Write your name here

Surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9 - 1)

Centre Number | Candidate Number

Combined Science

Paper 6: Physics 2

Foundation Tier

Sample Assessment Materials for first teaching September 2016

Time: 1 hour 10 minutes

Paper Reference
1SC0/2PF

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.

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.

Turn over ▶

S50063A

S 5 0 0 6 3 A 0 1 2 4

PEARSON

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 (a) (i) Complete each box in Figure 1 to show how particles are arranged in a solid, liquid and gas.

One particle in each box has been drawn for you.

(3)

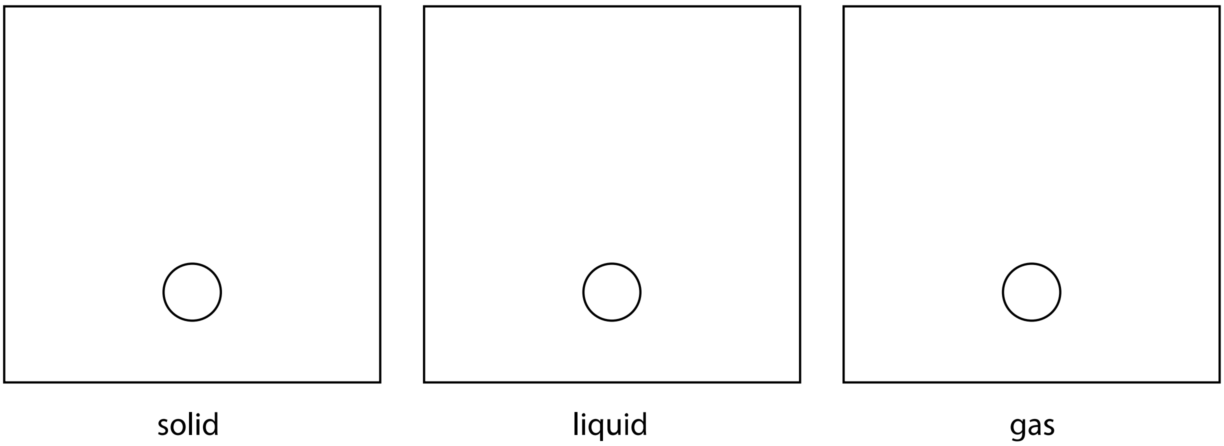


Figure 1

(ii) Which row of the table is correct for water compared to steam?

(1)

		the density of water is	the water molecules are
☒	**A**	bigger	smaller
☒	**B**	smaller	bigger
☒	**C**	bigger	closer together
☒	**D**	smaller	further apart

(b) A student investigates the density of a copper block and the density of a small stone, as shown in Figure 2.

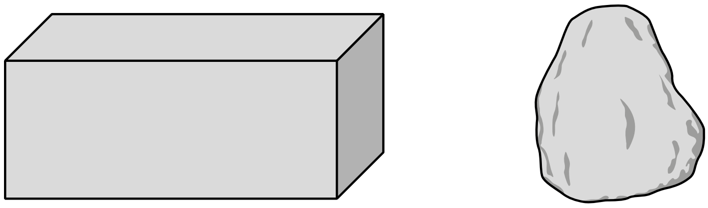


Figure 2

(i) The student calculates the volume of the block as 13 cm³.

She finds that the mass of the block is 100 g.

Calculate the density of the block.

Use the equation

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

(2)

density = ... g/cm³

(ii) The student found the volume of the copper block by multiplying the area of its base by its height.

The small stone does not have straight sides.

Describe how the student could measure the volume of the small stone.
You may use a diagram if it helps your answer.

(3)

....

....

....

....

....

....

(Total for Question 1 = 9 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

2 An electric heater is used to heat some water.

Figure 3 shows the experimental setup used.

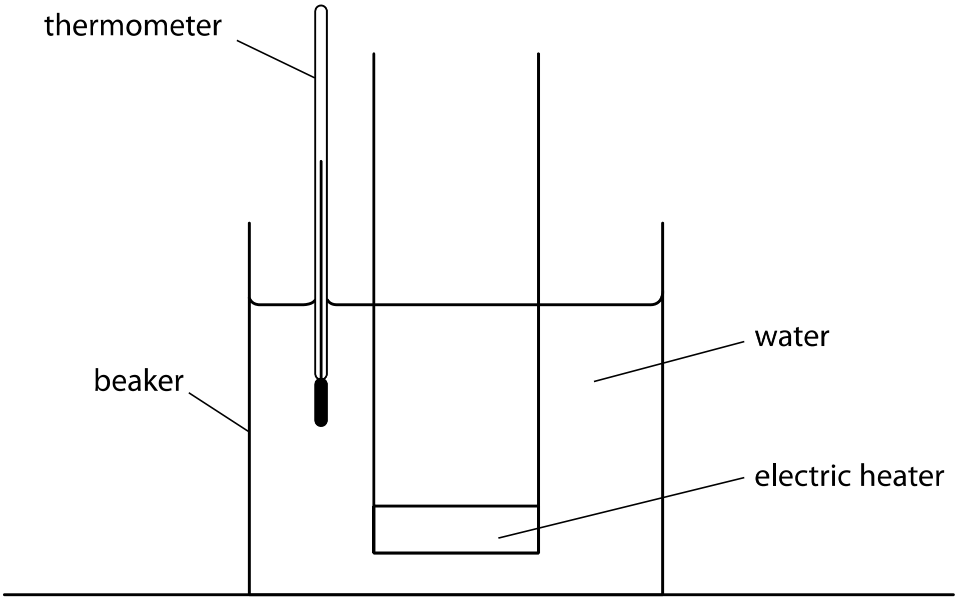


Figure 3

(a) Figure 4 shows the energy transferred by the electric heater in 1 second.

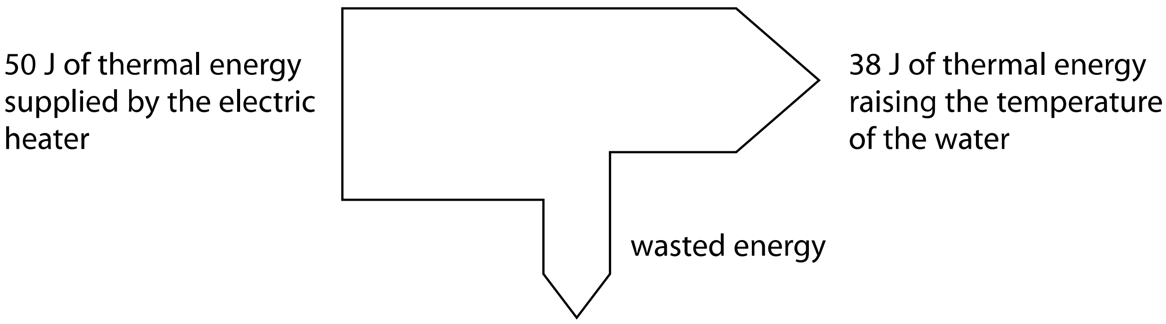


Figure 4

(i) How much energy is wasted each second?

(1)

☐ **A** 12 J

☐ **B** 38 J

☐ **C** 50 J

☐ **D** 88 J

(ii) Describe what happens to the wasted energy.

(2)

....

....

....

....

(b) Explain **one** way the experiment can be improved to reduce the amount of wasted energy.

(2)

....

....

....

....

(c) The initial mass of the water in the beaker is 0.72 kg.

The electric heater is switched on for some time and the water boils.

The mass of the water after the heater is switched off is 0.60 kg.

The thermal energy transferred to the water while it boils is 270 000 J.

Use an equation from the formula sheet to calculate the specific latent heat of the water.

(3)

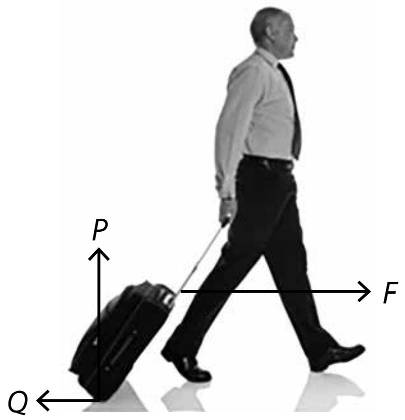
specific latent heat = ... J/kg °C

(Total for Question 2 = 8 marks)

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

3 A man pulls a suitcase with a horizontal force, *F*, as shown in Figure 5.

Two other forces acting on the suitcase are labelled *P* and *Q*.



Not to scale

Figure 5

(a) (i) Which of these gives the correct names for the forces *P* and *Q*?

(1)

	name of	
	force *P*	**force *Q***
☒ **A**	upthrust	reaction
☒ **B**	reaction	friction
☒ **C**	reaction	reaction
☒ **D**	friction	upthrust

(ii) Draw an arrow on the diagram to represent the weight of the suitcase.

(1)

(b) The man pulls the suitcase for 80 m along a horizontal path.

The mass of the man and the suitcase is 85 kg.

The man does 1200 J of work on the suitcase as he pulls the suitcase along.

He walks with an average velocity of 1.5 m/s.

(i) Calculate the kinetic energy of the man and the suitcase.

(2)

kinetic energy = ... J

(ii) Calculate the horizontal force, *F*, that the man exerts on the suitcase.

Use the equation:

work done = force × distance moved in the direction of the force

(2)

force = ... N

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

(c) The man runs up a set of stairs carrying his suitcase.

Explain whether he does more total work if he walks up the same stairs instead of running.

(2)

....

....

....

....

(d) The man lifts his suitcase.

The increase in gravitational potential energy of the suitcase is 264 J.

The mass of the suitcase is 12 kg.

Calculate the vertical height the suitcase is raised.

(gravitational field strength, g = 10 N/kg)

Use the equation:

change in gravitational potential energy = mass $\times$ g $\times$ change in vertical height

(2)

height raised = ... m

(Total for Question 3 = 10 marks)

4 The efficiency of an electric motor is investigated as shown in Figure 6.

The motor lifts a mass at a constant speed.

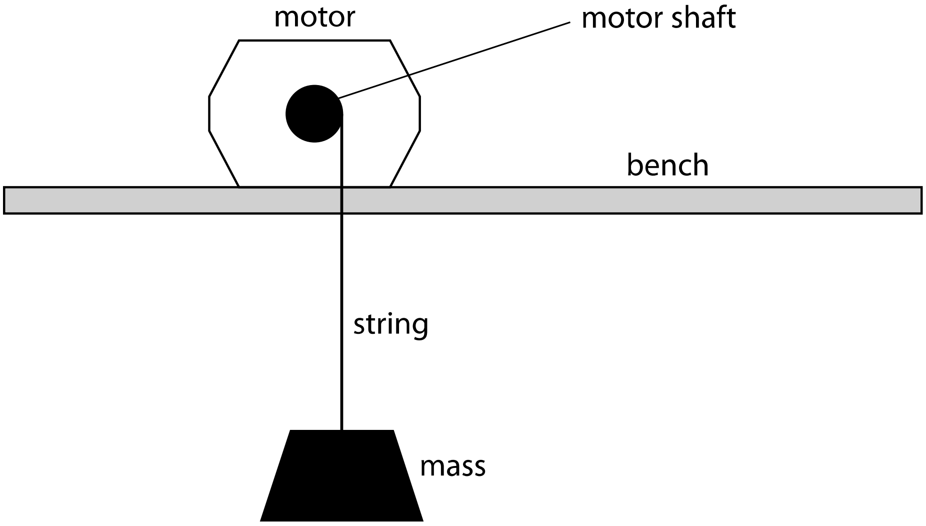


Figure 6

The results are shown in Figure 7.

current in motor	1.9 A
voltage across motor	10.0 V
time taken to lift mass	9.0 s

Figure 7

(a) (i) Which of these changes would improve the **reliability** of these results?

(1)

☒ **A** Repeating the investigation with different masses

☒ **B** Repeating the readings and calculating averages

☒ **C** Using a motor that works with a higher voltage

☒ **D** Using a shorter piece of string to lift the mass

(ii) Which of these best shows the energy stores as the mass is lifted?

(1)

	kinetic energy of the mass	potential energy of the mass
☒ **A**	constant	increasing
☒ **B**	constant	decreasing
☒ **C**	decreasing	increasing
☒ **D**	decreasing	decreasing

(b) (i) Show that the total energy supplied to the motor in the 9 s is about 170 J.

(2)

(ii) During the 9 s the efficiency of the motor is 70%.

Calculate the amount of useful energy transferred in the 9 s.

Use the equation

$$\text{efficiency} = \frac{\text{useful energy transferred}}{\text{total energy supplied}}$$

(3)

useful energy = ... J

(c) Which row of the table is correct for the resistance of the motor?

(1)

	resistance of motor =	resistance of motor =
☒ **A**	$I \div V$	$I^2 \div P$
☒ **B**	$V \div I$	$P \div I^2$
☒ **C**	$V \div I$	$P \times I^2$
☒ **D**	$I \times V$	$P \div I^2$

(d) When the motor lifts the mass, the coil in the motor becomes warm.

Explain why the coil becomes warm.

(3)

....

....

....

....

....

....

(Total for Question 4 = 11 marks)

5 A student investigates how the resistance of a thermistor varies with temperature.

(a) The student uses the equipment shown in Figure 8 to measure the temperature of the thermistor.

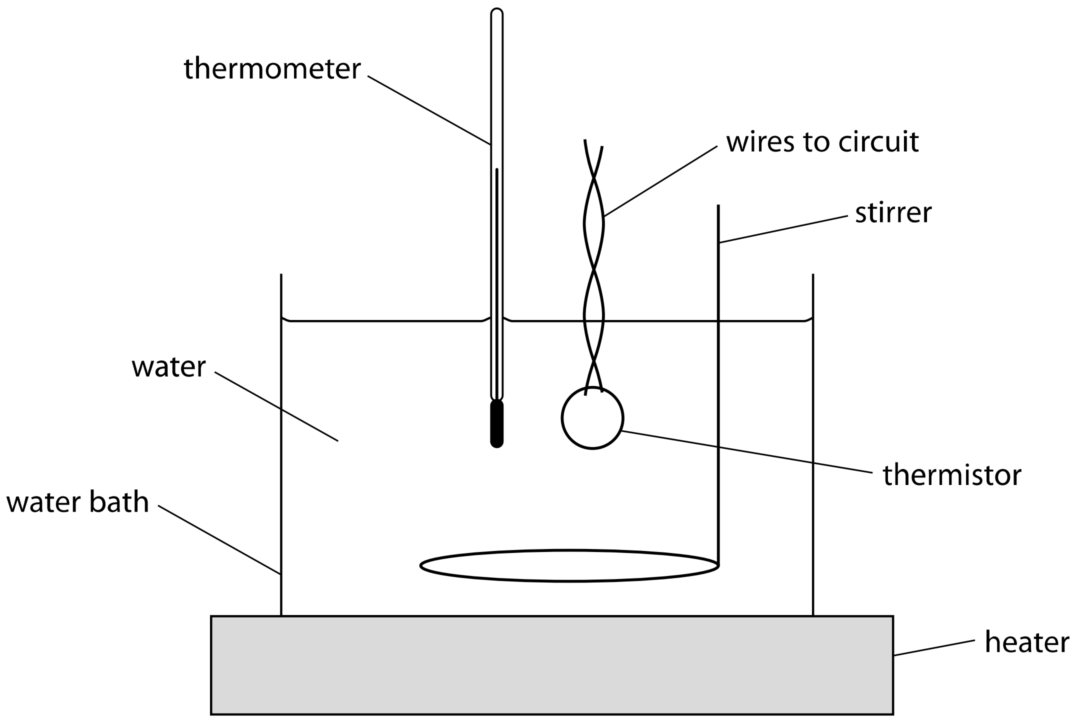


Figure 8

(i) Give **one** reason for using the water bath.

(1)

....

....

(ii) The equipment shown in Figure 8 is for investigations in the temperature range from 20 °C to 100 °C.

State **one** way the student could develop this experimental procedure to investigate temperatures outside this range.

(1)

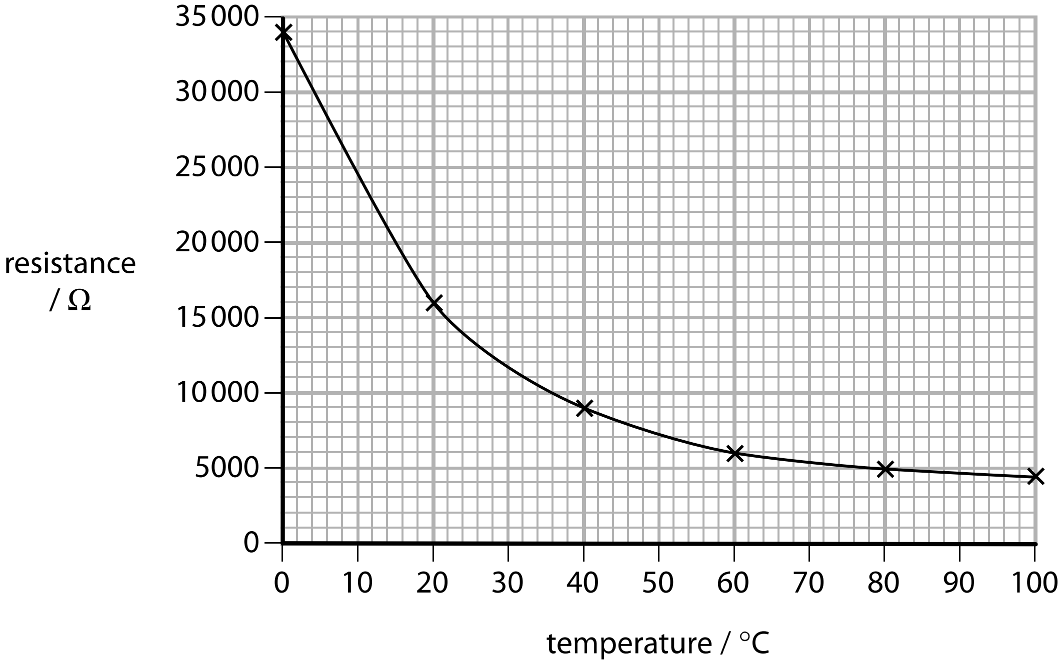
....

....

(b) The student takes measurements for two other components, **A** and **B**.

The results for both these components are shown in Figure 9.

Component A



Component B

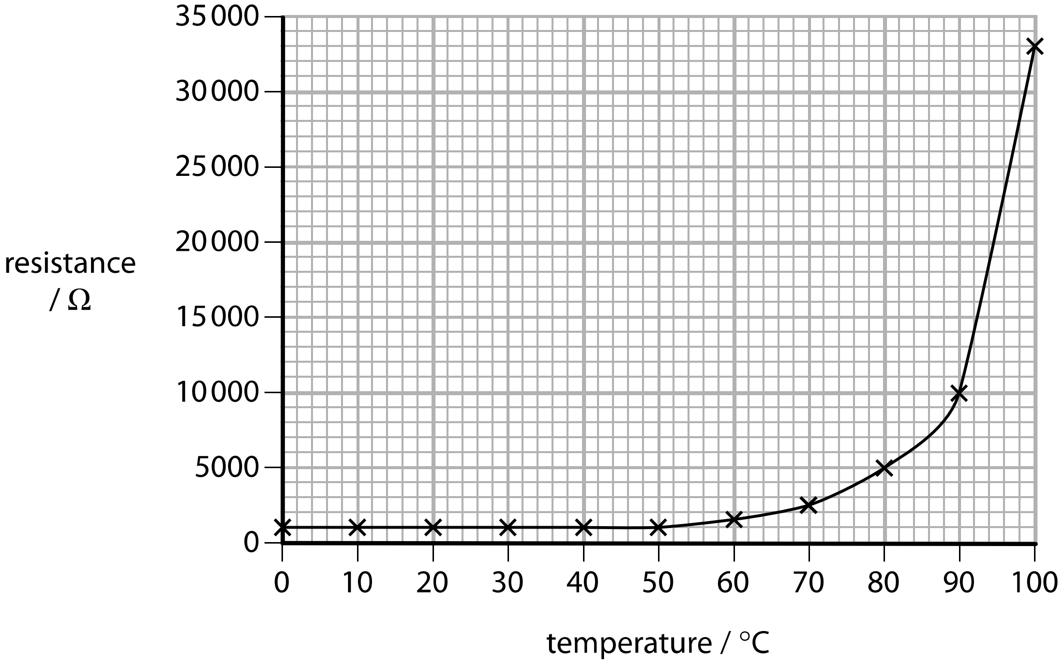


Figure 9

Compare and contrast how the resistances of component **A** and component **B** vary with temperature.

(3)

....

....

....

....

....

*(c) Describe how the student should carry out an experiment to determine the specific heat capacity of water.

(6)

....

....

....

....

....

....

....

....

....

....

....

....

(Total for Question 5 = 11 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

6 A student uses a digital calliper to measure the length of a spring, as shown in Figure 10.

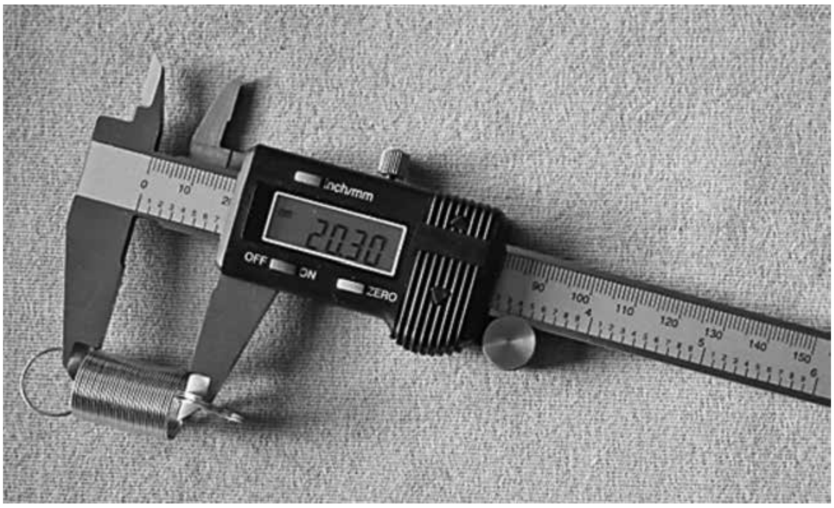


Figure 10

The spring is bendy and difficult to measure.

The student takes the six readings shown in Figure 11.

Figure 11

(a) Calculate the average length of the spring.

(2)

average length = ... mm

(b) The student investigates the stretching of a spring with the equipment shown in Figure 12.

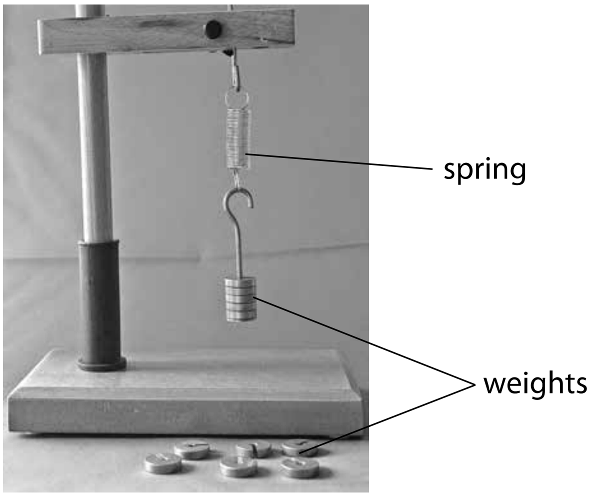


Figure 12

The student investigates the extension of the spring using six different weights.

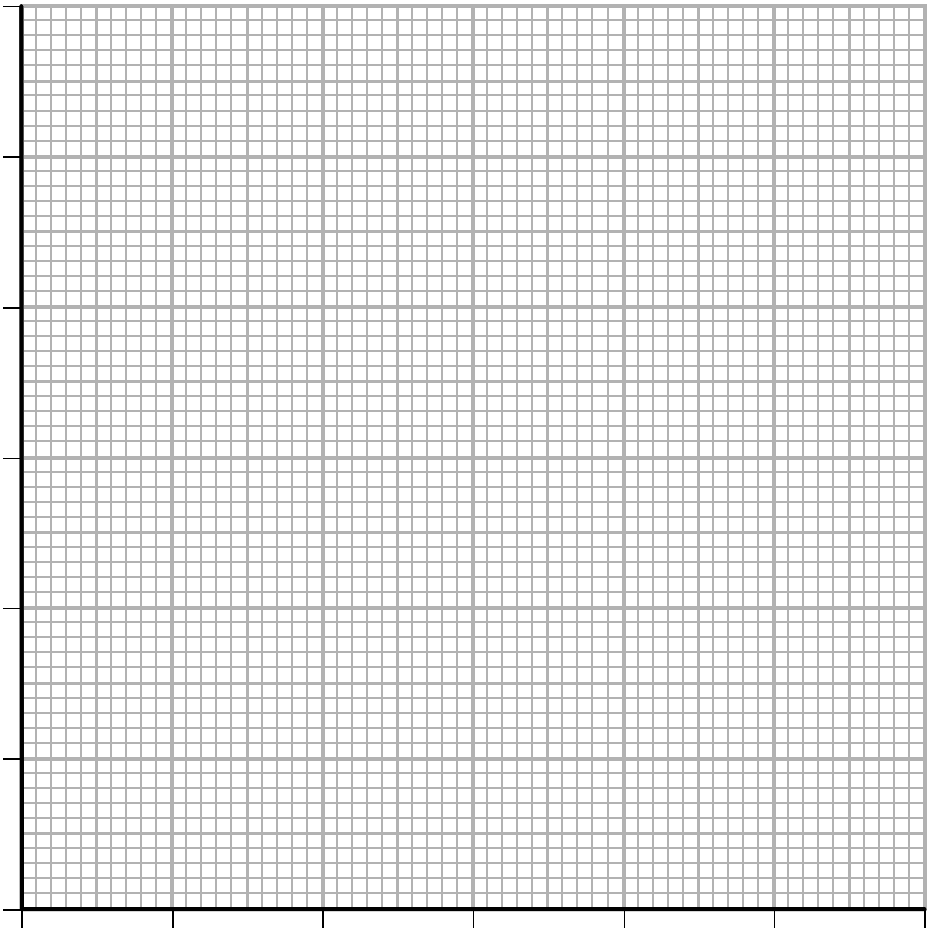
The results are shown in Figure 13.

weight (N)	extension (mm)
0.20	4.0
0.40	8.0
0.60	12.0
0.80	16.0
1.00	20.0
1.20	24.0

Figure 13

(i) Draw a graph for the readings, using the grid shown.

(3)



(ii) The student writes this conclusion:

'*The extension of the spring is directly proportional to the weight stretching the spring.*'

Comment on the student's conclusion.

(3)

....

....

....

....

....

....

(c) The student extends the investigation by finding information about the stretching of wires.

The student finds the graph shown in Figure 14 for the stretching of a wire.

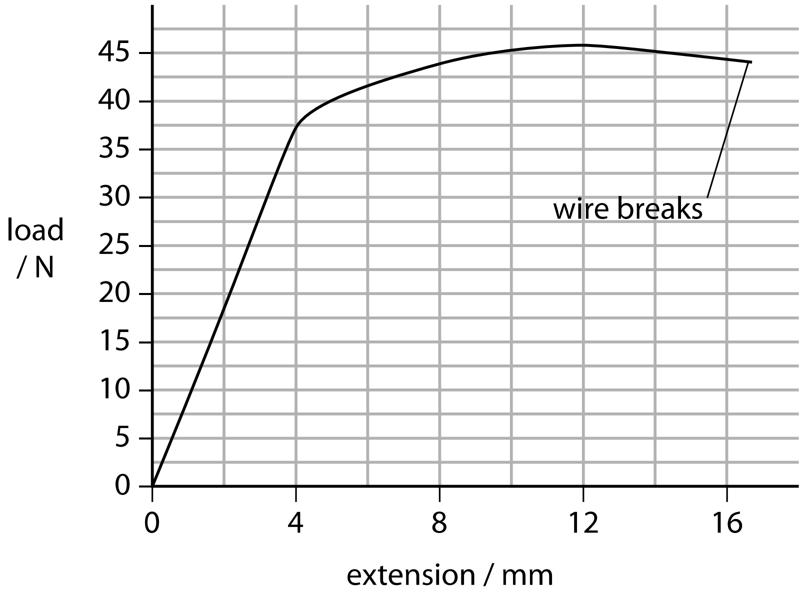


Figure 14

Describe the non-linear stretching of the wire shown in Figure 14.

(3)

....

....

....

....

....

....

(Total for Question 6 = 11 marks)

TOTAL FOR PAPER = 60 MARKS

Equations

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

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

BLANK PAGE

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE