Paper Reference(s) 1SC0/1PF
Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Combined Science
PAPER 3
Foundation Tier

Total Marks

Time: 1 hour 10 minutes

In the boxes below, write your name, centre number and candidate number.

Surname					
Other names					
Centre Number					
Candidate Number					

X69479A

Pearson

YOU MUST HAVE

Calculator, ruler, Equation Booklet

YOU WILL BE GIVEN

Diagram Booklet, Additional Equations Insert

INSTRUCTIONS

Answer ALL questions.

Answer the questions in the space provided in this Question Paper or in the separate Diagram Booklet – 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.

Lists of equations are provided as a separate booklet and as an additional insert.

There may be spare copies of some diagrams.

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.

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) Look at FIGURE 1 for Question 1(a) in the Diagram Booklet. It shows how the visible spectrum of white light is shown on a screen.

(i) Which of these is the best piece of equipment to produce the white light?
(1 mark)

☐ A ray box

☐ B ruler

☐ C measuring cylinder

☐ D ammeter

(continued on the next page)

1 continued.

(ii) Which colour is seen between yellow and blue in the spectrum on the screen?
(1 mark)

☐ A red

☐ B orange

☐ C green

☐ D violet

(continued on the next page)

1 continued.

(b) Look at FIGURE 2 for Question 1(b) in the Diagram Booklet. It shows the main parts of the electromagnetic spectrum.

Complete the following sentences using information from Figure 2. Each part of the electromagnetic spectrum may be used once, more than once or not at all.

(i) The part of the electromagnetic spectrum used to detect broken bones is
(1 mark)

_____

(ii) The part of the electromagnetic spectrum used in thermal imaging is
(1 mark)

_____

(continued on the next page)

1 continued.

(iii) The part of the electromagnetic spectrum that

- is used to cook food

AND

- has a shorter wavelength than microwaves is
(1 mark)

(iv) The part of the electromagnetic spectrum that

- is used to sterilise medical equipment

AND

- has a shorter wavelength than x-rays is
(1 mark)

(Total for Question 1 = 6 marks)

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2 This question is about waves.

(a) Look at FIGURE 3 for Question 2(a) in the Diagram Booklet. It is a diagram of a WATER WAVE in a ripple tank.

(i) State the number of crests of the wave between P and Q.
(1 mark)

number of crests = _____

(continued on the next page)

2 continued.

(ii) The distance between **P** and **Q** is 42 cm.

Calculate the wavelength of the water wave in Figure 3.
(2 marks)

wavelength = _____cm

(continued on the next page)

2 continued.

(iii) Describe how a student could determine the wave speed of the water wave in Figure 3. (3 marks)

(continued on the next page)

2 continued.

(b) (i) Which row of the table is correct for sound waves?
(1 mark)

	sound waves are	can sound waves transfer energy?
☐ A	longitudinal	yes
☐ B	longitudinal	no
☐ C	transverse	yes
☐ D	transverse	no

(continued on the next page)

2 continued.

(ii) A sound wave has a frequency of 440 Hz and a wavelength of 0·75 m.

Calculate the wave speed of the sound wave. (2 marks)

wave speed = _____ m/s

(Total for Question 2 = 9 marks)

3 (a) Look at FIGURE 4 for Question 3(a) in the Diagram Booklet. It shows a truck lifting a box.

The box has a mass of 57 kg.

The truck lifts the box through a vertical height of 2·1 m.

The gravitational field strength, g = 10 N / kg

Calculate the change in the gravitational potential energy of the box.
(2 marks)

Use the equation

$$\Delta GPE = m \times g \times \Delta h$$

change in gravitational potential energy =

_____ J

(continued on the next page)

3 continued.

(b) A cyclist of mass 70 kg travels at a constant velocity of 8 m/s.

Calculate the kinetic energy of the cyclist.
(3 marks)

kinetic energy of the cyclist = _____J

(continued on the next page)

3 continued.

(c) Look at FIGURE 5 for Question 3(c) in the Diagram Booklet. It shows a trolley at the top of a slope.

A student gently pushes the trolley until it just starts to roll down the slope.

The student measures the time it takes for the trolley to roll down the slope.

The student repeats this for different values of the angle α.

Look at FIGURE 6 for Question 3(c)(i) in the Diagram Booklet. It is a graph of the student's results.

(i) Use the graph in Figure 6 to find the time the trolley takes to roll down the ramp when the angle $\alpha = 45°$.
(1 mark)

time = _____ s

(continued on the next page)

3 continued.

(ii) Use the graph in Figure 6 to estimate the time the trolley takes to roll down the ramp when the angle $\alpha = 80°$.

Show your working on the graph.
(2 marks)

time = _____ s

(continued on the next page)

3 continued.

(iii) The student had a choice of how to measure the time the trolley takes to roll down the ramp.

1. Use a hand-held stopwatch.

2. Use light gates at the top and bottom of the slope.

The student chose to use the light gates.

Explain why this was the correct choice.

You should refer to the data on the time axis of Figure 6 in your answer.
(2 marks)

(Total for Question 3 = 10 marks)

4 (a) (i) State ONE way that radioactivity can be dangerous to humans.
(1 mark)

_____

_____

_____

(ii) State ONE piece of equipment that can be used to measure radioactivity.
(1 mark)

_____

_____

_____

(continued on the next page)

4 continued.

(iii) Alpha (α) radiation and ultraviolet (UV) radiation are ionising radiations.

Give TWO other ionising radiations.
(2 marks)

1 _____

_____

_____

2 _____

_____

_____

(continued on the next page)

4 continued.

(b) Sulfur-35 is a radioactive isotope of sulfur.

Look at FIGURE 8 for Question 4(b) in the Diagram Booklet. It represents a nucleus of sulfur-35.

Draw one line from each type of particle to the number of that type of particle in a nucleus of sulfur-35.
(3 marks)

(continued on the next page)

4 continued.

(c) A sample of a radioactive isotope has a mass of 520 g.

The half-life of the radioactive isotope is 18 days.

(i) Calculate the mass of the original radioactive isotope remaining after 18 days.
(1 mark)

mass after 18 days _____g

(continued on the next page)

4 continued.

(ii) Calculate the mass of the original radioactive isotope remaining after 54 days.
(2 marks)

mass after 54 days _____g

(Total for Question 4 = 10 marks)

5 (a) Which statement describes conservation of energy in a closed system?
(1 mark)

- ☐ **A** when there are energy transfers, the total energy reduces
- ☐ **B** when there are energy transfers, the total energy does not change
- ☐ **C** when there are no energy transfers, the total energy reduces
- ☐ **D** when there are no energy transfers, the total energy increases

(continued on the next page)

5 continued.

(b) Look at FIGURE 9 for Question 5(b) in the Diagram Booklet.

A student uses the apparatus in Figure 9 to find out which of two materials, sand or sawdust, is the better insulator.

The student also has a kettle to boil water, a thermometer and a stop clock.

(i) On page 26 draw a labelled diagram to show how the student should set up the equipment to investigate which material is the better insulator.
(3 marks)

(continued on the next page)

5 continued.

(continued on the next page)

5 continued.

(ii) Give THREE factors that the student must control in this investigation.
(3 marks)

1 _____

_____

_____

2 _____

_____

_____

3 _____

_____

_____

(continued on the next page)

5 continued.

(c) Expanded polystyrene, used to insulate buildings, has different densities.

Look at FIGURE 10 for Question 5(c) in the Diagram Booklet. It shows how the thermal conductivity of expanded polystyrene changes with the density of expanded polystyrene.

Using the graph in Figure 10, describe how the thermal conductivity of expanded polystyrene changes with the density of expanded polystyrene. (2 marks)

(continued on the next page)

5 continued.

(d) Look at FIGURE 11 for Question 5(d) in the Diagram Booklet. It is an energy diagram for an electric kettle, used to heat water.

(i) Calculate the amount of energy lost to the surroundings in one second.
(1 mark)

energy lost to the surroundings in one second =

_____J

(continued on the next page)

5 continued.

(ii) Calculate the efficiency of the kettle.
(2 marks)

Use the equation

$$\text{efficiency} = \frac{\text{useful energy transferred by the kettle in one second}}{\text{total energy supplied to the kettle in one second}}$$

efficiency = _____

(Total for Question 5 = 12 marks)

6 (a) Look at FIGURE 12 for Question 6(a) in the Diagram Booklet. It is a speed limit sign from a European motorway.

The speeds shown are in km/h (kilometres per hour).

(i) The sign tells drivers to drive at a slower speed in wet weather.

Explain why it is safer for drivers to drive at a slower speed in wet weather.
(2 marks)

(continued on the next page)

6 continued.

(ii) Show that a speed of 31 m / s is less than a speed of 130 km / h.
(2 marks)

(continued on the next page)

6 continued.

(iii) The driver's reaction time is the time between the driver seeing an emergency and starting to brake.

A car is travelling at a speed of 31 m / s.

The car travels 46 m between the driver seeing an emergency and starting to brake.

Calculate the driver's reaction time.

Give your answer to 2 significant figures.
(3 marks)

driver's reaction time = _____ s

(continued on the next page)

6 continued.

*(b) Look at FIGURE 13 for Question 6(b) in the Diagram Booklet. It is a velocity/time graph for a toy train on a straight track for 7 seconds.

Using information from the graph, describe when and how the velocity and acceleration of the toy train change at different times during the 7 seconds shown on the graph.
(6 marks)

(continued on the next page)

6 continued.

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS
END OF PAPER