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)

Thursday 22 May 2025

Morning (Time: 1 hour 10 minutes) | **Paper reference** **1SC0/1PF**

Combined Science

PAPER 3

Foundation 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*.

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 ▶

BLANK PAGE

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) Draw **one** straight line from each electromagnetic radiation to its correct description.

(3)

electromagnetic radiation	**description**
infrared •	• used in night vision cameras
gamma •	• the least dangerous radiation
ultraviolet •	• may damage eyes, so sunglasses worn as protection
radio waves •	• the most dangerous radiation

(b) Different colours of light have different frequencies.

Which of these colours has the highest frequency?

(1)

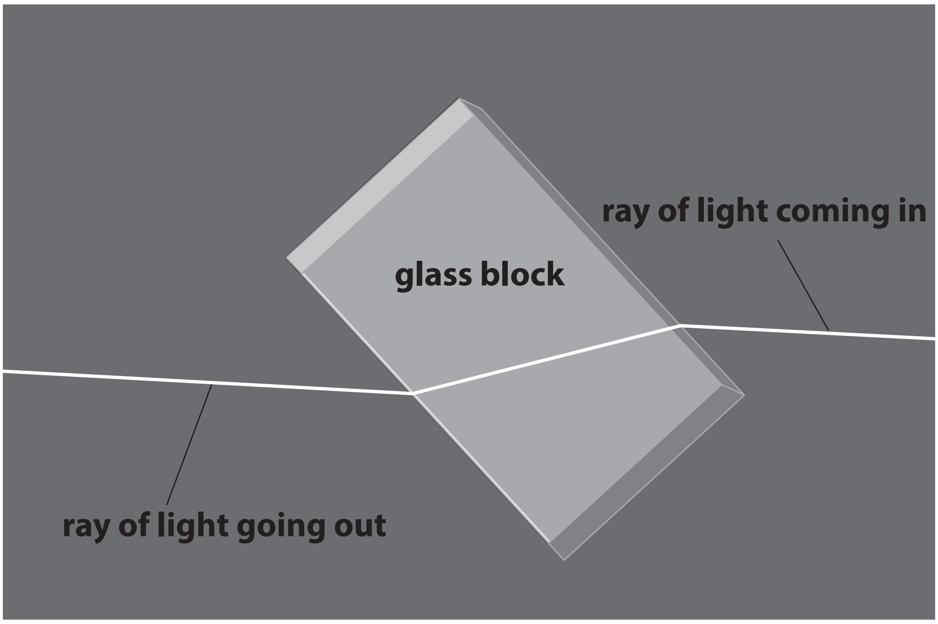
☒ **A** blue

☒ **B** green

☒ **C** red

☒ **D** yellow

(c) Figure 1 is a diagram of a glass block being used to investigate the refraction of light.



(Source: © ajizai/docstoc.com)

Figure 1

The angle of incidence was varied and the angle of refraction was measured each time.

Figure 2 shows the results in a table.

angle of incidence in degrees	angle of refraction in degrees
20	13
30	20
40	25
50	31
60	35
70	39
80	41

Figure 2

Figure 3 shows a graph of these results.

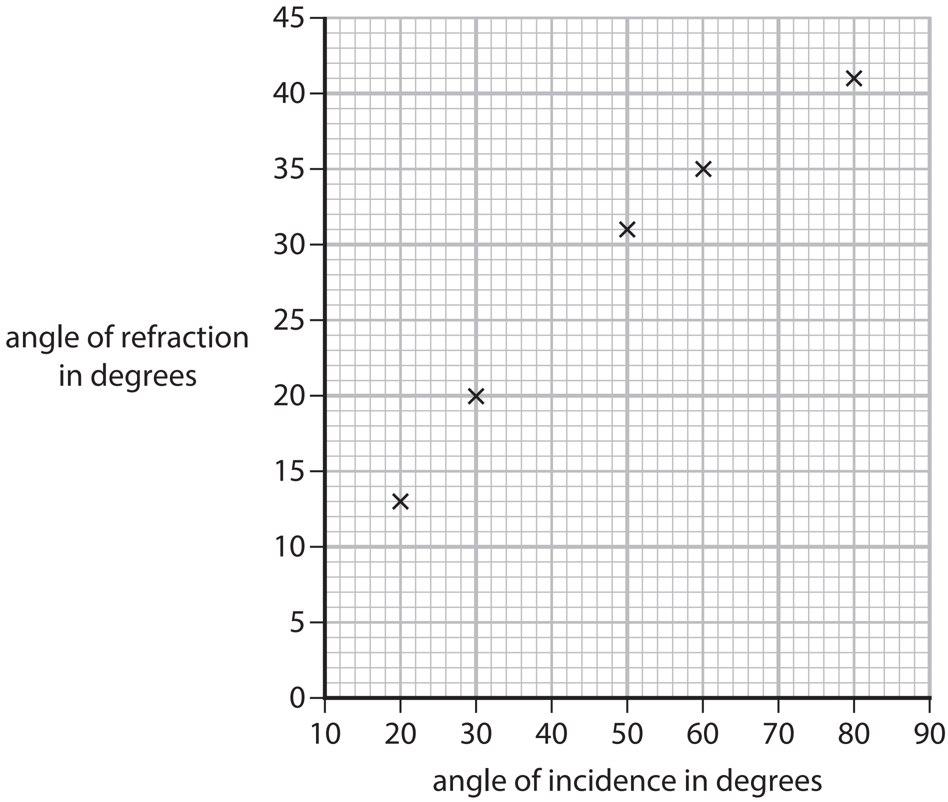


Figure 3

(i) The two shaded rows in Figure 2 are not plotted on the graph in Figure 3.

Plot these missing results on the graph in Figure 3.

(2)

(ii) Draw a curve of best fit through the points on the graph in Figure 3.

(1)

(iii) Using figure 3, describe the relationship between the angle of refraction and the angle of incidence.

(2)

....

....

....

....

(Total for Question 1 = 9 marks)

2 Figure 4 shows a velocity / time graph for a car moving on a test track.

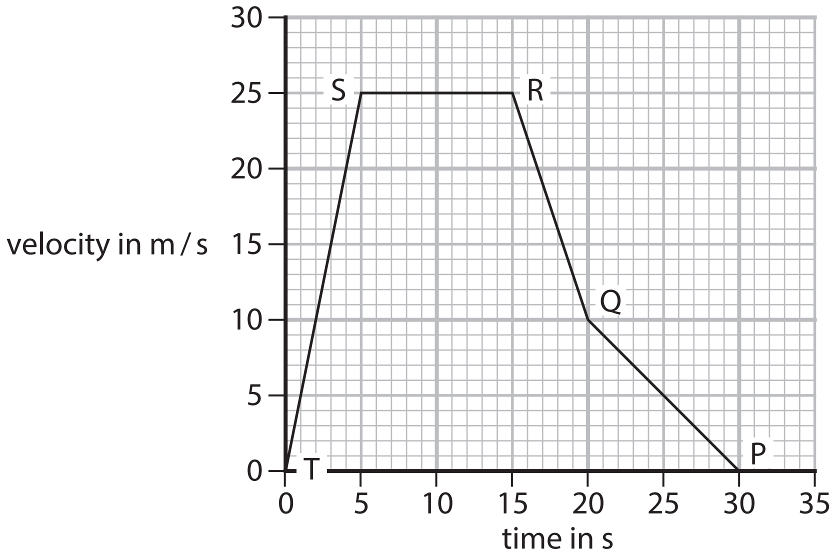


Figure 4

(a) (i) Use this graph to describe the velocity of the car in stages TS, SR and RQ.

(3)

TS

....

....

SR

....

....

RQ

....

....

(ii) State how the motion of the car is different in RQ compared with QP.

(1)

....

....

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

(b) (i) Calculate the acceleration of the car in Figure 4 in the first 5 s.

Use the equation

$$\text{acceleration} = \frac{\text{change in velocity}}{\text{time taken}}$$

(2)

acceleration = ... m/s^2

(ii) Calculate the distance travelled by the car in Figure 4 from 5 s to 15 s.

(2)

distance = ... m

(Total for Question 2 = 8 marks)

3 (a) Figure 5 shows a diagram of a helium atom.

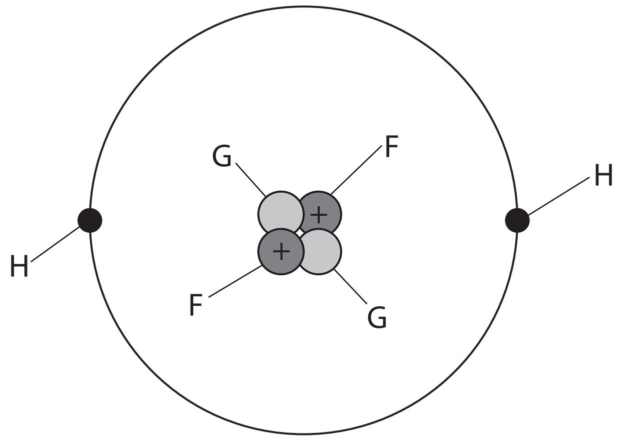


Figure 5

Complete the table for particles G and H, as shown in Figure 5.

(4)

particle	name of particle	charge
F	proton	positive
G		
H		

(b) An atom of beryllium has the symbol

$$^{9}_{4}\text{Be}$$

The beryllium atom has 4 protons.

(i) Determine the number of neutrons in this atom.

(1)

number of neutrons ....

(ii) Determine the number of electrons in this atom.

(1)

number of electrons ....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(c) (i) Which of these is the unit for the activity of a radioactive isotope?

(1)

- ☒ **A** second (s)
- ☒ **B** kilogram (kg)
- ☒ **C** kelvin (K)
- ☒ **D** becquerel (Bq)

(ii) The isotope nitrogen-13 (N-13) has a half-life of 10 minutes.

A sample of N-13 has an initial mass of 120 g.

Calculate the mass of N-13 that remains after 30 minutes.

(2)

mass remaining = ... g

(Total for Question 3 = 9 marks)

4 (a) Figure 6 shows apparatus set up to investigate the speed of a falling object.

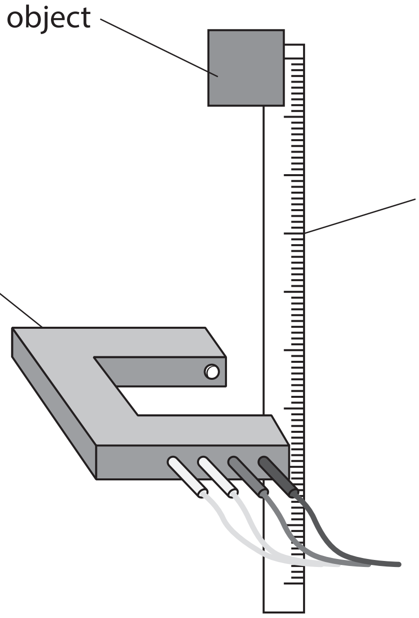


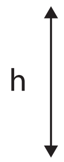
Figure 6

The object is dropped from rest at the position shown.
The object falls through the light gate.

(i) The speed of the object, after it has fallen through a height, h, is measured by the light gate.

Label Figure 6 to show the height, h.
Your label should look like this

(1)



(ii) The speed is measured at least four times for each drop height.

Give **one** reason for repeating the measurements.

(1)

....

....

(iii) The metre rule shown in Figure 6 is used to measure the height, h.

Suggest **two** ways to make the measurement of h as accurate as possible.

(2)

1 ....

....

2 ....

....

(b) As the object in Figure 6 falls, energy is transferred.

These energy transfers are represented in Figure 7.

Complete the labels of the energy stores involved.

(3)

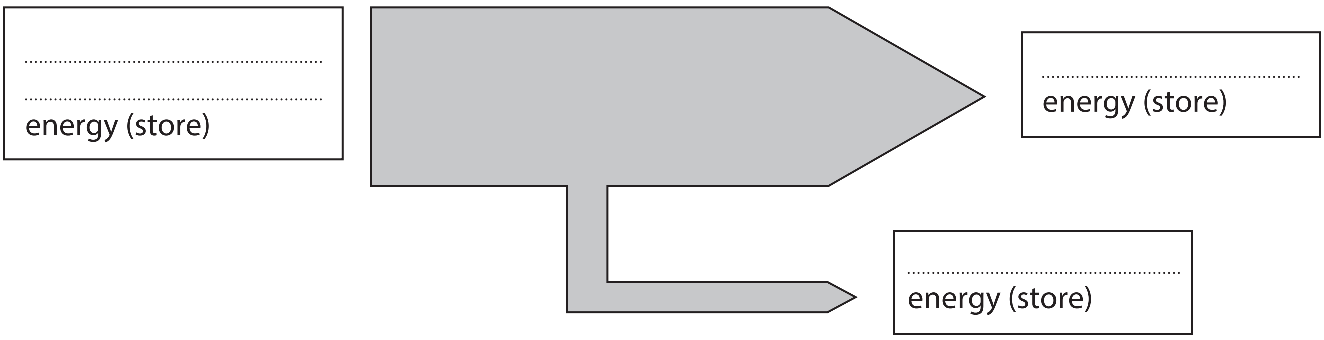


Figure 7

(c) Figure 8 shows wind power generation from the year 2000 onwards.

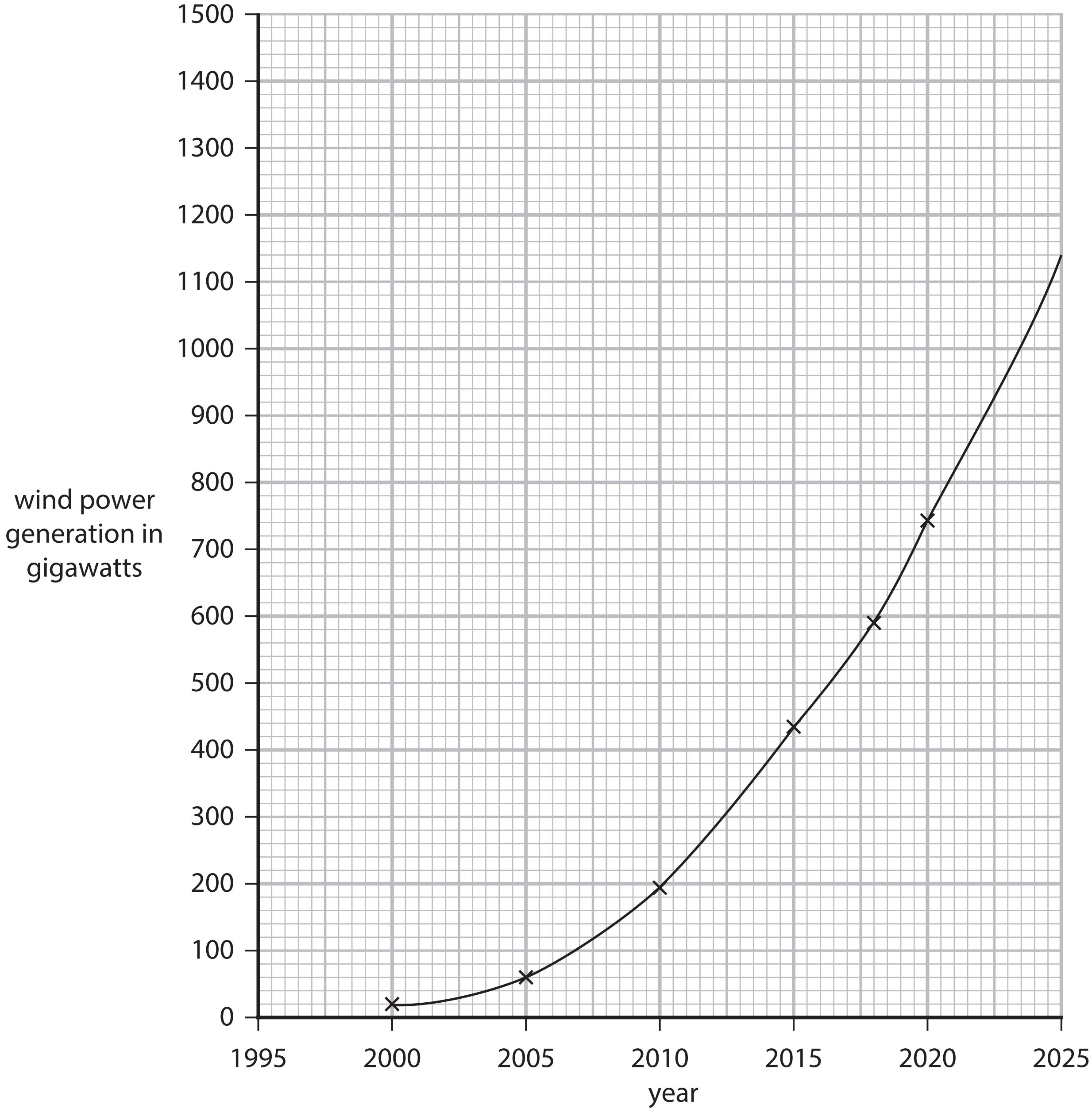


Figure 8

Estimate the percentage change in wind power generation from 2005 to 2020.

(3)

percentage change = ... %

(Total for Question 4 = 10 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

5 (a) (i) Which row of the table shows the correct units of weight and of mass?

(1)

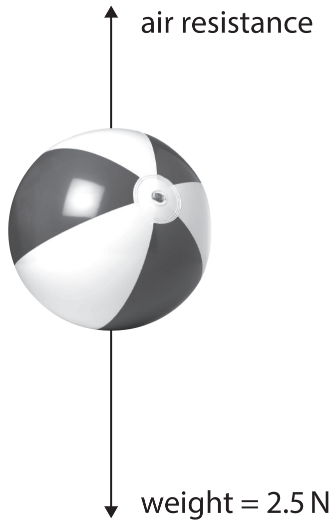
		unit of weight	unit of mass
☒	**A**	kilogram	newton
☒	**B**	newton	kilogram
☒	**C**	newton per kilogram	newton
☒	**D**	newton per kilogram	kilogram

(ii) State the name of a piece of equipment that can be used to measure mass.

(1)

....

(b) Figure 9 shows the two forces acting on a beach ball as it falls through the air.



(Source: © Stepan Bormotov/Shutterstock)

Figure 9

The resultant of these two forces is 0.92 N downwards.

(i) The mass of the beach ball is 0.25 kg.

Calculate the acceleration of the beach ball as it falls.

Use the equation

$$F = m \times a$$

(3)

acceleration = ... m/s^2

(ii) Calculate the size of the air resistance force on the beach ball.

(1)

air resistance = ... N

(c) Some students are investigating forces.

They use a newton meter to keep a trolley stationary on a sloping runway, as shown in Figure 10.

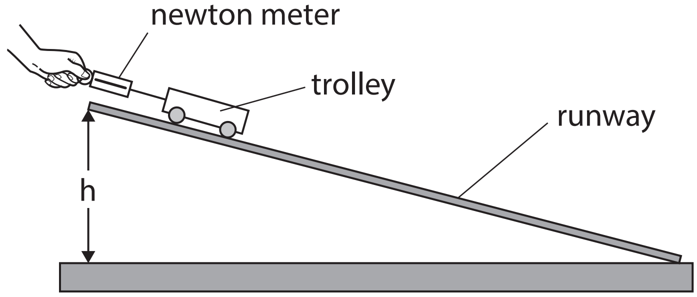


Figure 10

They measure the force needed to keep the trolley stationary on the sloping runway.

(i) They do this at four different places on the runway.

When the height, h, of the runway is 0.60 m, their four readings for force are

2.1 N   2.7 N   2.5 N   2.2 N

Calculate the mean value of these forces.

(1)

mean force = ... N

The students then measure values of the force, F, for several different values of h, the height of the runway.

Figure 11 is a graph of F against h.

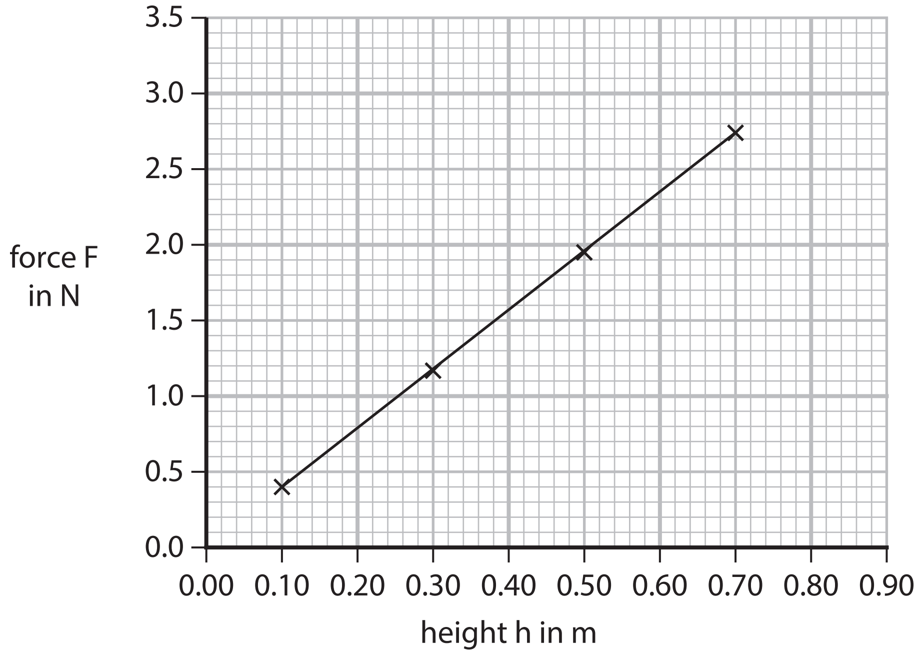


Figure 11

(ii) Use the graph in Figure 11 to determine the value of F when h = 0.80 m.

(2)

F = ... N

(iii) Determine the gradient of the graph in Figure 11.

(2)

gradient = ... N / m

(Total for Question 5 = 11 marks)

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

6 (a) Figure 12 is a diagram of part of a water wave.

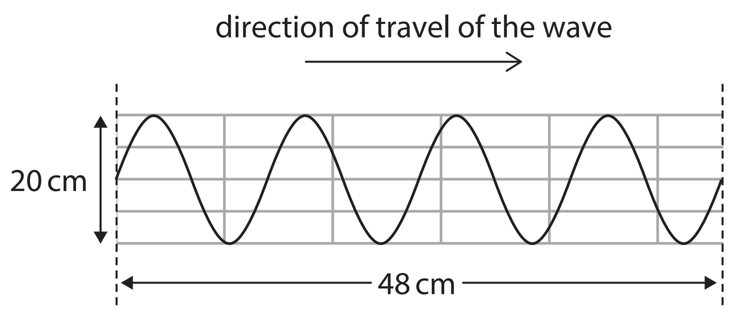


Figure 12

(i) Use data from Figure 12 to determine the amplitude of the wave.

(1)

amplitude = ... cm

(ii) Use data from Figure 12 to determine the wavelength of the wave.

(1)

wavelength = ... cm

(iii) The water wave shown in Figure 12 is generated in a large tank.

A student observes the wave.

Describe how the student could determine the wave speed of the wave.

(2)

....

....

....

....

(b) When an earthquake happens, waves are transmitted through the Earth.
Figure 13 is a diagram of a part of the Earth's crust.

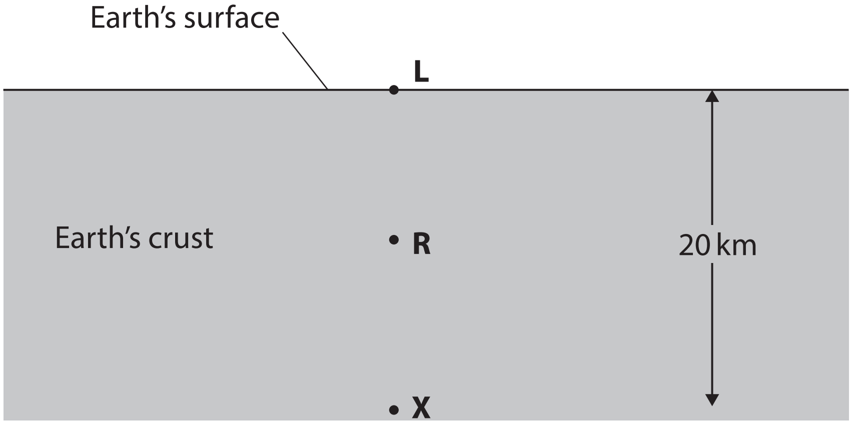


Figure 13

An earthquake happens at point **X**, 20 km below the Earth's surface.

An earthquake wave from **X** is detected at point **L**.

This earthquake wave is a transverse wave.

(i) State **one** other example of a transverse wave.

(1)

....

(ii) A point in the crust is labelled **R** in Figure 13.
There is a rock at point **R**.

Describe the effect that this earthquake wave has on the rock at **R** as the wave passes through the rock.

You may add to Figure 13 to help your answer.

(2)

....

....

....

....

*(c) A scientist investigates a sample of an unknown radioactive material.

The scientist finds that the sample does **not** emit beta radiation.

The scientist sets up the experiment shown in Figure 14 and uses different absorbers to investigate alpha and gamma radiation.

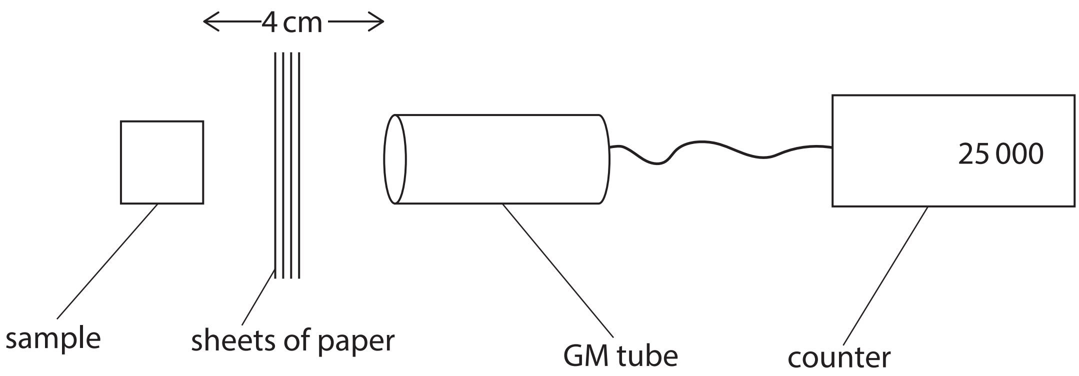


Figure 14

The results are shown in Figure 15.

The count rates are rounded to two significant figures.

The background radiation was 18 counts per minute (cpm).

absorber	count rate / cpm
none	33 000
4 sheets of paper	25 000
3 cm of lead	4 000

Figure 15

Discuss whether the sample emits alpha or gamma radiation or both.

Your answer should refer to

- the data shown in Figure 15
- how the data gives evidence for particular radiations.

(6)

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

BLANK PAGE

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

P 7 8 7 0 1 R A 0 2 4 2 4

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

Thursday 22 May 2025

Paper reference **1SC0/1PF**

Combined Science

PAPER 3

Foundation Tier

Equation Booklet

Do not return this Booklet with the question paper.

Turn over

P78701RA

Y:1/1/1/1/

P 7 8 7 0 1 R A

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

BLANK PAGE