

Name:



# OUNDLÉ

School

2021 Non Common Entrance Examination  
For Third and Fourth Form Entry

## Science

Time Allowed : 60 minutes

- *Please write your name in the box above*
- *Answer as many questions as you can in the time available*
- *The paper is out of 70 marks; 25 for Biology, 20 for Chemistry and 25 for Physics*

You will need:

- *A pen*
- *A pencil*
- *A ruler*
- *A calculator*

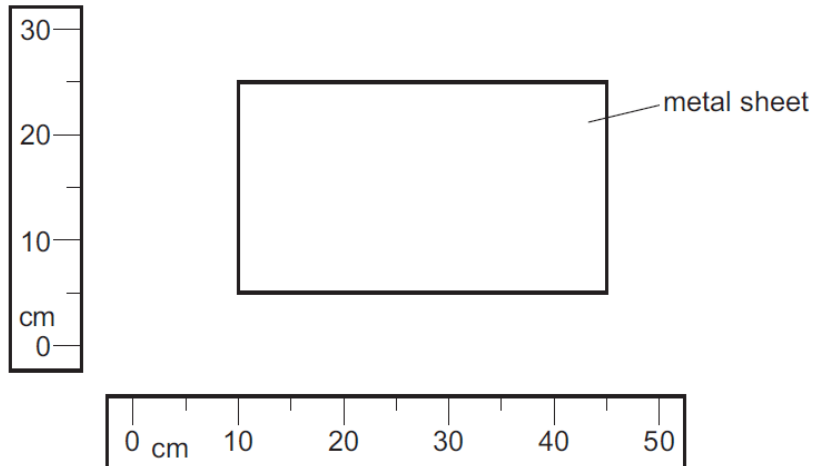
Biology mark / 25	
Chemistry mark / 20	
Physics mark / 25	
Total mark / 70	
Percentage	

# Physics

## Multiple Choice Section

1.

The diagram shows a rectangular metal sheet close to two rulers.



What is the area of the metal sheet?

- A** 700 cm<sup>2</sup>      **B** 875 cm<sup>2</sup>      **C** 900 cm<sup>2</sup>      **D** 1125 cm<sup>2</sup>

[1]

2.

A measuring cylinder contains 40 cm<sup>3</sup> of water.

A solid metal ball is dropped into the water and the water level rises to 56 cm<sup>3</sup>.

The mass of the ball is 80 g.

What is the density of the metal from which the ball is made?

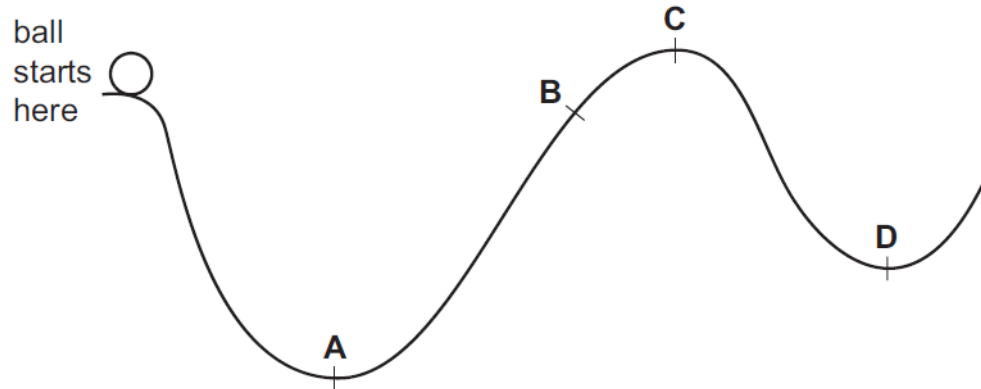
- A** 0.20 g/cm<sup>3</sup>      **B** 1.4 g/cm<sup>3</sup>      **C** 2.0 g/cm<sup>3</sup>      **D** 5.0 g/cm<sup>3</sup>

[1]

3.

A ball is released from rest and rolls down a track from the position shown.

What is the furthest position that it is possible for the ball to reach?



[1]

4.

A skier is standing still on a flat area of snow.



The weight of the skier is 550 N. The total area of his skis in contact with the ground is  $0.015 \text{ m}^2$ .

What is the pressure exerted on the ground by the skier?

- A**  $0.83 \text{ N/m}^2$     **B**  $8.3 \text{ N/m}^2$     **C**  $3700 \text{ N/m}^2$     **D**  $37000 \text{ N/m}^2$

[1]

5.

On the Moon, the gravitational field strength  $g$  is  $1.6 \text{ N/kg}$ .

An object has a mass of  $2.0 \text{ kg}$ .

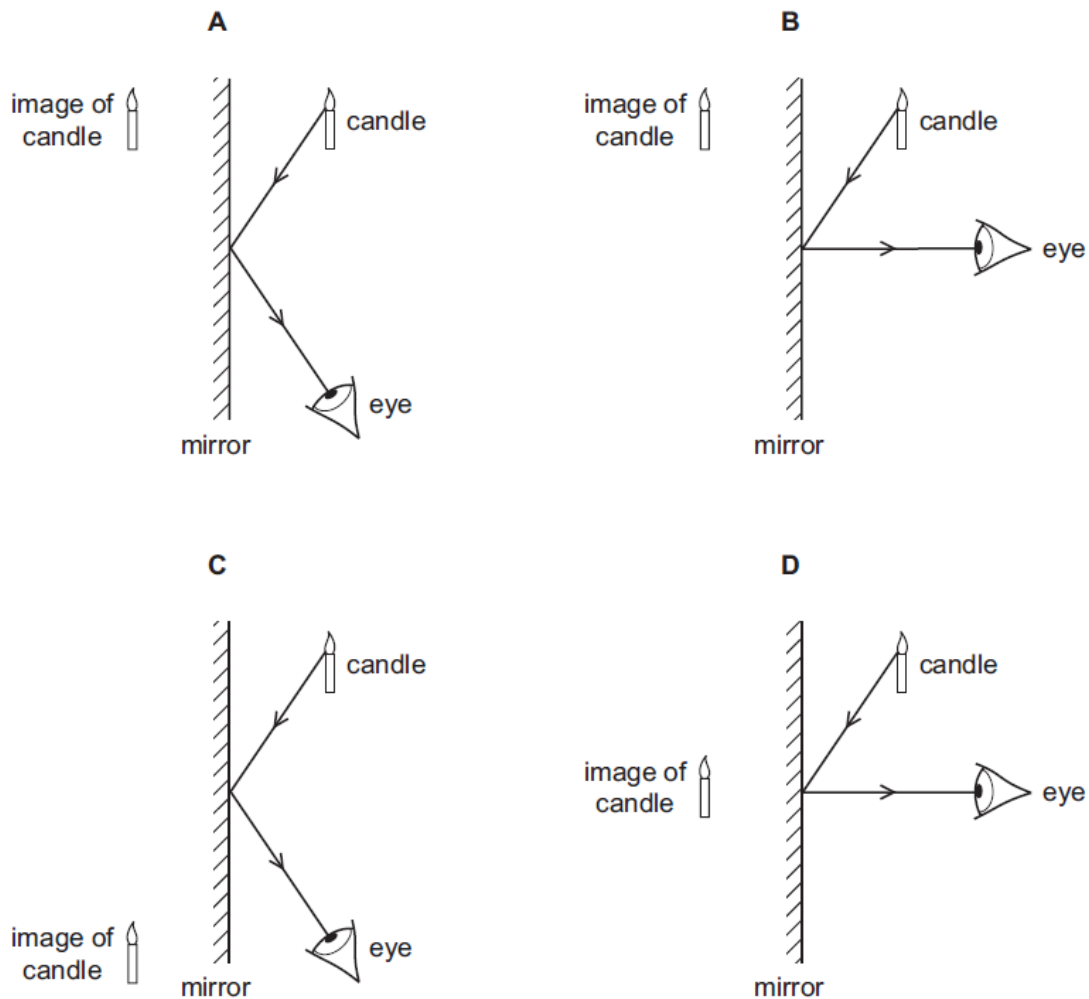
What is the weight of the object on the Moon?

- A**  $0 \text{ N}$                       **B**  $1.3 \text{ N}$                       **C**  $3.2 \text{ N}$                       **D**  $20.0 \text{ N}$

[1]

6.

Which diagram shows how the light from a candle is reflected by a mirror, and shows the position of the image formed?

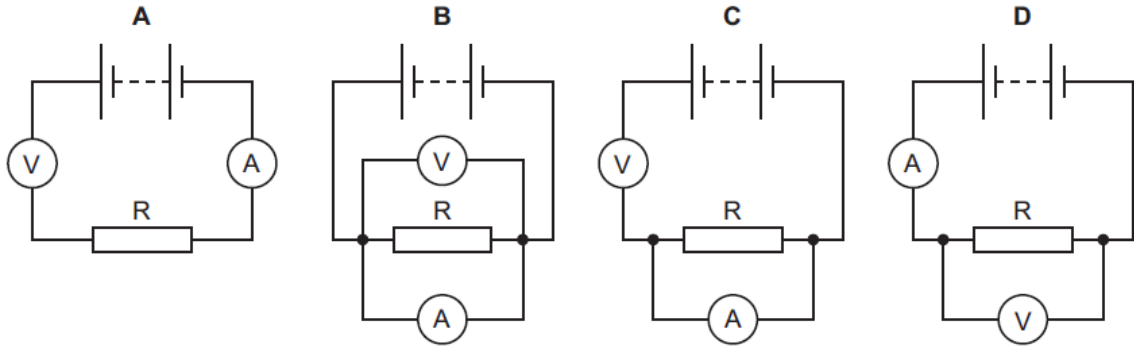


[1]

7.

A student is to determine the resistance of resistor R. She uses a circuit including a voltmeter and an ammeter.

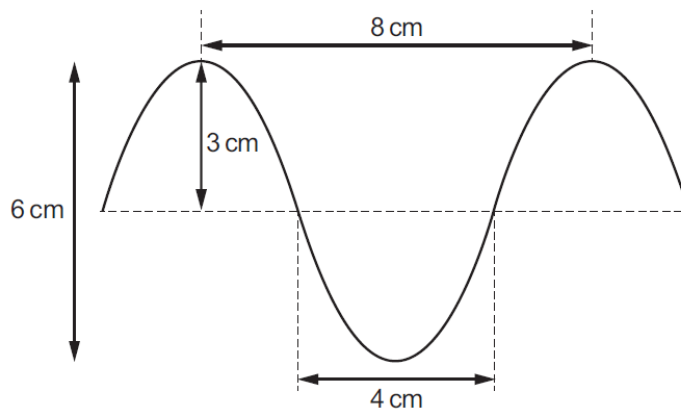
Which circuit should be used?



[1]

8.

The diagram shows a wave.



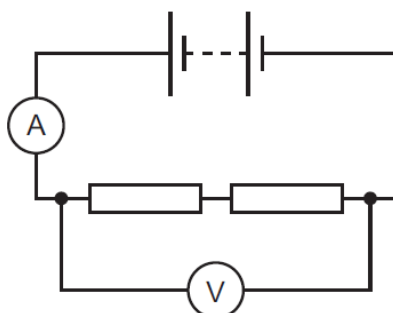
What are the amplitude and the wavelength of this wave?

	amplitude / cm	wavelength / cm
<b>A</b>	3	4
<b>B</b>	3	8
<b>C</b>	6	4
<b>D</b>	6	8

[1]

9.

A student uses the circuit shown to determine the resistance of two identical resistors.



The voltmeter reading is 2.2 V and the ammeter reading is 0.25 A.

What is the resistance of each resistor?

- A** 0.275  $\Omega$       **B** 0.55  $\Omega$       **C** 4.4  $\Omega$       **D** 8.8  $\Omega$

[1]

10.

The table shows the forces that exist between magnetic poles.

Which row is correct?

	N pole and N pole	N pole and S pole
<b>A</b>	attraction	attraction
<b>B</b>	attraction	repulsion
<b>C</b>	repulsion	attraction
<b>D</b>	repulsion	repulsion

[1]

**Structured questions**

11. A train travels 9 km from station A to station B.

It takes 15 minutes.

(a) (i) State the equation linking average speed, distance moved and time taken.

[1]

(ii) Calculate the average speed of the train and give its unit.

[2]

Average speed = ..... unit .....

(iii) The maximum speed of the train must be higher than the value you have calculated.

Explain why.

[2]

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.....  
.....  
.....

[Total 5 marks]





13. A washing machine has an electric motor and an electric heater.



The resistance of the heater is  $22 \Omega$ .

The mains voltage is  $230 \text{ V}$ .

(a) (i) State the equation linking voltage, current and resistance.

[1]

(ii) Show that the current in the heater is about  $10 \text{ A}$  when it is working.

[2]

(b) The washing machine is fitted with a fuse rated at  $13 \text{ A}$ .

(i) Explain why the washing machine is fitted with a fuse.

[1]

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(ii) When the motor is working, the current in it is 1.74 A.

Explain why it would **not** be sensible to replace the 13 A fuse with a 2 A fuse.

[2]

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[Total 6 marks]

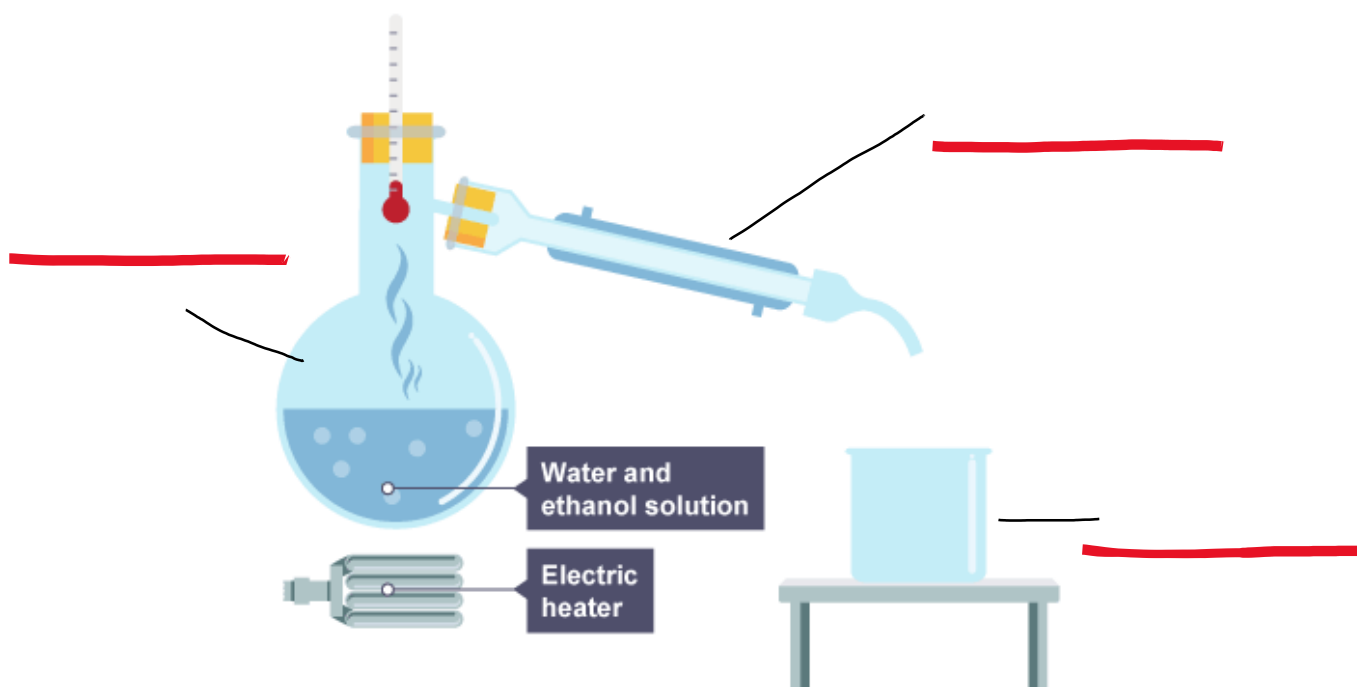
# Chemistry

## Multiple Choice Section

1. Heating up copper carbonate produces copper oxide and carbon dioxide. This is an example of what sort of reaction? [1]  
A - reduction  
B - neutralisation  
C - thermal decomposition  
D – displacement
2. If sulphuric acid and calcium carbonate react what gas will be produced? [1]  
A - nitrogen  
B - carbon dioxide  
C – oxygen  
D – hydrogen
3. When a salt dissolves in water, what is the salt known as? [1]  
A - solute  
B - solvent  
C – solution  
D -saturation
4. A solid turning directly into a gas when heated is called [1]  
A – melting  
B – dissolving  
C – deposition  
D – sublimation

### Structured questions

1. The diagram below shows the apparatus required to separate an ethanol and water mix.



- (a) Label the 3 parts of the diagram [3]

- (b) Referring to the various changes of state happening along the way as well as the specific boiling points of the two substances, fully explain how this process works in order to separate water and ethanol. [3]

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(c) Ethanol and water are both compounds. Define the term compound. [2]

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.....

(d) When a gas turns to a liquid what is happening in terms of particle arrangement and particle movement? [2]

.....  
.....  
.....

**Total [10]**

2. Some magnesium metal was warmed with dilute sulphuric acid. Bubbles of gas were given off and tested to see if the gas were hydrogen. A colourless solution remained.

(a) How would you test a gas to see if it were hydrogen? What is a positive result? [2]

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.....

(b) A second sample of magnesium was dropped into some copper(II) sulphate solution. A dark, pinkish-brown coating appeared on the surface of the magnesium and the blue colour of the solution disappeared.

Name the dark coating on the surface of the magnesium. [1]

.....

(i) Write a word equation for the reaction. [1]

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(ii) Explain how this experiment enables you to say whether copper is more or less reactive than magnesium. [2]

.....  
.....

**Total [6]**

## Biology Section

### Balanced Diet

1. A balanced diet consists of water and six other substances.

What is missing from the following list?

- Vitamins
- Fibre
- Proteins
- Lipids

..... [2]

2. Look at the following two lists. For each statement select either a food or a nutrient use.

Some require TWO letters/numbers

	Food		Nutrient
A	Egg	1	Helps prevent constipation
B	Fish	2	Provides a source of energy
C	Butter	3	Required for strong bones
D	Spaghetti	4	A good food for body builders
E	Milk	5	Vitamins help cell reactions
F	Wholemeal bread	6	Cholesterol can be harmful in excess
G	Oranges	7	Fats provide long-term energy

Question	Response – insert number or letter
a) This food helps prevent constipation	
b) A good source of some vitamins	
c) This helps strengthen bones	
d) Cholesterol is part of a balanced diet	
e) These foods provide energy	

[6]

3. The table shows the mass of water, fat, Vitamin C and fibre in 100g of potato.

The potatoes have been cooked in three different ways.

Per 100g	Water (g)	Fat (g)	Fibre (g)	Vit C (mg)
Chips	57	7	2	9
Boiled, peeled	80	Nil	1	6
Baked in skin	63	Nil	3	14

a) Use this information to complete these sentences

i) Chips are crispier than boiled potatoes because they contain less ..... [1]

ii) Most of the fibre in potato is in the ..... [1]

b) Use the information in the table to work out how much Vitamin C there is in

i) 200g of chips .....mg [1]

ii) 200g baked potatoes ..... mg [1]

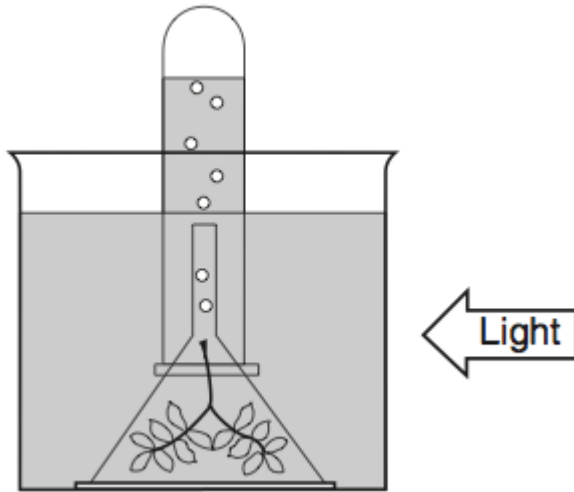
c) Sometimes people do not eat a balanced diet. Match the fact about a person's diet to the organ(s) it harms. [3]

Not enough calcium		Heart
		Intestine
Not enough fibre		Lung
Too much fat		Bones

**Total for this section 15**

### Green Plants as Organisms

4. A pupil used the apparatus to collect the following data

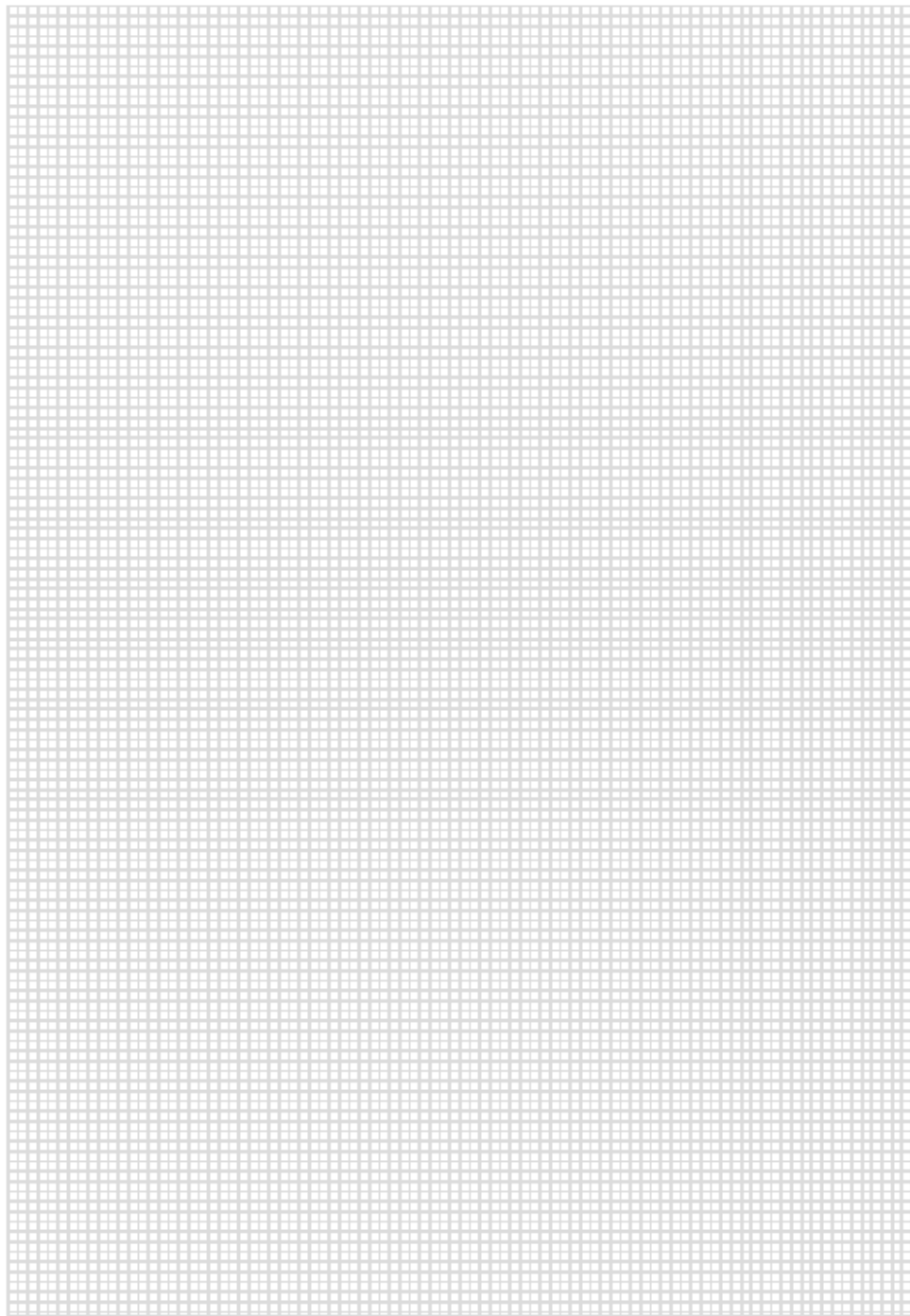


Light Intensity (arbitrary units)	Volume of Oxygen (mm <sup>3</sup> per minute)
1	7
2	14
3	21
4	28
5	34
6	39
7	42
8	44
9	45
10	45
11	45



a) Plot a graph of the data

[4]



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b) At what light intensity did the plant produce 25mm<sup>3</sup> of oxygen per minute (1)

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c) What was the maximum light intensity that seemed to affect the rate of photosynthesis (1)

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d) Use this information to explain to someone the conditions needed in a greenhouse (2)

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.....  
.....  
.....

e) To make this a fair test, which of the following should be kept the same?

Tick each correct answer

- 1.1. Light source
- 1.2. Distant from light
- 1.3. Temperature
- 1.4. Amount of water
- 1.5. Amount of plasticine
- 1.6. Type of pond weed
- 1.7. Size of pondweed
- 1.8. Colour of pondweed

(2)

**Total for this question [10]**