EDEXCEL · GCSE COMBINED SCIENCE 1SC0

Physics — Higher Tier, Paper 2

June 2025 exam series

QUESTION PAPER

Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

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

Monday 16 June 2025

Morning (Time: 1 hour 10 minutes)

Paper reference **1SC0/2PH**

Combined Science

PAPER 6

Higher Tier

You must have:
Calculator, ruler, Equation Booklet (enclosed)

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

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P 7 8 7 1 5 R R A 0 1 2 8

Pearson

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

Some questions must be answered with a cross in one of the four boxes ☒. 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) A student places a trolley at the top of a runway, as shown in Figure 1.

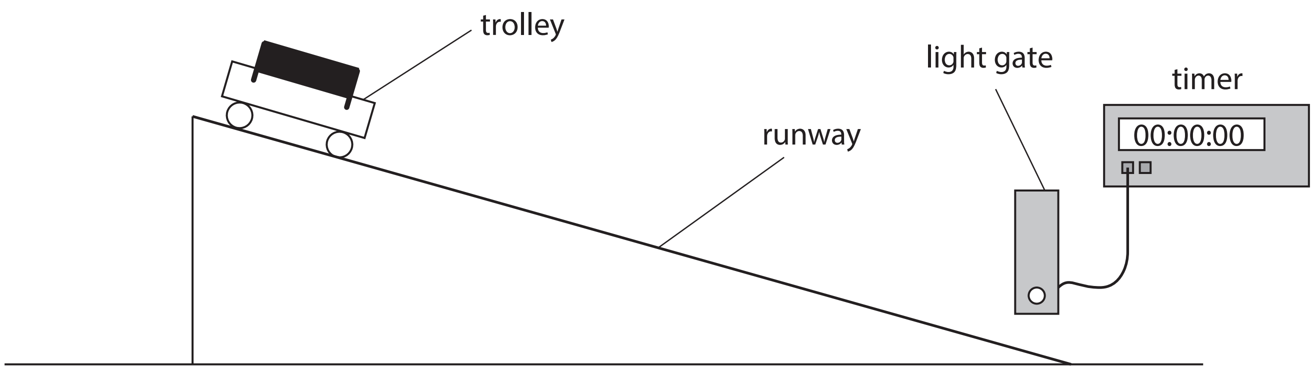

Figure 1

The student had to lift the trolley through a height of 26 cm to put it at the top of the runway.

The gravitational potential energy, ΔGPE, of the trolley increases by 4.1 J when lifted to the top of the runway.

The gravitational field strength, g, = 10 N / kg.

(i) Show that the mass of the trolley is about 1.6 kg.

Use the equation

$$m = \frac{\Delta GPE}{g \times \Delta h}$$

(2)

(ii) The student releases the trolley and the trolley moves down the runway.

The student assumes that all the extra gravitational potential energy, ΔGPE, stored at the top of the runway is transferred to kinetic energy at the end of the runway.

Calculate the expected value of the velocity of the trolley at the end of the runway.

Use the equation

$$v^2 = \frac{2 \times \Delta GPE}{m}$$

(3)

expected velocity = ... m/s

(iii) The light gate, shown in Figure 1, is used to determine the actual velocity of the trolley at the end of the runway.

The actual velocity at the end of the runway is less than the expected velocity as calculated in (ii).

Suggest **one** way to reduce the difference between the actual velocity and the expected velocity.

(1)

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(b) A different student finds out how much power can be generated by running up some stairs in a measured amount of time.

The following quantities are measured:

mass of student = 48 kg

total height of stairs = 2.9 m

time to run up stairs = 3.4 s

Calculate the power the student generated.

Give the answer to 2 significant figures (2 s.f.).

Use the equation

$$\text{power} = \frac{\text{weight of student} \times \text{height of stairs}}{\text{time to run up stairs}}$$

(3)

power = ... W

(Total for Question 1 = 9 marks)

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2 (a) State the frequency of the supply of electricity to homes in the UK (United Kingdom).

(1)

frequency = ... Hz

(b) The mains supply to the television is 230 V.

The current supplied to the television is 0.53 A.

Calculate the power input to the television.

Use the equation

$$P = I \times V$$

(2)

power = ... W

(c) A plug connects a television to the mains supply.

(i) The plug contains a fuse that is connected to the

(1)

☒ **A** live pin

☒ **B** negative pin

☒ **C** neutral pin

☒ **D** positive pin

(ii) A 3 A fuse is used in the plug.

Explain what happens if a fault causes the current to rise to more than 3 A.

(2)

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(iii) A fuse is a safety device.

State **one** other safety device that can be used in domestic electrical wiring.

(1)

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P 7 8 7 1 5 R R A 0 6 2 8

(d) Figure 2 shows two pieces of electrical cable side by side.

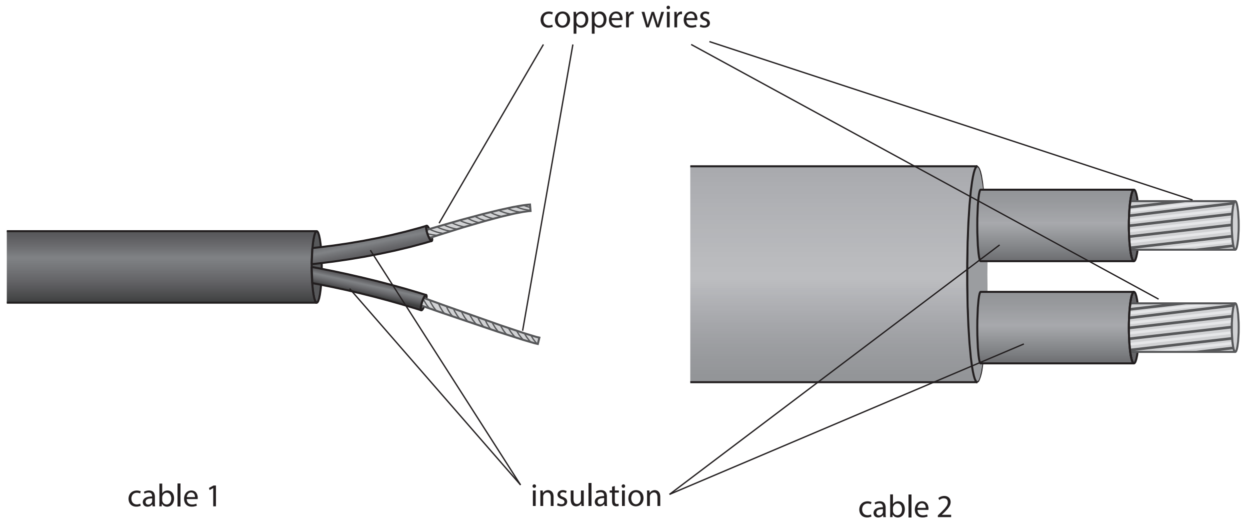

Figure 2

Cable 1 is used to supply electric current to the television.

Cable 2 is used to supply electric current to the house.

Explain why cable 2 is more suitable than cable 1 for supplying electric current to the house.

(2)

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(Total for Question 2 = 9 marks)

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3 A teacher heats a block of wax until all the wax melts.

The teacher pours the melted wax into a container and allows the wax to cool.

Figure 3 shows how the temperature of the wax changes during a time of 20 minutes.

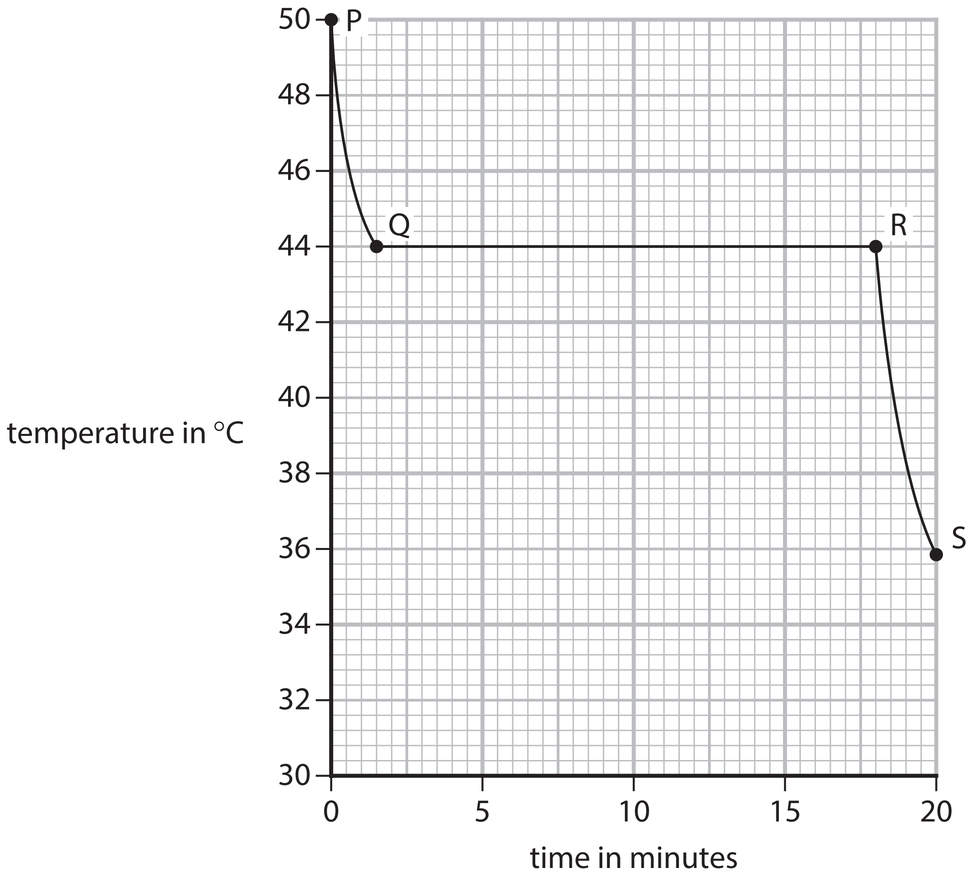

Figure 3

Four different points on the graph are labelled P, Q, R and S.

(a) Between which two points is **all** the wax liquid?

(1)

☒ **A** P and Q

☒ **B** P and R

☒ **C** Q and S

☒ **D** R and S

(b) Describe the change in the motion of the wax particles as the wax changes from liquid to solid.

(2)

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(c) Figure 4 shows the values of some properties of the wax.

property	**value**
density when solid	$930\,kg/m^3$
density when liquid	$830\,kg/m^3$
specific latent heat	190 kJ/kg
specific heat capacity of solid wax	2.1 kJ/kg °C

Figure 4

(i) The wax has a mass of 3.9 kg.

Using information from Figure 4, calculate the volume of the wax when it is all liquid.

Use the equation

$$\rho = \frac{m}{V}$$

(2)

volume = ... m^3

(ii) State, using information from Figure 4, how the volume of the wax changes when it becomes a solid.

(1)

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(iii) Explain why, using Figure 4, the time from R to S is much shorter than the time from Q to R on the graph in Figure 3.

(3)

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(Total for Question 3 = 9 marks)

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4 (a) Figure 5 shows two nails, X and Y, hanging from a magnet.

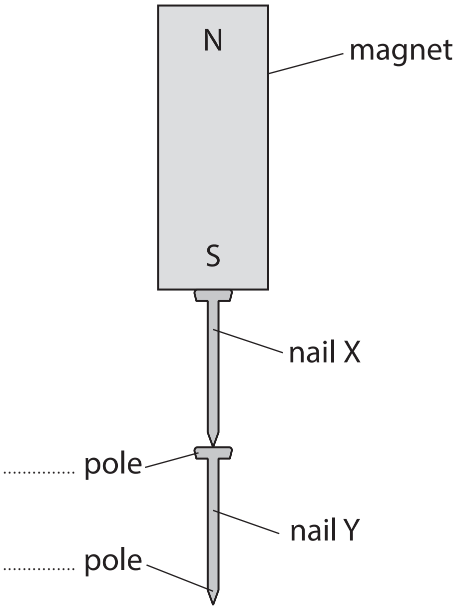

Figure 5

(i) Complete the labels in Figure 5 to show the N and S poles of nail Y.

(1)

(ii) Nail X is removed from the magnet and nail Y falls off nail X.

This shows that the magnet caused both nails to be

(1)

☒ **A** permanent magnets

☒ **B** temporarily charged

☒ **C** permanently charged

☒ **D** induced magnets

(b) A teacher has a pile of steel nails, a magnet and some plastic strips that are all the same size.

The teacher places a plastic strip under the magnet and picks up some nails from the pile, as shown in Figure 6.

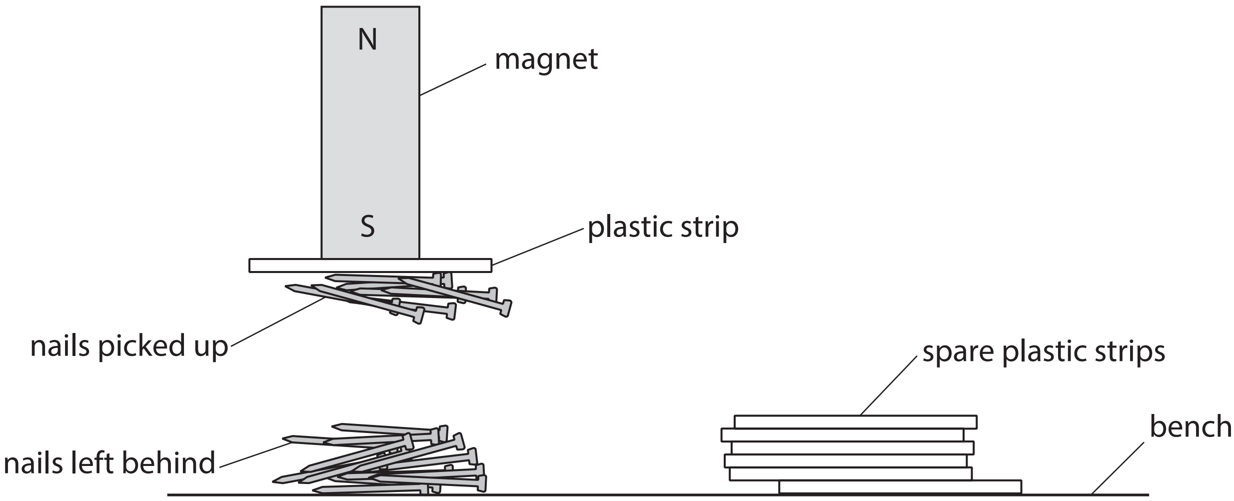

Figure 6

Some nails are not picked up and are left behind on the bench.

The teacher investigates how the number of nails that can be picked up changes when the number of plastic strips under the magnet is increased.

The results are shown in Figure 7.

	number of nails picked up				
number of plastic strips	**1st trial**	**2nd trial**	**3rd trial**	**4th trial**	**mean**
1	12	13	12	13	12.5
2	11	....	12	12	12.0
3	10	12	11	12	11.25
4	7	9	8	12	9.0
5	6	6	8	7	6.75
6	3	5	4	6	4.5
7	1	2	3	2	2.0

Figure 7

(i) Complete Figure 7 to show the missing value.

(1)

(ii) Use the data in Figure 7 to complete the bar chart in Figure 8.

(1)

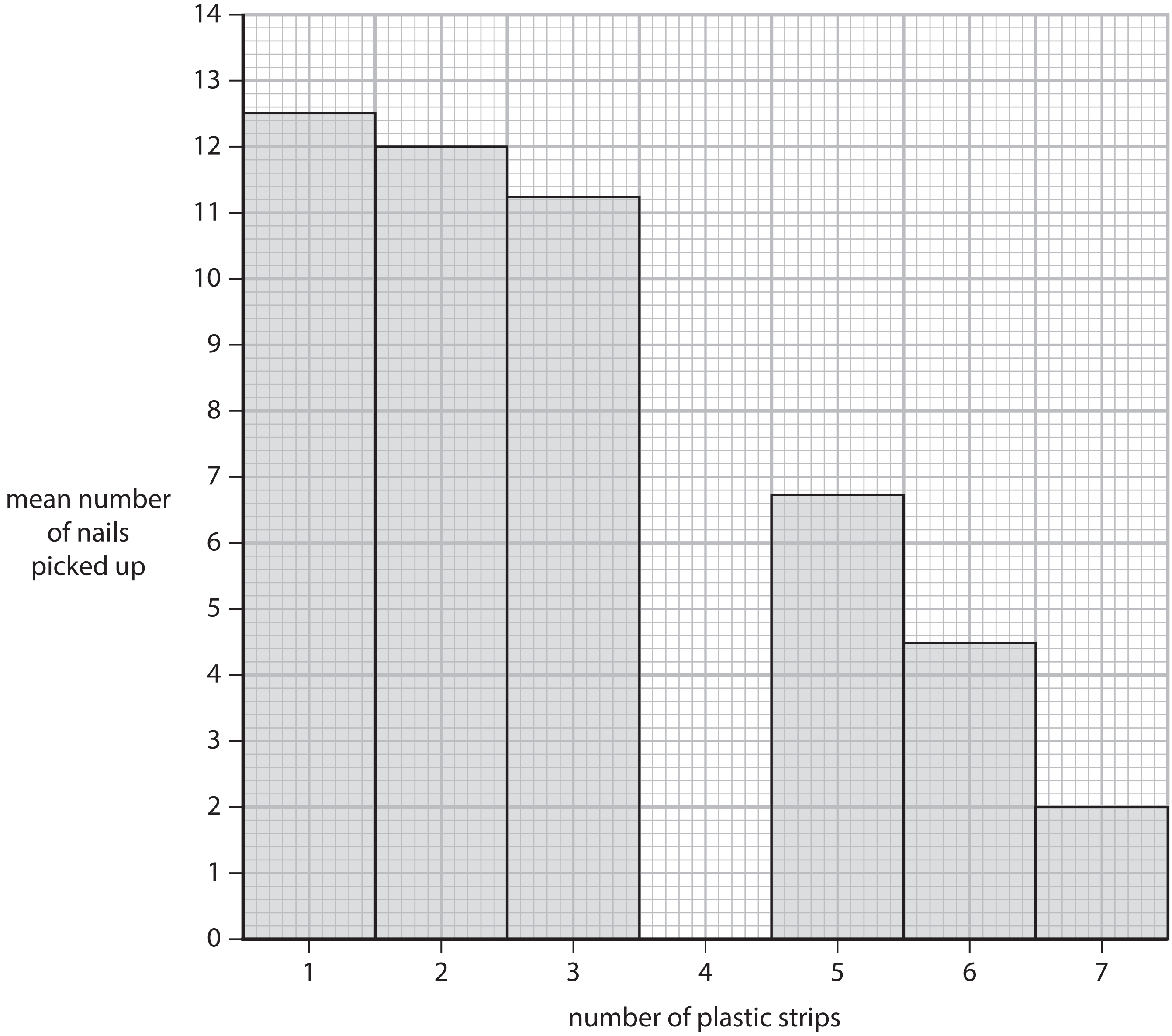

Figure 8

(iii) Use Figure 8 to describe the relationship between the number of plastic strips and the mean number of nails picked up.

(2)

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(iv) A student thinks that none of the nails used in the investigation become permanently magnetised.

Suggest how the student could test this hypothesis.

(2)

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P 7 8 7 1 5 R R A 0 1 6 2 8

(c) The magnetic flux density, B, is a measure of the strength of the magnetic field of a magnet.

B varies with the distance, d, from a magnetic pole of a magnet as given by the equation

$$B \times d^2 = K$$

where K is a constant for the magnet.

At a distance of 3 mm from the pole of a magnet, $B = 650\,\mu T$.

Calculate the value of B at a distance of 6 mm from the pole of the magnet.

(3)

B at 6 mm = ... μT

(Total for Question 4 = 11 marks)

5 (a) A student measures the length of a spring when it is horizontal and when it is vertical, as shown in Figures 9a and 9b.

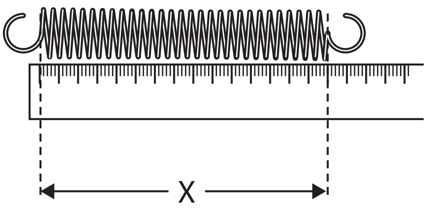

Figure 9a

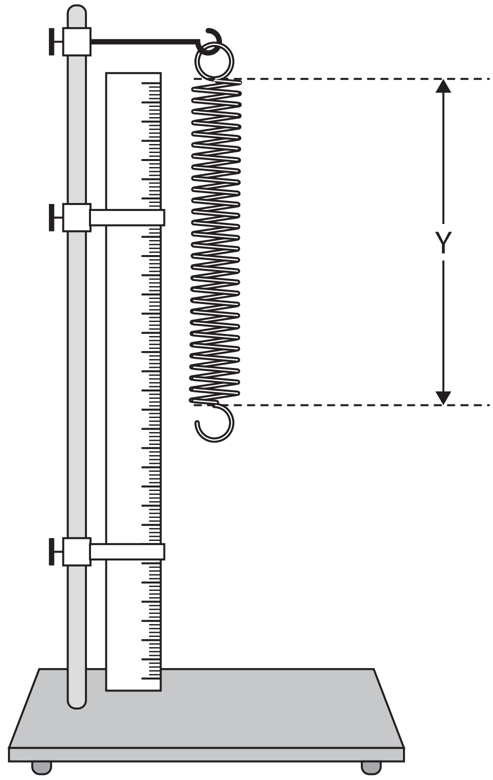

Figure 9b

The length, Y, of the vertical spring in Figure 9b is greater than the length, X, of the horizontal spring in Figure 9a.

(i) Give a reason why the length of the spring in Figure 9b is greater than the length of the the spring in Figure 9a.

(1)

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(ii) The student adds some weights to the end of the spring, as shown in Figure 10b.

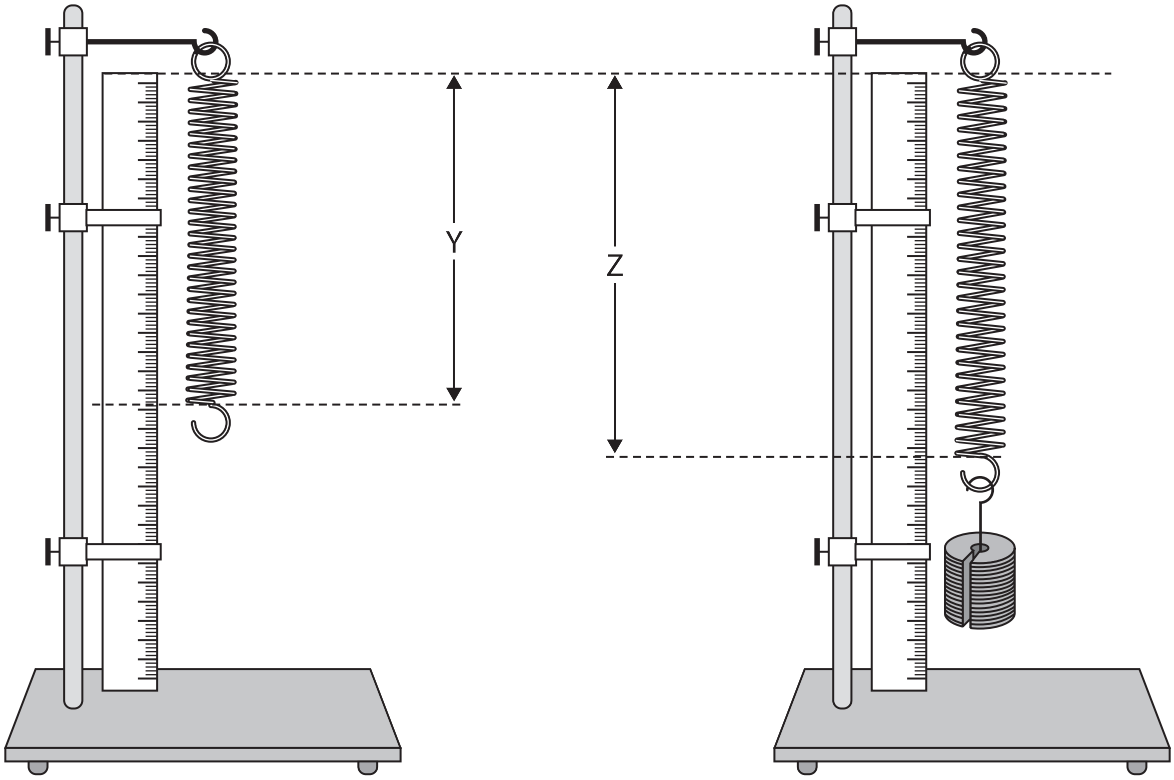

Figure 10a **Figure 10b**

(Source: https://www.shalom-education.com/courses/ks3-physics/lessons/motion-and-forces/topic/deformation-and-hookes-law/)

The extension of the spring due to these added weights is equal to

(1)

☒ **A** Z – Y

☒ **B** Z + Y

☒ **C** Z

☒ **D** Y

(b) The extension of the spring in Figure 10b is now determined for different weights added to the spring up to a maximum of 6 N.

Figure 11 shows a graph of the results.

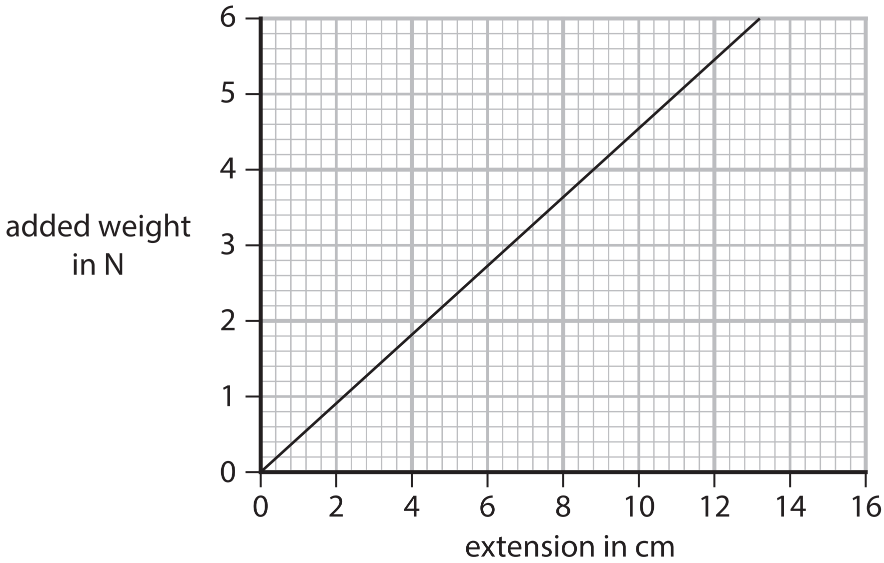

Figure 11

(i) The increase in potential energy stored in the spring is equal to the area under the graph in Figure 11.

Calculate the increase in potential energy stored in the spring when the spring is extended from 0 cm to 8 cm.

Give your answer in joules (J).

(3)

energy = ... J

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(ii) Calculate the spring constant of the spring using data from the graph in Figure 11.

State the unit.

(2)

spring constant = ... unit ....

(iii) The box in Figure 12 represents a weight added to the end of the spring.

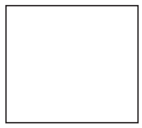

Figure 12

Draw **two** vectors on Figure 12 to complete a free body force diagram of a 5 N weight in equilibrium.

(2)

(c) Figure 13 shows two forces, P and Q, acting at point X.

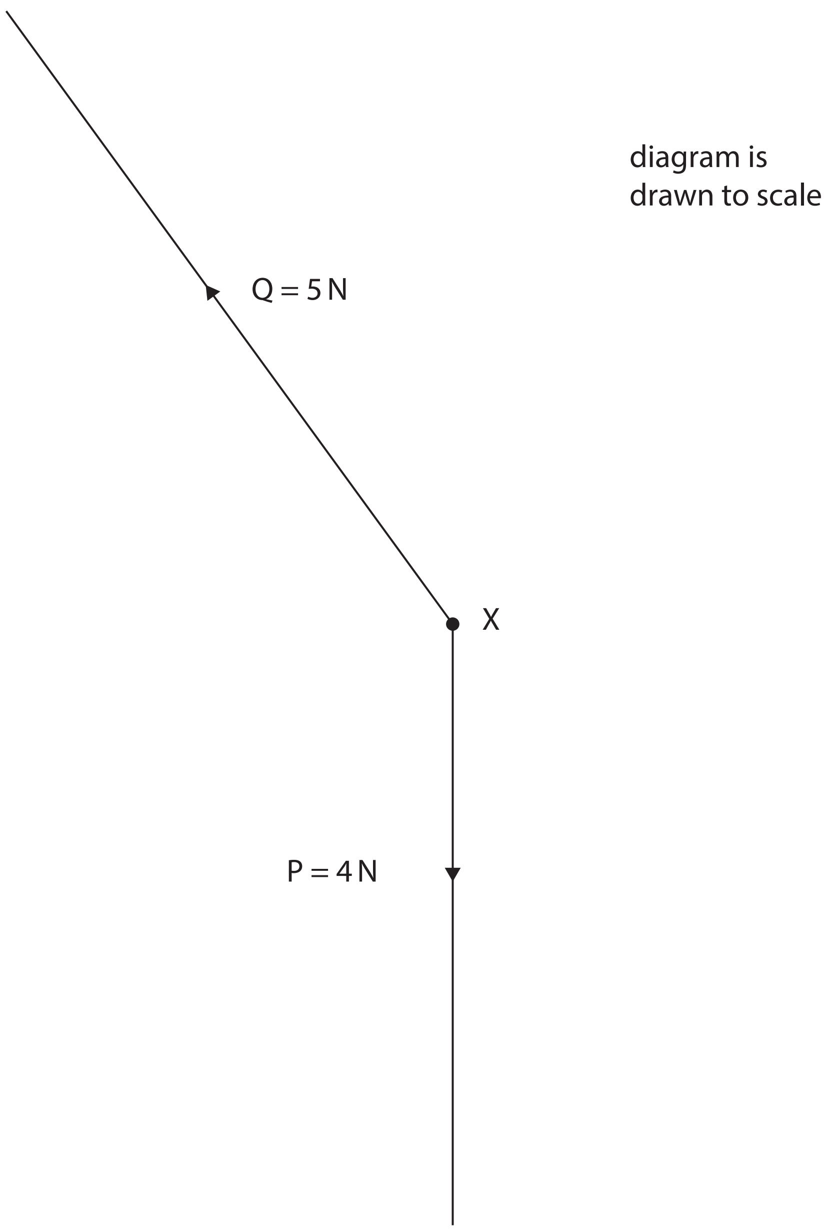

Figure 13

Complete the diagram in Figure 13 to show the size and direction of the resultant force, R, on point X.

(2)

(Total for Question 5 = 11 marks)

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6 (a) A student connects a resistor across the terminals of a 9V battery.

There is a current of 6 mA in the resistor.

(i) Calculate the resistance of the resistor.

(2)

resistance = ... Ω

(ii) Describe how an additional component could be used to vary the current in the resistor.

(2)

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....

(b) A voltmeter has four different scales.

Which one of these scales would be most suitable to measure a voltage of 0.85V?

(1)

☒ **A** 0 to 20 mV

☒ **B** 0 to 200 mV

☒ **C** 0 to 2V

☒ **D** 0 to 20V

*(c) The table in Figure 14 gives some information about **series** and **parallel** circuits.

series and **parallel** circuits
A battery can be connected to two equal value resistors in **series**. The same battery can be connected to the same two equal value resistors in **parallel**.
The current from the battery when the resistors are in **series** is different from the current from the battery when the resistors are in **parallel**.
The potential difference across each resistor when the resistors are in **series** will be different from the potential difference across each resistor when the resistors are in **parallel**.

Figure 14

Describe how a student can use ammeters and voltmeters to investigate the information given in Figure 14.

Your answer should include

- circuit diagrams showing how the currents and voltages can be measured
- a comparison of the results that would be expected

(6)

Space for circuit diagrams

Answer lines for this question are on page 27.

(Total for Question 6 = 11 marks)

TOTAL FOR PAPER = 60 MARKS

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

Monday 16 June 2025

Paper reference **1SC0/2PH**

Combined Science

PAPER 6

Higher Tier

Equation Booklet

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Turn over

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Pearson

If you're taking **GCSE (9–1) Combined Science** or **GCSE (9–1) Physics**, you will need these equations:

HT = higher tier

	distance travelled = average speed × time	
	acceleration = change in velocity ÷ time taken	$a = \frac{(v-u)}{t}$
	force = mass × acceleration	$F = m \times a$
	weight = mass × gravitational field strength	$W = m \times g$
HT	**momentum = mass × velocity**	$\boldsymbol{p = m \times v}$
	change in gravitational potential energy = mass × gravitational field strength × change in vertical height	$\Delta GPE = m \times g \times \Delta h$
	kinetic energy = 1/2 × mass × (speed)^2	$KE = \frac{1}{2} \times m \times v^2$
	efficiency = $\frac{\text{(useful energy transferred by the device)}}{\text{(total energy supplied to the device)}}$	
	wave speed = frequency × wavelength	$v = f \times \lambda$
	wave speed = distance ÷ time	$v = \frac{x}{t}$
	work done = force × distance moved in the direction of the force	$E = F \times d$
	power = work done ÷ time taken	$P = \frac{E}{t}$
	energy transferred = charge moved × potential difference	$E = Q \times V$
	charge = current × time	$Q = I \times t$
	potential difference = current × resistance	$V = I \times R$
	power = energy transferred ÷ time taken	$P = \frac{E}{t}$
	electrical power = current × potential difference	$P = I \times V$
	electrical power = (current)^2 × resistance	$P = I^2 \times R$
	density = mass ÷ volume	$\rho = \frac{m}{V}$

	force exerted on a spring = spring constant × extension	$F = k \times x$
	(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance	$v^2 - u^2 = 2 \times a \times x$
HT	**force = change in momentum ÷ time**	$\boldsymbol{F = \frac{(mv - mu)}{t}}$
	energy transferred = current × potential difference × time	$E = I \times V \times t$
HT	**force on a conductor at right angles to a magnetic field carrying a current = magnetic flux density × current × length**	$\boldsymbol{F = B \times I \times l}$
	For transformers with 100% efficiency, 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	$Q = m \times L$
	energy transferred in stretching = 0.5 × spring constant × (extension)^2	$E = \frac{1}{2} \times k \times x^2$

If you're taking **GCSE (9–1) Physics**, you also need these extra equations:

	moment of a force = force × distance normal to the direction of the force	
	pressure = force normal to surface ÷ area of surface	$P = \frac{F}{A}$
HT	$\boldsymbol{\frac{\textit{potential difference across primary coil}}{\textit{potential difference across secondary coil}} = \frac{\textit{number of turns in primary coil}}{\textit{number of turns in secondary coil}}}$	$\boldsymbol{\frac{V_p}{V_S} = \frac{N_p}{N_S}}$
	to calculate pressure or volume for gases of fixed mass at constant temperature	$P_1 \times V_1 = P_2 \times V_2$
HT	**pressure due to a column of liquid = height of column × density of liquid × gravitational field strength**	$\boldsymbol{P = h \times \rho \times g}$

END OF EQUATION LIST

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