Please check the examination details below before entering your candidate information

| Candidate surname | Other names |
|---|---|
| | |

**Pearson Edexcel**
**Level 1/Level 2 GCSE (9–1)**

| Centre Number | Candidate Number |
|---|---|
| | |

**Time** 1 hour 10 minutes

**Paper reference** **1SC0/2PF**

# Combined Science

## PAPER 6

## Foundation Tier

**You must have:**
Calculator, ruler

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- Calculators may be used.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

### Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- In questions marked with an **asterisk (*)**, marks will be awarded for your ability to structure your answer logically, showing how the points that you make are related or follow on from each other where appropriate.
- A list of equations is included at the end of this exam paper.

### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.
- Good luck with your examination.

*Turn over* ▶

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**Answer ALL questions. Write your answers in the spaces provided.**

**Some questions must be answered with a cross in a box ☒.**
**If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.**

**1** Figure 1 shows an electrical circuit.

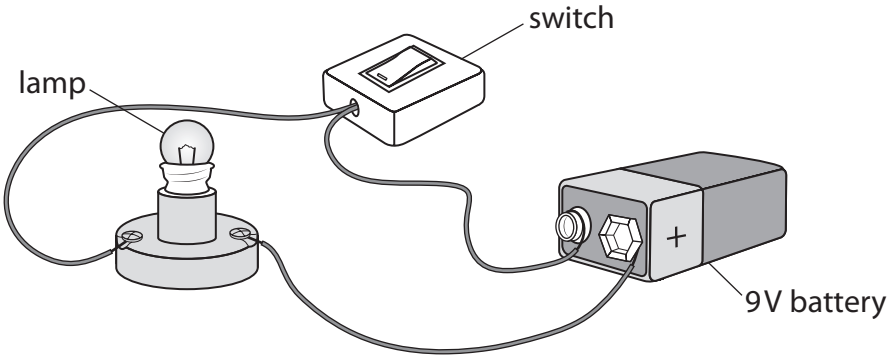



**Figure 1**

(a) Draw a circuit diagram of the electrical circuit in Figure 1 in the space below.

**(4)**

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(b) When the current in a lamp is 0.15 A, the resistance of the lamp is 40 Ω.

Calculate the voltage across the lamp.

Use the equation

$$V = I \times R$$

**(2)**

voltage = ..... V

(c) Figure 2 shows an ammeter that can read up to 5 A.

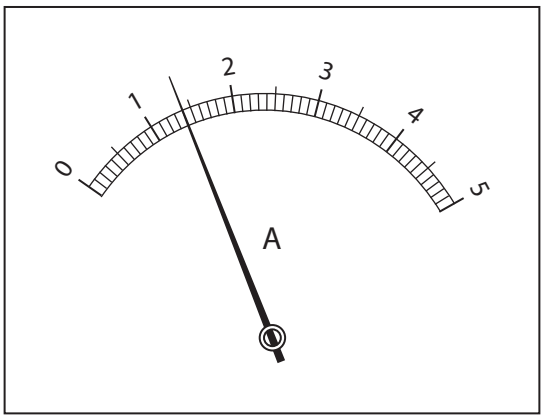



**Figure 2**

State the value of the current shown on the ammeter in Figure 2.

**(1)**

current = ..... A

**(Total for Question 1 = 7 marks)**

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**2** (a) Figure 3 shows some objects and words describing these objects.

Draw one line from each object to its description.

**(2)**

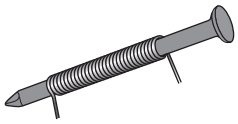
| **object** | **description** |
|---|---|
|  nail in a current-carrying coil | non-magnetic |
|  plotting compass needle | permanent magnet |
|  wooden ruler | temporary magnet |

**Figure 3**

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(b) Figure 4 shows a wire passing through a piece of card.
The wire carries an electric current.

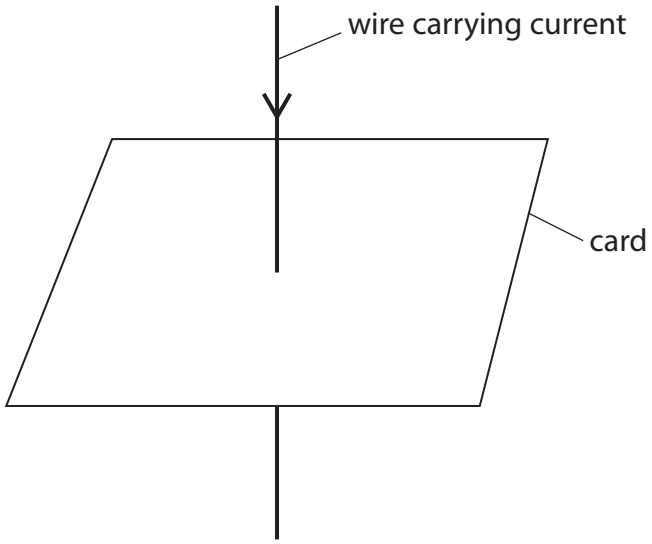



**Figure 4**

(i) Draw **one** magnetic field line on Figure 4, to show the shape of the magnetic field produced by the current.

**(1)**

(ii) Draw **one** arrow on the field line you have drawn to show the direction of the magnetic field.

**(1)**

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(c) A student measures the strength of the magnetic field at several distances from the wire in Figure 4.
Figure 5 shows most of the student's results.

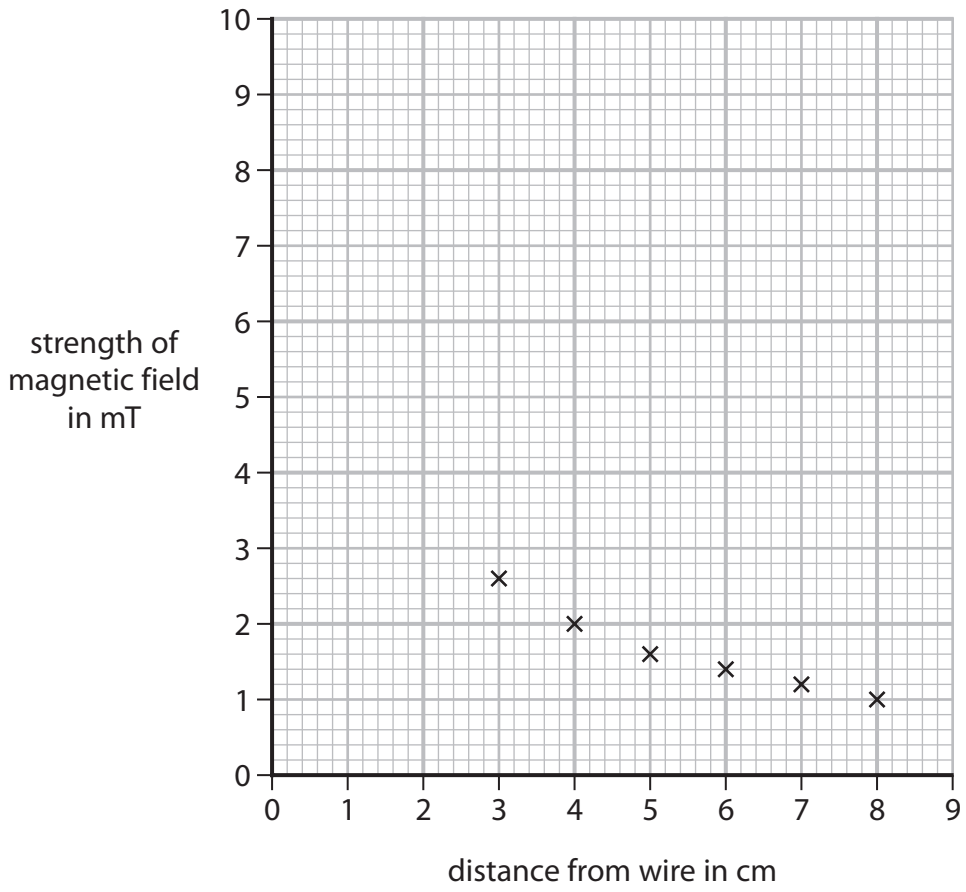



**Figure 5**

Figure 6 shows two extra sets of results.
mT is a unit of strength of a magnetic field.

| distance from wire in cm | strength of magnetic field in mT |
|---|---|
| 1.0 | 8.1 |
| 2.0 | 3.9 |

**Figure 6**

(i) Plot the two extra points on Figure 5.

**(2)**

(ii) Draw a best fit curve on the graph in Figure 5.

**(1)**

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(iii) Use the graph in Figure 5 to calculate the change in strength of magnetic field when the distance from the wire changes from 4 cm to 8 cm.

**(2)**

change in strength of magnetic field = ..... mT

(iv) The distance from the wire affects the strength of the magnetic field.

State **one** other factor that affects the strength of the magnetic field.

**(1)**

.....

**(Total for Question 2 = 10 marks)**

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**3** This question is about using the mains electricity supply.

(a) (i) An electric kettle is used to boil some water.
The mains supply voltage is 230 V.
The power supplied to the kettle is 1.9 kW.

Calculate the current in the kettle.
Use the equation

$$I = \frac{P}{V}$$

**(2)**

current supplied to the kettle = ..... A

(ii) A coffee machine takes 120 s to heat some water.

Mains supply voltage = 230 V
Current in this coffee machine = 7.4 A

Calculate the energy transferred to the coffee machine in 120 s.

Use an equation selected from the list of equations at the end of the paper.

**(2)**

energy transferred to coffee machine = ..... J

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(b) Figure 7 shows the inside of a mains plug.
The neutral wire is labelled.

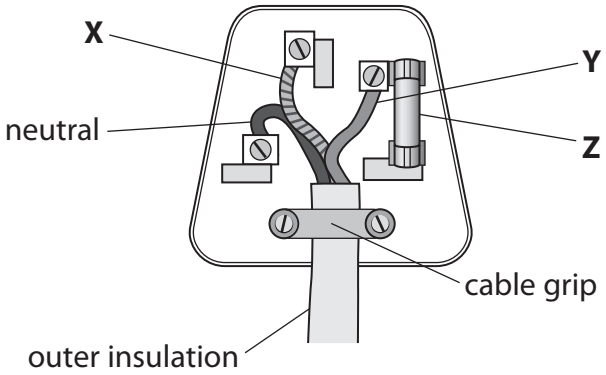



**Figure 7**

(i) State the name of wire **X** and the name of wire **Y**.

**(2)**

wire **X** .....

wire **Y** .....

(ii) State the name of component **Z**.

**(1)**

component **Z** .....

(c) A transformer is used to connect a laptop computer to the mains electricity supply.
The input voltage to the transformer is 230 V.
The output current from the transformer is 2.37 A.
The transformer has an output voltage of 19.0 V.
The transformer used is 100% efficient.

Calculate the input current to the transformer.

Use the equation

input current × input voltage = output current × output voltage

**(3)**

input current = ..... A

**(Total for Question 3 = 10 marks)**



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**4** This question is about energy changes.

(a) Figure 8 shows a water slide.
A person travels from the top to the bottom of the water slide.

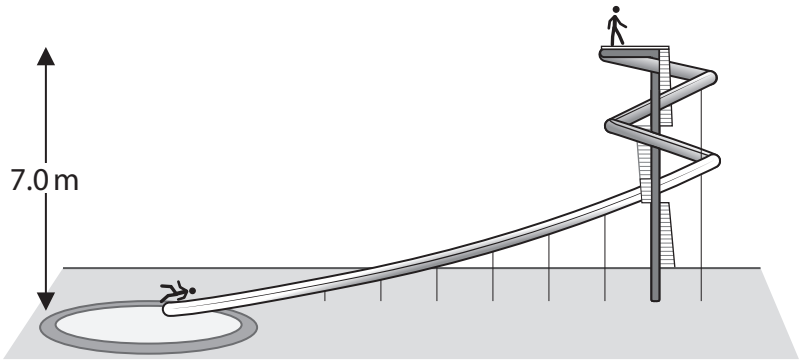



**Figure 8**

(i) The mass of the person, $m = 72$ kg.
The change in vertical height, $h = 7.0$ m
Gravitational field strength, $g = 10$ N / kg

Calculate the change in gravitational potential energy for the person.

Use the equation

change in gravitational potential energy = $m \times g \times h$

**(2)**

change in gravitational potential energy = ..... J

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(ii) The person comes to rest after the end of the water slide.

Explain what happens to the energy as the person comes to rest after the end of the water slide.

**(2)**

.....

.....

(b) Figure 9 shows a person pushing a box from the bottom of a slope to the top of the slope.

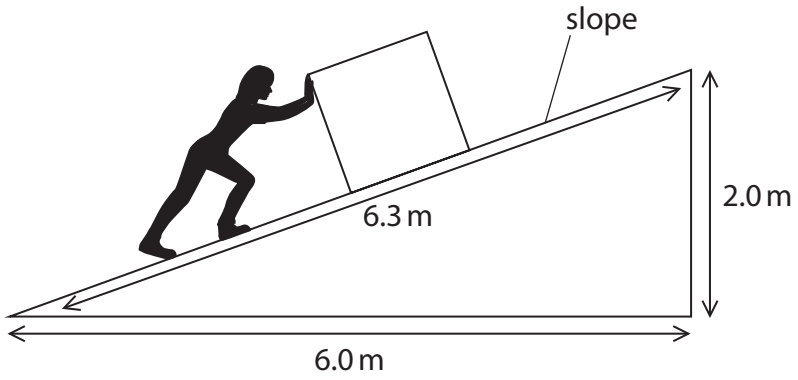



**Figure 9**

Explain which one of the three distances shown in Figure 9 should be used to calculate the work done against the force of friction between the box and the slope.

**(2)**

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(c) Calculate the kinetic energy of a tennis ball travelling at 28 m/s.
The mass of the tennis ball = 58 g.

Use the equation

$$KE = \frac{1}{2} \times m \times v^2$$

**(3)**

kinetic energy = ..... J

**(Total for Question 4 = 9 marks)**

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**5** (a) Figure 10 shows two different types of the same circuit component.

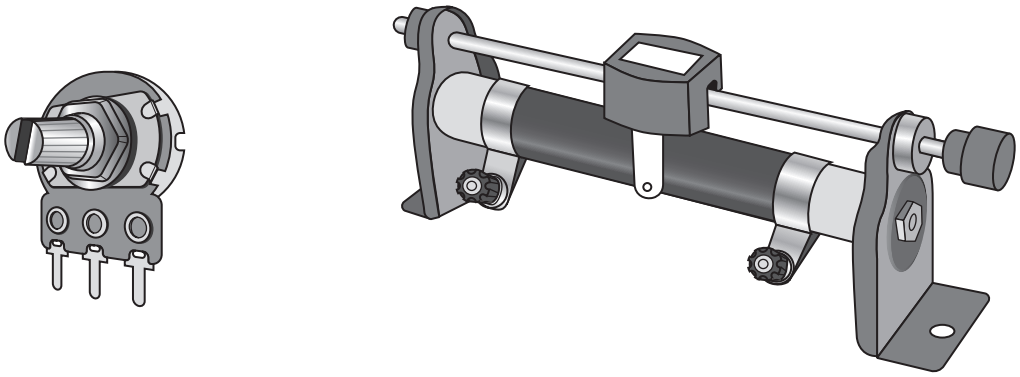


**Figure 10**

What is the name of this circuit component?

**(1)**

☒ **A** diode

☒ **B** light dependent resistor

☒ **C** thermistor

☒ **D** variable resistor

(b) Which row in the table describes the way that ammeters and voltmeters should be connected with a component in a circuit?

**(1)**

| | ammeter | voltmeter |
|---|---|---|
| ☒ **A** | in parallel | in parallel |
| ☒ **B** | in parallel | in series |
| ☒ **C** | in series | in parallel |
| ☒ **D** | in series | in series |

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(c) Figure 11 shows the results from an experiment where the potential difference (voltage) across a filament lamp was varied.

The current and voltage were measured.

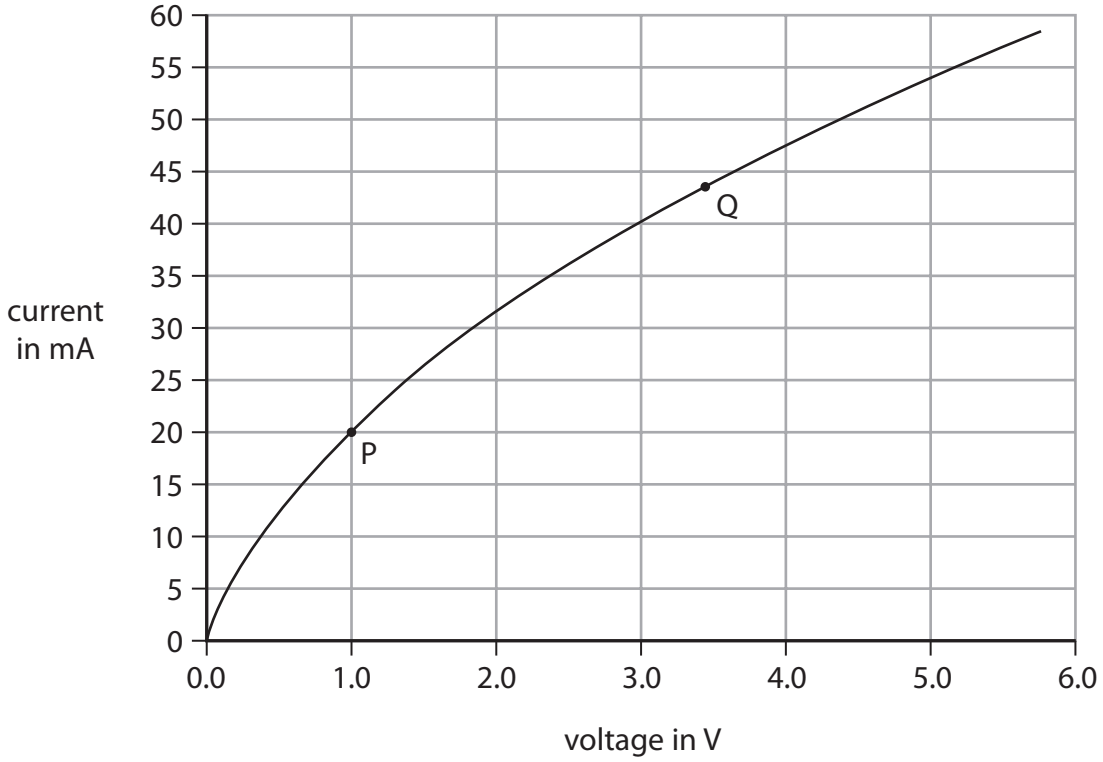



**Figure 11**

(i) Describe the relationship between the current and the voltage as shown in the graph in Figure 11.

**(2)**

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(ii) Use the values of the voltage and current at point P and at point Q on the graph in Figure 11 to complete the table in Figure 12.

**(2)**

| | voltage in V | current in mA |
|---|---|---|
| point P | | |
| point Q | | |

**Figure 12**

(iii) Calculate the resistance of the filament lamp when the voltage is 4.5 V and the current is 51 mA.

Use the equation

$$R = \frac{V}{I}$$

**(2)**

resistance = ..... Ω

(iv) Explain why the resistance of the filament lamp changes as the voltage across it increases.

**(3)**

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**(Total for Question 5 = 11 marks)**

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**6** (a) Describe, in terms of particles, **two** differences between a solid and a liquid of the same substance.

**(2)**

1 .....

.....

2 .....

.....

(b) Figure 13 shows the dimensions of a solid block of concrete.

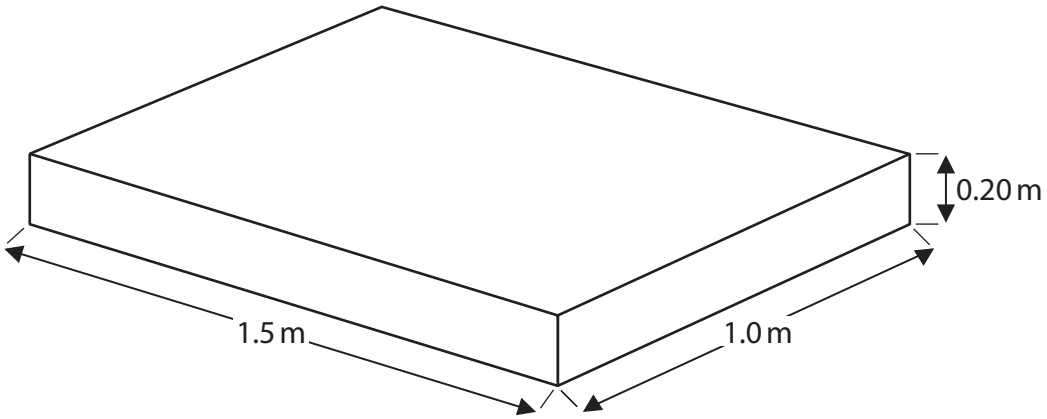



**Figure 13**

Density of concrete, $\rho$, = 2100 kg / m$^3$.

Calculate the mass of the concrete block.

Use the equation:

$$m = \rho \times V$$

**(3)**

mass of concrete block = ..... kg

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(c) Figure 14 shows a shed made mostly of concrete blocks.

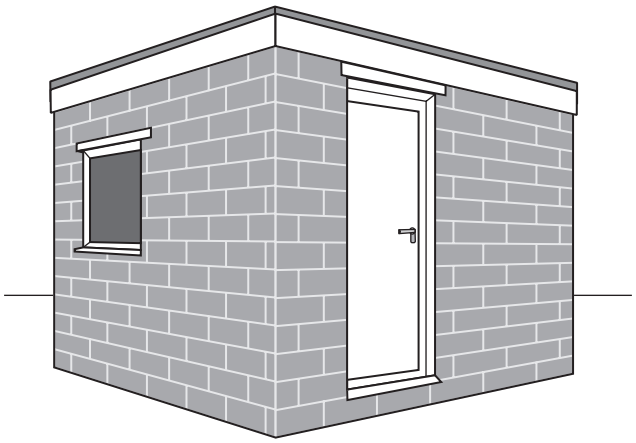


**Figure 14**

State **two** practical ways to reduce heat loss from this shed.

**(2)**

1 .....

.....

2 .....

.....

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*(d) A student has two metal strips and a ruler, as shown in Figure 15.

A teacher tells the student that

- one metal strip is made of aluminium
- the other metal strip is made of stainless steel.

The student looks up data in a reference book, finding some density values:

density of aluminium = 2710 kg / $m^3$

density of stainless steel = 7850 kg / $m^3$

The student has access to more of the same metal strips, if needed, and may ask for any extra measuring devices.

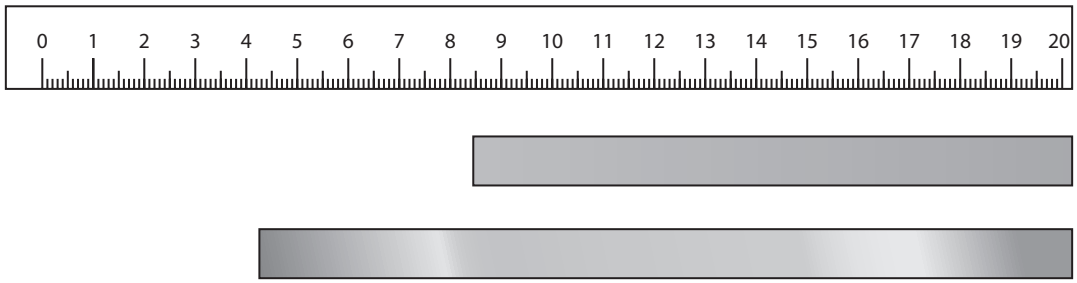



**Figure 15**

Plan how the student could confirm the teacher's statements, by determining the density of each of the strips as accurately as possible.

**(6)**

**(Total for Question 6 = 13 marks)**

**TOTAL FOR PAPER = 60 MARKS**

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**Equations**

| |
|---|
| (final velocity)$^2$ – (initial velocity)$^2$ = 2 × acceleration × distance<br><br>$v^2 - u^2 = 2 \times a \times x$ |
| energy transferred = current × potential difference × time<br><br>$E = I \times V \times t$ |
| potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil<br><br>$V_p \times I_p = V_s \times I_s$ |
| change in thermal energy = mass × specific heat capacity × change in temperature<br><br>$\Delta Q = m \times c \times \Delta\theta$ |
| thermal energy for a change of state = mass × specific latent heat<br><br>$Q = m \times L$ |
| to calculate pressure or volume for gases of fixed mass at constant temperature<br><br>$P_1 V_1 = P_2 V_2$ |
| energy transferred in stretching = 0.5 × spring constant × (extension)$^2$<br><br>$E = ½ \times k \times x^2$ |

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