OXFORD
INTERNATIONAL
AQA EXAMINATIONS

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

# INTERNATIONAL GCSE
# PHYSICS

Paper 2

Tuesday 12 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 a pyramid. Pyramids are ancient buildings made from large stone blocks.

**Figure 1**

**0 1 . 1** Why are pyramids very stable?

Tick (✓) **one** box.

**[1 mark]**

Pyramids have a wide base. ☐

Pyramids have steep sides. ☐

The stone blocks are heavy. ☐

The stone blocks are strong. ☐

*Do not write outside the box*

**0 1 . 2** The largest stone block in the pyramid has a mass of 80 000 kg.

What is the weight of the largest stone block?

Use the Physics Equations Sheet.

gravitational field strength = 9.8 N/kg

**[2 marks]**

Weight = _____ N

**Question 1 continues on the next page**

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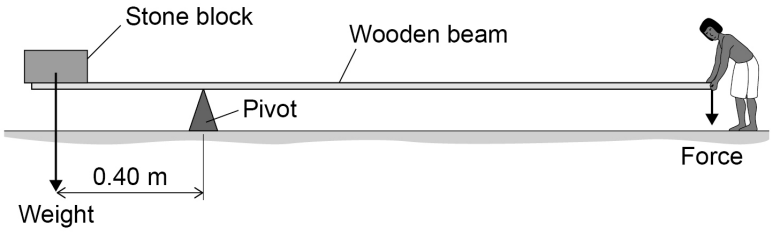
**Figure 2** shows a wooden beam being used to lift a stone block.

**Figure 2**




**0 1 . 3** The wooden beam acts as a simple lever.

Why are simple levers useful?

Tick (✓) **one** box.

**[1 mark]**

They can act as force multipliers. ☐

They decrease the amount of energy required. ☐

They increase the work done on an object. ☐

They reduce the weight of heavy objects. ☐

**0 1 . 4** The stone block in **Figure 2** has a weight of 12 000 N.

Calculate the moment about the pivot produced by the weight of the stone block.

Use the Physics Equations Sheet.

**[2 marks]**

Moment = _____ N m

*Do not write outside the box*

**0 1 . 5** The person in **Figure 2** exerts a force on the beam, so that the beam is stationary.

What is the size of the moment of this force about the pivot?

Tick (✓) **one** box.

**[1 mark]**

Equal to that produced by the weight of the stone block. ☐

Greater than that produced by the weight of the stone block. ☐

Less than that produced by the weight of the stone block. ☐

**Question 1 continues on the next page**

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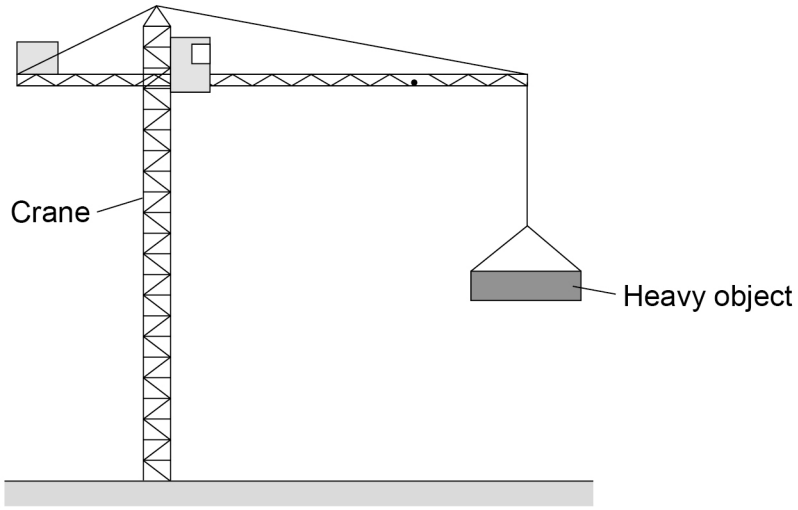
**0 1 . 6** Large modern buildings are built using cranes to lift heavy objects.

**Figure 3** shows a crane.

**Figure 3**




Compare the advantages and disadvantages of using a crane rather than the wooden beam shown in **Figure 2**.

**[4 marks]**

11

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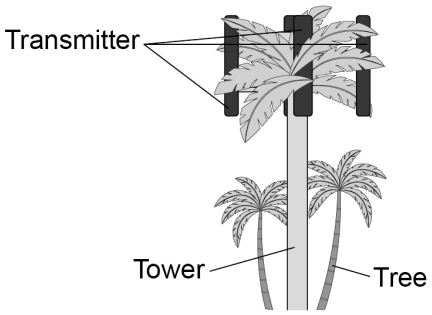
**0 2** **Figure 4** shows a man-made tower made to look like a tree.

The tower contains four mobile phone transmitters.

The transmitters emit electromagnetic waves.

**Figure 4**




**0 2 . 1** What type of wave are electromagnetic waves?

Tick (✓) **one** box.

**[1 mark]**

Longitudinal ☐

Mechanical ☐

Transverse ☐

**Question 2 continues on the next page**

*Do not write outside the box*

**0 2 . 2** Which type of electromagnetic wave do the transmitters emit?

Tick (✓) **one** box.

**[1 mark]**

Infrared ☐

Microwaves ☐

Ultraviolet ☐

Visible light ☐

**0 2 . 3** Suggest why there is more than one transmitter on the tower in **Figure 4**.

**[1 mark]**

**0 2 . 4** Suggest **two** reasons why the transmitters are **not** attached to a real tree.

**[2 marks]**

1

2

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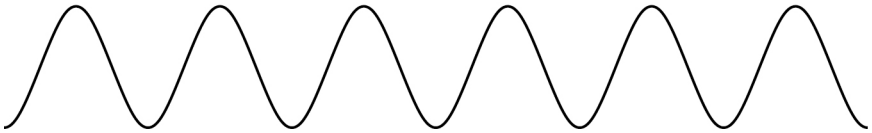
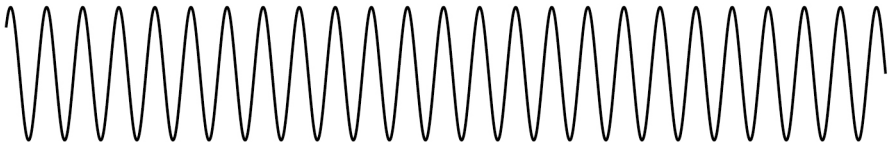
**0 2 . 5** **Figure 5** shows two of the different waves that the transmitters emit.

**Figure 5**

Wave **A**



Wave **B**



Complete the following sentences.

Choose the answers from the box.

**[2 marks]**

| | | | | |
|---|---|---|---|---|
| **amplitude** | **distance** | **frequency** | **speed** | **wavelength** |

Compared to wave **B**, wave **A** has a greater _____ .

Compared to wave **A**, wave **B** has a greater _____ .

**7**

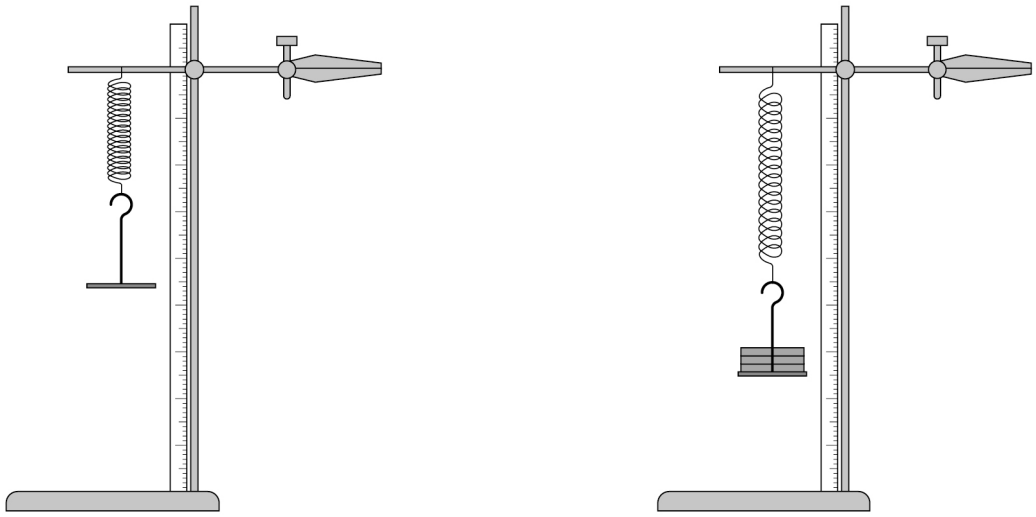
**Turn over for the next question**

*Do not write outside the box*

**0 3** A student carried out an investigation to determine the elastic limit of a spring.

**Figure 6** shows two stages of the investigation.

**Figure 6**



**0 3 . 1** Give **two** safety precautions the student should take when doing the investigation.

**[2 marks]**

1 _____

_____

2 _____

_____

**0 3 . 2** Plan the investigation the student could carry out to determine the elastic limit of the spring.

**[4 marks]**

_____

_____

_____

_____

_____

_____

_____

_____

*Do not write outside the box*

**0 3 . 3** Explain why it was **not** possible for the student to repeat the investigation with the same spring.

**[2 marks]**

**0 3 . 4** The student repeated the investigation with a different spring.

Before the limit of proportionality was reached, the spring stretched by 60 mm when a force of 3.0 N was applied.

Calculate the spring constant of the spring.

Use the Physics Equations Sheet.

**[4 marks]**

Spring constant = _____ N/m

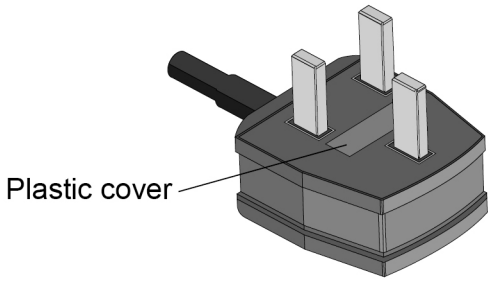
**12**

**Turn over for the next question**

*Do not write outside the box*

**0 4** **Figure 7** shows a 3-pin plug containing a 13 Amp fuse.

**Figure 7**




**0 4 . 1** Describe how a 13 Amp fuse protects an appliance.

**[2 marks]**

**0 4 . 2** The fuse is normally covered by a plastic cover that is easy to remove.

Suggest why the cover needs to be easy to remove.

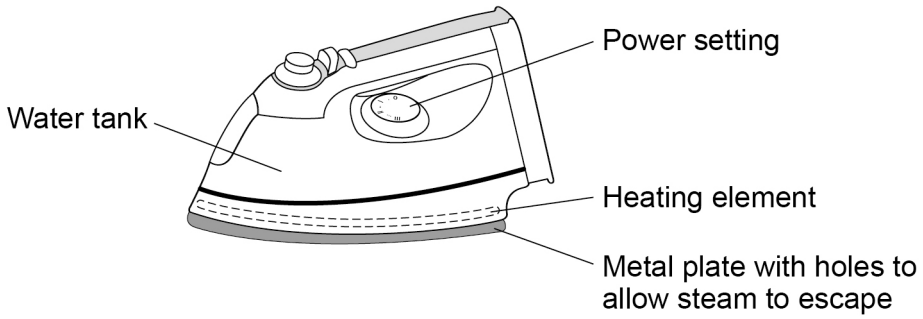
**[1 mark]**

*Do not write outside the box*

**Figure 8** shows a steam iron that the plug is attached to. The steam iron converts liquid water into steam.

The steam iron has different power settings. A current in the heating element heats the metal plate.

**Figure 8**




**0 4 . 3** The steam iron is set to its lowest power which is 759 W.

The potential difference is 230 V.

Calculate the current in the heating element of the steam iron when on its lowest power setting.

Use the Physics Equations Sheet.

**[3 marks]**

Current = _____ A

**Question 4 continues on the next page**

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**0 4 . 4** The steam iron is then set to its maximum power of 2530 W.

Calculate the maximum mass of water that can be converted into steam in one minute by the steam iron.

specific latent heat of vaporisation of water = 2 300 000 J/kg

Give your answer in grams.

Use the Physics Equations Sheet.

**[6 marks]**

Mass = _____ g

**0 4 . 5** Explain why the actual mass of steam produced will be less than the maximum value calculated in Question **04.4**.

**[2 marks]**

14

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**Turn over for the next question**

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**ANSWER IN THE SPACES PROVIDED**

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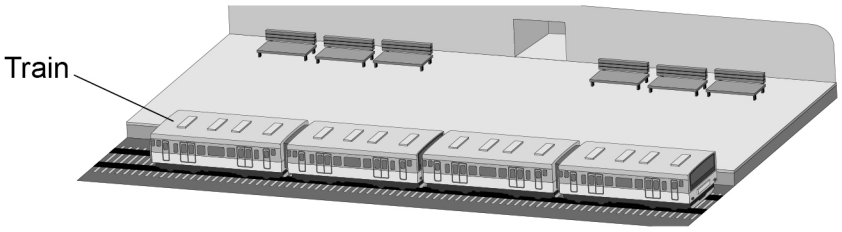
**0 5** **Figure 9** shows an underground train station.

**Figure 9**




**0 5 . 1** The train is travelling at a velocity of 22.8 m/s.

The train decelerates to a stop at a station.

Calculate the time taken for the train to stop.

deceleration of train = 1.14 m/s$^2$

Use the Physics Equations Sheet.

**[3 marks]**

Time = _____ s

**0 5 . 2** The average resultant force acting on the train as it decelerates is 912 000 N.

Calculate the mass of the train.

deceleration of train = 1.14 m/s$^2$

Use the Physics Equations Sheet.

**[3 marks]**

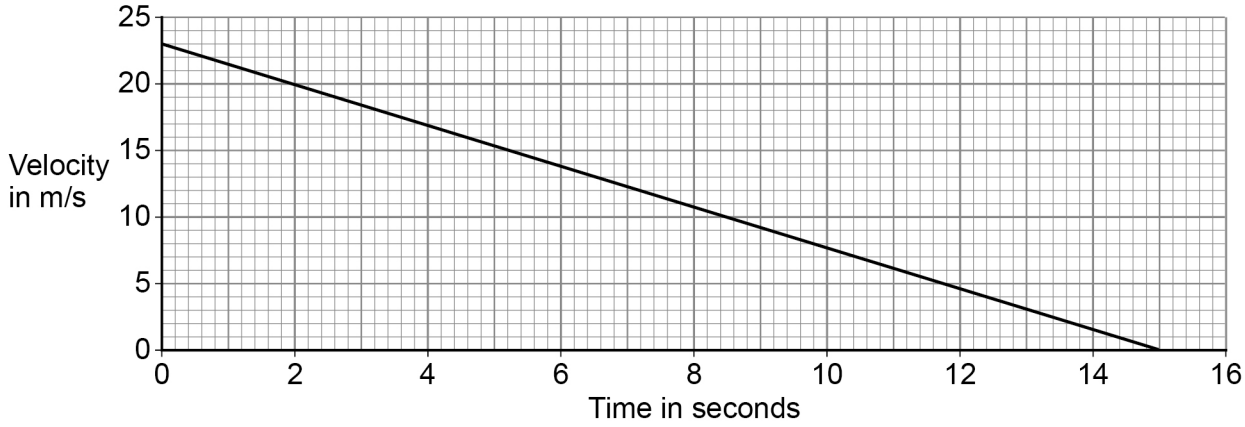
Mass = _____ kg

*Do not write outside the box*

The force produced by the train's brakes can be increased in an emergency.

**Figure 10** is a velocity-time graph for the train stopping in an emergency.

**Figure 10**




**0 5 . 3** Which feature of the graph in **Figure 10** represents the deceleration of the train?

**[1 mark]**

**0 5 . 4** Explain why increasing the braking force will decrease the distance the train travels before stopping.

**[2 marks]**

**0 5 . 5** Determine the distance the train travels during braking in the emergency stop shown in **Figure 10**.

**[3 marks]**

Distance = _____ m

*Do not write outside the box*

**0 5 . 6** When stopping at a station, the brakes are not applied with the maximum possible force.

Explain why.

**[2 marks]**

14

*Do not write outside the box*

**0 6** **Figure 11** shows a very old painting on a cave wall.

**Figure 11**

The paint used contains a very small amount of the radioactive isotope carbon-14. The age of the painting can be determined by measuring the very small amounts of radiation emitted by the carbon-14.

**0 6 . 1** Give **one** reason why a sample of the paint must be removed from the cave and tested in a laboratory.

**[1 mark]**

**0 6 . 2** A very small sample of paint is removed.

Give **one** advantage and **one** disadvantage of removing only a very small sample of paint.

**[2 marks]**

Advantage

Disadvantage

**0 6 . 3** When a nucleus of carbon-14 decays it emits a beta particle.

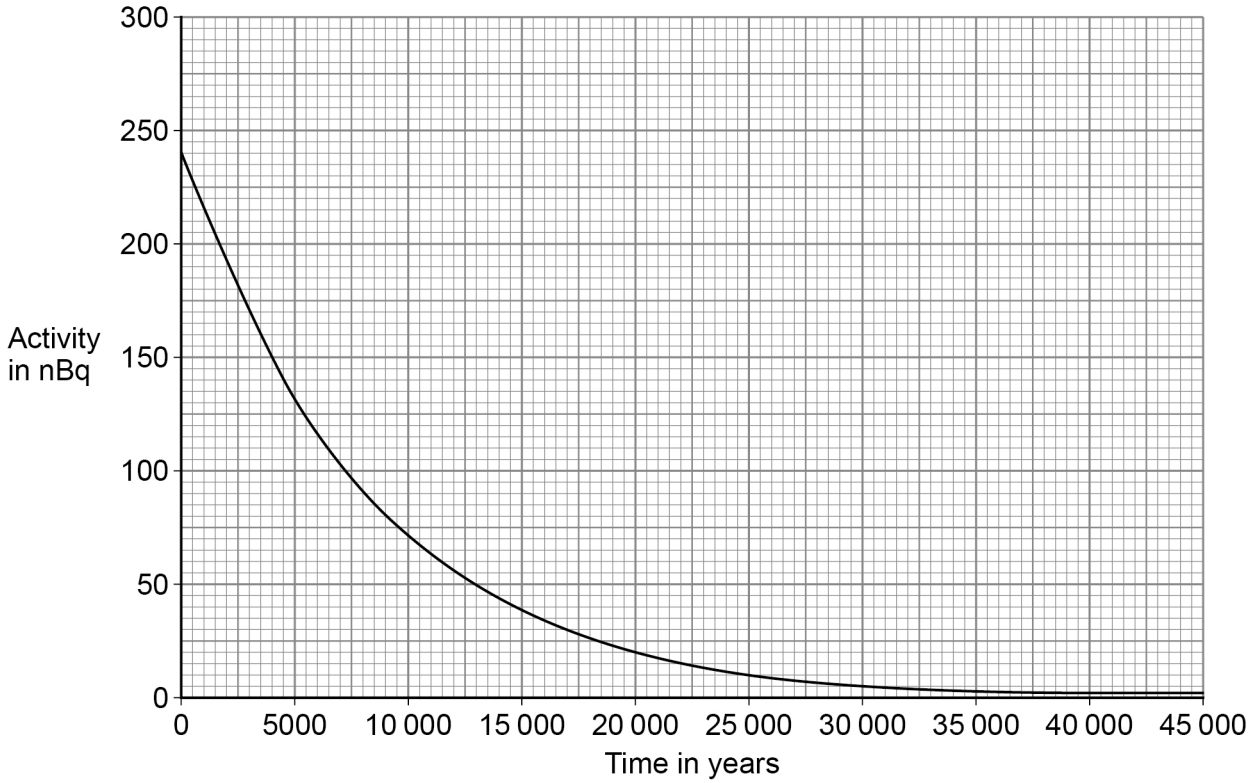
Explain why an atom of carbon-14 changes into a different element when its nucleus decays.

**[2 marks]**

*Do not write outside the box*

Once the activity of the paint sample is measured, **Figure 12** can be used to determine the age of the sample.

**Figure 12**




**0 6 . 4** The sample of paint from the image is 17 000 years old.

Determine how many half-lives of carbon-14 have passed since the painting was painted on the cave wall.

**[3 marks]**

Number of half-lives = _____

Do not write outside the box

**0 6 . 5** The oldest cave painting found is at least 35 000 years old.

Explain why it is **not** possible to determine the age of a sample that is 35 000 years old using the activity of carbon-14 in the sample.

Use information from **Figure 12.**

**[2 marks]**

**0 6 . 6** The isotope carbon-14 is made in the Earth's atmosphere by radiation.

To produce the data in **Figure 12**, scientists assumed the percentage of carbon in the atmosphere that is carbon-14 is constant.

Give **two** ways in which human activity may have affected the amount of radiation in the atmosphere in the last 100 years.

**[2 marks]**

1

2

**12**

**Turn over for the next question**

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**0 7** **Figure 13** shows a woman wearing prescription sunglasses in very bright light conditions. Prescription sunglasses protect against the sun and also correct defects of vision.

**Figure 13**

**0 7 . 1** Explain the changes in the woman's pupils when she first puts on the sunglasses.

**[2 marks]**

**0 7 . 2** The woman is long-sighted. She cannot read the book in **Figure 13** without wearing prescription glasses.

Explain how these glasses move her near point so she can read the book she is holding.

You may include a diagram in your answer.

**[3 marks]**

*Do not write outside the box*

Manufacturers of prescription glasses need to know the refractive index of the material the lenses are made from.

**Table 1** shows the data gathered from an investigation to determine the refractive index of the material a lens is made from.

Light travelled from air into the material.

**Table 1**

| **Angle of incidence, *i* in degrees** | | | |
|---|---|---|---|
| **10** | 6 | 0.17 | 0.10 |
| **20** | 12 | 0.34 | 0.20 |
| **30** | 17 | 0.50 | 0.29 |
| **40** | 22 | 0.64 | 0.38 |
| **50** | 27 | 0.77 | 0.45 |
| **60** | 31 | 0.87 | 0.51 |
| **70** | 34 | 0.94 | 0.55 |

**0 7 . 3** Add column headings to **Table 1**.

**[2 marks]**

**0 7 . 4** The data in **Table 1** can be used to draw a graph from which the refractive index of the lens material may be determined.

Explain how.

**[2 marks]**

**9**

**Turn over for the next question**

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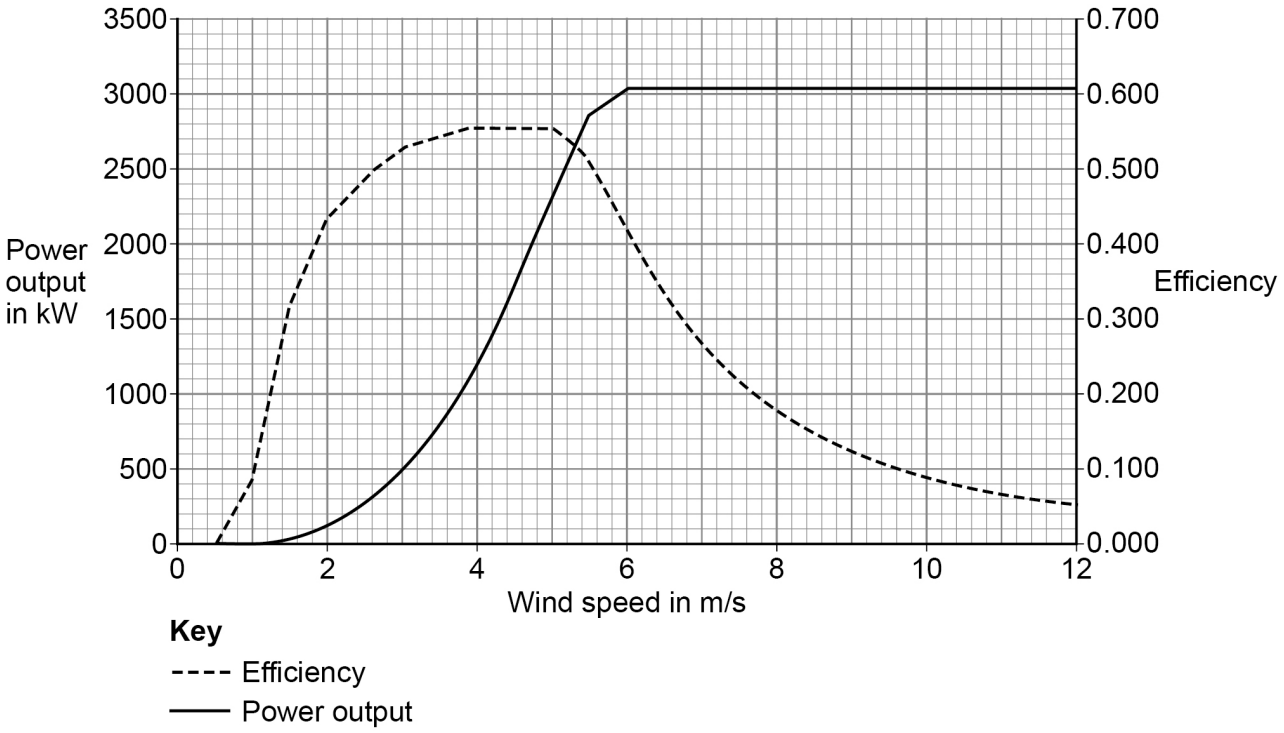
**0 8** Wind speed affects the efficiency of a wind turbine.

**Figure 14** shows the power output and efficiency of a wind turbine at different wind speeds.

**Figure 14**




**0 8 . 1** At what range of wind speeds is the wind turbine most efficient?

**[1 mark]**

Range = _____ to _____ m/s

**0 8 . 2** Determine the input power at a wind speed of 5.3 m/s.

Use the Physics Equations Sheet.

**[4 marks]**

_____

_____

_____

_____

_____

Input power = _____ kW

*Do not write outside the box*

**Figure 15** shows an A.C generator connected to the blades of the wind turbine.

**Figure 15**

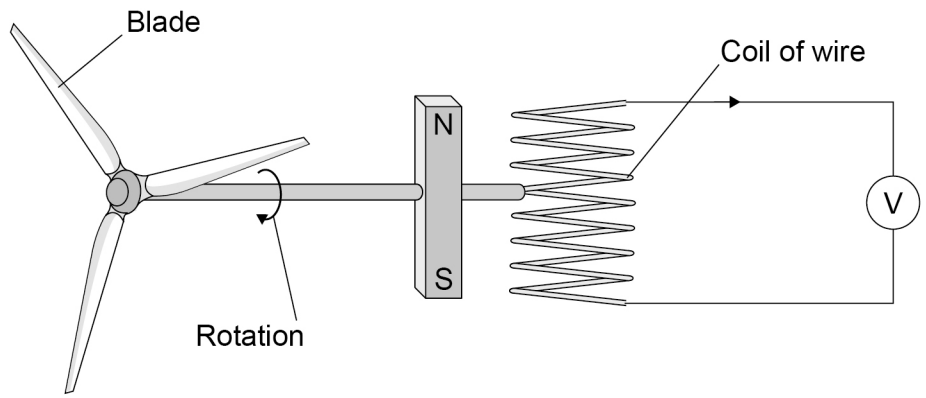
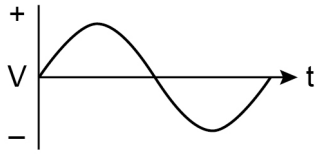



**Figure 16** shows the potential difference induced across the coil when the wind blows.

**Figure 16**




**0 8 . 3** Explain how the rotating blades produce the potential difference shown in **Figure 16**.

**[6 marks]**

**END OF QUESTIONS**

**11**

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**ANSWER IN THE SPACES PROVIDED**

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