OXFORD

INTERNATIONAL
AQA EXAMINATIONS

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

INTERNATIONAL GCSE

PHYSICS

Paper 1

Wednesday 6 November 2019 07:00 GMT Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- a ruler
- a scientific calculator
- the Physics Equations Sheet (enclosed).

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 worked out your answer.

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

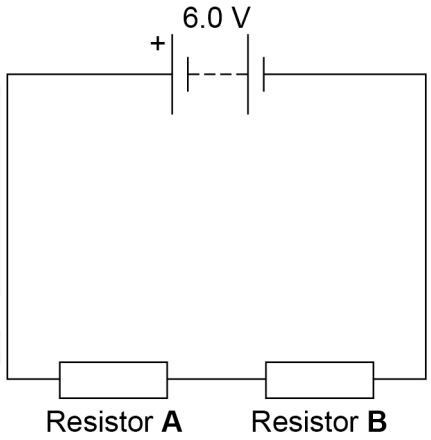
Information
- The maximum mark for this paper is 90.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.

Do not write outside the box

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

0 1 **Figure 1** shows identical resistors **A** and **B** connected in series with a 6.0 V battery.

Figure 1



0 1 . 1 What is the potential difference across resistor **A**?

Tick (✓) **one** box.

[1 mark]

3.0 V ☐

6.0 V ☐

9.0 V ☐

12.0 V ☐

Do not write outside the box

0 1 . 2 A charge of 0.40 coulombs flows through resistor **A** in a time of 8.0 seconds.

Calculate the current in resistor **A**.

Use the Physics Equations Sheet.

[2 marks]

Current = _____ A

0 1 . 3 Complete the sentence.

Choose the answer from the box.

[1 mark]

greater than	**less than**	**the same as**

The current in resistor **A** is _____ the current in resistor **B**.

0 1 . 4 Each resistor in **Figure 1** has a resistance of 30 Ω.

Determine the total resistance of the circuit in **Figure 1**.

[1 mark]

Total resistance = _____ Ω

Question 1 continues on the next page

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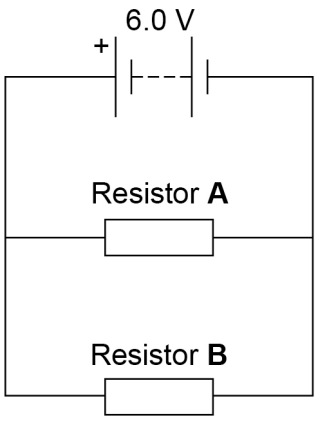
Figure 2 shows resistors **A** and **B** connected in parallel with the same 6.0 V battery.

Figure 2



0 1 . 5 What is the potential difference across each resistor?

Tick (✓) **one** box.

[1 mark]

3.0 V ☐

6.0 V ☐

9.0 V ☐

12.0 V ☐

Do not write outside the box

0 1 . 6 Each resistor in **Figure 2** has a resistance of 30 Ω.

Determine the current in resistor **A**.

Use the Physics Equations Sheet.

[3 marks]

Current = _____ A

0 1 . 7 Determine the current in the 6.0 V battery.

[1 mark]

0 1 . 8 Complete the sentence.

Choose the answer from the box.

[1 mark]

greater than	**less than**	**the same as**

The total resistance of the parallel circuit in **Figure 2** is _____

the total resistance of the series circuit in **Figure 1**.

11

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0 2 A car is fitted with an ultrasound sensor. The sensor emits and detects ultrasound.

The sensor warns the driver if the car is too close to another object.

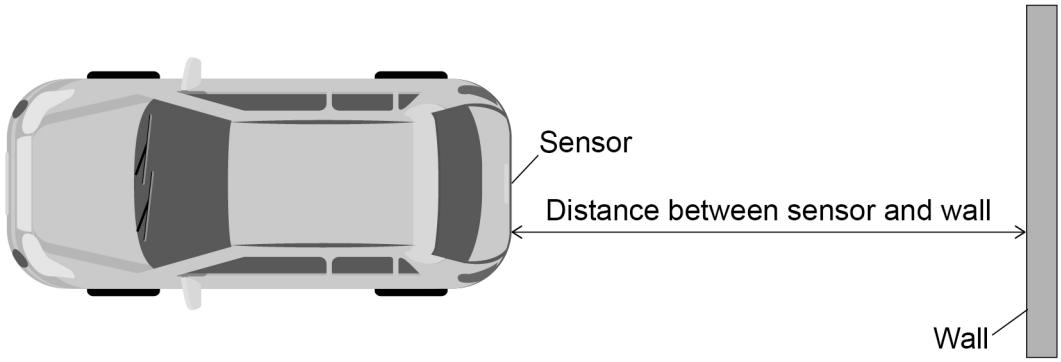
0 2 . 1 Explain why humans **cannot** hear the ultrasound emitted by the sensor.

[2 marks]

Do not write outside the box

Figure 3 shows a car about to reverse towards a wall.

Figure 3



The sensor emits an ultrasound wave.

The wave reflects off the wall and is detected by the sensor.

The sensor measures the time taken between the wave being emitted and detected.

0 2 . 2 The speed of ultrasound in air is 330 m/s.

The reflected ultrasound is detected 0.012 s after it is emitted.

Calculate the total distance travelled by the ultrasound wave.

Use the equation:

total distance travelled = speed × time

[2 marks]

Total distance travelled = _____ m

0 2 . 3 Determine the distance between the sensor and the wall.

[1 mark]

Distance = _____ m

Question 2 continues on the next page

Turn over ►

Do not write outside the box

0 2 . 4 When the car gets too close to an object, a beeper gives a warning to the driver.

The beeper emits sound waves that travel at a speed of 330 m/s and have a wavelength of 0.75 m.

Calculate the frequency of the sound wave.

Use the Physics Equations Sheet.

[3 marks]

Frequency = _____ Hz

8

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Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

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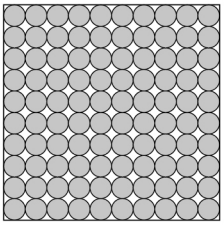
0 3 Stearic acid is a solid at room temperature.

0 3 . 1 Stearic acid changes state to a liquid when heated.

Which of the following shows the arrangement of particles in stearic acid when it is a liquid?

Tick (✓) **one** box.

[1 mark]



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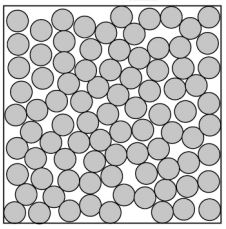

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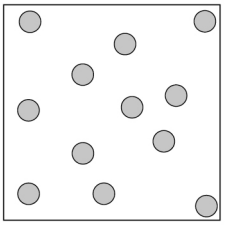

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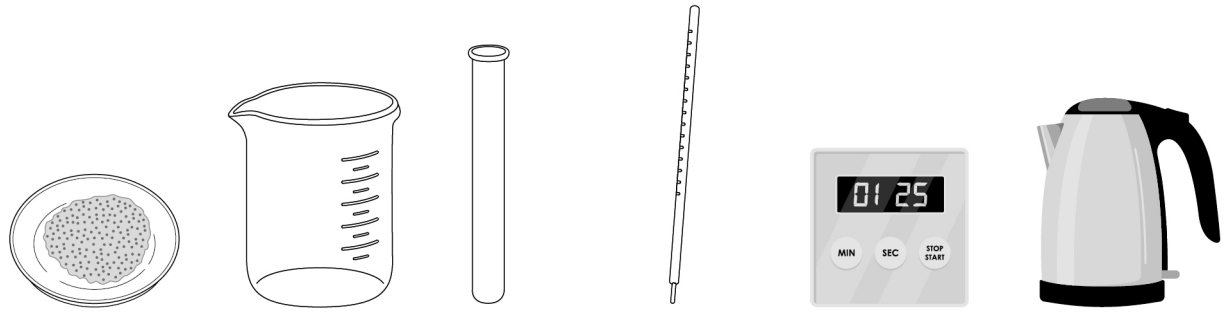
0 3 . 2 A student was provided with a sample of solid stearic acid.

The student wanted to plot a graph of temperature against time for liquid stearic acid as it cooled.

Describe how the student could use the equipment in **Figure 4** to collect the data.

[6 marks]

Figure 4



Solid stearic acid | Beaker | Test tube | Thermometer | Stop clock | Kettle

Question 3 continues on the next page

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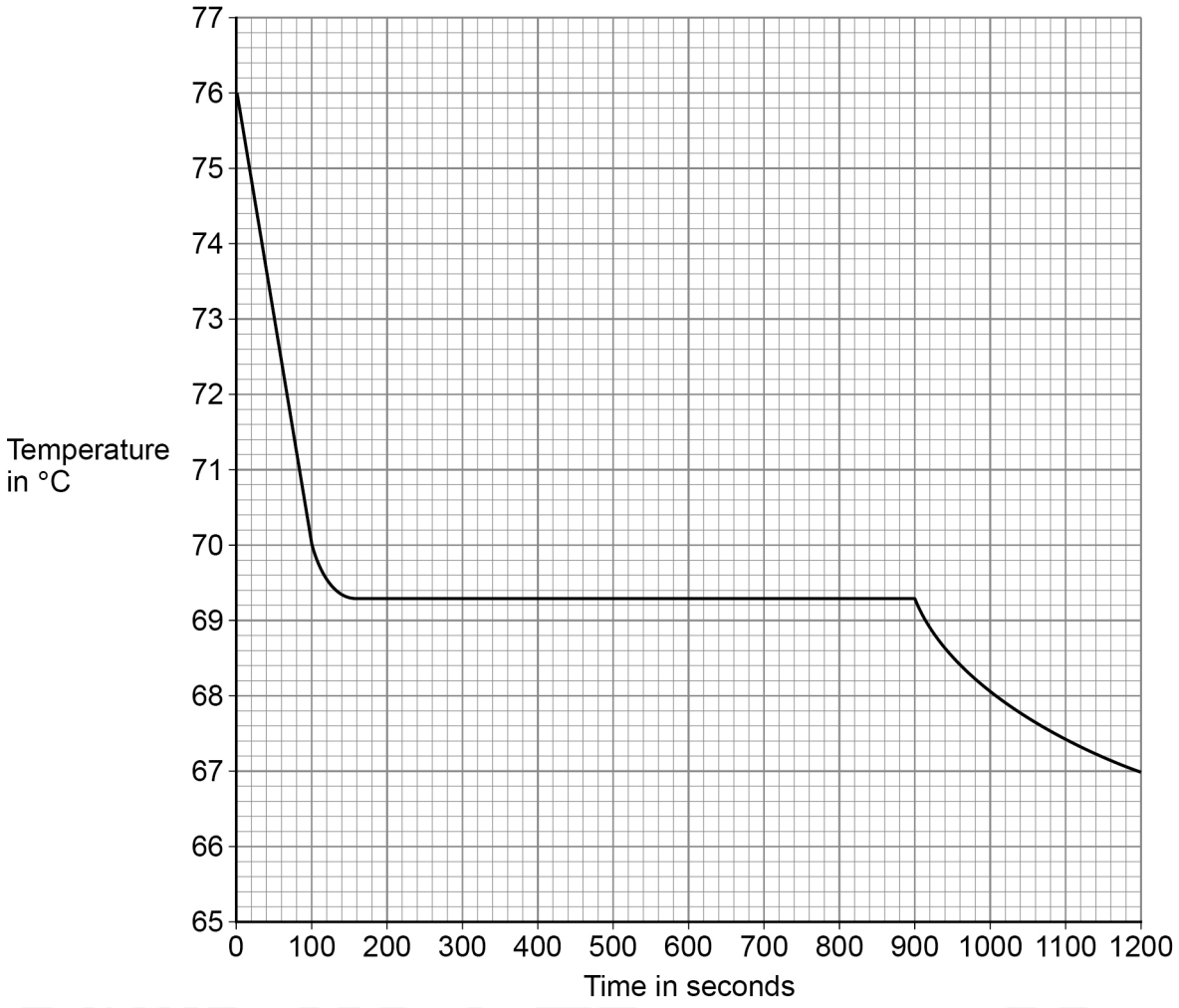
Figure 5 shows a graph of the student's results.

Figure 5



0 3 . 3 Determine the time taken from when the liquid begins to change state until it is completely solid.

[2 marks]

Time taken = _____ seconds

Do not write outside the box

0 3 . 4 Determine the energy transferred from the liquid stearic acid in the first 100 seconds.

mass of stearic acid = 15 g

specific heat capacity of liquid stearic acid = 560 J/kg °C

Use the Physics Equations Sheet.

[4 marks]

Energy transferred = _____ J

13

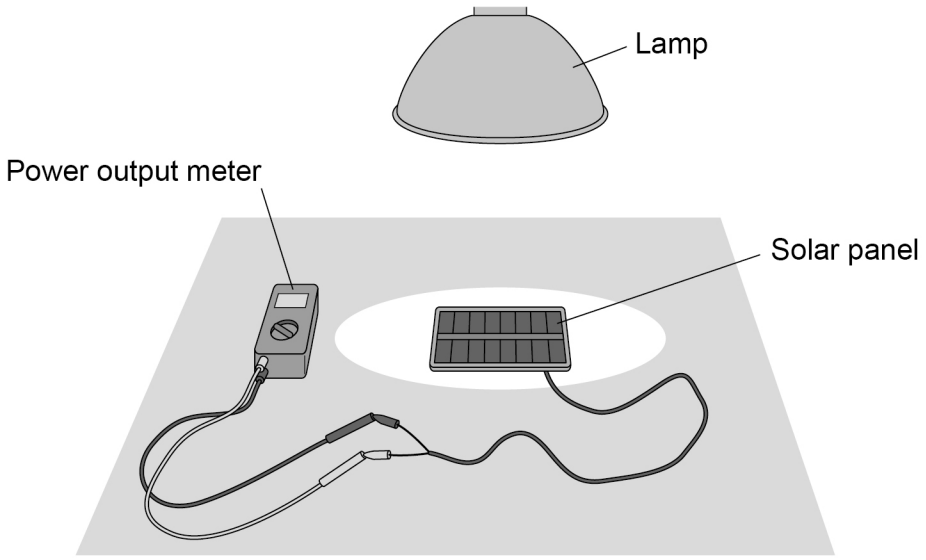
Turn over for the next question

Do not write outside the box

0 4 A student investigated how the distance between a lamp and a solar panel affected the power output of the solar panel.

Figure 6 shows some of the equipment used.

Figure 6



The student measured the power output of the solar panel when the lamp was at different distances.

0 4 . 1 What type of variable is the power output of the solar panel?

Tick (✓) **one** box.

[1 mark]

Categoric ☐

Control ☐

Dependent ☐

Independent ☐

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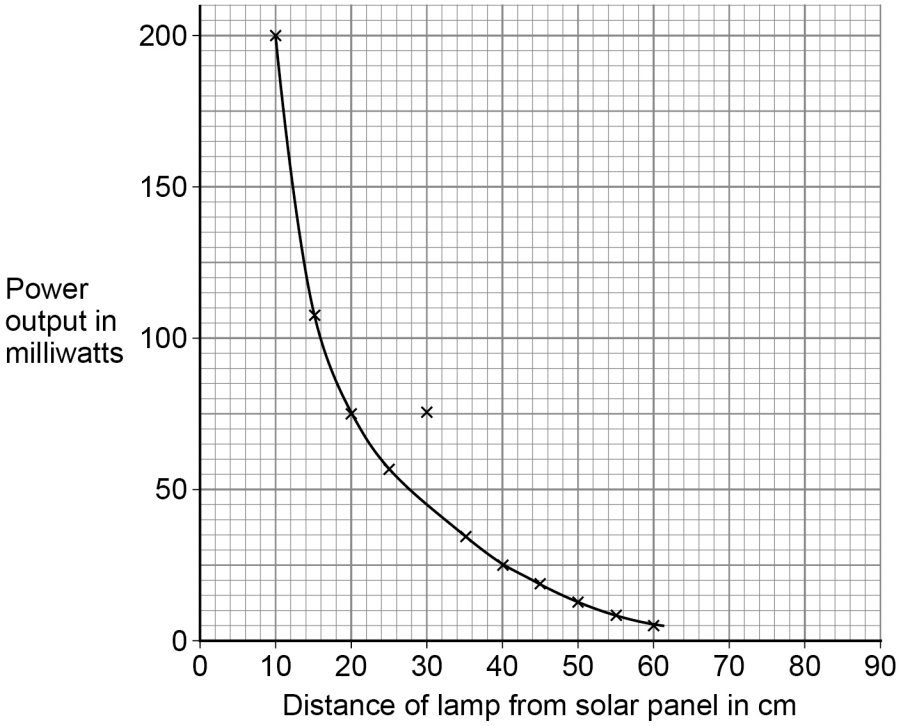
Figure 7 shows the results of the investigation.

Figure 7



0 4 . 2 One of the results is anomalous.

What is meant by an anomalous result?

[1 mark]

0 4 . 3 The data has been plotted on the graph correctly.

Suggest a reason for this anomalous result.

[1 mark]

Question 4 continues on the next page

Do not write outside the box

0 4 . 4 Describe how the power output changes with the distance between the lamp and the solar panel.

[2 marks]

0 4 . 5 Another student does a similar investigation using a voltmeter and an ammeter.

Describe how the student could use a voltmeter and an ammeter to measure the power output of the solar panel.

[3 marks]

Do not write outside the box

Solar panels can be used to generate electricity.

Figure 8 shows solar panels being used as a road surface and on the roof of a house.

Figure 8

Table 1 shows data for road solar panels and roof solar panels.

Table 1

	Area of solar panel in m^2	Life span in years	Energy output in kWh	Manufacturing cost of each solar panel in dollars
Road solar panel	1.8	20	70	5300
Roof solar panel	1.8	20	106	750

0 4 . 6 Evaluate why the manufacturers of the road solar panels are trying to reduce manufacturing costs rather than increase the energy output.

[4 marks]

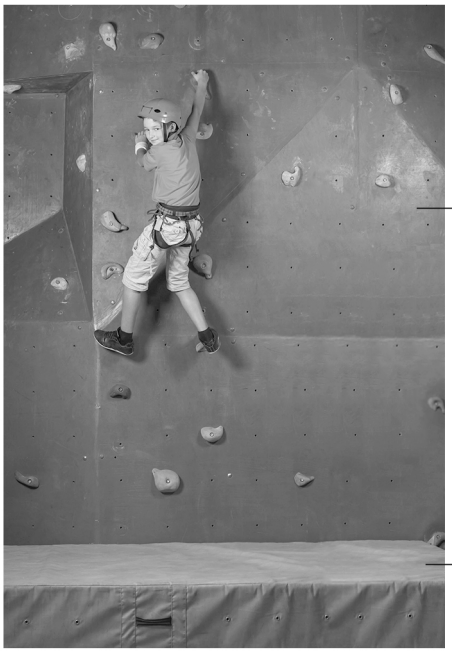
12

Turn over ►

Do not write outside the box

0 5 **Figure 9** shows a child on a climbing wall. There is a crash mat at the bottom of the wall.

Figure 9



The child jumps off the climbing wall and lands on the crash mat. The momentum of the child just before landing is 160 kg m/s.

0 5 . 1 Calculate the velocity of the child on landing.

mass of child = 50 kg

Give the unit.

Use the Physics Equations Sheet.

[4 marks]

Velocity = _____ Unit _____

Do not write outside the box

0 5 . 2 It takes 0.80 s for the child to stop after hitting the crash mat.

Calculate the average force the child exerts on the crash mat during landing.

Use the Physics Equations Sheet.

[2 marks]

Average force = _____ N

0 5 . 3 Explain why the crash mat reduces the risk of injury if the child falls.

[4 marks]

10

Turn over for the next question

Do not write outside the box

0 6 Future space rockets may be powered by the energy released from nuclear fusion.

0 6 . 1 Where does nuclear fusion occur naturally?

[1 mark]

0 6 . 2 Explain why very high temperatures are needed for nuclear fusion to take place.

[4 marks]

Do not write outside the box

Table 2 shows some data about a fission engine and a fusion engine.

Table 2

Type of engine	Fuel used by engine	Energy required to produce 1 kg of fuel in joules	Energy released by 1 kg of fuel in joules
Fission	Plutonium	6.0×10^{11}	8.0×10^{13}
Fusion	Hydrogen	4.0×10^{11}	2.0×10^{14}

0 6 . 3 Justify why fusion engines would be better than fission engines for use in a space rocket.

Use **Table 2**.

[3 marks]

0 6 . 4 Describe a nuclear fission reaction.

[3 marks]

11

Turn over ►

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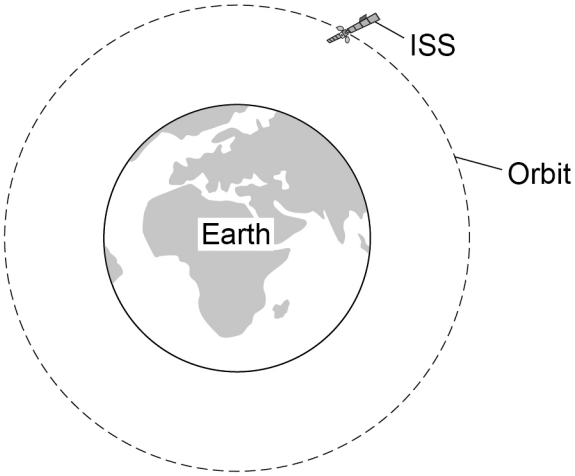
0 7 **Figure 10** shows the International Space Station (ISS) orbiting the Earth.

Figure 10



0 7 . 1 What name is given to an object that orbits a planet?

Tick (✓) **one** box.

[1 mark]

A comet ☐

A galaxy ☐

A satellite ☐

A star ☐

0 7 . 2 The Earth exerts a gravitational force on the ISS.

Draw an arrow on **Figure 10** to show the direction of this force.

[1 mark]

Do not write outside the box

0 7 . 3 The ISS travels at a constant speed around the Earth.

Explain how an object can be accelerating whilst travelling at a constant speed.

[3 marks]

0 7 . 4 When in orbit, the ISS has a kinetic energy of 1.2×10^{13} J.

Calculate the magnitude of the velocity of the ISS.

mass of ISS = 4.2×10^{5} kg

Give your answer to 2 significant figures.

Use the Physics Equations Sheet.

[4 marks]

Magnitude of velocity = _____ m/s

Question 7 continues on the next page

Do not write outside the box

0 7 . 5 Rockets do work on the ISS.

Explain the effect the work done has on the orbit of the ISS.

[3 marks]

12

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0 8 **Figure 11** shows a battery-operated drill.

When the drill is turned on, the drill bit spins around.

Figure 11

0 8 . 1 Describe the energy transfers in the drill when it is first turned on.

[3 marks]

Question 8 continues on the next page

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0 8 . 2 The power rating of the drill is 21.6 W.

The potential difference of the battery is 18.0 V.

The drill is turned on and 30.0 C of charge flows through the battery.

Calculate the time for which the drill was turned on.

Use the Physics Equations Sheet.

[5 marks]

Time = _____ s

Do not write outside the box

Figure 12 shows a mains-operated drill.

Figure 12

0 8 . 3 Describe the difference between the current supplied by the mains and the current supplied by a battery.

[2 marks]

0 8 . 4 The drill in **Figure 12** has a power rating of 1500 W.

The drill is used for 0.5 hours.

The cost of using the drill is $0.15.

Calculate the cost per kWh of the mains electricity.

Use the Physics Equations Sheet.

[3 marks]

Cost per kWh = $ _____

13

END OF QUESTIONS

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