for Question 2 = 1 mark)**

**3** Which of these can easily be separated into simpler substances?

☒ **A** an atom

☒ **B** an element

☒ **C** a compound

☒ **D** a mixture

**(Total for Question 3 = 1 mark)**

**4** We can see the Moon at night, even though it does not produce light of its own.

Which statement best explains how we see the Moon at night?

☒ **A** Light from the Sun is refracted by the Moon.

☒ **B** Light from the Earth is reflected by the Moon.

☒ **C** Light from the Sun is reflected by the Moon.

☒ **D** Light from the Earth is refracted by the Moon.

**(Total for Question 4 = 1 mark)**

**5** A seedling is watered and kept in a sunny place.

What else is needed for the seedling to grow into a healthy and strong plant?

☒ **A** darkness

☒ **B** minerals

☒ **C** weedkiller

☒ **D** wind

**(Total for Question 5 = 1 mark)**

**6** What is the name of the process in which plants use sunlight to create food?

☒ **A** biomass

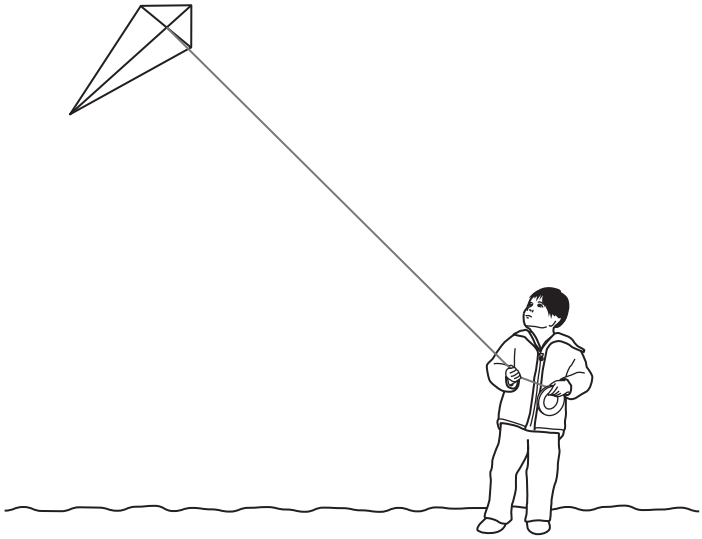
☒ **B** chloroplast

☒ **C** photosynthesis

☒ **D** respiration

**(Total for Question 6 = 1 mark)**

**7** Archie is flying a kite.



As the wind blows, the kite changes speed and direction. Why does this happen?

☒ **A** The forces acting on the kite are unbalanced.

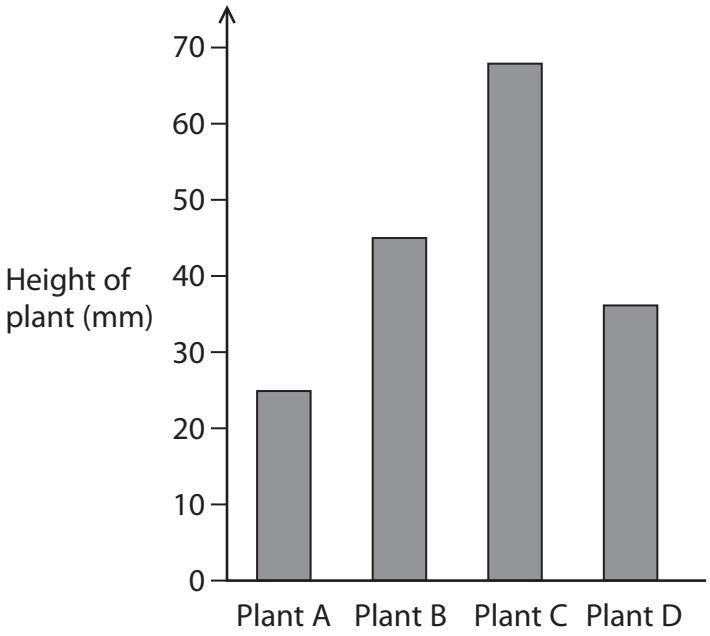
☒ **B** There are no forces acting on the kite.

☒ **C** There are too many forces acting on the kite.

☒ **D** The forces acting on the kite are balanced.

**(Total for Question 7 = 1 mark)**

**8** Harriet grows four plants (A, B, C and D). After 6 weeks she measures the height of the plants and puts the data into a bar chart.




Which plant was **most** likely to have been given fertiliser?

☒ **A**

☒ **B**

☒ **C**

☒ **D**

**(Total for Question 8 = 1 mark)**

**9** What is the force of gravity on Earth?

☒ **A** 100N per 1 kg

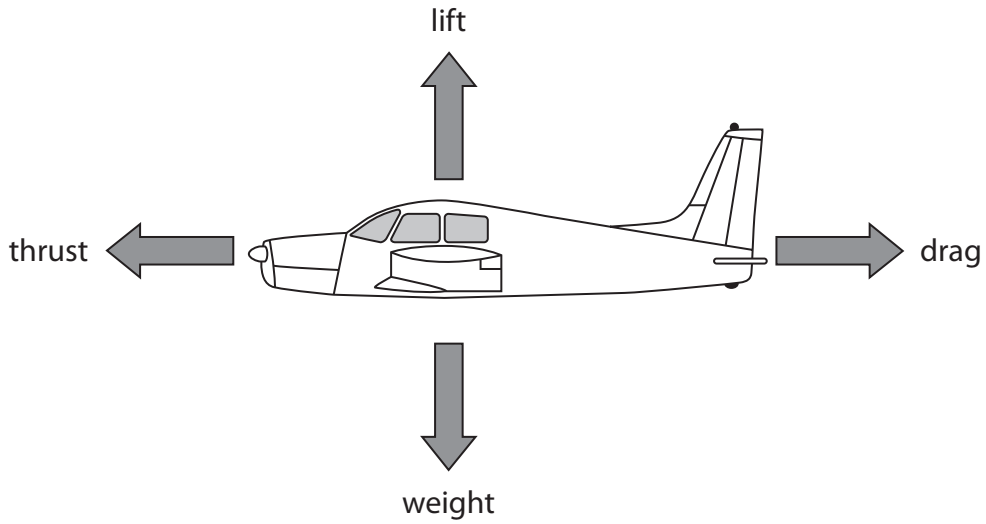
☒ **B** 10N per 1 kg

☒ **C** 1N per 1 kg

☒ **D** 0.1N per 1 kg

**(Total for Question 9 = 1 mark)**

**10** The picture shows the direction of four forces that act on an aeroplane in flight.




Which force slows the plane down when it is moving?

- ☒ **A** drag
- ☒ **B** lift
- ☒ **C** thrust
- ☒ **D** weight

**(Total for Question 10 = 1 mark)**

**11** A class is considering the properties of some substances.

| Property | Substance | | | | | |
|---|---|---|---|---|---|---|
| | **copper** | **iron** | **salt** | **sand** | **sugar** | **wax** |
| **Does it dissolve in water?** | No | No | Yes | No | | |
| **Is it magnetic?** | No | Yes | No | No | | |

(a) Complete the table to show the properties of sugar and wax.

**(2)**

(b) The class is then asked how to separate mixtures of some of the substances.

Choose a property from the table that could be used to separate a mixture of

(i) iron and sand

**(1)**

.....

(ii) salt and copper

**(1)**

.....

**(Total for Question 11 = 4 marks)**

**12** Choose an answer from the box to complete each sentence below. Each answer may be used once, more than once or not at all.

| characteristics | chloroplasts | DNA | gametes | nucleus |
|---|---|---|---|---|

Chromosomes are found in the ..... of a cell.

Chromosomes contain information about an organism's .....

Chromosomes are made of .....

**(Total for Question 12 = 3 marks)**

**13** Part of the reactivity series for metals is shown below.

HIGHEST — calcium
↓ aluminium
↓ copper
↓ silver
LOWEST — gold

Use this reactivity series to help you complete the following word equations.

If you think no reaction takes place, then indicate this by writing "no reaction".

(a) aluminium + silver nitrate → ..... + .....

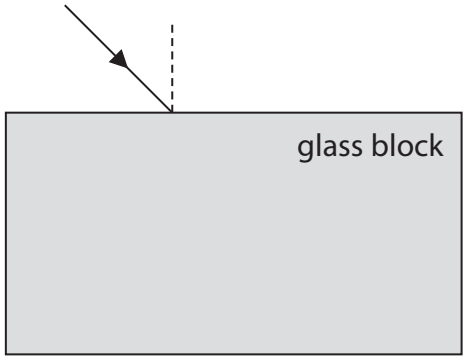
(b) copper + silver nitrate → ..... + .....

(c) gold + calcium chloride → ..... + .....

**(Total for Question 13 = 3 marks)**

**14** Joe is investigating refraction through a glass block. He shines a light through the glass block as shown by the arrow.

Complete the diagram to show the pathway of the refracted ray of light as it passes through and leaves the glass block.




**(Total for Question 14 = 2 marks)**

**For questions 15 – 24 put a cross in one box ☒ to indicate your answer.**
**If you change your mind, put a line through the box ☒ and then put a cross in another box ☒.**
**Each question is worth one mark.**

**15** In the human reproductive system, which of these is only found in males?

☒ **A** gamete

☒ **B** ovary

☒ **C** oviduct

☒ **D** testis

**(Total for Question 15 = 1 mark)**

**16** Which of these inherited characteristics is harmful in humans?

☒ **A** eye colour

☒ **B** earlobe shape

☒ **C** cystic fibrosis

☒ **D** hair colour

**(Total for Question 16 = 1 mark)**

**17** Scurvy is a condition caused by a lack of vitamin C in the diet. Scurvy is an example of

☒ **A** a balanced diet.

☒ **B** an inherited disease.

☒ **C** a bacterial infection.

☒ **D** a deficiency disease.

**(Total for Question 17 = 1 mark)**

**18** Which of these carry genetic information inside a cell?

☒ **A** cell membranes

☒ **B** chlorophyll

☒ **C** chromosomes

☒ **D** vacuoles

**(Total for Question 18 = 1 mark)**

**19** William wants to measure the current flowing in an electrical circuit.

To do this, he should connect

☒ **A** a voltmeter in series.

☒ **B** an ammeter in series.

☒ **C** a voltmeter in parallel.

☒ **D** a bulb in series.

**(Total for Question 19 = 1 mark)**

**20** The word equation for the reaction of magnesium carbonate and hydrochloric acid starts like this:

magnesium carbonate + hydrochloric acid ⟶

Which option correctly completes the equation?

☒ **A** magnesium hydroxide + hydrogen

☒ **B** magnesium chloride + water + carbon dioxide

☒ **C** magnesium hydroxide + hydrogen + carbon dioxide

☒ **D** magnesium chloride + carbon + water

**(Total for Question 20 = 1 mark)**

**21** This is an equation for photosynthesis.

P + carbon dioxide ⟶ Q + oxygen

What are P and Q in this equation?

☒ **A** P is glucose and Q is sunlight.

☒ **B** P is sunlight and Q is water.

☒ **C** P is glucose and Q is water.

☒ **D** P is water and Q is glucose.

**(Total for Question 21 = 1 mark)**

**22** A class investigated the reactivity of four metals by dropping little pieces of the metals into solutions of their salts.

When there was a reaction they recorded a `Y', when there was no reaction they recorded an `N'.

Here is their table of results.

| Salt solution | Metals | | | |
|---|---|---|---|---|
| | iron | lead | magnesium | zinc |
| iron nitrate | | N | Y | Y |
| lead nitrate | Y | | Y | Y |
| magnesium nitrate | N | N | | N |
| zinc nitrate | N | N | Y | |

From their results, which is the **least** reactive metal?

☒ **A** iron

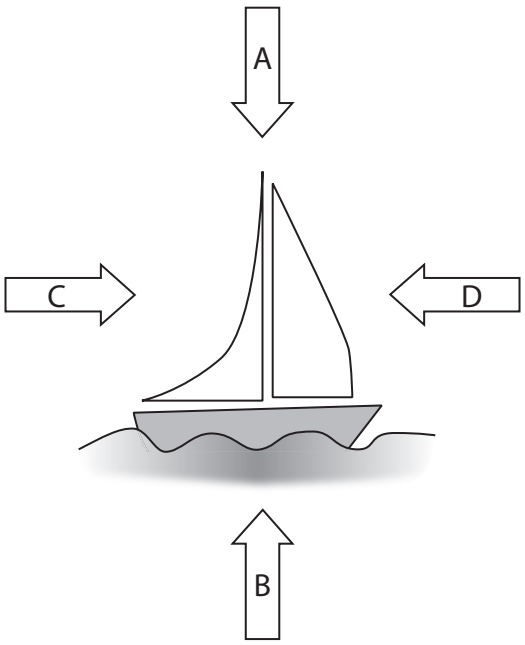
☒ **B** lead

☒ **C** magnesium

☒ **D** zinc

**(Total for Question 22 = 1 mark)**

**23** The boat is floating on the water.




Which arrow shows the **upthrust** force?

**A** ☒ **B** ☒ **C** ☒ **D** ☒

**(Total for Question 23 = 1 mark)**

**24** The picture below shows two peppered moths. The moths are the same species, but are found in different habitats.

What has caused the difference between these two moths?

☒ **A** cloning

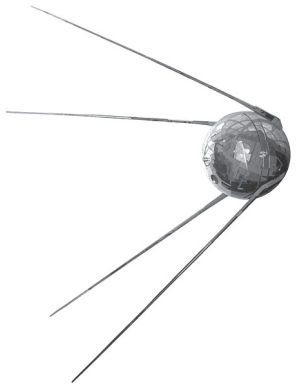
☒ **B** inheritance

☒ **C** selective breeding

☒ **D** variation

**(Total for Question 24 = 1 mark)**

**25** The picture below is of Sputnik 1. This was the first artificial satellite to be placed in orbit around Earth.



(a) What keeps satellites like Sputnik 1 in orbit?

**(1)**

.....

.....

(b) Today there are thousands of artificial satellites in different orbits around Earth. Many of these satellites are in a geostationary orbit.

(i) Describe what is meant by a "geostationary orbit".

**(1)**

.....

.....

(ii) Give **one** use of a satellite with a geostationary orbit.

**(1)**

.....

**(Total for Question 25 = 3 marks)**

**26** The three characteristics in the table are either inherited or affected by the environment.

Place **one** tick in each row to indicate whether each characteristic is inherited or affected by the environment.

| Characteristic | Inherited | Environment |
|---|---|---|
| tongue rolling | | |
| favourite music | | |
| gender | | |

**(Total for Question 26 = 2 marks)**

**27** This is a Punnet square that shows the inheritance of eye colour from parents Emma and John.

B = Brown eyes  b = Blue eyes

| Emma's gametes / John's gametes | B | b |
|---|---|---|
| B | BB | Bb |
| b | ..... | bb |

(a) Complete the Punnet square to show the missing genotype.

**(1)**

(b) Emma and John both have brown eyes. What does this tell you about the allele for brown eyes?

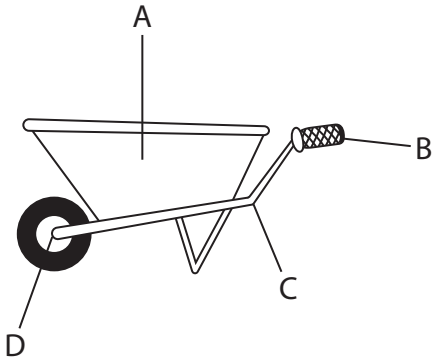
**(1)**

.....

**(Total for Question 27 = 2 marks)**

**For questions 28 – 37 put a cross in one box ☒ to indicate your answer.**
**If you change your mind, put a line through the box ☒ and then put a cross in another box ☒.**
**Each question is worth one mark.**

**28** Which label on the wheelbarrow shows the pivot?




☒ **A**

☒ **B**

☒ **C**

☒ **D**

**(Total for Question 28 = 1 mark)**

**29** When a metal reacts with a dilute acid, the products are

☒ **A** a salt and hydrogen.

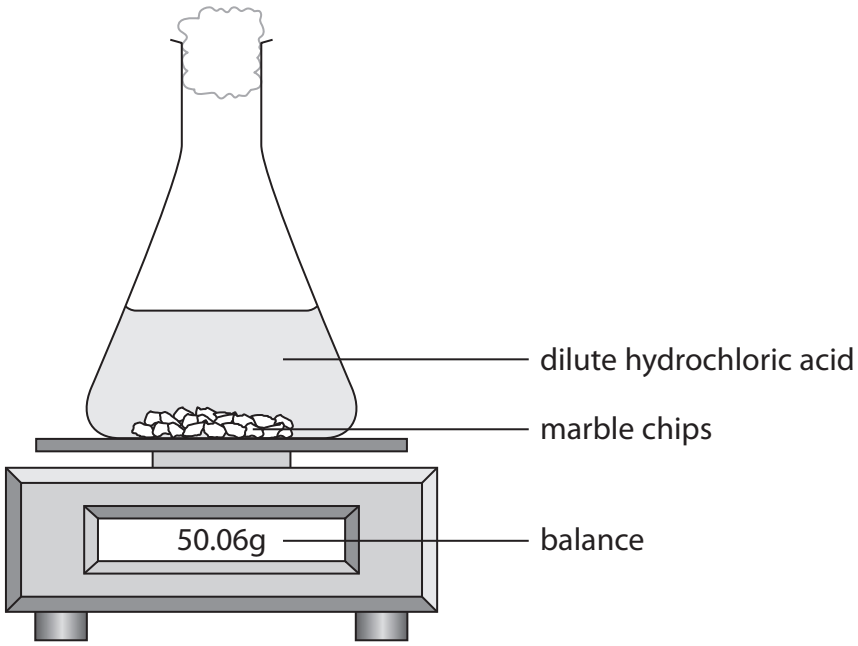
☒ **B** hydrogen and carbon dioxide.

☒ **C** a salt and water and carbon dioxide.

☒ **D** water and carbon dioxide.

**(Total for Question 29 = 1 mark)**

**30** Two students react marble chips (calcium carbonate) with dilute hydrochloric acid.




They record the starting mass as 50.06 g.

When the reaction is complete and the marble chips can no longer be seen, they record the end mass as 42.13 g.

What is the most likely explanation for this loss in mass?

☒ **A** Gas has been produced and has left the flask.

☒ **B** The marble chips have all dissolved.

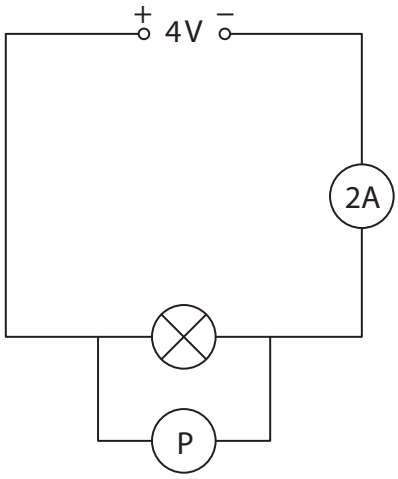
☒ **C** The students made a mistake recording the mass.

☒ **D** Gas from the air has entered the flask.

**(Total for Question 30 = 1 mark)**

**31** Look at the circuit below.

What is the voltage on the voltmeter labelled **P**?




☒ **A** 0V

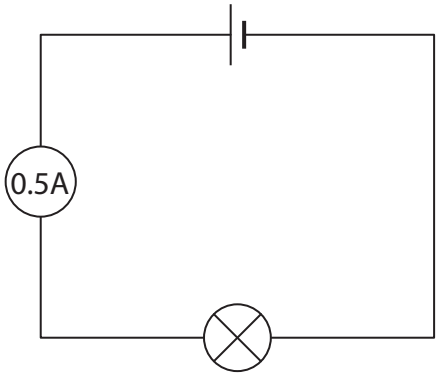
☒ **B** 2V

☒ **C** 4V

☒ **D** 8V

**(Total for Question 31 = 1 mark)**

**32** Ammir makes this circuit. He then adds another cell.




What happens when the second cell is added to the circuit?

| | Ammeter reading | Bulb brightness |
|---|---|---|
| ☒ **A** | increases | dimmer |
| ☒ **B** | increases | brighter |
| ☒ **C** | decreases | brighter |
| ☒ **D** | decreases | dimmer |

**(Total for Question 32 = 1 mark)**

**33** What is the main function of root hairs in a plant?

☒ **A** To anchor the plant firmly into the ground.

☒ **B** To increase the surface area to absorb water.

☒ **C** To decrease the surfaces that absorb oxygen.

☒ **D** To allow the plant roots to grow into small spaces.

**(Total for Question 33 = 1 mark)**

**34** Rocks made up of layers of smaller particles cemented together are

☒ **A** igneous.

☒ **B** metamorphic.

☒ **C** sedimentary.

☒ **D** volcanic.

**(Total for Question 34 = 1 mark)**

**35** When sodium reacts with water, what products are formed?

☒ **A** hydrogen and sodium hydroxide

☒ **B** hydrogen and sodium chloride

☒ **C** hydrogen and sodium carbonate

☒ **D** hydrogen and sodium nitrate

**(Total for Question 35 = 1 mark)**

**36** The weight of an object is found using the acceleration due to gravity.
Which equation is correct?

☒ **A** weight = acceleration due to gravity + mass

☒ **B** weight = acceleration due to gravity + volume

☒ **C** weight = acceleration due to gravity × volume

☒ **D** weight = acceleration due to gravity × mass

**(Total for Question 36 = 1 mark)**

**37** When zinc metal is reacted with sulfuric acid, the products are zinc sulfate and hydrogen.

The symbol equation starts like this

$$Zn + H_2SO_4 \rightarrow$$

Which option correctly completes the equation?

☒ **A** $H_2SO_4 + ZnO$

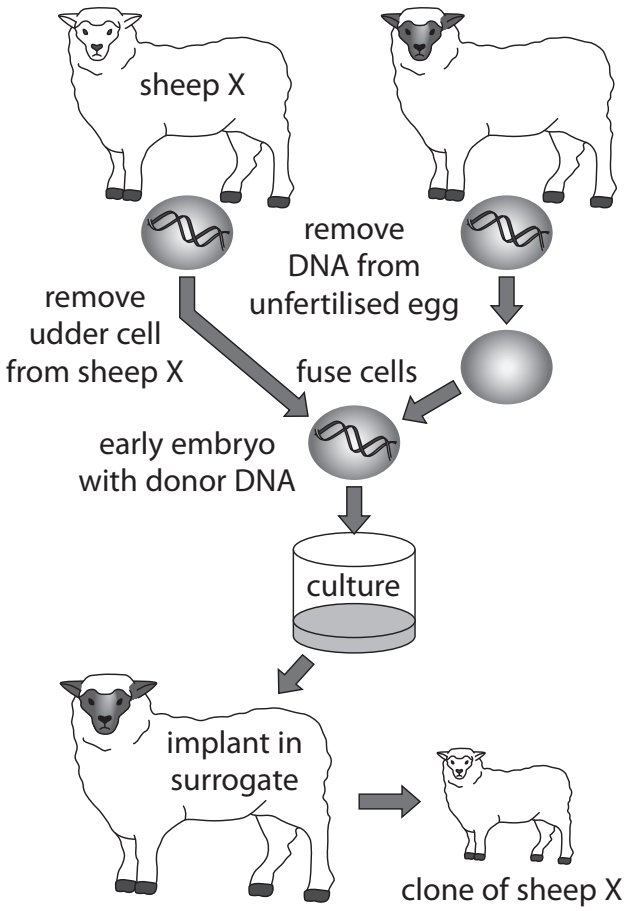
☒ **B** $H_2SO_4 + Zn$

☒ **C** $ZnSO_4 + H_2$

☒ **D** $ZnSO_4 + H_2O$

**(Total for Question 37 = 1 mark)**

**38** Use the diagram below to help sequence the main stages needed to clone sheep X.




Number the stages 2–4 in the correct sequence. The first one has been done for you.

| Number | Stage |
|---|---|
| | growth and implantation of embryo into surrogate mother sheep |
| | removal of DNA from egg cell nucleus |
| 1 | removal of an udder cell from sheep X |
| | place udder cell DNA into egg cell |

**(Total for Question 38 = 2 marks)**

**39** Sam investigates the reactivity of metals in air. His observations are shown below.

| |
|---|
| Metal A reacts very slowly when heated and an oxide forms. |
| Metal B burns very brightly and rapidly forms an oxide. |
| Metal C does not react when heated. |
| Metal D reacts slowly when heated and forms an oxide. |

(a) Write the letter of each metal in order of reactivity, from most to least.

**(2)**

| | |
|---|---|
| Most reactive | |
| | |
| | |
| Least reactive | |

(b) Sam then plans to add small pieces of the same metals to some dilute hydrochloric acid.

Four possible observations are:

| |
|---|
| No reaction |
| Bubbles form very slowly |
| Fizzes quickly |
| Bubbles form very quickly |

Predict which one of these four observations is most likely with

(i) Metal A .....

**(1)**

(ii) Metal C .....

**(1)**

**(Total for Question 39 = 4 marks)**

**40** The pictures show a drawing pin being pushed into a block of wood and a tractor in a field.

(a) Use your knowledge of pressure to explain the following statements.

(i) The drawing pin **will** go into the wood and **will not** go into the finger.

**(1)**

.....

.....

(ii) The tractor has large rear tyres.

**(2)**

.....

.....

.....

(b) A tractor tyre has a surface area of 0.8 $m^2$ in contact with a road. The tyre exerts a force of 4500N on the road.

Calculate the pressure exerted by the tyre on the road. Give the units with your answer.

**(2)**

Pressure ..... Units .....

**(Total for Question 40 = 5 marks)**

**TOTAL FOR SECTION A = 60 MARKS**

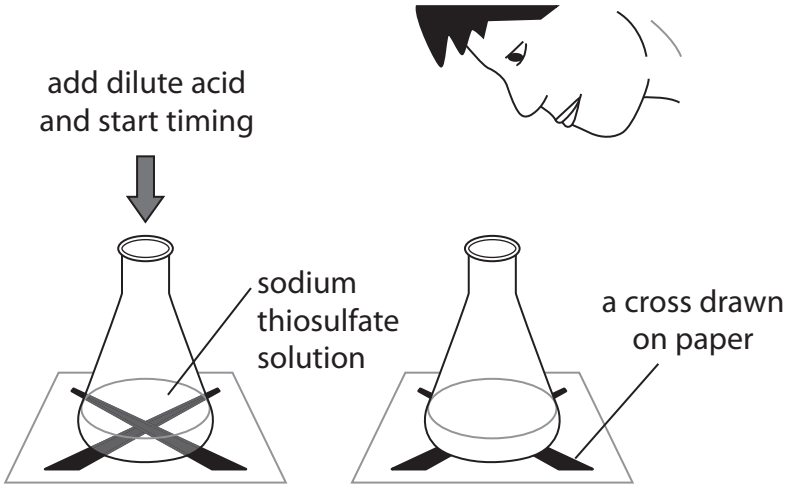
## SECTION B

**Answer ALL questions.**

**41** Fred investigates if there is a relationship between the concentration of hydrochloric acid and the speed of its reaction with a solution of sodium thiosulfate.

The reaction takes place at room temperature (20 °C). He uses the equipment shown in the diagram below.

When the two solutions are added together a reaction takes place. This makes the solution turn more and more cloudy until Fred can no longer see the cross.




(a) (i) Suggest **one** variable that should be controlled in this investigation.

**(1)**

.....

(ii) Suggest **one** safety precaution that should be taken during this experiment when using acid.

**(1)**

.....

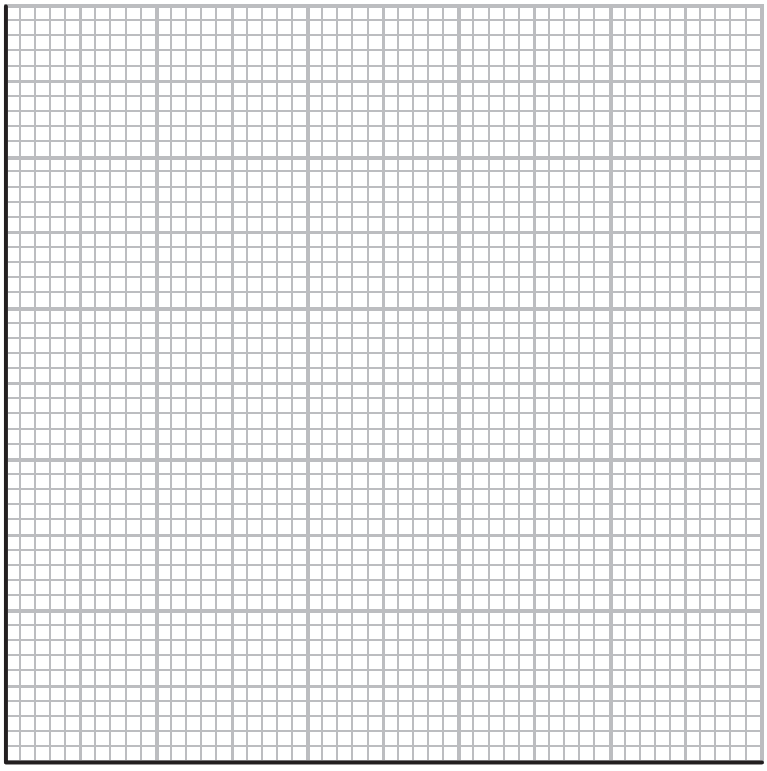
Fred collects this data.

| Volume of sodium thiosulfate ($cm^3$) | Volume of hydrochloric acid ($cm^3$) | Volume of water ($cm^3$) | Time taken for cross to disappear (s) |
|---|---|---|---|
| 50 | 5 | 0 | 24 |
| 50 | 4 | 1 | 31 |
| 50 | 3 | 2 | 40 |
| 50 | 2 | 3 | 53 |
| 50 | 1 | 4 | 87 |

(b) Plot a graph to display the relationship between the volume of hydrochloric acid and the time taken for the reaction. Include a line of best fit.

**(3)**

Time taken for cross to disappear (s)



Volume of hydrochloric acid ($cm^3$)

(c) Fred suggests two conclusions from his data.

| | Conclusion |
|---|---|
| 1 | Water speeds up chemical reactions. |
| 2 | The reaction is faster when the acid is more concentrated. |

Which conclusion is supported by the data collected?

**(2)**

Conclusion .....

Give a reason for your choice.

.....

.....

**(Total for Question 41 = 7 marks)**

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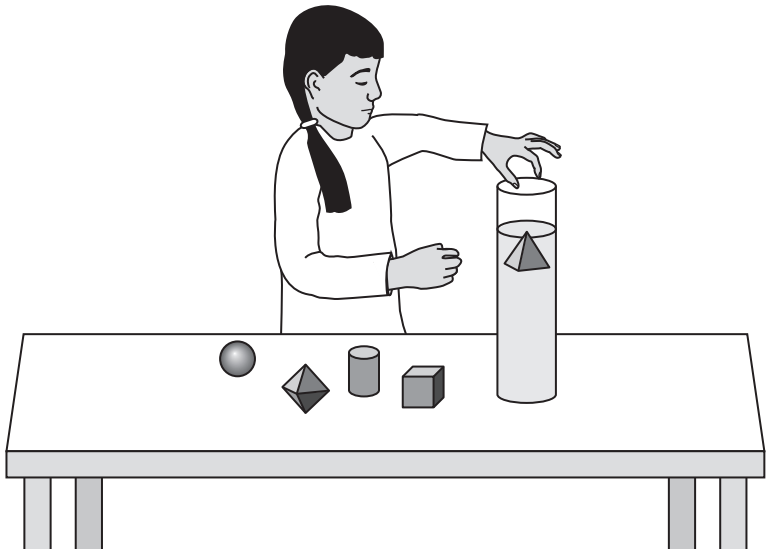
**42** Mia is investigating streamlining. She makes five different shapes and drops them into a tube of thick liquid.



(a) Mia times how long it takes for each shape to fall through the thick liquid.

To make it a fair test

- she starts the timer from when the shape first touches the surface of the liquid.
- she stops the timer when the shape reaches the bottom of the tube.

Suggest **one** further thing that Mia should do to make this a fair test.

**(1)**

.....

.....

(b) Her results are shown in the table below.

| Shape | Time taken for shape to fall through the thick liquid |
|---|---|
| A  | 5.6 |
| B  | 4.6 |
| C  | 5.3 |
| D  | 5.9 |
| E  | 4.2 |

What information is missing from the table of results?

**(1)**

.....

(c) (i) Which shape is the most streamlined?

Shape .....

**(1)**

(ii) What should Mia do to make her results more reliable?

**(1)**

.....

**(Total for Question 42 = 4 marks)**

**43** Lisa is investigating the effect of light on the height of 12 bean plants.

(a) Identify the independent and dependent variables in this experiment.

**(2)**

Independent variable: .....

Dependent variable: .....

(b) State **two** other variables that she should consider controlling in her investigation.

**(2)**

1 .....

2 .....

(c) Lisa measures the height of the plants to the nearest centimetre.

(i) What equipment could Lisa use to measure the height of the plants?

**(1)**

.....

(ii) How can she make her measurements more precise?

**(1)**

.....

.....

**(Total for Question 43 = 6 marks)**

**44** Rakesh investigates the loss of thermal energy from a cup using the equipment below. He fills the cup with hot water and records the temperature at the start and then every five minutes.

He wants to find out whether cotton wool or aluminium foil are good insulating materials.

Rakesh repeats the test with a cup wrapped in cotton wool and then with a cup wrapped in aluminium foil.

His results are shown in the table.

| Insulating material | Temperature (°C) | | | |
|---|---|---|---|---|
| | At start (0 min) | After 5 min | After 10 min | After 15 min |
| none | 80 | 71 | 62 | 55 |
| cotton wool | 80 | 78 | 75 | 72 |
| aluminium foil | 80 | 75 | 70 | 65 |

(a) (i) Why did Rakesh put a lid on the cup?

**(1)**

.....

(ii) Why was it important to test a cup with no insulating material?

**(1)**

.....

.....

(b) Rakesh concludes that cotton wool is a better insulating material than aluminium foil. What evidence from the table supports this conclusion?

**(1)**

.....

.....

.....

**(Total for Question 44 = 3 marks)**

**TOTAL FOR SECTION B = 20 MARKS**
**TOTAL FOR PAPER = 80 MARKS**