OXFORD
INTERNATIONAL AQA EXAMINATIONS

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

# INTERNATIONAL GCSE

# PHYSICS

Paper 2

Wednesday 14 November 2018 07:00 GMT
Time allowed: 1 hour 30 minutes

**Materials**
For this paper you must have:
- a ruler
- a scientific calculator
- a Physics Equations Sheet.

**Instructions**
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

| For Examiner's Use | |
|---|---|
| Question | Mark |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| **TOTAL** | |

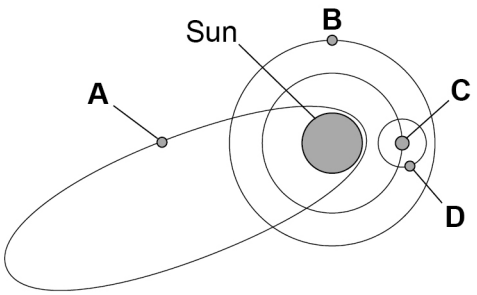
**Information**
- The maximum mark for this paper is 90.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.

*Do not write outside the box*

Answer **all** questions in the spaces provided.

**0 1** **Figure 1** shows the orbits of some objects in the solar system.

**Figure 1**




**0 1 . 1** Which object is a comet?
Tick **one** box.

**[1 mark]**

| A | | B | | C | | D | |
|---|---|---|---|---|---|---|---|

**0 1 . 2** Which object is a moon?
Tick **one** box.

**[1 mark]**

| A | | B | | C | | D | |
|---|---|---|---|---|---|---|---|

**0 1 . 3** Complete the sentences.
Use words from the box.

**[2 marks]**

| **galaxy** | **moon** | **planet** | **star** |
|---|---|---|---|

The Milky Way is a _____ .

The Sun is a _____ .

*Do not write outside the box*

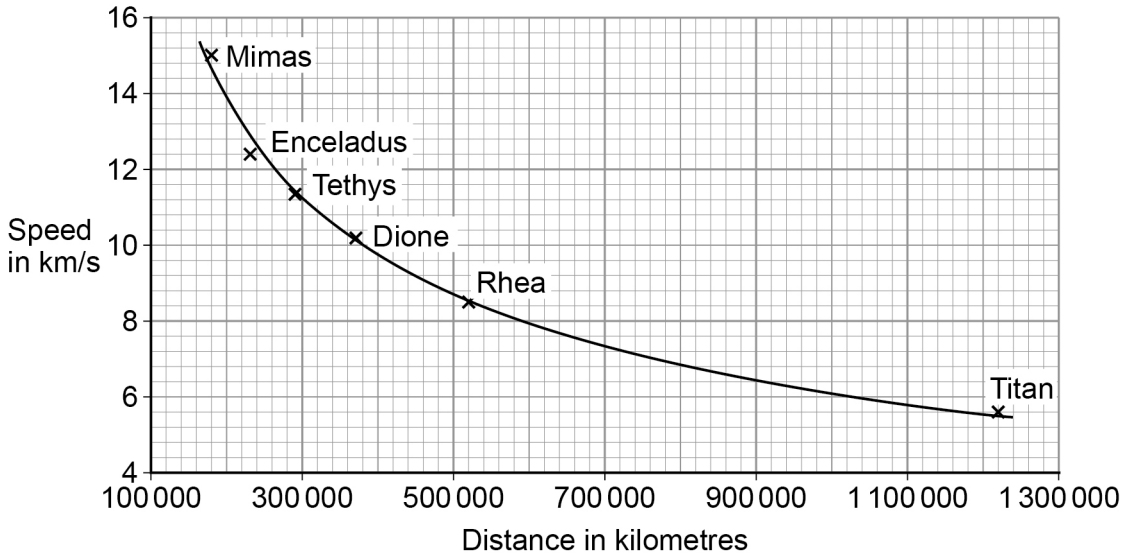
Saturn is a planet that has many moons in orbit around it.

**0 1 . 4** What is the name of the force that causes a moon to orbit Saturn?

**[1 mark]**

**Figure 2** shows how speed varies with distance from the centre of Saturn for Saturn's largest moons.

**Figure 2**




**0 1 . 5** Saturn has a smaller moon called Methone which is not shown on **Figure 2**.

The distance between Methone and the centre of Saturn is 200 000 km.

Determine the speed of Methone.

**[1 mark]**

Speed = _____ km/s

**0 1 . 6** Determine the difference in speed between Titan and Rhea.

**[2 marks]**

Difference in speed = _____ km/s

8

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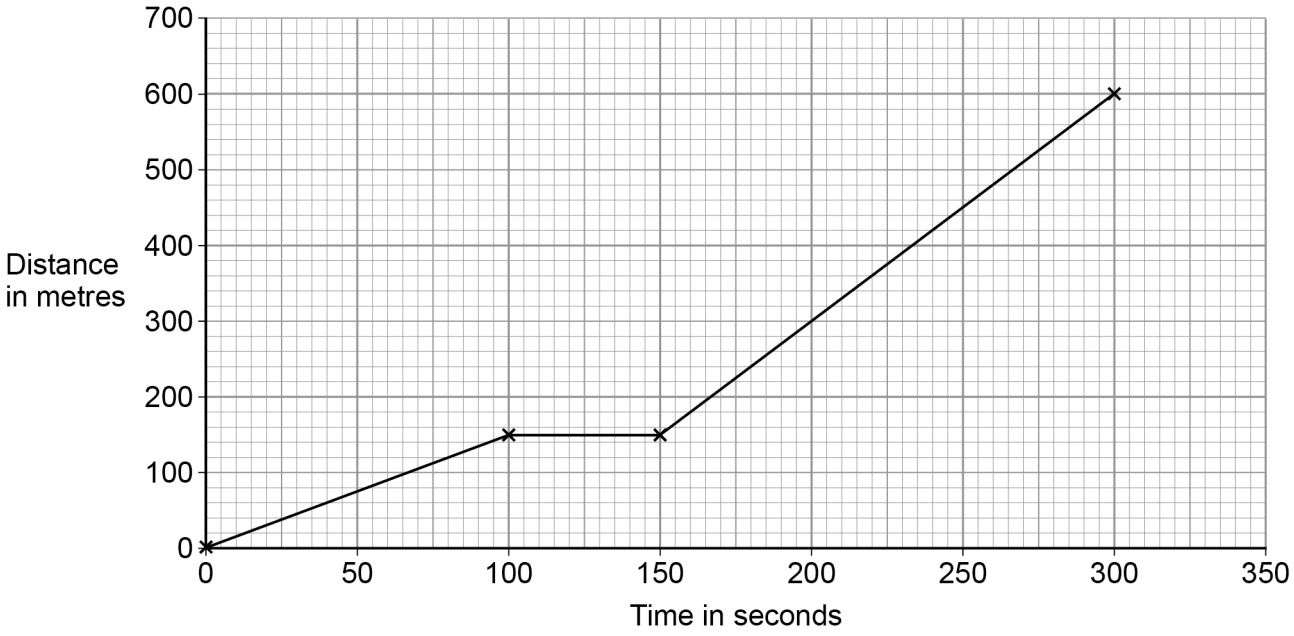
**0 2** **Figure 3** shows a distance-time graph for a student walking to school.

**Figure 3**




**0 2 . 1** Which of the following describes the motion of the student between 100 seconds and 150 seconds?
Tick **one** box.

**[1 mark]**

Constant acceleration ☐

Slowing down ☐

Speeding up ☐

Stationary ☐

**0 2 . 2** What is the total distance travelled by the student?

**[1 mark]**

Total distance = _____ m

Do not write outside the box

**0 2 . 3** Determine the speed of the student during the first 100 seconds.

**[2 marks]**

Speed = _____ m/s

**0 2 . 4** The next day the student ran to school at a constant speed.

The journey took half the time than it did on the first day.

Draw another line on **Figure 3** to show the student running to school.

**[2 marks]**

**0 2 . 5** The student ran at a speed of 4.0 m/s.

The student had a mass of 50 kg.

Calculate the momentum of the student.

Use the Physics Equations Sheet.

**[2 marks]**

Momentum = _____ kg m/s

8

**Turn over for the next question**

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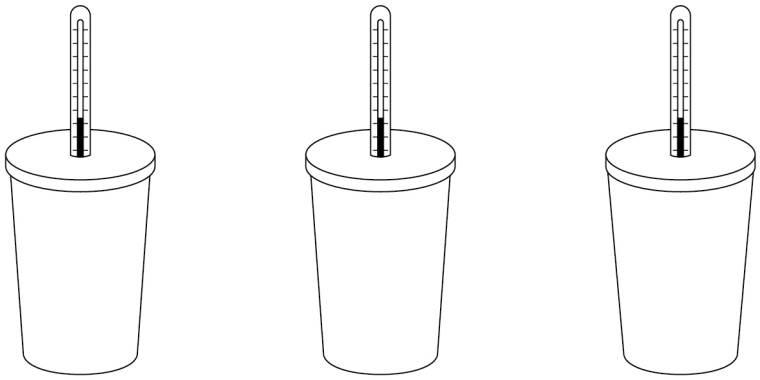
**0 3** **Figure 4** shows three cups made from different materials.

**Figure 4**



Paper Polystyrene Plastic

A student investigated how the material of each cup affected the length of time hot water would take to cool down.

The student put hot water at the same temperature into each cup. The student measured the time it took for the water to cool to 40 °C.

The student used the following equipment in the investigation:

- thermometer
- measuring cylinder.

**0 3 . 1** Suggest **two** other pieces of equipment the student would need in this investigation.

**[2 marks]**

1 _____

2 _____

**0 3 . 2** Explain why the student used a measuring cylinder in the investigation.

**[2 marks]**

_____

_____

_____

_____

*Do not write outside the box*

**0 3 . 3** When using the equipment in **Figure 4**, the student found it difficult to obtain an accurate value for the time taken for the water to cool to 40 °C.

Explain why.

**[2 marks]**

**0 3 . 4** **Table 1** shows the student's results.

**Table 1**

| Cup material | Time in seconds |
|---|---|
| Paper | 906 |
| Polystyrene | 987 |
| Plastic | 960 |

Which cup material gave the lowest rate of energy transfer?

Give a reason for your answer.

**[2 marks]**

Material _____

Reason _____

**Question 3 continues on the next page**

*Do not write outside the box*

**0 3 . 5** The starting temperature of the water was 90 °C.

The mass of water in one cup was 0.25 kg.

Calculate the energy transferred from the water as it cooled to 40 °C.

specific heat capacity of water = 4200 J/kg °C

Use the Physics Equations Sheet.

Give your answer to **2** significant figures.

**[4 marks]**

Energy transferred = _____ J

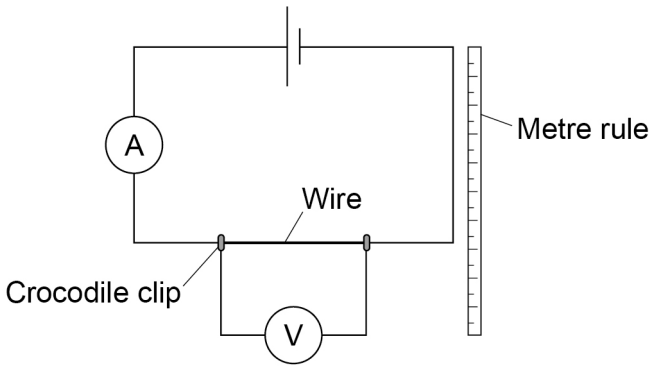
**12**

*Do not write outside the box*

**0 4** A student investigated how the resistance of a wire varies with the length of the wire.

**Figure 5** shows the circuit the student used. The student also had a metre rule.

**Figure 5**




**0 4 . 1** Plan an experiment to investigate how the resistance of a wire varies with the length of the wire.

**[6 marks]**

**Question 4 continues on the next page**

*Do not write outside the box*

Another student investigated how the current in a resistor varied with the potential difference across it.

**Table 2** shows the student's results.

**Table 2**

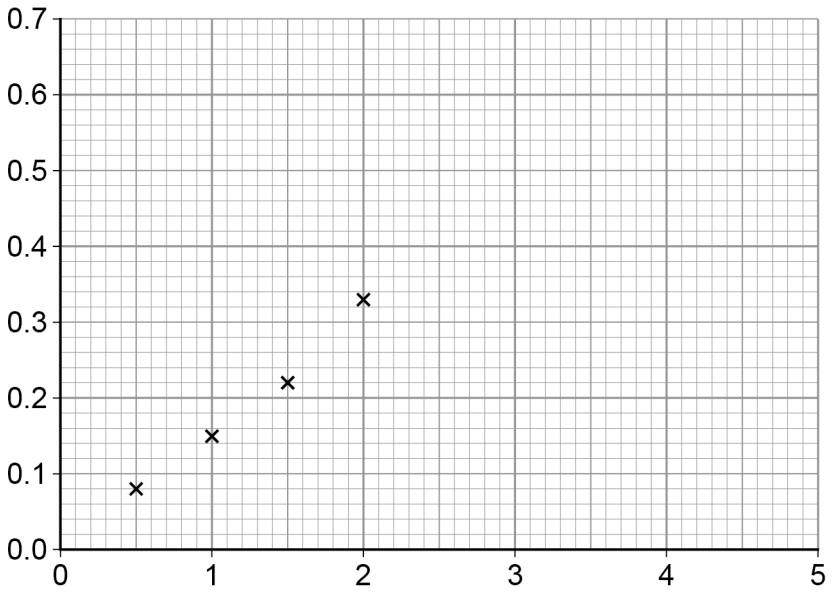
| Potential difference in volts | Current in amps |
|---|---|
| 0.50 | 0.08 |
| 1.0 | 0.15 |
| 1.5 | 0.22 |
| 2.0 | 0.33 |
| 2.5 | 0.43 |
| 3.0 | 0.48 |
| 3.5 | 0.54 |
| 4.0 | 0.62 |
| 4.5 | 0.66 |

**0 4 . 2** Complete **Figure 6**. You should:

- label the x-axis and the y-axis
- plot the remaining five points
- add a line of best fit.

**[4 marks]**

**Figure 6**




10

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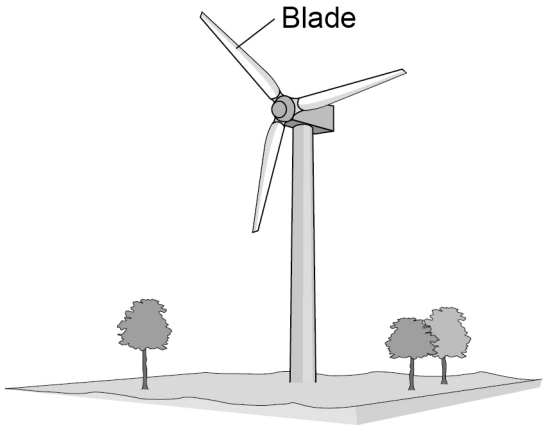
**0 5** **Figure 7** shows a wind turbine.

**Figure 7**




**0 5 . 1** Which of the following statements about using wind turbines to generate electricity are true?
Tick **two** boxes.

**[2 marks]**

Wind turbines are a reliable source of energy. ☐

Wind turbines are silent when working. ☐

Wind turbines do not emit greenhouse gases. ☐

Wind turbines have no fuel costs when working. ☐

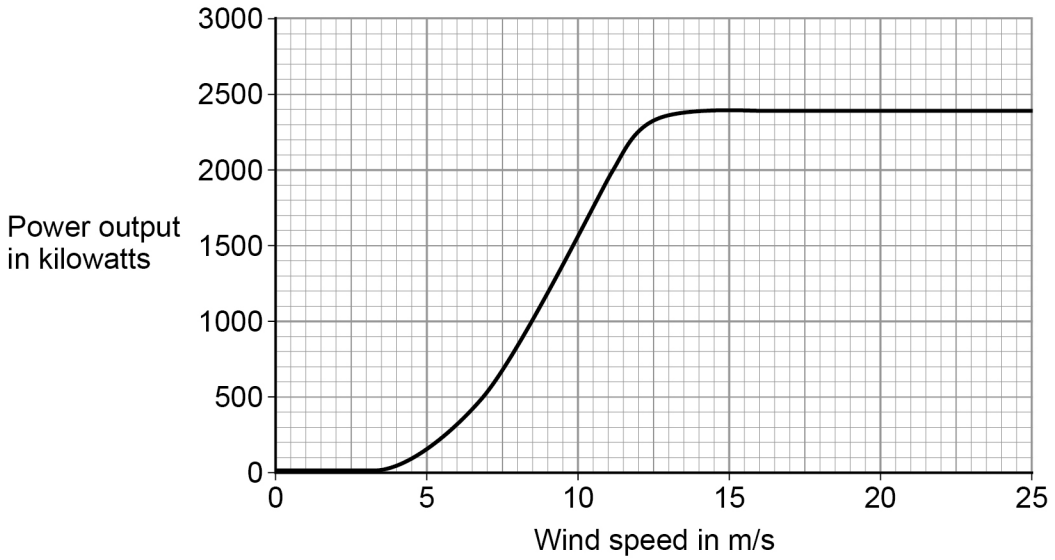
Wind turbines have no impact on the environment. ☐

**Question 5 continues on the next page**

*Do not write outside the box*

**Figure 8** shows how the power output from a wind turbine varies with wind speed.

**Figure 8**




**0 5 . 2** Describe how the wind speed affects the power output from the wind turbine.

Your answer should include data from **Figure 8**.

**[3 marks]**

*Do not write outside the box*

**0 5 . 3** During 1 hour, the average power output for the wind turbine was $2.0 \times 10^6$ W.

Calculate the electrical energy generated by the wind turbine during this hour.

Use the Physics Equations Sheet.

**[4 marks]**

Energy generated = _____ J

**Question 5 continues on the next page**

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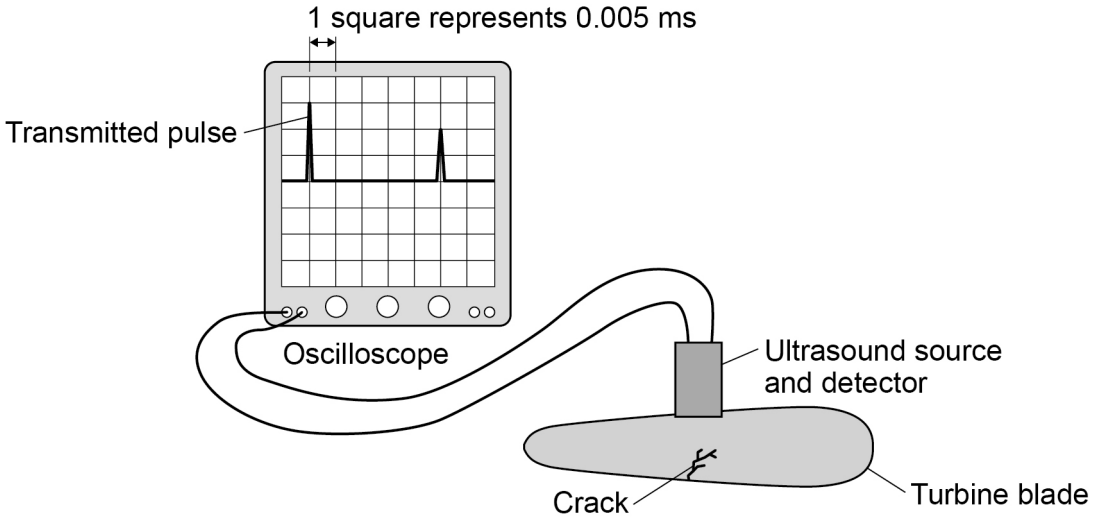
Ultrasound may be used to check for cracks in wind turbine blades.

**Figure 9** shows the equipment used.

**Figure 9**




**0 5 . 4** What is ultrasound?

**[1 mark]**

**0 5 . 5** Explain what is meant by a longitudinal wave.

**[2 marks]**

*Do not write outside the box*

**0 5 . 6** Determine the distance from the ultrasound source to the crack in the turbine blade.

Use the Physics Equations Sheet. Use information from **Figure 9**.

speed of ultrasound through the turbine blade = 6000 m/s

**[4 marks]**

Distance = _____ m

**16**

**Turn over for the next question**

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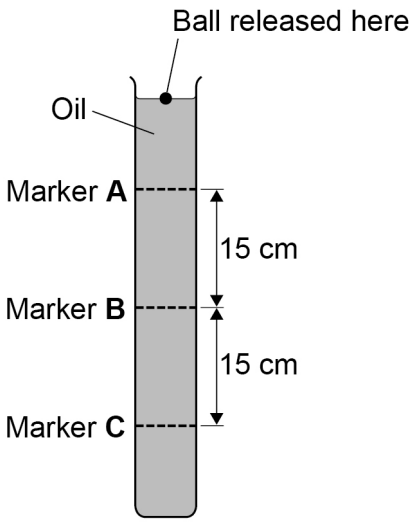
**0 6** A student was investigating drag forces.

The student released a ball into a cylinder full of oil.

**Figure 10** shows the equipment the student used.

**Figure 10**




The student used a stopwatch to measure the time taken for the ball to fall between the markers.

**0 6 . 1** The student repeated each measurement of time three times and calculated a mean.

Explain **one** other way the student could make sure each measurement of time was as accurate as possible.

**[2 marks]**

*Do not write outside the box*

**Table 3** shows the student's results.

**Table 3**

| | Time in seconds | | | |
|---|---|---|---|---|
| **Markers** | **Test 1** | **Test 2** | **Test 3** | **Mean** |
| **A to B** | 2.1 | 2.0 | 2.2 | 2.1 |
| **B to C** | 2.0 | 2.0 | 2.3 | |

**0 6 . 2** What was the mean time taken for the ball to fall between **B** and **C**?

**[1 mark]**

Mean time = _____ s

**0 6 . 3** Explain how the results in **Table 3** show that the ball was travelling at terminal velocity before reaching marker **A**.

**[3 marks]**

**Question 6 continues on the next page**

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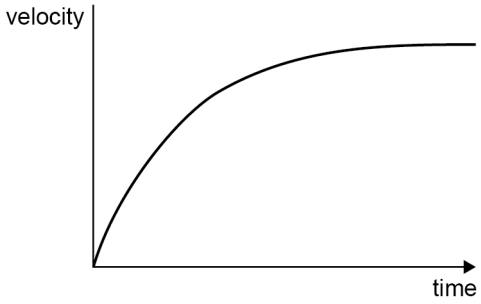
**0 6 . 4** **Figure 11** shows how the velocity of the ball changed between being released and reaching marker **A**.

**Figure 11**




Explain the shape of the graph in terms of the forces acting on the ball.

**[6 marks]**

12

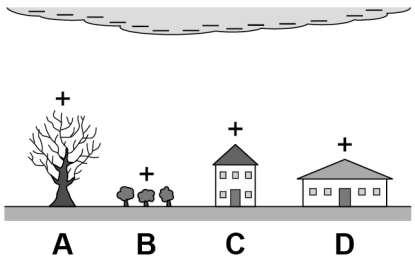
*Do not write outside the box*

**0 7** Static electricity may be dangerous or useful.

**0 7 . 1** Lightning is caused by a build-up of charge in a cloud.

**Figure 12** shows the charge on the bottom of a cloud compared with the charge on the ground.

**Figure 12**




Describe what happens to the cloud during a lightning strike.

**[2 marks]**

**0 7 . 2** Explain which object in **Figure 12** is most likely to be struck by lightning.

**[2 marks]**

**Question 7 continues on the next page**

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A defibrillator is a machine that transfers charge. Defibrillators are used in hospitals to give an electric shock to a patient's heart.

The output potential difference of a defibrillator can be changed.

**Table 4** shows the energy transferred by a defibrillator for various output potential differences.

**Table 4**

| **Output potential difference in volts** | **Energy in joules** |
|---|---|
| 1370 | 150 |
| 1500 | 180 |
| 1590 | 200 |
| 1940 | 300 |
| 2130 | 360 |

**0 7 . 3** Estimate the energy transferred when the output potential difference is 1750 V.

**[1 mark]**

Energy transferred = _____ J

**0 7 . 4** A student suggested that the energy transferred is directly proportional to the output potential difference.

The suggestion is **not** correct.
Explain why.
Use data from **Table 4** in your answer.

**[2 marks]**

Do not write outside the box

**0 7 . 5** The defibrillator is regularly tested to ensure the values of output potential difference are accurate.

Suggest why it is important to the patient that values of output potential difference are measured accurately.

**[2 marks]**

9

**Turn over for the next question**

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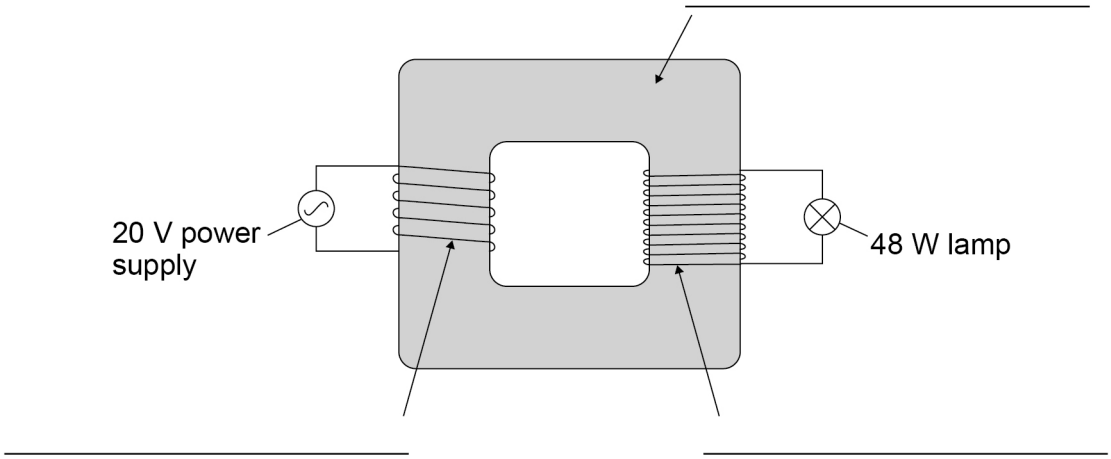
**0 8** **Figure 13** shows a transformer used by a teacher in a demonstration.

**Figure 13**




**0 8 . 1** Complete the labels on **Figure 13**.

**[3 marks]**

**0 8 . 2** Explain whether the transformer in **Figure 13** is a step-up or step-down transformer.

**[2 marks]**

**0 8 . 3** Calculate the potential difference across the lamp in **Figure 13**.

Use the Physics Equations Sheet.

**[4 marks]**

Potential difference = _____ V

*Do not write outside the box*

**0 8 . 4** Calculate the current in the power supply in **Figure 13**.

Use the Physics Equations Sheet.

**[3 marks]**

Current = _____ A

**0 8 . 5** The teacher replaces the lamp in **Figure 13** with a light emitting diode (LED). The LED flickers on and off rapidly.

Explain why the LED flickers when connected to the transformer.

**[3 marks]**

**15**

**END OF QUESTIONS**

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**ANSWER IN THE SPACES PROVIDED**

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| Question number | **Additional page, if required.**<br>**Write the question numbers in the left-hand margin.** |
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