Surname

Other Names

Candidate Signature

AQA

General Certificate of Secondary Education
Foundation Tier
June 2015

Physics
Unit Physics P3

Wednesday 20 May 2015   1.30 pm to 2.30 pm

PH3FP

F

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

Time allowed
● 1 hour

Instructions
● Use black ink or black ball-point pen.
● Fill in the boxes at the top of this page.
● Answer **all** questions.
● You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
● Do all rough work in this book. Cross through any work you do not want to be marked.

Information
● The marks for questions are shown in brackets.
● The maximum mark for this paper is 60.
● You are expected to use a calculator where appropriate.
● You are reminded of the need for good English and clear presentation in your answers.
● Question 9(b) should be answered in continuous prose.
  In this question you will be marked on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.

Advice
● In all calculations, show clearly how you work out your answer.

A

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

1 (a) Use the correct answer from the box to complete the sentence.

[1 mark]

balancing	stretching	turning

A moment is the .... effect of a force.

1 (b) **Figure 1** shows how a lever can be used to lift a heavy rock.

Figure 1

0.30 m

Rock

P

Weight of rock = 1400 N
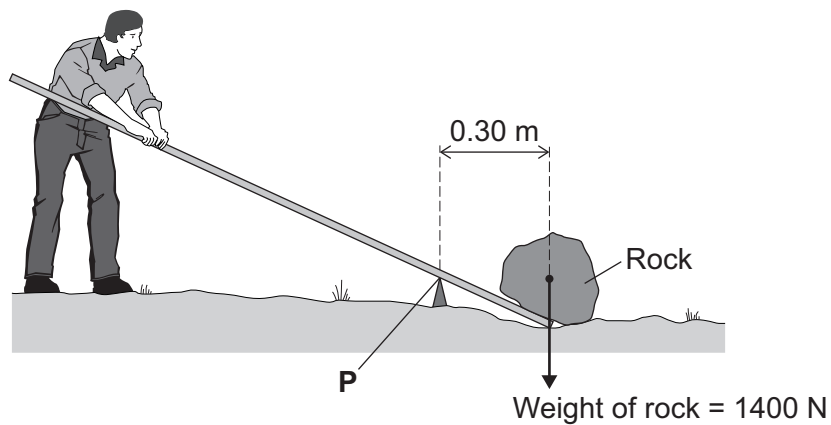
Calculate the moment of the weight of the rock about point **P**.

Use the correct equation from the Physics Equations Sheet.

[2 marks]

....

....

Moment = ... newton metres

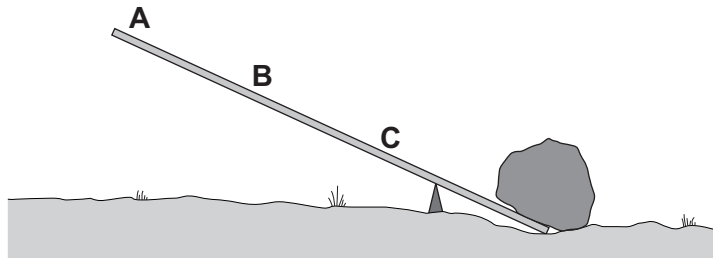**1 (c)** **Figure 2** shows three positions on the lever, **A**, **B** and **C**, where the person could have applied a force to lift the rock.

Figure 2

Which position, **A**, **B** or **C**, needs the smallest force to lift the rock?

Draw a ring around the correct answer.

[2 marks]

A   **B**   **C**

Give the reason for your answer.

....

....

5

Turn over for the next question

Turn over ▶

2 **Figure 3** shows a traditional transformer.
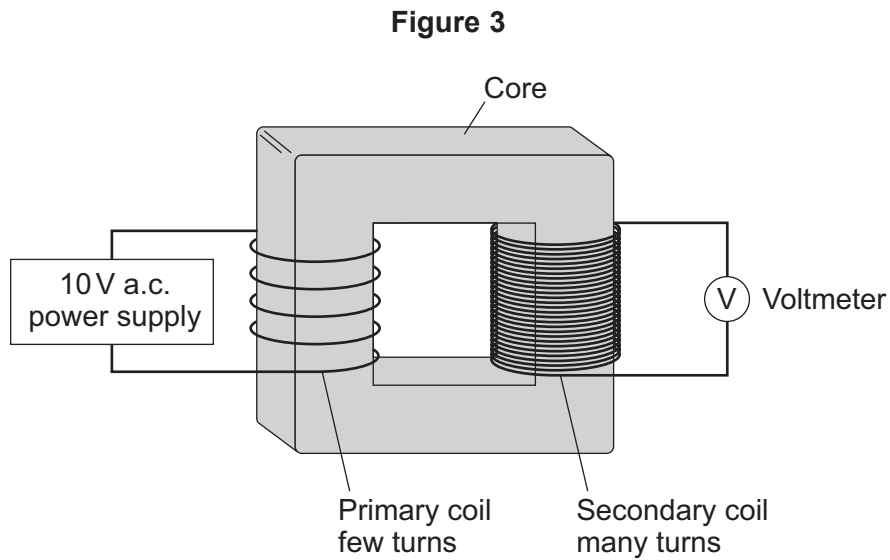
Figure 3

2 (a) (i) Which metal should the core of the transformer be made from?

[1 mark]

Tick (✓) **one** box.

aluminium ☐

copper ☐

iron ☐

2 (a) (ii) What would the reading be on the voltmeter shown in **Figure 3**?

Draw a ring around the correct answer.

[2 marks]

| 2 V | 10 V | 50 V |

Give the reason for your answer.

....

....

2 (b) **Figure 4** shows a tablet computer and its charger.

Figure 4
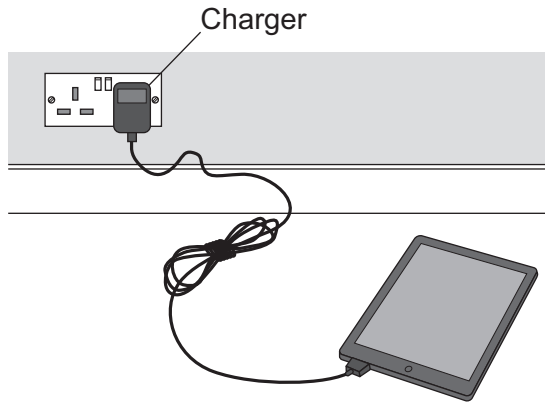
Charger

The charger contains a switch mode transformer.

2 (b) (i) Use the correct answer from the box to complete the sentence.

[1 mark]

200	1000	20 000

Switch mode transformers operate at frequencies

from 50 kHz to .... kHz.

2 (b) (ii) Give **one** advantage of a switch mode transformer over a traditional transformer.

[1 mark]

....

....

5

Turn over for the next question

Turn over ▶

3   **Figure 5** shows a diagram of a human eye.

Figure 5

....

....
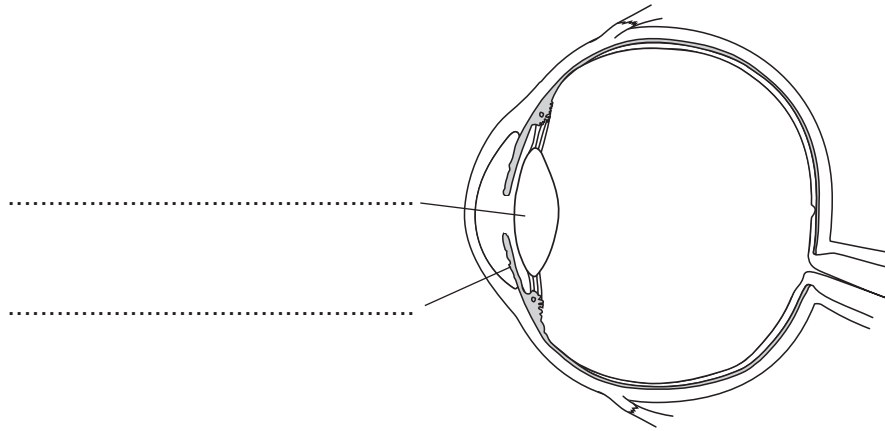
3 (a)   Use words from the box to label **Figure 5**.

[2 marks]

Cornea	Iris	Lens	Pupil

3 (b)   Draw **one** line from each part of the eye to its correct function.

[2 marks]

Part of the eye   **Function**

Changes light into
electrical signals

Cornea

Changes the direction
of light entering the eye

Retina

Changes the shape
of the lens

3 (c)   Some people wear contact lenses to help them to see clearly.

A contact lens has a focal length of 0.2 metres.

Calculate the power of this contact lens.

Use the correct equation from the Physics Equations Sheet.

[2 marks]

....

....

Power of the contact lens = ... dioptres

3 (d)   Eye lens replacement is a surgical procedure that can help some people to see clearly.

In this procedure, the surgeon removes the eye lens and replaces it with an artificial lens.

Which statement gives the correct reason for carrying out the procedure?

[1 mark]

Tick (✓) **one** box.

The potential benefit of the procedure is greater than the risk. ☐

The procedure involves a recent medical development. ☐

The surgical procedure is totally safe. ☐

Question 3 continues on the next page

Turn over ▶

3 (e) When a human eye changes focus from a distant object to a close object, the power of the eye lens changes.

Figure 6 shows how the amount that the power of an eye lens can change depends on age.

Figure 6
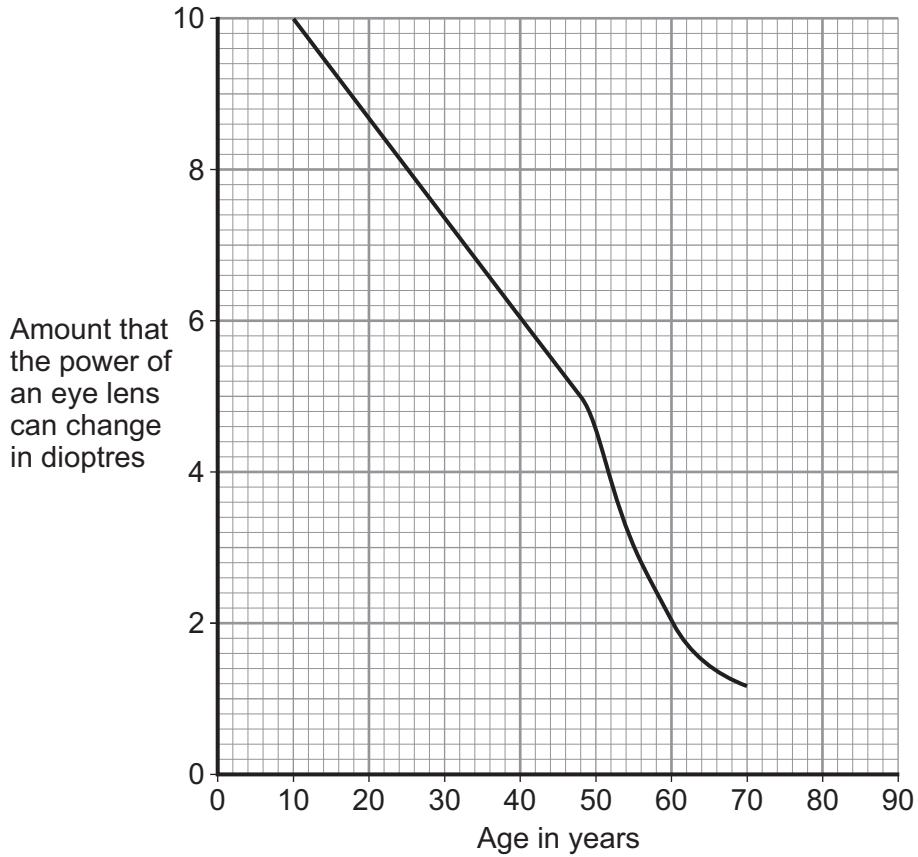
3 (e) (i) A person is 40 years old.

State the amount that the power of this person's eye lens is able to change.

[1 mark]

Change in power = ... dioptres

3 (e) (ii) Give **one** conclusion that can be made from **Figure 6**.

[1 mark]

....

....

3 (e) (iii) Use **Figure 6** to estimate the amount that the power of the eye lens of an 80-year-old person is able to change.

[1 mark]

Tick (✓) **one** box.

2 dioptres ☐

1 dioptre ☐

0 dioptres ☐

Turn over for the next question

10

Turn over ▶

4 **Figure 7** shows a demonstration carried out by a teacher.

Figure 7
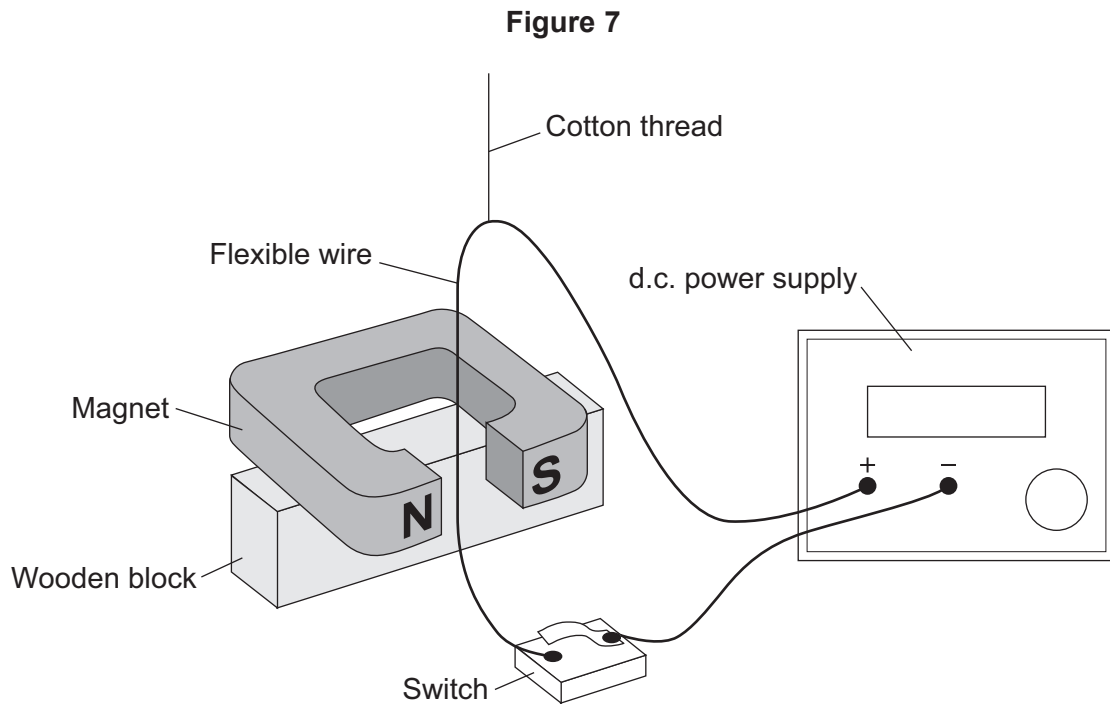
When the switch is closed, there is a current of 2 A through the wire. The wire experiences a force and moves.

4 (a) Use the correct word from the box to complete the sentence.

[1 mark]

generator	**motor**	**transformer**

The demonstration shows the .... effect.

4 (b) State **two** changes that the teacher could make to the demonstration, each of which would increase the force on the wire. The teacher does not touch the wire.

[2 marks]

1 ....

....

2 ....

....

4 (c) State **one** change that the teacher could make to the demonstration to change the direction of the force on the wire.

[1 mark]

....

....

4 (d) With the switch closed, the teacher changes the position of the wire so that the force on the wire is zero.

What is the position of the wire?

[1 mark]

Tick (✓) **one** box.

The wire is at 90° to the direction of the magnetic field. ☐

The wire is at 45° to the direction of the magnetic field. ☐

The wire is parallel to the direction of the magnetic field. ☐

5

Turn over for the next question

Turn over ▶

5 (a) **Figure 8** shows a ray of light entering a glass block.

Figure 8
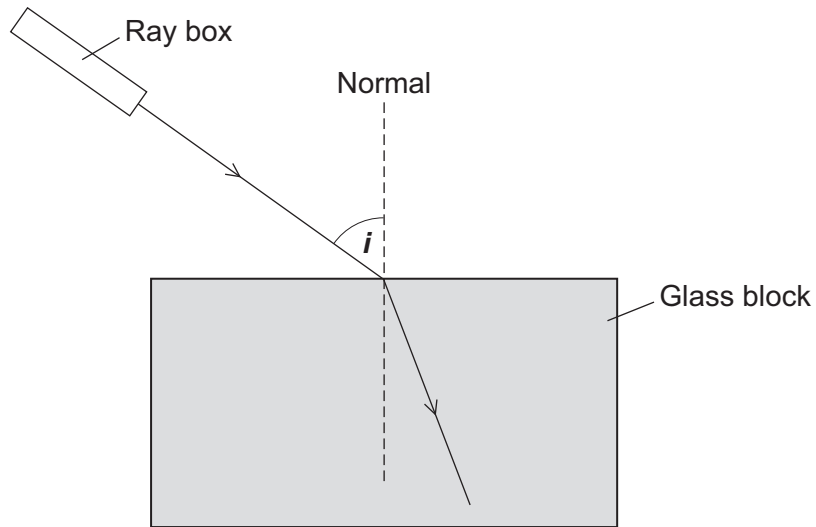
5 (a) (i) The angle of incidence in **Figure 8** is labelled with the letter *i*.

On **Figure 8**, use the letter *r* to label the angle of refraction.

[1 mark]

5 (a) (ii) **Figure 9** shows the protractor used to measure angles *i* and *r*.

Figure 9
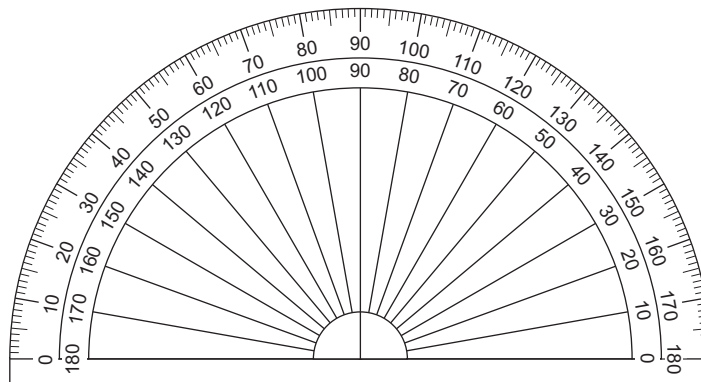
What is the resolution of the protractor?

[1 mark]

Tick (✓) **one** box.

1 degree ☐   5 degrees ☐   10 degrees ☐

5 (a) (iii) **Table 1** shows calculated values for angle *i* and angle *r* from an investigation.

Table 1

Calculated values
sin *i* = 0.80
sin *r* = 0.50

Use the values from **Table 1** to calculate the refractive index of the glass.

Use the correct equation from the Physics Equations Sheet.

[2 marks]

....

....

....

Refractive index = ...

5 (b) The diagrams below show a ray of light moving through glass.

Which diagram correctly shows what happens when the ray of light strikes the surface of the glass at the critical angle?

[1 mark]

Tick (✓) **one** box.

Air

Glass

☐

Air

Glass

☐

Air

Glass

☐
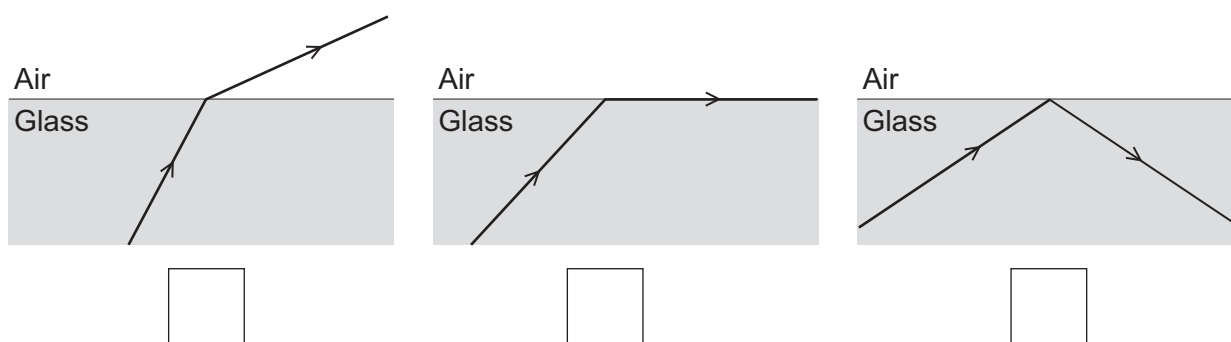
Question 5 continues on the next page

Turn over ▶

5 (c) A concave (diverging) lens is fitted into a door to make a security spyhole.

Figure 10 shows how this lens produces an image.

Figure 10

Object
Height = 4 cm

F Image
Height = 1 cm

Concave lens
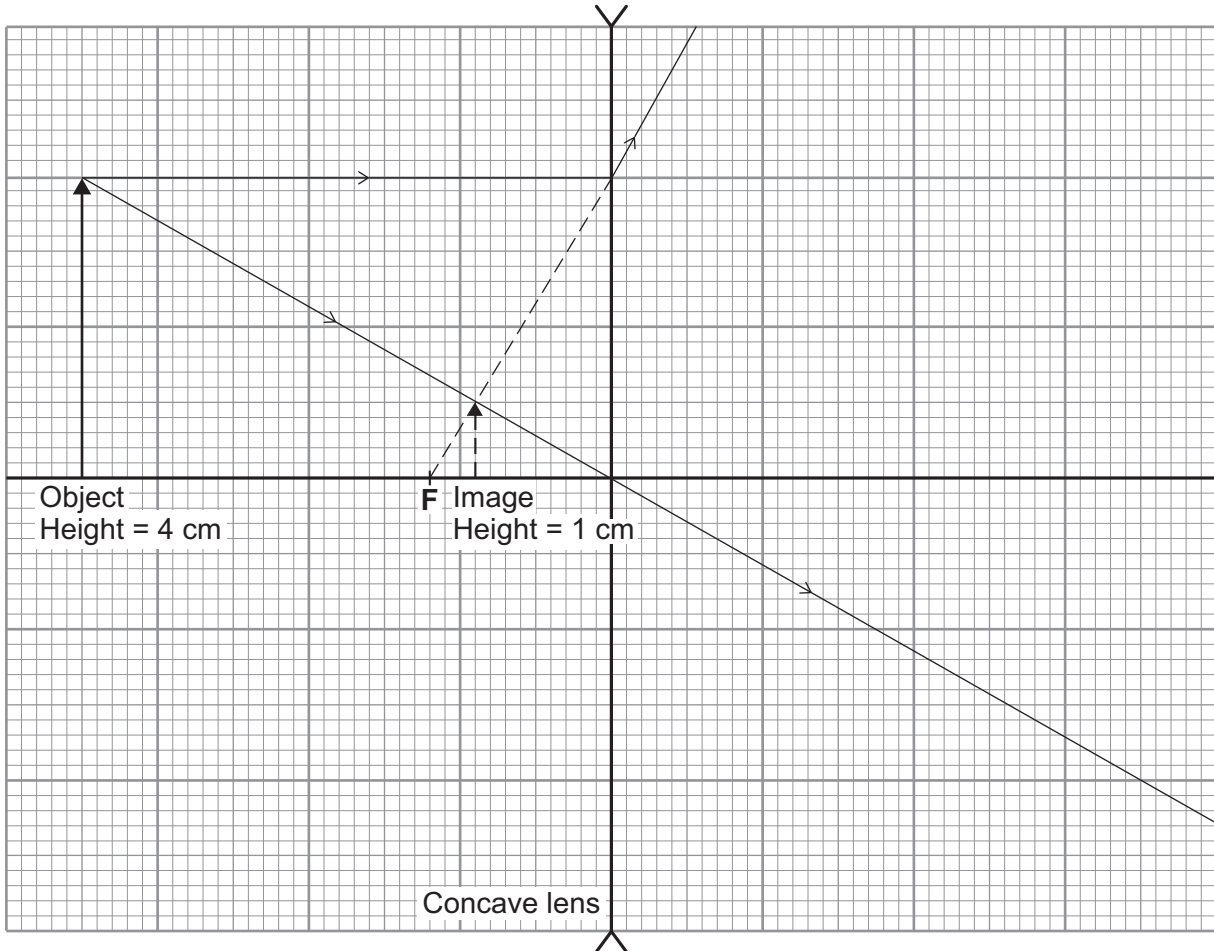
5 (c) (i) State **one** word to describe the nature of the image in **Figure 10**.

[1 mark]

....

5 (c) (ii) Use data from **Figure 10** to calculate the magnification of the image.

Use the correct equation from the Physics Equations Sheet.

[2 marks]

....

....

....

Magnification = ...

5 (c) (iii) What is another use for a concave lens?

[1 mark]

Tick (✓) **one** box.

A magnifying glass ☐

Correcting short sight ☐

To focus an image in a camera ☐

9

Turn over for the next question

Turn over ▶

6 **Figure 11** shows a magnet moving into a coil of wire. This movement causes a reading on the voltmeter.

Figure 11
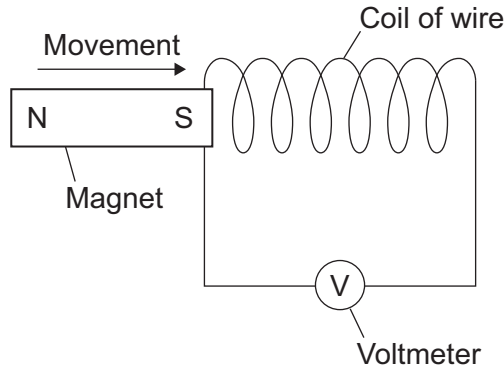
6 (a) Use the correct word from the box to complete the sentence.

[1 mark]

generated	induced	produced

Moving the magnet into the coil of wire causes a reading on the voltmeter because a

potential difference is .... across the ends of the wire.

6 (b) A student investigated how the number of turns on the coil of wire affects the maximum voltmeter reading. The student changed the number of turns on the coil of wire, then moved the magnet into the coil. The student recorded the maximum voltmeter reading.

To obtain valid data, suggest **two** variables that the student should control in this investigation.

[2 marks]

1 ....

....

2 ....

....

6 (c)   The student's results are shown in **Figure 12**.
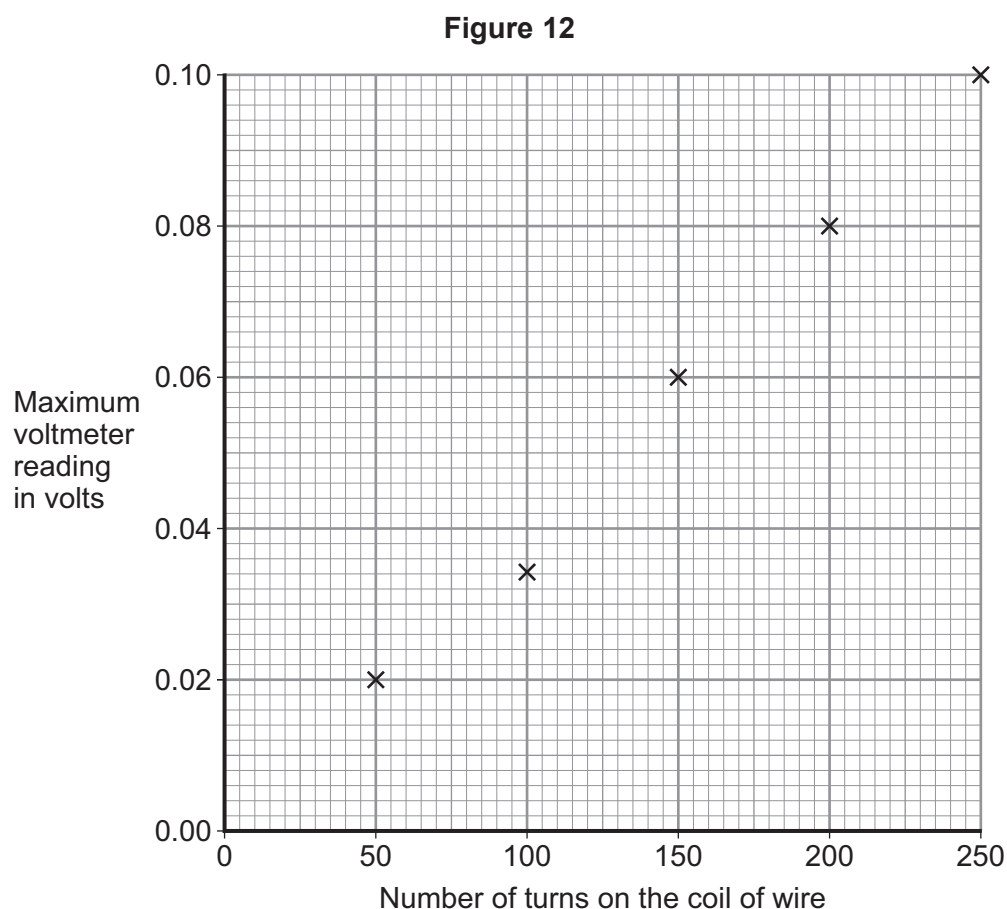
Figure 12

6 (c) (i)   One of the results is anomalous.
Suggest a reason for the anomalous result.

[1 mark]

....

6 (c) (ii)   Draw a line of best fit on **Figure 12**.

[1 mark]

6 (d)   A data-logger can automatically record and store data.

It may have been better for the student to have used a data-logger in his investigation rather than a voltmeter.

Suggest **one** reason why.

[1 mark]

....

....

Turn over ▶

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7 The clock shown in **Figure 13** uses a pendulum to keep time.

Figure 13
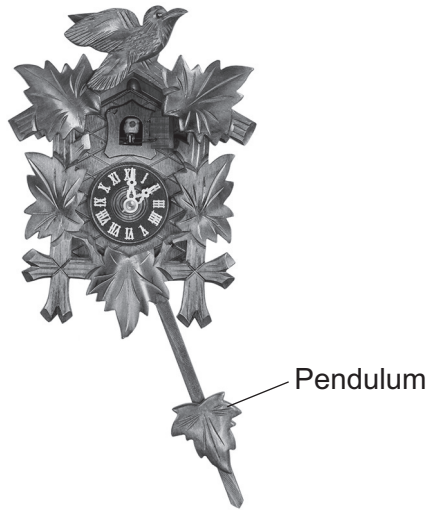
Pendulum

7 (a) The pendulum has a frequency of 0.80 Hz.

Calculate the periodic time of the pendulum.

Use the correct equation from the Physics Equations Sheet.

[2 marks]

....

....

....

Periodic time = ... seconds

Question 7 continues on the next page

Turn over ▶

7 (b) A student investigated the factors affecting the oscillation of a pendulum. The student set up a pendulum as shown in **Figure 14**.

Figure 14

Pendulum bob

Stop clock

0.0
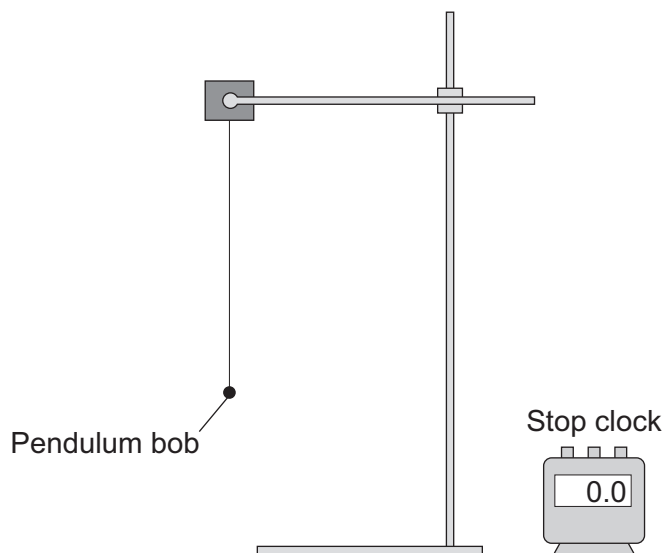
The student investigated how many complete oscillations the pendulum made for different lengths of the pendulum and different masses of the pendulum bob.

The results are shown in **Table 2**.

Table 2

Length of the pendulum in millimetres	Mass of the pendulum bob in grams	Number of complete oscillations made by the pendulum in 20 seconds
200	100	22
200	200	22
400	100	15
400	200	15
600	50	13
600	100	13

7 (b) (i) State **two** conclusions that the student should make from the results shown in **Table 2**.

[2 marks]

1 ....

....

2 ....

....

7 (b) (ii) The student wants to be more certain that her conclusions are correct.

Suggest **two** ways in which the investigation could be improved.

[2 marks]

1 ....

....

2 ....

....

Turn over for the next question

6

Turn over ▶

8 (a) **Figure 15** shows a car travelling around a bend in the road. The car is travelling at a constant speed.

Figure 15
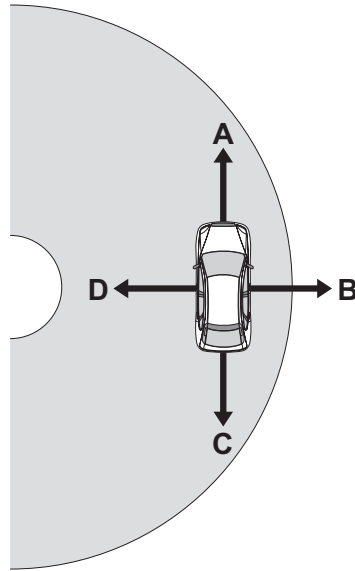
There is a resultant force acting on the car. This resultant force is called the centripetal force.

8 (a) (i) In which direction, **A**, **B**, **C** or **D**, does the centripetal force act on the car?

[1 mark]

Tick (✓) **one** box.

A ☐   B ☐   C ☐   D ☐

8 (a) (ii) State the name of the force that provides the centripetal force.

[1 mark]

....

8 (a) (iii) State **two** factors that affect the size of the centripetal force acting on the car.

[2 marks]

1 ....

2 ....

8 (b) **Figure 16** shows a racing car.

Figure 16

The racing car should not roll over when racing.

State **two** features of the car that make it difficult for the car to roll over.

[2 marks]

1 ....

....

2 ....

....

6

Turn over for the next question

Turn over ▶

9 (a) Complete the following sentences.

[2 marks]

Ultrasound waves have a minimum frequency

of .... hertz.

The wavelength of an X-ray is about the same as

the diameter of ....

9 (b) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Figure 17 shows one medical use of ultrasound and one medical use of X-rays.

Figure 17

Compare the medical uses of ultrasound and X-rays.

Your answer should include the risks, if any, and precautions, if any, associated with the use of ultrasound and X-rays.

[6 marks]

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Extra space ....

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8

END OF QUESTIONS

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