Write your name here

Surname	Other names

Pearson Edexcel International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Physics

Unit: 4PH0
Paper: 2PR

Thursday 12 June 2014 – Morning
Time: 1 hour

Paper Reference
4PH0/2PR

You must have:
Ruler, calculator

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.*
- Show all the steps in any calculations and state the units.
- 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 ☒.

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.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 4 1 9 2 9 A 0 1 2 0

PEARSON

EQUATIONS

You may find the following equations useful.

energy transferred = current × voltage × time $E = I \times V \times t$

pressure × volume = constant $p_1 \times V_1 = p_2 \times V_2$

$$\text{frequency} = \frac{1}{\text{time period}} \qquad f = \frac{1}{T}$$

$$\text{power} = \frac{\text{work done}}{\text{time taken}} \qquad P = \frac{W}{t}$$

$$\text{power} = \frac{\text{energy transferred}}{\text{time taken}} \qquad P = \frac{W}{t}$$

$$\text{orbital speed} = \frac{2\pi \times \text{orbital radius}}{\text{time period}} \qquad v = \frac{2 \times \pi \times r}{T}$$

$$\frac{\text{pressure}}{\text{temperature}} = \text{constant} \qquad \frac{p_1}{T_1} = \frac{p_2}{T_2}$$

$$\text{force} = \frac{\text{change in momentum}}{\text{time taken}}$$

Where necessary, assume the acceleration of free fall, $g = 10\ \text{m/s}^2$.

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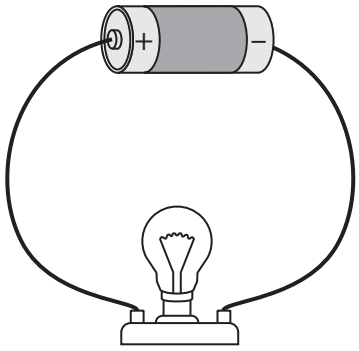
Answer ALL questions.

1 (a) Which of these is a unit for energy?

(1)

- ☒ **A** joule
- ☒ **B** kilogram
- ☒ **C** newton
- ☒ **D** watt

(b) The diagram shows a cell connected to a lamp.



Use words from the box to complete the sentences.

Each word may be used once, more than once, or not at all.

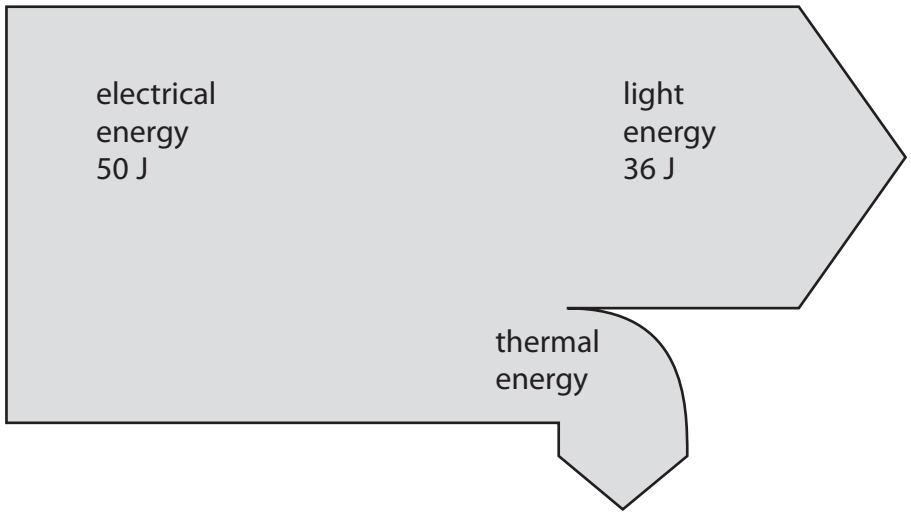
(3)

chemical	electrical	light	sound	thermal	work

The cell converts ..... energy into ..... energy.

The lamp converts this energy into ..... energy and ..... energy.

(c) This is the Sankey energy diagram for a low energy lamp.



(i) Calculate the amount of thermal energy wasted in the lamp.

(1)

thermal energy = ... J

(ii) State the equation linking efficiency, useful energy output and total energy input.

(1)

(iii) Calculate the efficiency of the lamp.

(2)

efficiency = ...

(Total for Question 1 = 8 marks)

2 This question is about temperature and pressure in gases.

(a) A gas is heated in a container which has a constant volume.

The particles in the gas

(1)

- ☒ **A** expand
- ☒ **B** hit the walls of the container harder
- ☒ **C** move closer together
- ☒ **D** have a lower average speed

(b) Describe what happens to the average kinetic energy of particles as the temperature decreases from 10 K towards 0 K.

(2)

.....

.....

.....

.....

(c) (i) Convert a temperature of 27 °C into kelvin (K).

(1)

temperature = ... K

(ii) The gas in a cylinder has a pressure of 210 kPa at a temperature of 27 °C.

Calculate the new pressure when the temperature of the gas rises to 81 °C.

(3)

pressure = ... kPa

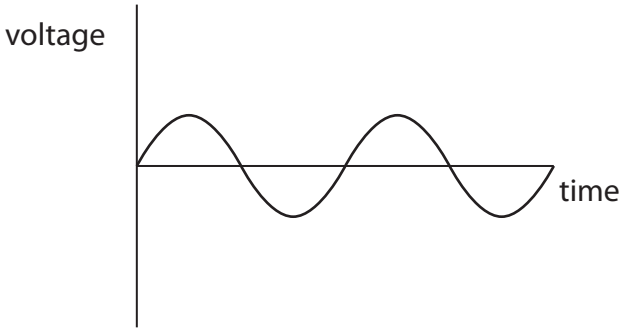
(Total for Question 2 = 7 marks)

3 (a) The graphs show oscilloscope traces produced by four different sounds. The oscilloscope settings are the same for each trace.

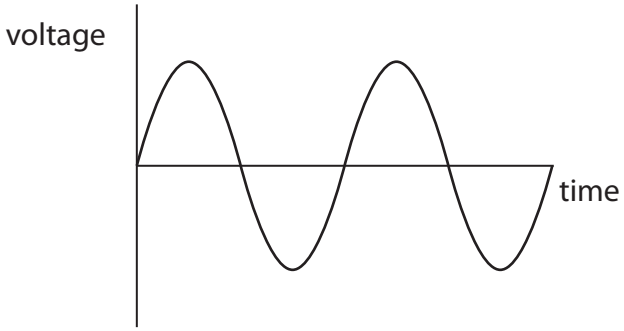
Which graph shows the trace for the loudest sound at the lowest frequency?

(1)

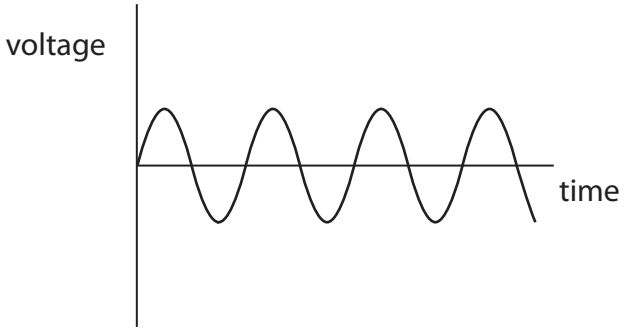
☒ **A**



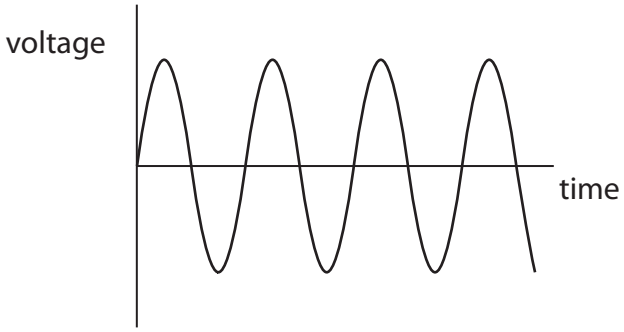
☒ **B**



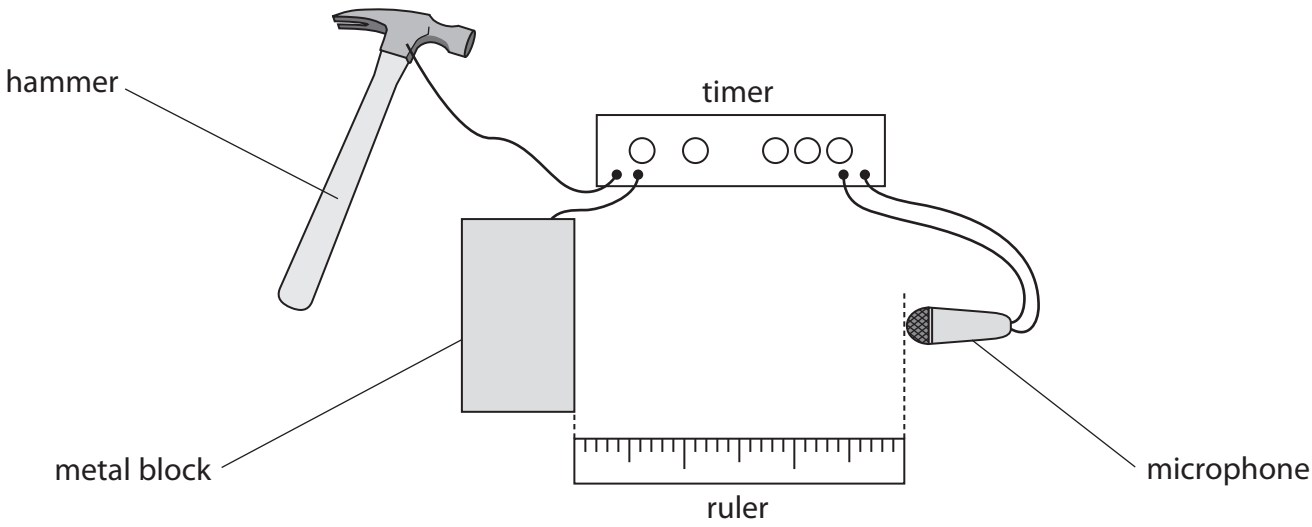
☒ **C**



☒ **D**



(b) The diagram shows the equipment used by a student to measure the speed of sound in air.



The student measures the distance between the front of the metal block and the microphone.

She then uses this method to measure the time taken for sound to travel from the metal block to the microphone.

- start the timer by hitting the metal block with the hammer
- stop the timer when the sound produced reaches the microphone
- record the time taken for sound to reach the microphone in milliseconds

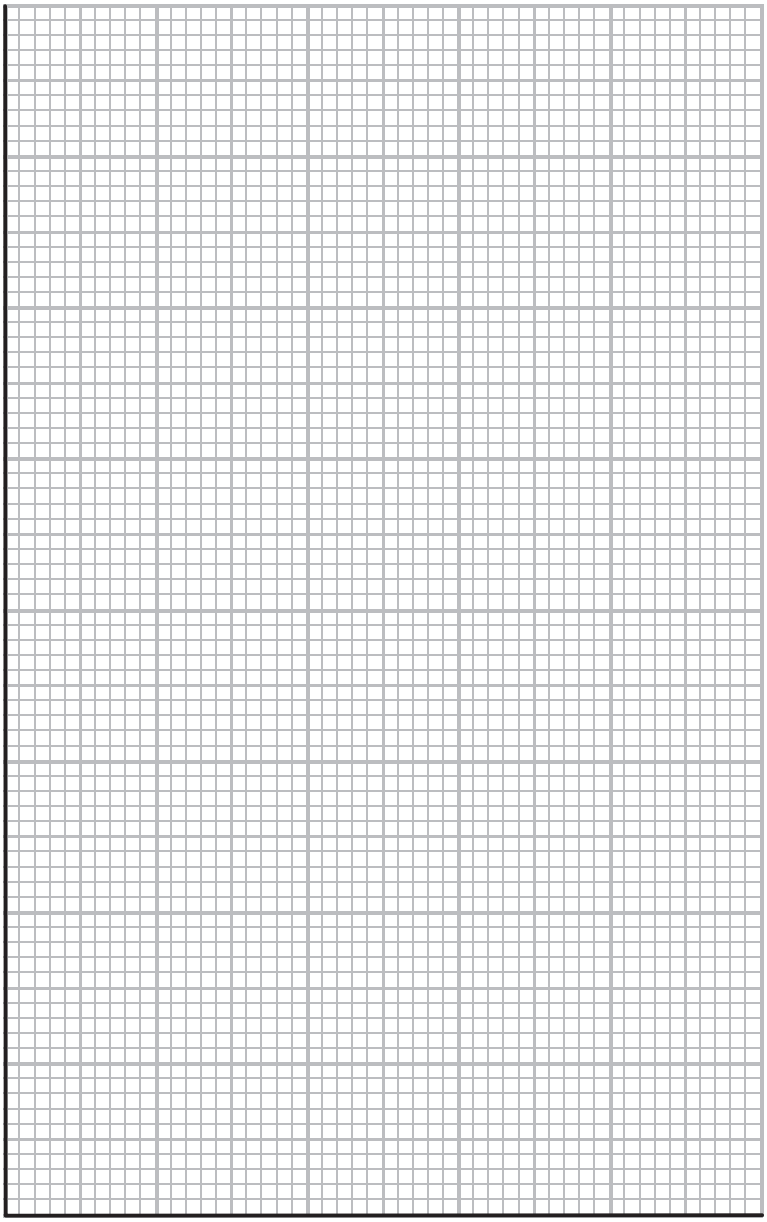
The student repeats the experiment six times, changing the distance between the metal block and the microphone for each experiment.

The table shows her results.

Distance in m	Time in ms
0.62	1.8
0.80	2.4
1.00	3.0
1.20	3.8
1.38	4.2

(i) Use the student's results to plot a graph of distance against time and draw the straight line of best fit.

(5)



(ii) Use your graph to find the speed of sound in air and give the unit.

(3)

speed = ... unit .....

(iii) Suggest how the student could make this experiment valid (a fair test).

(1)

.....

.....

.....

(iv) Suggest two ways that the student could improve the quality of her data.

(2)

1 .....

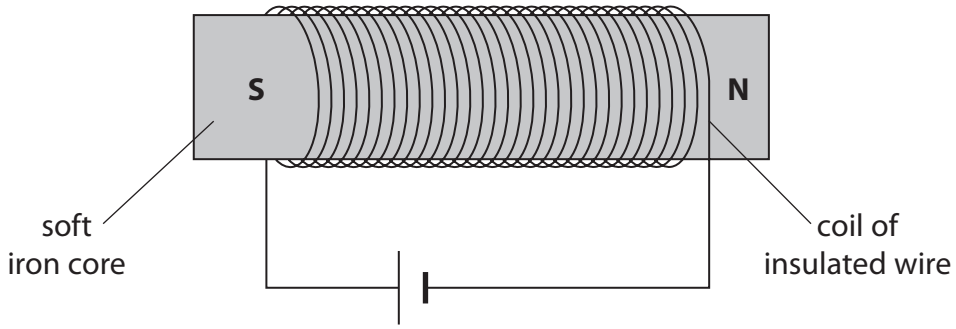
.....

2 .....

.....

(Total for Question 3 = 12 marks)

4 (a) The diagram shows a solenoid with a soft iron core connected in an electric circuit.



(i) On the diagram, draw field lines to show the shape and direction of the magnetic field produced by the solenoid.

(3)

(ii) Explain the effect of the soft iron core.

(1)

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(b) A solenoid with a steel core can be used as an electromagnet.

When the current is switched on, the electromagnet picks up some steel paper clips.

Explain why the steel paper clips remain attached to the steel core when the current is switched off.

(2)

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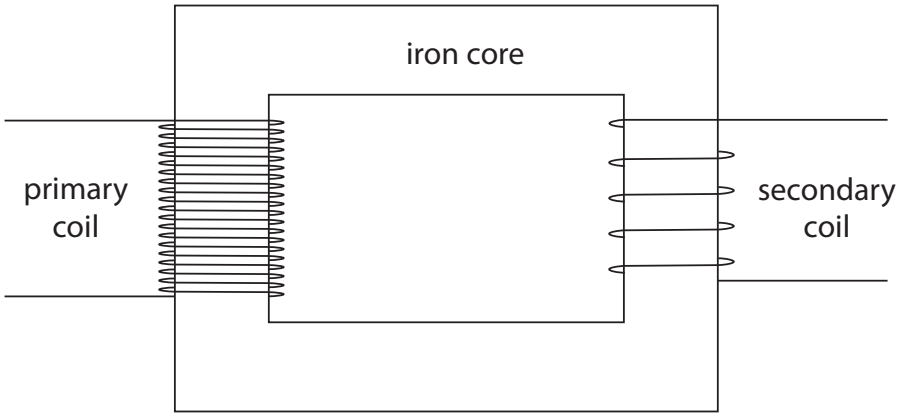
(Total for Question 4 = 6 marks)

5 The diagram shows parts of a transformer.



(a) The input voltage to the transformer is 230 V a.c.

The output of the transformer is 25 V a.c.

There are 100 turns on the secondary coil.

(i) Name the type of transformer shown in the diagram.

(1)

.....

(ii) State the equation linking input (primary) voltage, output (secondary) voltage, primary turns and secondary turns.

(1)

(iii) Calculate the number of turns on the primary coil.

(2)

number of turns .....

(b) Explain how a transformer works.

In your answer, you should include the reasons for using

- two coils
- the iron core
- an alternating supply

(5)

(Total for Question 5 = 9 marks)

6 The photograph shows an investigation of static electricity.

A teacher rubs a balloon with a cloth so that the balloon gains a positive charge.

She then holds the balloon close to her head, and her hair rises.

(a) Explain, in terms of moving charges, how the balloon becomes positively charged.

(2)

(b) Explain why the teacher's hair rises.

(2)

(c) Suggest why the charge remains on the balloon even when it is being held.

(1)

.....

.....

.....

(d) Suggest why the experiment does not work so well when the air is humid (damp).

(1)

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(Total for Question 6 = 6 marks)

7 Cars have a number of features that make them safer in a collision.

(a) Apart from seat belts, name two safety features that reduce the risk of serious injury in a car crash.

(2)

1 .....

2 .....

(b) Photograph A shows a person wearing a seat belt.

Photograph A

(i) Using ideas of momentum and force, explain how a seat belt reduces the risk of serious injury in a car crash.

(4)

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(ii) Photograph B shows a full-body harness used in a racing car.

Photograph B

Suggest why a full-body harness is used in a racing car, instead of an ordinary seatbelt.

(1)

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.....

.....

(c) Photograph C shows a crash-test dummy in a car. The car has crashed into a concrete wall.

Photograph C

State what happens to the momentum of the car during the crash.

(1)

.....

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(Total for Question 7 = 8 marks)

8 (a) State the equation linking momentum, mass and velocity.

(1)

(b) A truck of mass 10 000 kg is moving with a velocity of 4.5 m/s.

A car of mass 1500 kg has the same momentum as the truck.

Calculate the velocity of the car.

(3)

velocity = ... m/s

(Total for Question 8 = 4 marks)

TOTAL FOR PAPER = 60 MARKS

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