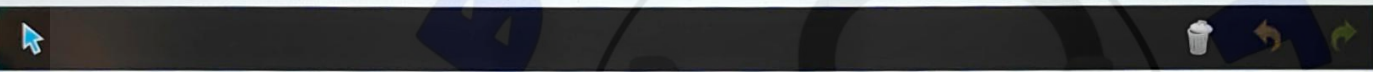


Question 1 (9 marks)

Question 1a (2 marks)

Select the correct location to show the path of an oxygen molecule (O_2) through the respiratory system.



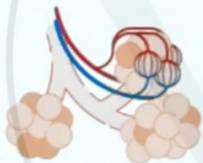
Draggable items:



Trachea



Lungs



Alveoli



Bronchi



Nose

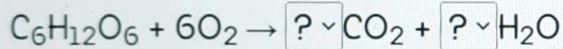


- 1 (9 marks)
 - Question 1a
 - Question 1b
 - Question 1c
 - Question 1d
- 2 (8 marks)
- 3 (9 marks)
- 4 (28 marks)
- 5 (23 marks)
- 6 (23 marks)



Question 1b (2 marks)

Oxygen reacts with glucose to release energy. This process is called respiration. **Select** numbers to balance the chemical equation below:



Question 1c (1 mark)

The following picture shows alveoli in healthy lungs that can efficiently exchange gases and alveoli in diseased lungs that cannot efficiently exchange gases. **State** one structural



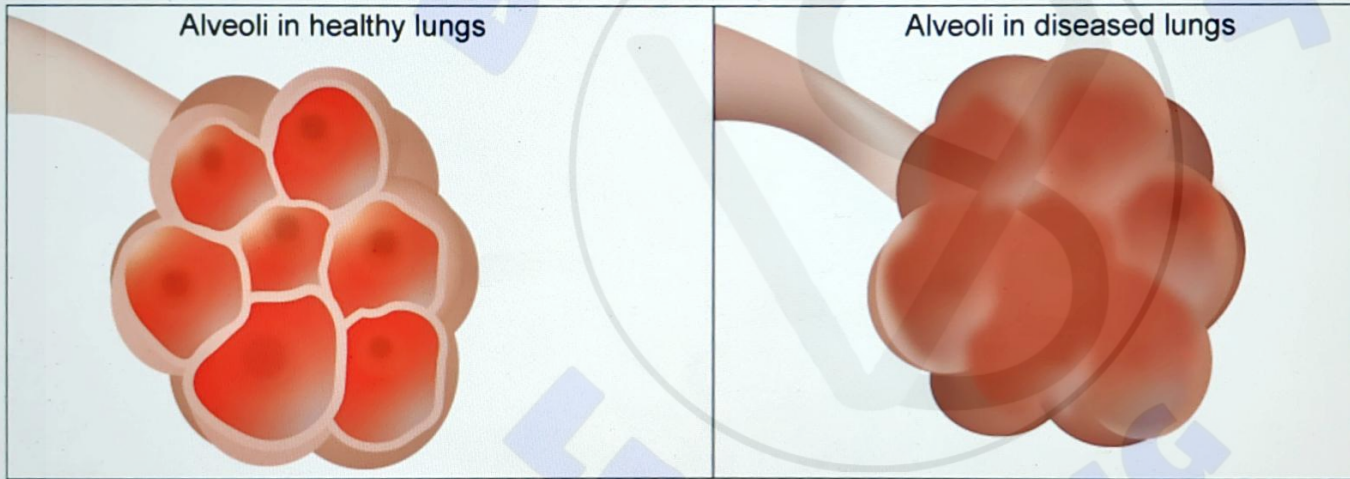
Scroll down to continue

- 1 (9 marks)
- Question 1a
- Question 1b
- Question 1c
- Question 1d
- 2 (8 marks)
- 3 (9 marks)
- 4 (28 marks)
- 5 (23 marks)
- 6 (23 marks)



Question 1c (1 mark)

The following picture shows alveoli in healthy lungs that can efficiently exchange gases and alveoli in diseased lungs that cannot efficiently exchange gases. **State** one structural difference between the alveoli in healthy lungs and the alveoli in diseased lungs.



- 1 (9 marks) ^
- Question 1a
- Question 1b
- Question 1c
- Question 1d
- 2 (8 marks) v
- 3 (9 marks) v
- 4 (28 marks) v
- 5 (23 marks) v
- 6 (23 marks) v





Question 1d (4 marks)

Use the images in part (c) to **explain** how lung disease affects the gas exchange process.

B *I* ← → U x_2 x^2 $\frac{1}{2}$ $\frac{3}{4}$ Ω Σ Styles

1 (9 marks) ^

Question 1a

Question 1b

Question 1c

Question 1d

2 (8 marks) v

3 (9 marks) v

4 (28 marks) v

5 (23 marks) v

6 (23 marks) v



Question 2 (8 marks)

Pollutants in the air come from many different sources. Small particles are one type of pollutant. Particles smaller than 2.5 micrometres (μm) known as $\text{PM}_{2.5}$ are particularly dangerous as they are too small to see or feel but they can cause serious health problems. The Air Quality Index (AQI) scale is used by health authorities to inform people of the levels of $\text{PM}_{2.5}$ in the air. The AQI relates air quality to concentration of particles in the air. Different countries, however, use different concentrations of $\text{PM}_{2.5}$ for the scale.

The graphic below shows the AQI scale used in two countries, Country A and Country B.







| AQI | | Concentration of $\text{PM}_{2.5} / \mu\text{g m}^{-3}$ | |
|--------------------------------|--|---|-----------|
| | | Country A | Country B |
| Good | | 0 – 12 | 0 – 35 |
| Moderate | | 13 – 35 | 36 – 75 |
| Unhealthy for sensitive groups | | 36 – 55 | 76 – 115 |
| | | 56 – 150 | 116 – 150 |

- 1 (9 marks) ▾
- 2 (8 marks) ▲
- Question 2a
- Question 2b
- Question 2c
- Question 2d
- 3 (9 marks) ▾
- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▾



particles in the air. Different countries, however, use different concentrations of $\text{PM}_{2.5}$ for the scale.

The graphic below shows the AQI scale used in two countries, Country A and Country B.

| AQI | | Concentration of $\text{PM}_{2.5} / \mu\text{g m}^{-3}$ | |
|--------------------------------|---|---|-----------|
| | | Country A | Country B |
| Good |  | 0 – 12 | 0 – 35 |
| Moderate |  | 13 – 35 | 36 – 75 |
| Unhealthy for sensitive groups |  | 36 – 55 | 76 – 115 |
| Unhealthy |  | 56 – 150 | 116 – 150 |
| Very unhealthy |  | 151 – 250 | 151 – 250 |
| Hazardous |  | > 250 | > 250 |

©



- 1 (9 marks) ▾
- 2 (8 marks) ▴
 - Question 2a
 - Question 2b
 - Question 2c
 - Question 2d
- 3 (9 marks) ▾
- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▾



Question 2a (2 marks)

Suggest two sources of air pollution.










 Styles  



Question 2b (2 marks)

Use the metric multiplier sheet to **write down** the diameter of a $2.5 \mu\text{m}$ particle in m. You must **write down** your answer in standard form.

👇 Scroll down to continue

- 1 (9 marks) ▾
- 2 (8 marks) ▲
 - Question 2a
 - Question 2b
 - Question 2c
 - Question 2d
- 3 (9 marks) ▾
- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▾



Question 2b (2 marks)

Use the metric multiplier sheet to **write down** the diameter of a $2.5 \mu\text{m}$ particle in m. You should express your answer in standard form.

B *I* ← → U \times_2 \times^2 $\frac{1}{2}$ $\frac{1}{3}$ Ω Σ Styles



Question 2c (1 mark)



- 1 (9 marks) ▾
- 2 (8 marks) ▲
 - Question 2a
 - Question 2b
 - Question 2c
 - Question 2d
- 3 (9 marks) ▾
- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▾



Question 2c (1 mark)

Different countries have different measures of AQI. **State** the range of concentration of $PM_{2.5}$ for an unhealthy AQI in country A.

B *I* | ← → | x₂ x² | := := | Ω Σ | Styles |



Question 2d (3 marks)



Scroll down to continue


from the table to find the difference in the range of $PM_{2.5}$ concentration Country A and Country B. Use this information to **suggest** which country


- 1 (9 marks) ▾
- 2 (8 marks) ▲
 - Question 2a
 - Question 2b
 - Question 2c
 - Question 2d
- 3 (9 marks) ▾
- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▾



Question 2d (3 marks)

Use information from the table to find the difference in the range of $PM_{2.5}$ concentration in a good AQI in Country A and Country B. Use this information to **suggest** which country has higher standards for air quality.

B *I* | ← → | U x_2 x^2 | $\frac{1}{2}$ $\frac{3}{4}$ | Ω Σ | Styles - | 

- 1 (9 marks) ▾
- 2 (8 marks) ▴
 - Question 2a 
 - Question 2b
 - Question 2c
 - Question 2d
- 3 (9 marks) ▾
- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▾



Question 3 (9 marks)

Question 3a (1 mark)

In humans, the optimum pH of blood is 7.4. **State** whether blood is an alkaline, acidic or neutral substance.

Select ▾

Select

Acidic

Alkaline

Neutral

Question 3b (2 marks)

Cellular respiration and breathing are two very different processes. **Select** the correct definitions below.



Cellular respiration

Draggable labels:

The process of moving oxygen from the lungs to the bloodstream.



Scroll down to continue

- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▴
 - Question 3a
 - Question 3b
 - Question 3c
 - Question 3d
 - Question 3e
- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▾



Question 3b (2 marks)

Cellular respiration and breathing are two very different processes. **Select** the correct definitions below.

| | |
|--|--|
| <p>Cellular respiration</p> <div style="border: 1px dashed black; height: 80px; width: 100%;"></div> <p>Breathing</p> <div style="border: 1px dashed black; height: 80px; width: 100%;"></div> | <p>Draggable labels:</p> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 5px;">The process of moving oxygen from the lungs to the bloodstream.</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 5px;">The process occurring in every cell that converts energy from food to ATP.</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 5px;">The process of moving air into and out of the lungs.</div> <div style="border: 1px solid gray; padding: 5px;">The process of maintaining constant conditions in the body.</div> |
|--|--|

- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▴
- Question 3a
- Question 3b
- Question 3c
- Question 3d
- Question 3e
- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▾

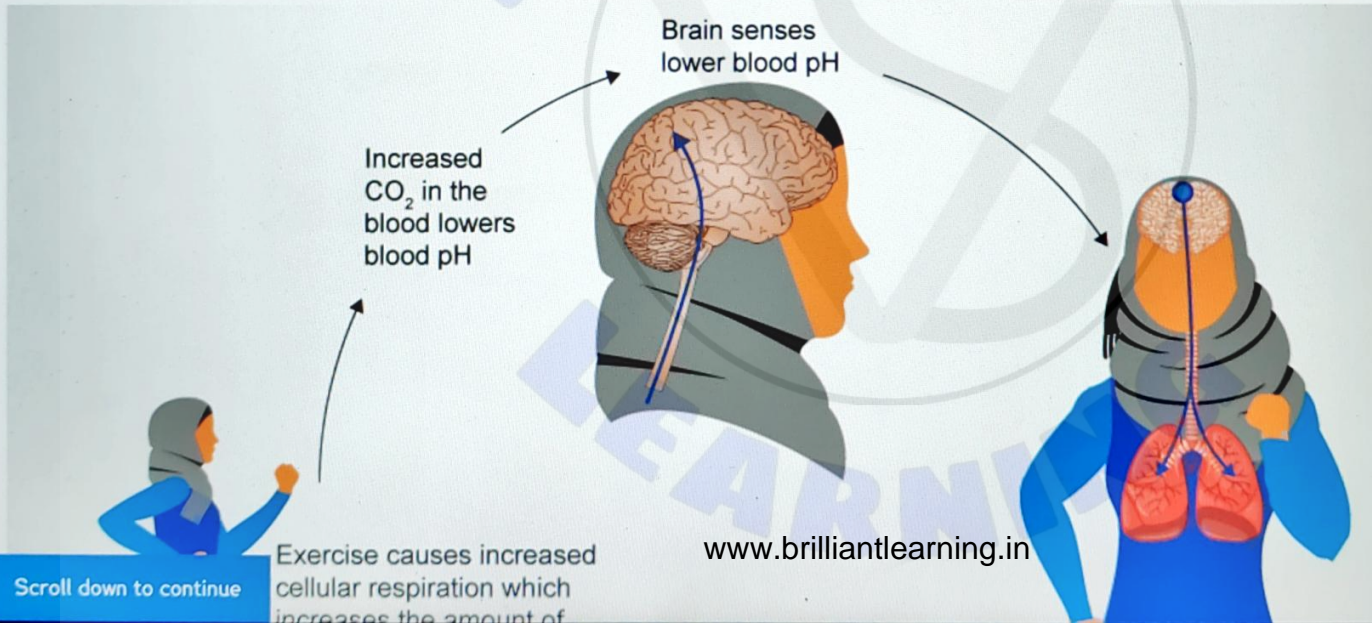




Question 3c (3 marks)

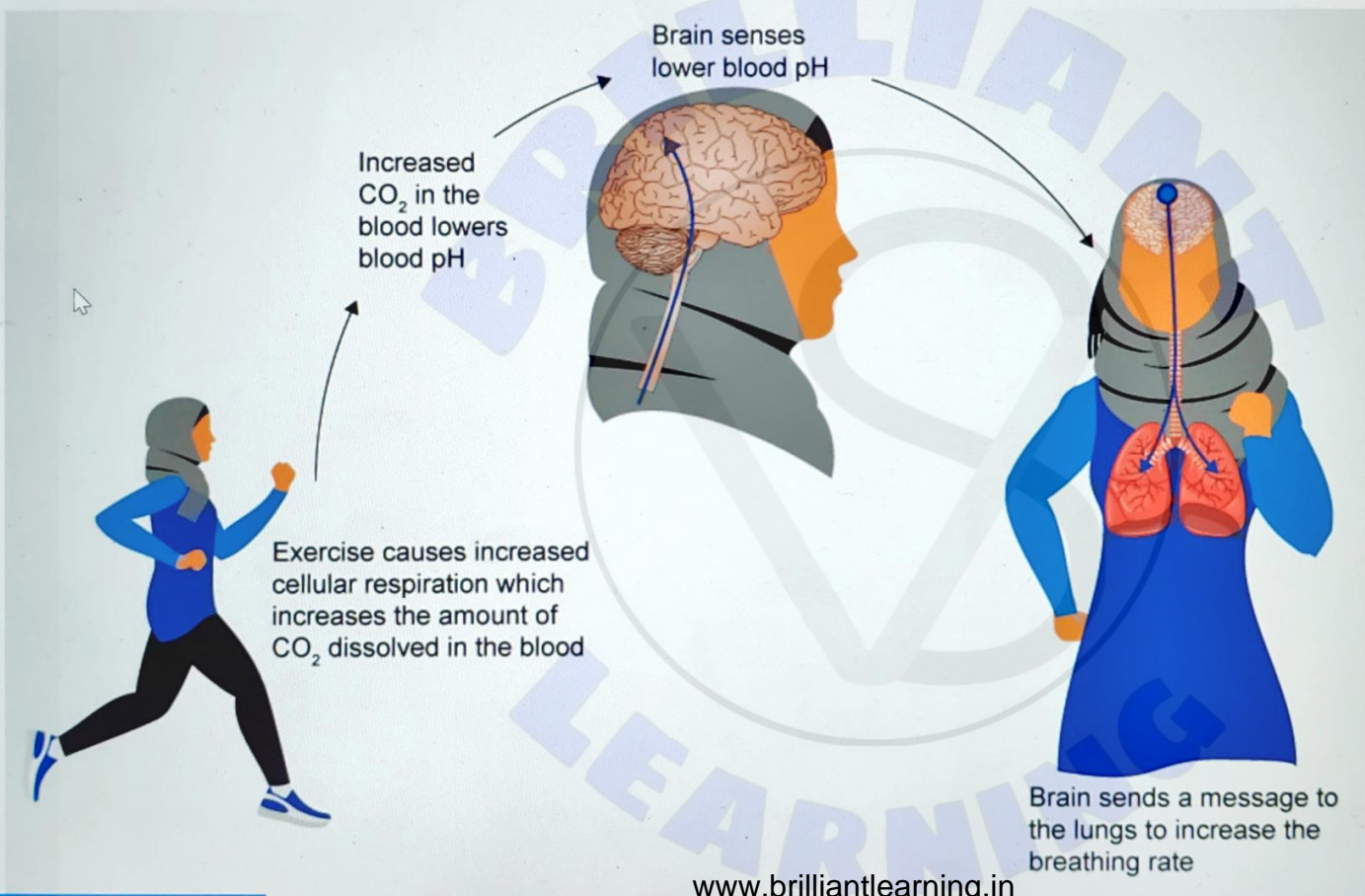
During exercise, cellular respiration increases to release more energy. Increased cellular respiration produces more CO_2 which causes a drop in blood pH. In response the breathing rate increases as shown in the diagram below:

Diagram not to scale



Scroll down to continue

- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▴
- Question 3a
- Question 3b
- Question 3c
- Question 3d
- Question 3e
- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▾



- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▴
 - Question 3a
 - Question 3b
 - Question 3c
 - Question 3d
 - Question 3e
- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▾



the lungs to increase the breathing rate

Explain how an increase in breathing rate will help to regulate the pH of the blood.

B *I* ← → U x_2 x^2 $\frac{1}{2}$ $\frac{3}{4}$ Ω Σ Styles

Italic (Ctrl+I)

1 (9 marks) ▾

2 (8 marks) ▾

3 (9 marks) ▴

Question 3a

Question 3b

Question 3c

Question 3d

Question 3e

4 (28 marks) ▾

5 (23 marks) ▾

6 (23 marks) ▾

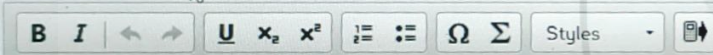




Question 3d (2 marks)

Red blood cells transport oxygen and carbon dioxide. Anemia is a condition that causes a reduction in the number of red blood cells.

Outline the consequences of reduced numbers of red blood cells to the cell respiration process.



- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▴
 - Question 3a
 - Question 3b
 - Question 3c
 - Question 3d
 - Question 3e
- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▾





Question 3e (1 mark)

Hemoglobin, present in the red blood cells, carries oxygen in the blood. The concentration of hemoglobin increases at high altitudes as time passes, compared to the value at sea level as shown in the graph below:

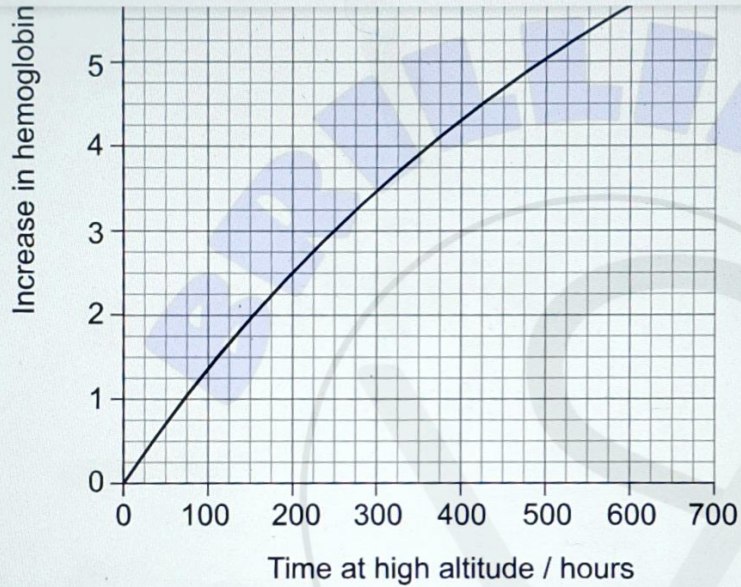


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- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▲
- Question 3a
- Question 3b
- Question 3c
- Question 3d
- Question 3e
- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▾



Scroll down to continue



Formulate a research question using the graph above.

B *I* ← → U x_2 x^2 $\frac{1}{2}$ $\frac{3}{4}$ Ω Σ Styles

- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▲
 - Question 3a
 - Question 3b
 - Question 3c
 - Question 3d
 - Question 3e
- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▾

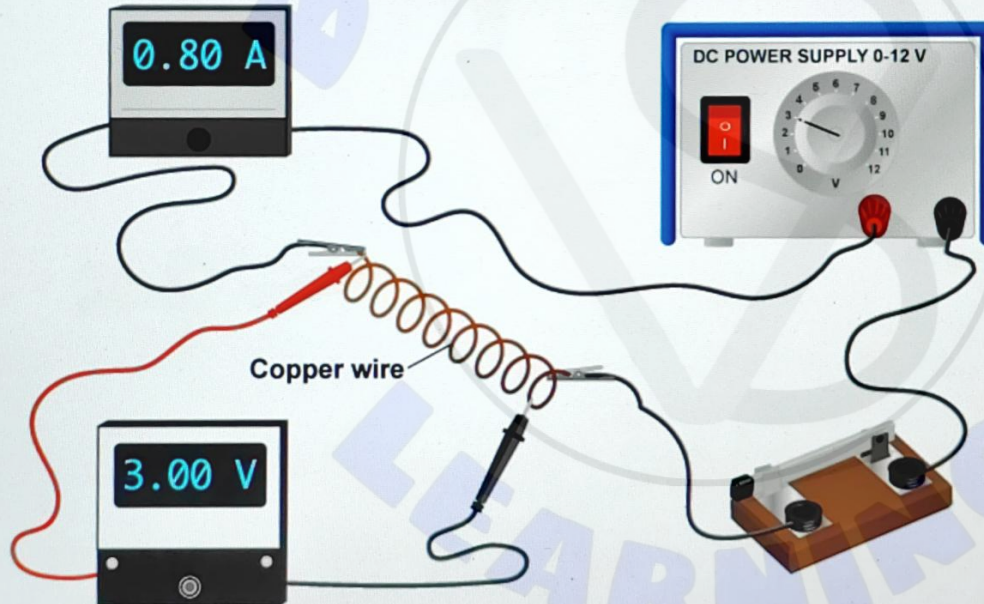




Question 4 (28 marks)



A student wants to investigate the relationship between voltage (V) and current (I) modelled by the formula $V = IR$ where $R =$ resistance. He uses the setup below to determine the resistance of a copper wire.



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- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▾
- 4 (28 marks) ▴
 - Question 4a
 - Question 4b
 - Question 4c
 - Question 4d
 - Question 4e
 - Question 4f
 - Question 4g
 - Question 4h
- 5 (23 marks) ▾
- 6 (23 marks) ▾



Question 4a (3 marks)

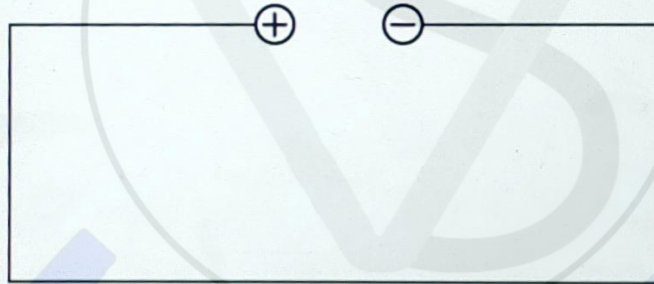
Use the tool to **draw** a circuit diagram of the equipment above.



Draggable items:

| | |
|--|--|
| | |
| | |
| | |
| | |
| | |
| | |

DC power supply
0-12 V



- 1 (9 marks)
- 2 (8 marks)
- 3 (9 marks)
- 4 (28 marks)
 - Question 4a
 - Question 4b
 - Question 4c
 - Question 4d
 - Question 4e
 - Question 4f
 - Question 4g
 - Question 4h
- 5 (23 marks)
- 6 (23 marks)



Question 4b (4 marks)

Suggest and justify two variables the student needs to control.

Control variable one

B I U x_2 x^2 $\frac{1}{z} =$ $z =$ Ω Σ

Styles

Control variable two

B I U x_2 x^2 $\frac{1}{z} =$ $z =$ Ω Σ

Styles

- 1 (9 marks)
- 2 (8 marks)
- 3 (9 marks)
- 4 (28 marks)
- Question 4a
- Question 4b
- Question 4c
- Question 4d
- Question 4e
- Question 4f
- Question 4g
- Question 4h
- 5 (23 marks)
- 6 (23 marks)

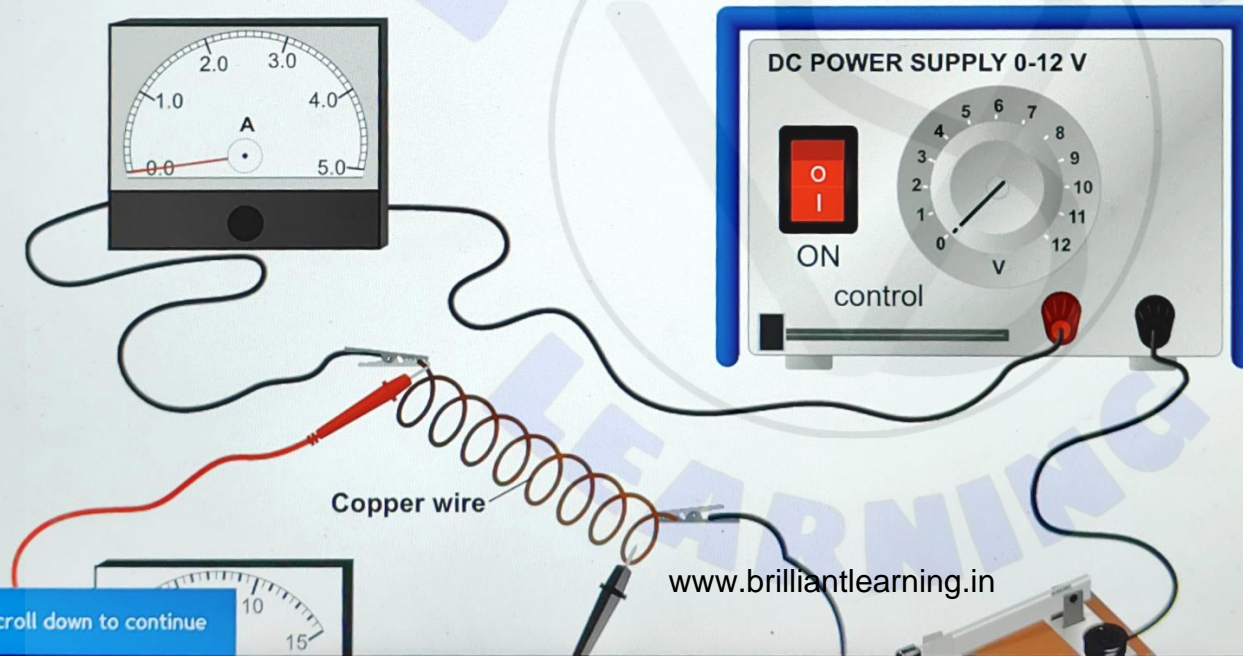




Question 4c (4 marks)

The simulation below allows the student to change the voltage and measure the current. His data table below is incomplete.

Move the slider control on the power supply to change the voltage in the circuit.

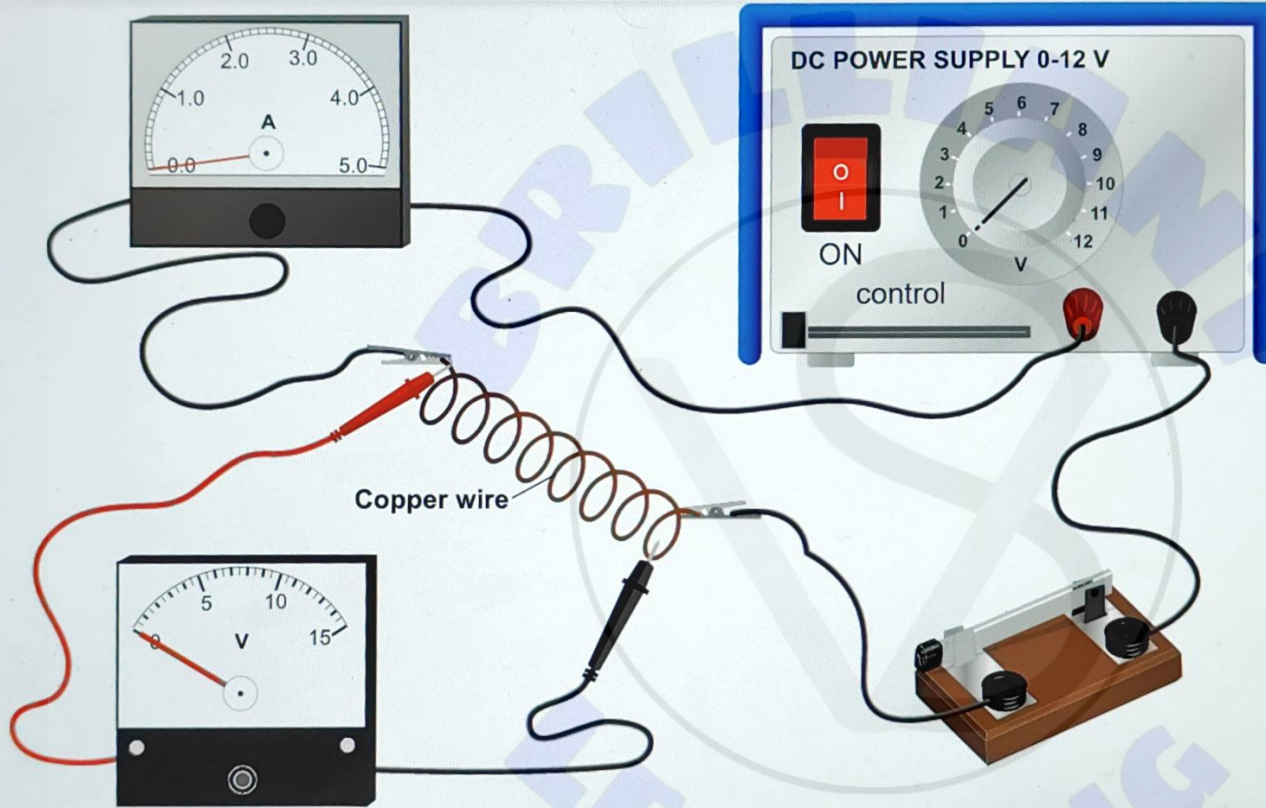


- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▾
- 4 (28 marks) ▴
 - Question 4a
 - Question 4b
 - Question 4c
 - Question 4d
 - Question 4e
 - Question 4f
 - Question 4g
 - Question 4h
- 5 (23 marks) ▾
- 6 (23 marks) ▾

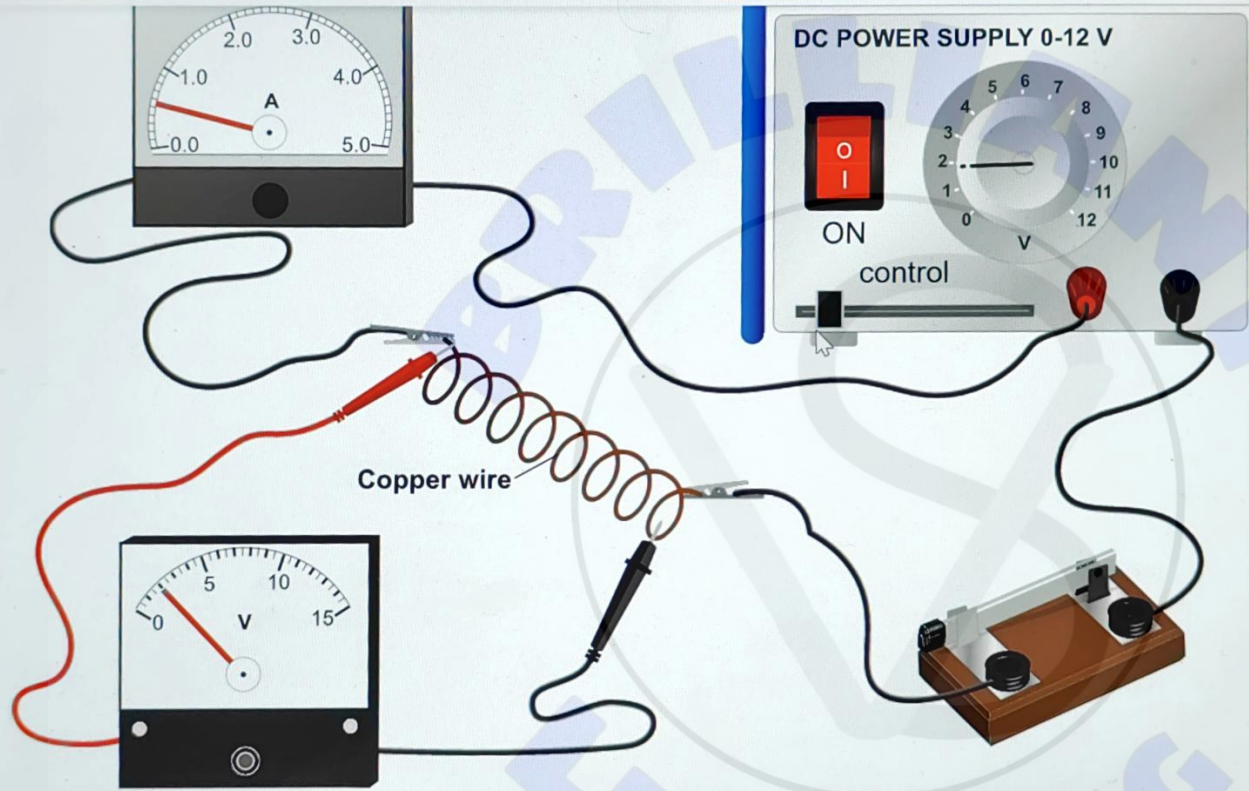


Scroll down to continue

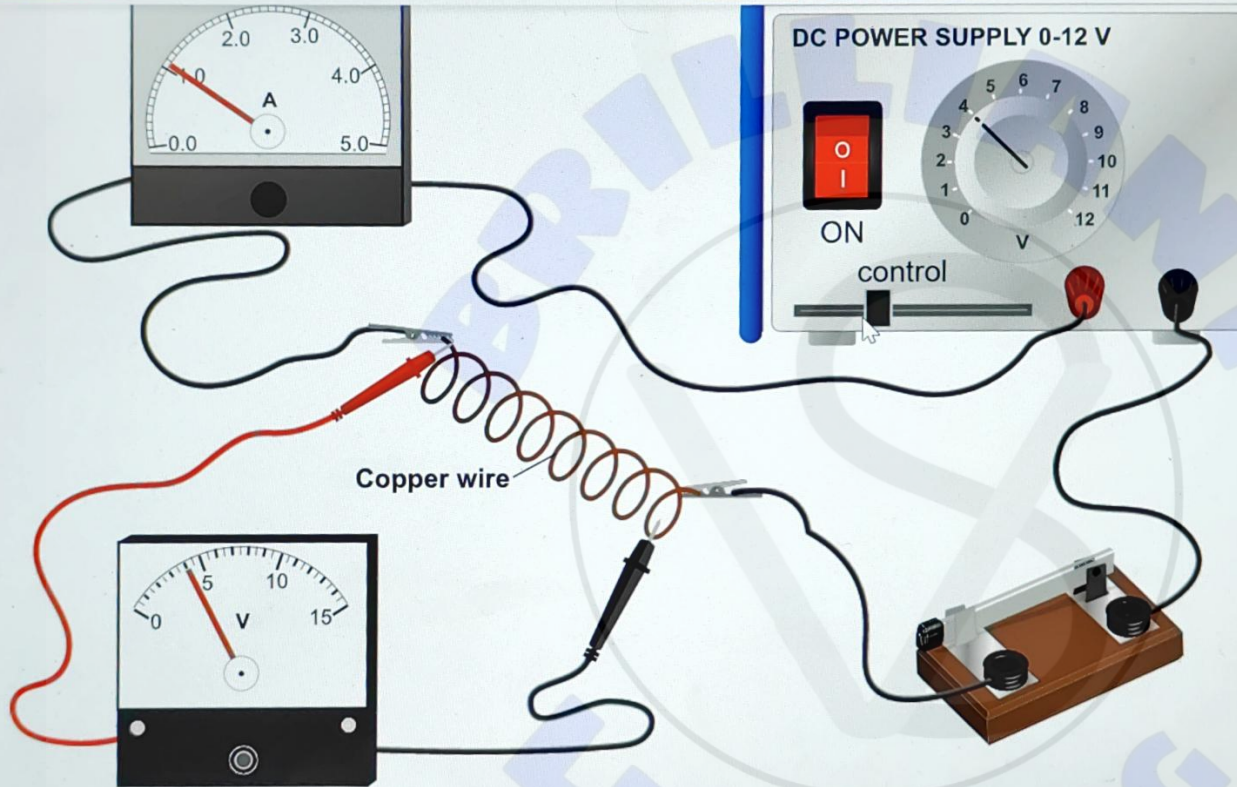




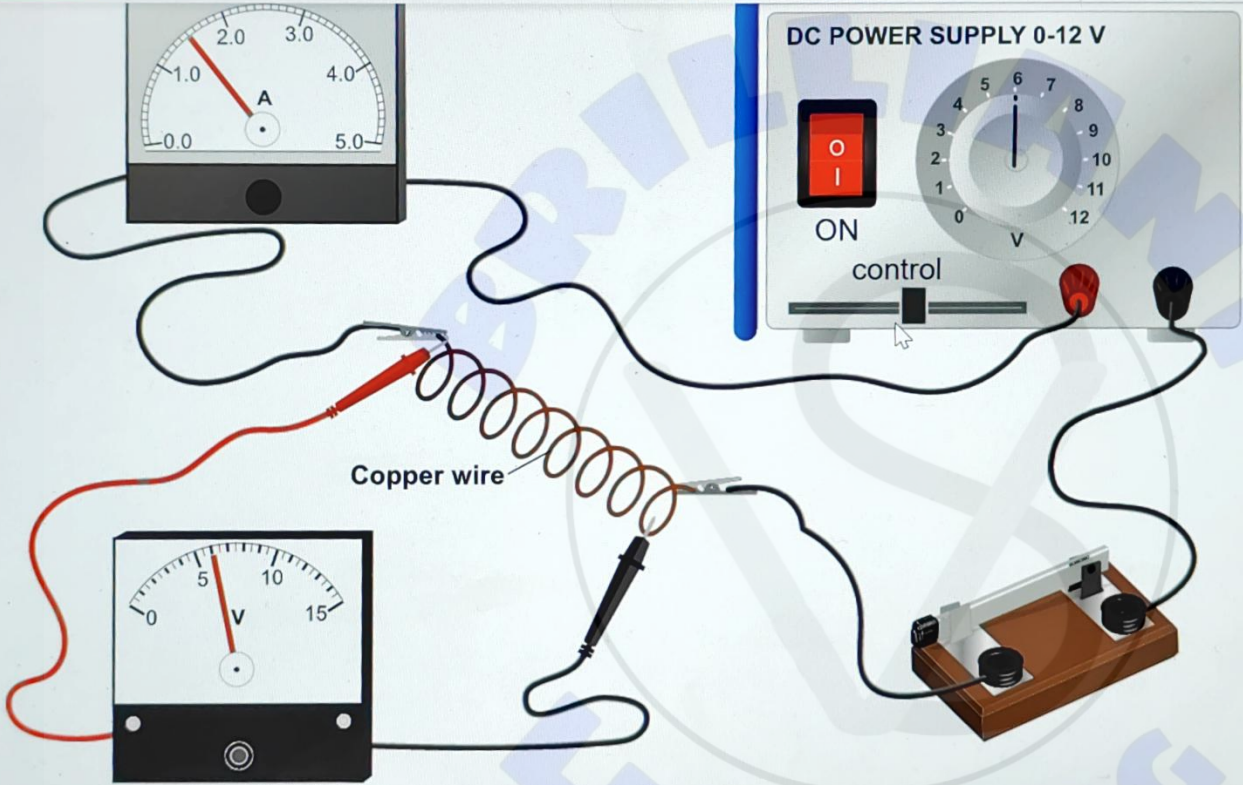
- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▾
- 4 (28 marks) ▴
 - Question 4a
 - Question 4b
 - Question 4c
 - Question 4d
 - Question 4e
 - Question 4f
 - Question 4g
 - Question 4h
- 5 (23 marks) ▾
- 6 (23 marks) ▾



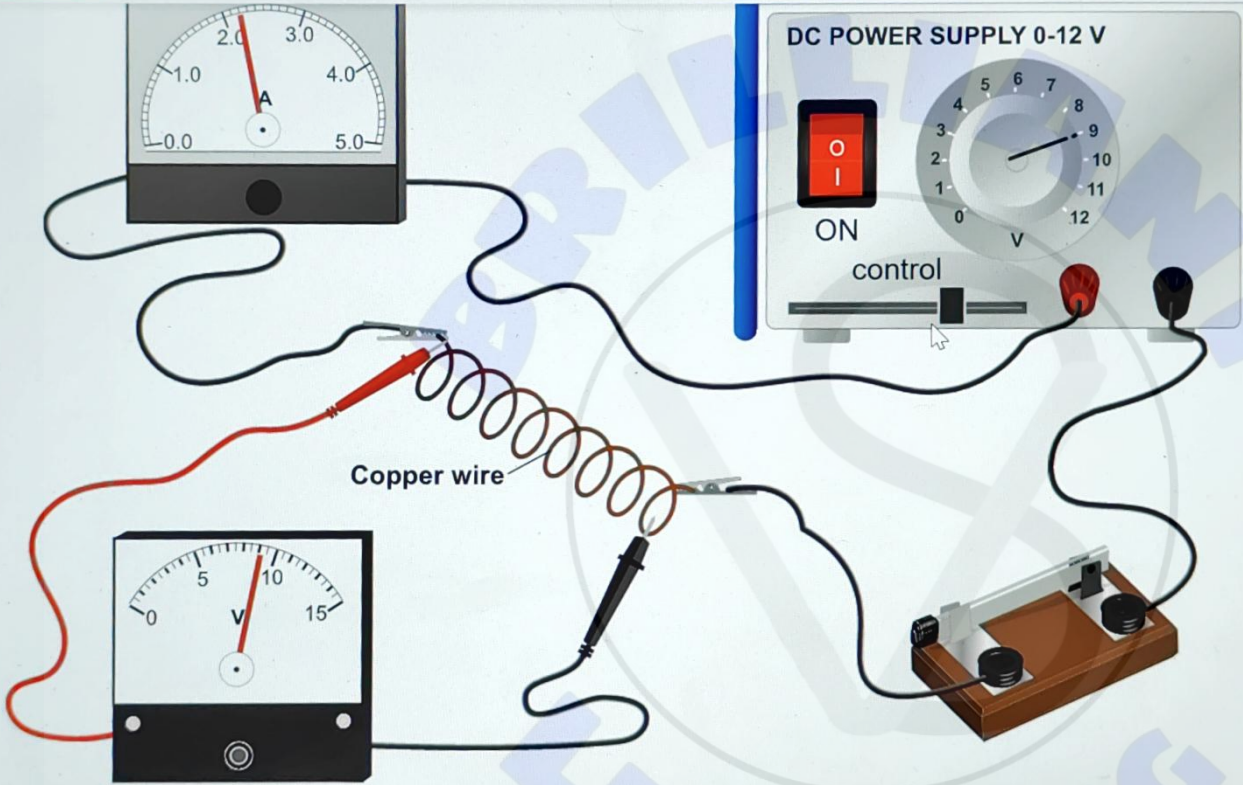
- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▾
- 4 (28 marks) ▴
 - Question 4a
 - Question 4b
 - Question 4c
 - Question 4d
 - Question 4e
 - Question 4f
 - Question 4g
 - Question 4h
- 5 (23 marks) ▾
- 6 (23 marks) ▾



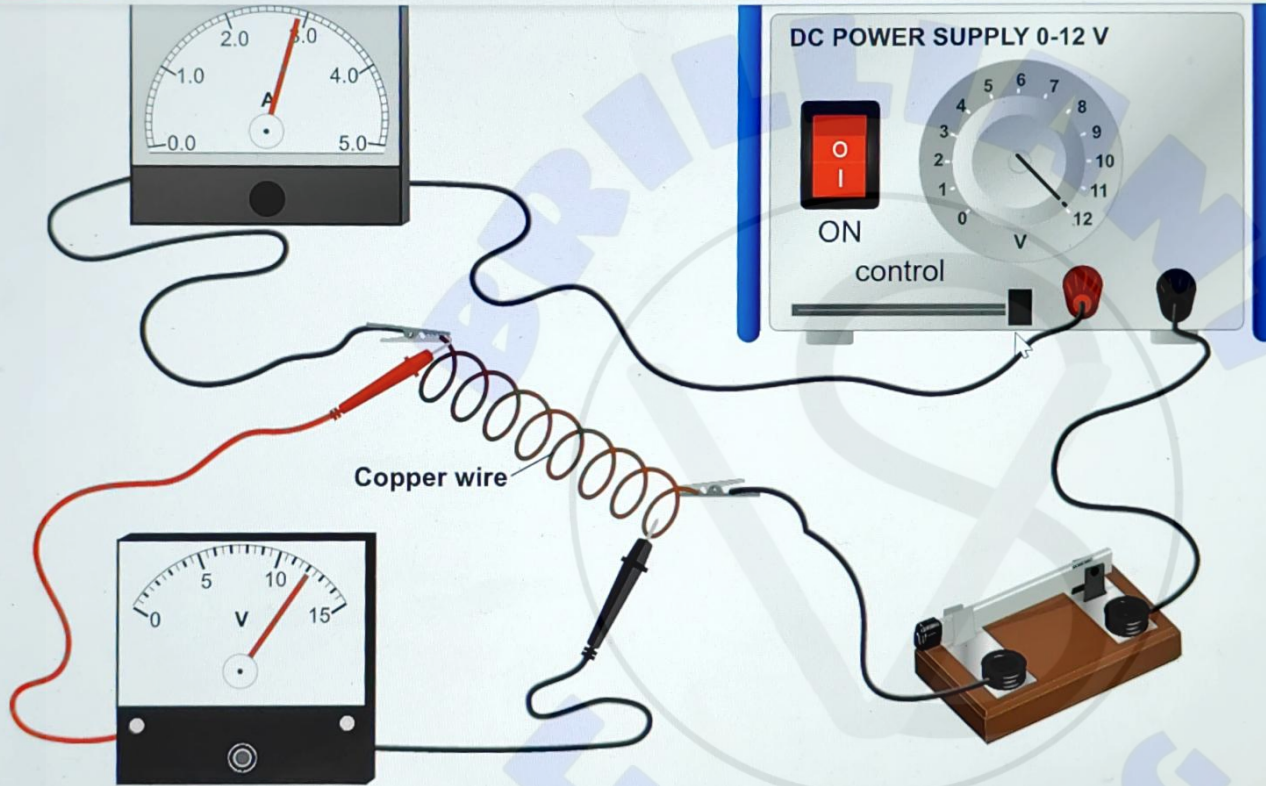
- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▾
- 4 (28 marks) ▴
 - Question 4a
 - Question 4b
 - Question 4c
 - Question 4d
 - Question 4e
 - Question 4f
 - Question 4g
 - Question 4h
- 5 (23 marks) ▾
- 6 (23 marks) ▾



- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▾
- 4 (28 marks) ▴
 - Question 4a
 - Question 4b
 - Question 4c
 - Question 4d
 - Question 4e
 - Question 4f
 - Question 4g
 - Question 4h
- 5 (23 marks) ▾
- 6 (23 marks) ▾



- 1 (9 marks)
- 2 (8 marks)
- 3 (9 marks)
- 4 (28 marks)
- Question 4a
- Question 4b
- Question 4c
- Question 4d
- Question 4e
- Question 4f
- Question 4g
- Question 4h
- 5 (23 marks)
- 6 (23 marks)



- 1 (9 marks)
- 2 (8 marks)
- 3 (9 marks)
- 4 (28 marks)
- Question 4a
- Question 4b
- Question 4c
- Question 4d
- Question 4e
- Question 4f
- Question 4g
- Question 4h
- 5 (23 marks)
- 6 (23 marks)



Label the missing units and use the simulation to **measure** the missing data points. Add your values to the table.

| Voltage / <input type="text"/> | Current / <input type="text"/> |
|--------------------------------|--------------------------------|
| <input type="text"/> | <input type="text"/> |
| 3 | 0.8 |
| 5 | 1.3 |
| 10 | 2.4 |
| <input type="text"/> | <input type="text"/> |


- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▾
- 4 (28 marks) ▴
 - Question 4a
 - Question 4b
 - Question 4c
 - Question 4d
 - Question 4e
 - Question 4f
 - Question 4g
 - Question 4h
- 5 (23 marks) ▾
- 6 (23 marks) ▾



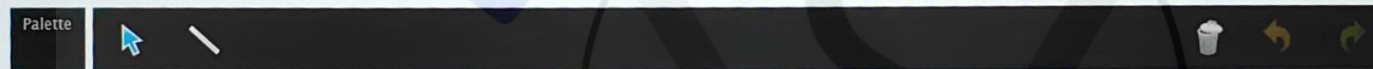


Question 4d (5 marks)

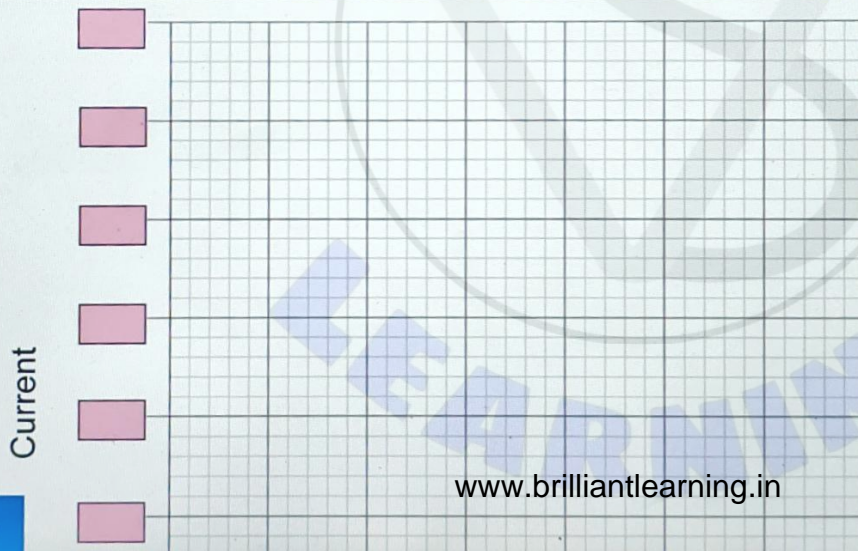
The axes below are incomplete. **Plot** a graph of the data in part (c) and **draw** a line of best fit.







Click the icon  in the palette and click to place on the graph.

Palette



Point

-  1 (9 marks) ▾
-  2 (8 marks) ▾
-  3 (9 marks) ▾
-  4 (28 marks) ▴
- Question 4a
- Question 4b
- Question 4c
- Question 4d
- Question 4e
- Question 4f
- Question 4g
- Question 4h
-  5 (23 marks) ▾
-  6 (23 marks) ▾



Question 4e (5 marks)

Use data from the graph to **calculate** the resistance of the wire.

B *I* ← → U x_2 x^2 $\frac{1}{2}$ $\frac{3}{2}$ Ω Σ Styles



Scroll down to continue

- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▾
- 4 (28 marks) ▴
 - Question 4a
 - Question 4b
 - Question 4c
 - Question 4d
 - Question 4e
 - Question 4f
 - Question 4g
 - Question 4h
- 5 (23 marks) ▾
- 6 (23 marks) ▾



Question 4f (2 marks)

State one weakness in the investigation and **suggest** an improvement to address this weakness.

B *I* | ← → | U x_2 x^2 | $\frac{1}{2}$ $\frac{3}{4}$ | Ω Σ | Styles |



Question 4g (2 marks)

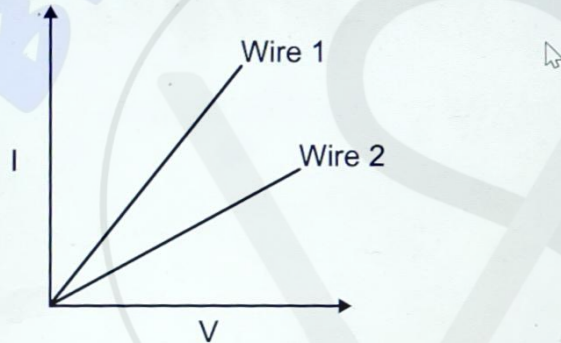


- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▾
- 4 (28 marks) ▴
 - Question 4a
 - Question 4b
 - Question 4c
 - Question 4d
 - Question 4e
 - Question 4f
 - Question 4g
 - Question 4h
- 5 (23 marks) ▾
- 6 (23 marks) ▾



Question 4g (2 marks)

The graph below compares the resistance of two different conducting wires.



A student makes the following hypothesis about wire 1:

If the voltage increases, the current will decrease because the relationship is inversely proportional.

Use the graph to state why this hypothesis is www.brilliantlearning.in wrong. Justify your answer.

- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▾
- 4 (28 marks) ▴
- Question 4a
- Question 4b
- Question 4c
- Question 4d
- Question 4e
- Question 4f
- Question 4g
- Question 4h
- 5 (23 marks) ▾
- 6 (23 marks) ▾



A student makes the following hypothesis about wire 1:

If the voltage increases, the current will decrease because the relationship is inversely proportional.

Use the graph to **state** why this hypothesis is invalid. **Justify** your answer.

B **I** ← → U x_2 x^2 \int \sum Ω Σ Styles

1 (9 marks) ▾

2 (8 marks) ▾

3 (9 marks) ▾

4 (28 marks) ▴

Question 4a

Question 4b

Question 4c

Question 4d

Question 4e

Question 4f

Question 4g

Question 4h

5 (23 marks) ▾

6 (23 marks) ▾





Question 4h (3 marks)

A student compares the resistance of two different wires and suggests that:

Wire 1 has a greater resistance than wire 2.

Use the graph in part (g) to **evaluate** whether the student's comparison is correct or not.

B *I* | ← → | x₂ x² | ≡ ≡ | Ω Σ | Styles | ↕

- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▾
- 4 (28 marks) ▴
 - Question 4a
 - Question 4b
 - Question 4c
 - Question 4d
 - Question 4e
 - Question 4f
 - Question 4g
 - Question 4h
- 5 (23 marks) ▾
- 6 (23 marks) ▾





Question 5 (23 marks)



Video

Template

Tiny dancer template



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- 1 (9 marks) v
- 2 (8 marks) v
- 3 (9 marks) v
- 4 (28 marks) v
- 5 (23 marks) ^
- Question 5a
- Question 5b
- Question 5c
- Question 5d
- 6 (23 marks) v



- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▾
- 4 (28 marks) ▾
- 5 (23 marks) ▲
- Question 5a
- Question 5b
- Question 5c
- Question 5d
- 6 (23 marks) ▾

A student wants to use his knowledge of electricity and magnetism to design a set of tiny dancers for a science competition. He has a set of small, strong permanent magnets, wire, batteries, a tool kit and a template to create the set of tiny dancers.



Question 5a (3 marks)

The strong magnets in this investigation are made from the element neodymium.





Question 5a (3 marks)

The strong magnets in this investigation are made from the element neodymium.

Neodymium Nd

Atomic number: 60
Relative atomic mass: 144

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- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▾
- 4 (28 marks) ▾
- 5 (23 marks) ▴
- Question 5a
- Question 5b
- Question 5c
- Question 5d
- 6 (23 marks) ▾



Scroll down to continue



©

Using the information from the image, **state** the number of protons, neutrons and electrons in an atom of neodymium.

Protons

Neutrons

Electrons



Question 5b (2 marks)

A student collected the following data about a tiny dancer in one trial: the dancer rotated 18 times in 15 seconds. **Calculate** the dancer's rotational speed. Give your answer in



Scroll down to continue

ute.

- 1 (9 marks) ▾
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- 4 (28 marks) ▾
- 5 (23 marks) ▲
- Question 5a
- Question 5b
- Question 5c
- Question 5d
- 6 (23 marks) ▾



Question 5b (2 marks)

A student collected the following data about a tiny dancer in one trial: the dancer rotated 18 times in 15 seconds. **Calculate** the dancer's rotational speed. Give your answer in rotations per minute.

B *I* ← → U x_2 x^2 \int \sum Ω Σ Styles



Question 5c (3 marks)



- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▾
- 4 (28 marks) ▾
- 5 (23 marks) ▴
- Question 5a
- Question 5b
- Question 5c
- Question 5d
- 6 (23 marks) ▾



Question 5c (3 marks)

The student wants to investigate the effect of the number of magnets on the rotational speed of the tiny dancer. **State** the variables in this investigation. The dependent variable has been completed for you.

Dependent variable

Number of rotations in one minute

Independent variable

B*I*U x_2 x^2

≡

≡



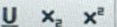

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- 3 (9 marks) ▾
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- 5 (23 marks) ▲
- Question 5a
- Question 5b
- Question 5c
- Question 5d
- 6 (23 marks) ▾






Independent variable







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
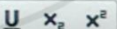


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
Control variable one

Styles 

Control variable two

Styles 

- 1 (9 marks) ▾
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- 3 (9 marks) ▾
- 4 (28 marks) ▾
- 5 (23 marks) ▲
- Question 5a
- Question 5b
- Question 5c
- Question 5d
- 6 (23 marks) ▾



Question 5d (15 marks)

Design a method to investigate the effect of the number of magnets on the rotational speed of the tiny dancer. In your answer, you should include:

- a research question
- a list of any additional equipment you might need
- a description of the method you will use to make measurements
- a justification of how you will collect sufficient data
- a statement of how you will make sure your method is safe.

B*I*U x_2 x^2 

Styles



Scroll down to continue

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|-----------------------|--------------|---|
| <input type="radio"/> | 1 (9 marks) | ▼ |
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| | Question 5a | |
| | Question 5b | |
| | Question 5c | |
| | Question 5d | |
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Question 6 (23 marks)

Video

Transcript

A natural disaster is a major event resulting from natural processes of the Earth, for example, earthquakes, tsunamis and volcanic eruptions.

An earthquake is defined as the shaking and movement of the Earth's crust. An earthquake is considered one of the most devastating and dangerous natural disasters a population can experience.

Earthquakes can trigger other destructive natural disasters such as tsunamis or landslides. Strong earthquakes cause major damage in populated areas in a short period of time. Some examples of countries affected by earthquakes include the United States, Mexico, Peru, Chile, Indonesia, Japan, China, Italy, and Greece.

Seismometers are used to record information about the size of earthquakes. Millions of earthquakes that are too weak to be recorded occur every year. Approximately 20 000 earthquakes are strong enough to be recorded. Few of those cause major damage. Once every five to ten years an earthquake will be strong enough to totally destroy communities.

- 1 (9 marks) ▾
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Question 6a

Question 6b

Question 6c

Question 6d

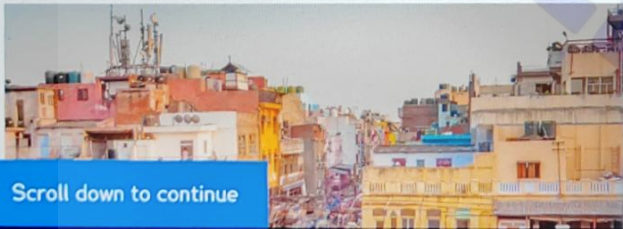




Question 6a (2 marks)

People who live in countries where earthquakes are common are very aware of the risks and take precautions to be safe. Governments develop laws and regulations about the construction of buildings and houses. Local authorities prepare for earthquakes by setting up risk-management systems.

The images below show buildings in two large cities in earthquake active areas, India and the United States.



Scroll down to continue

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 - 4 (28 marks) ▾
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 - 6 (23 marks) ▴
- Question 6a
- Question 6b
- Question 6c
- Question 6d



- 1 (9 marks) ▾
- 2 (8 marks) ▾
- 3 (9 marks) ▾
- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▴

Question 6a

Question 6b

Question 6c

Question 6d

Suggest two reasons why some cities might have a higher number of deaths after earthquakes of a similar size.



Scroll down to continue



Suggest two reasons why some cities might have a higher number of deaths after earthquakes of a similar size.

B I | | U x_2 x^e | | Ω Σ | Styles |

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- 3 (9 marks) ▾
- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▴
- Question 6a
- Question 6b
- Question 6c
- Question 6d



Question 6b (4 marks)

Suggest and justify two actions governments or local authorities can take to reduce the number of deaths caused by earthquakes.

B *I* | ← → | x₂ x² | $\frac{1}{2}$ $\frac{3}{4}$ | Ω Σ | Styles |



Question 6c (2 marks)



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| | Question 6a | |
| | Question 6b | |
| | Question 6c | |
| | Question 6d | |



Pause

Assistance



2:23



Question 6c (2 marks)

Scientists have been developing systems that detect the start of an earthquake and send a warning to an earthquake alert centre. These systems will send signals even if only a small shaking occurs. Currently these systems are only used in some locations, depending on the economy of the country.

Many countries such as the United States, Mexico and Japan are developing Early Warning System (EWS) apps. These apps provide warnings to individuals before, during and immediately after an event. The use of EWS apps may reduce the number of deaths and the economic impacts. They may give specific instructions such as to take shelter or disconnect power and gas supplies to avoid further damage. These systems rely on a strong commitment from governments to invest in EWS apps and to encourage their use by communities in areas where earthquakes are common.

The image shows how an EWS app senses an earthquake and communicates a warning to a cell phone or a computer.

- 1 (9 marks) ▾
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 - 3 (9 marks) ▾
 - 4 (28 marks) ▾
 - 5 (23 marks) ▾
 - 6 (23 marks) ▴
- Question 6a
- Question 6b
- Question 6c
- Question 6d

Cell phone or computer

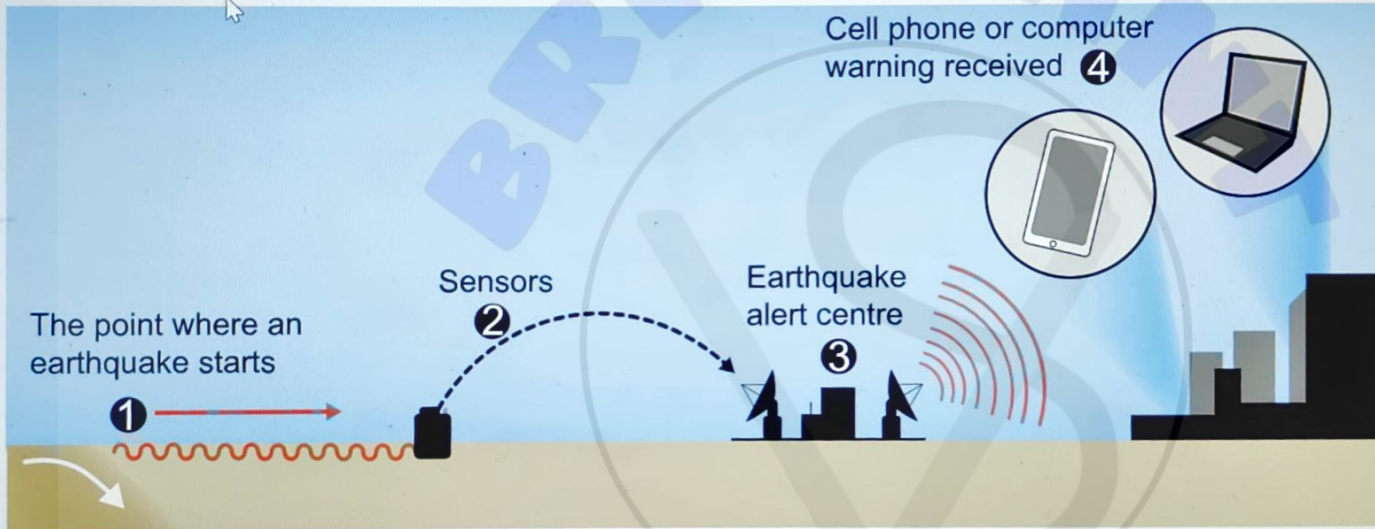
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The image shows how an EWS app senses an earthquake and communicates a warning to a cell phone or a computer.



©

An earthquake starts 80 km away from the sensor. The speed of the earthquake wave is 4 kms^{-1} . Calculate the time it takes the sensor to detect the earthquake.

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| 6 (23 marks) | ▲ |
| Question 6a | |
| Question 6b | |
| Question 6c | |
| Question 6d | |





©

An earthquake starts 80 km away from the sensor. The speed of the earthquake wave is 4 kms^{-1} . **Calculate** the time it takes the sensor to detect the earthquake.

B I | ← → | U \times_2 \times^2 | $\frac{1}{x}$ $\frac{1}{x^2}$ | Ω Σ | Styles - | 📄

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- 1 (9 marks) ▾
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- 4 (28 marks) ▾
- 5 (23 marks) ▾
- 6 (23 marks) ▴
- Question 6a
- Question 6b
- Question 6c
- Question 6d



Question 6d (15 marks)

Video

Transcript

[Announcer] Earthquake, drop, cover, hold on. Shaking expected.

[Narrator] Download the MyShake app to get a warning when earthquake shaking is headed your way.

[Narrator] If a quake of at least 4 1/2 magnitude hits California, MyShake users who are expected to feel shaking will get a warning.

[Announcer] Earthquake, drop, cover, hold on. Shaking expected.

[Teacher] Children, there's an earthquake.

[Narrator] Built by UC Berkeley, MyShake reminds you what to do in an earthquake.

[Announcer] Earthquake, drop, cover, hold on. Shaking expected.

[Narrator] Depending on how close you are to it, the alert may arrive before, during, or just after the shaking.

Using MyShake will help scientists better understand earthquakes.

Your phone will sense earthquakes, and then send motion and location data to scientists.

The more people that download MyShake, the faster earthquake research improves.

But beyond getting earthquake alerts, MyShake gives you real time information about quakes around the world. If you do feel a quake, let scientists and others know what happened around you, like where you felt the shaking, how much shaking you felt, damage to buildings around you, and road conditions.

And discover what other people experience during a quake.



Scroll down to continue

on how to prepare, survive, and recover.

to background, using very little storage and power.

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| 6 (23 marks) | ▲ |
| Question 6a | |
| Question 6b | |
| Question 6c | |
| Question 6d | |



[Narrator] Download the MyShake app to get a warning when earthquake shaking is headed your way.

[Narrator] If a quake of at least 4 1/2 magnitude hits California, MyShake users who are expected to feel shaking will get a warning.

[Announcer] Earthquake, drop, cover, hold on. Shaking expected.

[Teacher] Children, there's an earthquake.

[Narrator] Built by UC Berkeley, MyShake reminds you what to do in an earthquake.

[Announcer] Earthquake, drop, cover, hold on. Shaking expected.

[Narrator] Depending on how close you are to it, the alert may arrive before, during, or just after the shaking.

Using MyShake will help scientists better understand earthquakes.

Your phone will sense earthquakes, and then send motion and location data to scientists.

The more people that download MyShake, the faster earthquake research improves.

But beyond getting earthquake alerts, MyShake gives you real time information about quakes around the world. If you do feel a quake, let scientists and others know what happened around you, like where you felt the shaking, how much shaking you felt, damage to buildings around you, and road conditions.

And discover what other people experience during a quake.

You'll also get tips on how to prepare, survive, and recover.

MyShake runs in the background, using very little storage and power.

Are you ready? Download California's earthquake early warning app, MyShake.

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| 6 (23 marks) | ▲ |
| Question 6a | |
| Question 6b | |
| Question 6c | |
| Question 6d | |





Using all of the information provided and knowledge from your wider MYP studies, **discuss** and **evaluate** the strengths and limitations of using the EWS app in areas where earthquakes are common to reduce the risk of damage and economic impacts.

In your answer you should include:

- an outline of how the EWS app communicates warnings
- the strengths and limitations of the function of an EWS app
- the social impacts for an individual
- the economic impacts for governments
- your opinion about whether EWS apps should be used in all areas where earthquakes are common.

B *I* ← → U x_2 x^e $\frac{1}{2}$ $\frac{3}{4}$ Ω Σ Styles

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| | Question 6a | |
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