Write your name here

| Surname | Other names |
|---|---|
| | |

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

Centre Number | | | | | |

Candidate Number | | | | |

# Combined Science

## Paper 5: Physics 1

**Foundation Tier**

Sample Assessment Materials for first teaching September 2016
**Time: 1 hour 10 minutes**

Paper Reference
**1SC0/1PF**

**You must have:**
Calculator, ruler, protractor

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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**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) Figure 1 shows a solar-powered charger for a mobile phone.

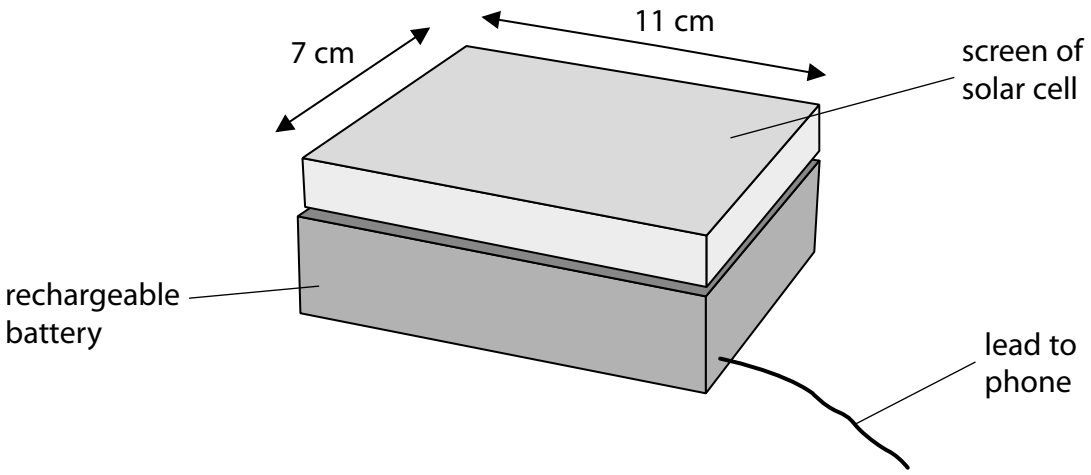


**Figure 1**

The screen of the solar cell takes in energy from the Sun.

(i) State how energy gets from the Sun to the screen.

**(1)**

.....

.....

(ii) State how energy is stored in the charger.

**(1)**

.....

.....

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(iii) Each second, 0.12 J of energy from the Sun reaches 1 $cm^2$ of the screen.

Calculate the total amount of energy reaching the whole screen in 1 second.

**(3)**

energy = ..... J

(b) Mobile phones emit microwaves.

Microwave ovens emit microwaves.

Explain why a mobile phone does not have the same heating effect as a microwave oven.

**(2)**

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**(Total for Question 1 = 7 marks)**

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**2** (a) A student is standing 600 m from a firework display.

A firework explodes with a loud bang, and a flash of light is seen.

Describe how a student can measure the time it takes for the sound wave from the loud bang to travel 600 m.

**(2)**

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(b) Figure 2 shows a water wave.

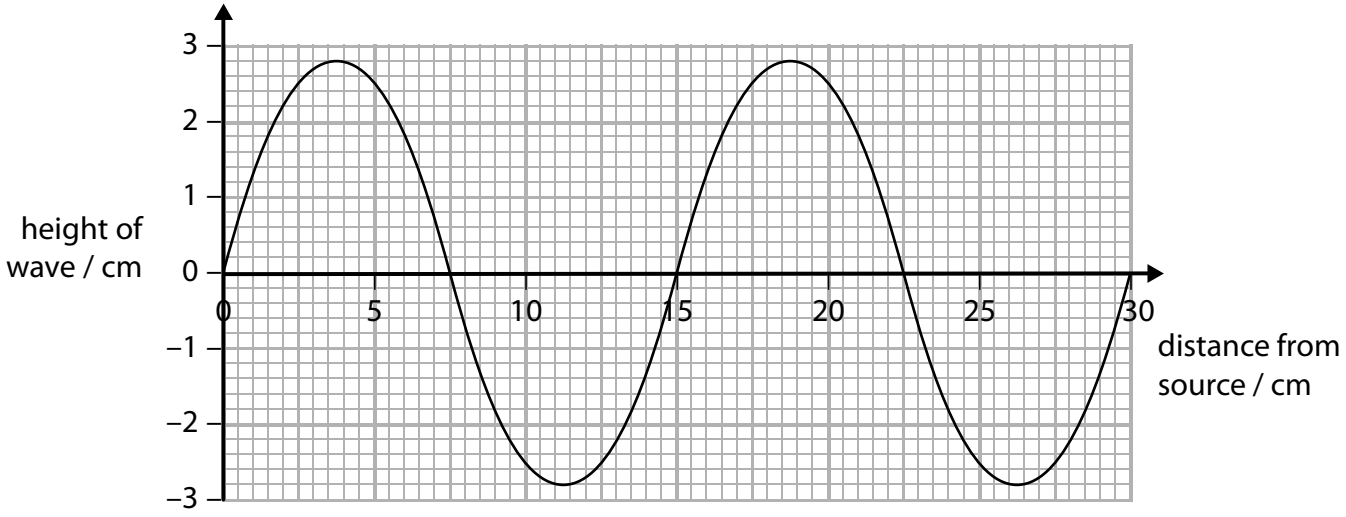


**Figure 2**

(i) What is the amplitude of this wave?

**(1)**

☒ **A** 2.8 cm

☒ **B** 5.6 cm

☒ **C** 7.5 cm

☒ **D** 15 cm

(ii) What is the wavelength of this wave?

**(1)**

☒ **A** 2.8 cm

☒ **B** 7.5 cm

☒ **C** 15 cm

☒ **D** 30 cm

(c) Water waves are transverse waves.

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

**(1)**

.....

(ii) Give **one** example of a longitudinal wave.

**(1)**

.....

(d) An earthquake causes a sea wave.

This sea wave travels 26 400 m in two minutes.

Calculate the speed of the wave.

Use the equation

$$\text{wave speed} = \frac{\text{distance}}{\text{time}}$$

**(3)**

speed = ..... m/s

**(Total for Question 2 = 9 marks)**

**3** (a) Figure 3 shows the structure of an oxygen-14 atom.

(i) Complete the four labels on Figure 3.

**(4)**

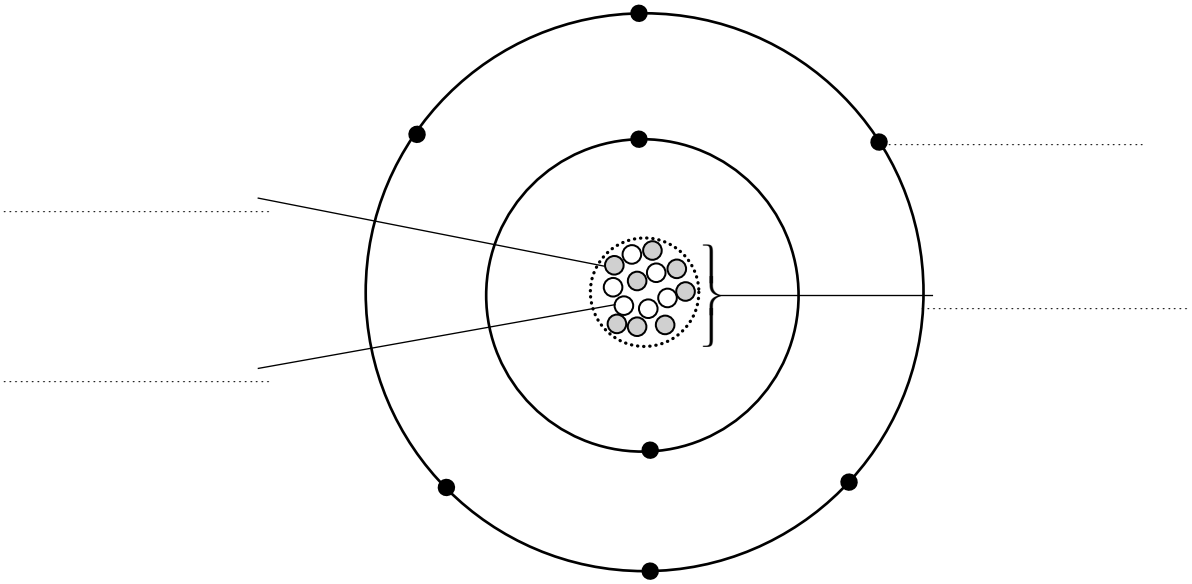

**Figure 3**

(ii) Which of these particles has a negative charge?

**(1)**

- ☒ **A** alpha particle
- ☒ **B** electron
- ☒ **C** neutron
- ☒ **D** nucleus

(iii) State the overall charge of the oxygen-14 atom.

**(1)**

.....

.....

(b) A teacher uses a Geiger-Müller tube and a counter to measure background radiation.

The reading on the counter tube is 34 counts per minute.

(i) The teacher puts a source of beta radiation 15 cm in front of the same Geiger-Müller tube.

The reading on the counter tube is now 468 counts per minute.

Calculate how much radiation detected by the Geiger-Müller tube comes from the source of beta radiation.

**(1)**

..... counts per minute

(ii) The teacher puts a thick sheet of aluminium between the source of beta radiation and the Geiger-Müller tube.

Estimate the reading on the counter.

**(1)**

..... counts per minute

(iii) Give a reason why the answer to (ii) is only an estimate.

**(1)**

.....

.....

**(Total for Question 3 = 9 marks)**

**4** (a) A car driver sees a rabbit on the road.

The driver makes an emergency stop after he sees the rabbit.

Figure 4 shows the speed of the car from the time the driver sees the rabbit until the car stops.

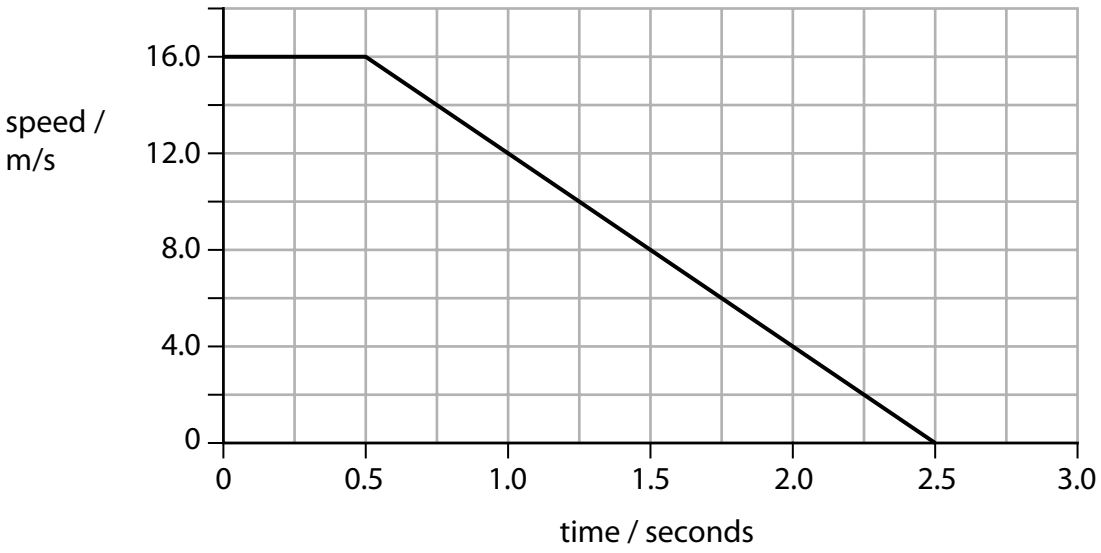


**Figure 4**

(i) The distance travelled by the car from the time the driver first sees the rabbit to when car starts to slow down is the

**(1)**

☒ **A** average distance

☒ **B** braking distance

☒ **C** stopping distance

☒ **D** thinking distance

(ii) Calculate the distance that the car travels in the first 0.5 seconds.

**(3)**

distance = ..... m

(iii) Which equation relates acceleration to change in velocity and time?

**(1)**

☒ **A** $a = \frac{(v - u)}{t}$

☒ **B** $a = \frac{t}{(v - u)}$

☒ **C** $a = t(v - u)$

☒ **D** $a = v - \frac{u}{t}$

(iv) Calculate the deceleration of the car.

**(3)**

deceleration = ..... $m/s^2$

(b) Two students, Alice and Bob, carry out an experiment to measure the speed of cars.

Alice paces out the distance between two lamp posts.

She records:

'*Distance between lamp posts = 20 paces*'

Bob starts to count when a car passes the first lamp post. He stops counting when he thinks it has passed the second lamp post.

He records:

*'My estimate for the time taken for the car to pass between the two lamp posts = 3'*

Give **three** ways the students could improve their experimental procedure.

**(3)**

1 .....

.....

2 .....

.....

3 .....

.....

**(Total for Question 4 = 11 marks)**

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**5** Figure 5 shows two students investigating reaction times.

Student B supports his left hand on a desk.

Student A holds a ruler so that the bottom end of the ruler is between the finger and thumb of student B.

When student A releases the ruler, student B catches the ruler as quickly as he can with his left hand.

The investigation is repeated with the right hand of student B.

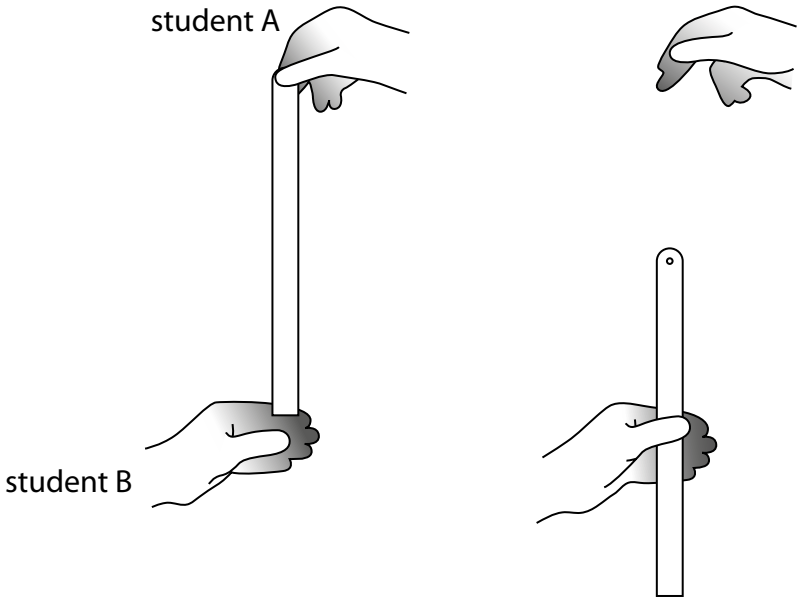


**Figure 5**

(a) Give a reason why it is better to have the 0 cm mark at the bottom of the ruler rather than at the top.

**(1)**

.....

.....

(b) Give a reason why two students are needed for this investigation.

**(1)**

.....

.....

(c) The students took five results for the left hand and five results for the right hand.

Figure 6 shows their results.

| which hand | distance dropped (cm) | | | | | |
|---|---|---|---|---|---|---|
| | trial 1 | trial 2 | trial 3 | trial 4 | trial 5 | average |
| left | 10.1 | 25.5 | 18.4 | 14.6 | 11.7 | 14 |
| right | 17.5 | 16.1 | 19.4 | 18.6 | 20.2 | ..... |

**Figure 6**

(i) Calculate the average distance dropped for the right hand.

Give your answer correct to two significant figures.

**(2)**

distance = ..... cm

(ii) Calculate the average time for the left hand.

Use the equation

$$\text{time}^2 = \frac{\text{distance}}{500}$$

**(2)**

average time = ..... s

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(d) Explain whether any of the readings are anomalous.

**(2)**

(e) Give **two** ways that the students can improve the quality of their data, other than ignoring anomalous results.

**(2)**

1

2

(f) Describe how the students could develop their investigation to investigate how reaction time changes with another variable.

**(2)**

**(Total for Question 5 = 12 marks)**

**6** A car accelerates at a constant rate of 1.83 m/s$^2$ along a flat straight road.

(a) The force acting on the car is 1.870 kN.

Calculate the mass of the car.

Give your answer to three significant figures.

**(3)**

mass = ..... kg

(b) The car accelerates from rest for 16 s.

Calculate the speed of the car after 16 s.

**(3)**

speed = ..... m/s

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*(c) Figure 7 is a speed-time graph for a different car moving along a horizontal road.

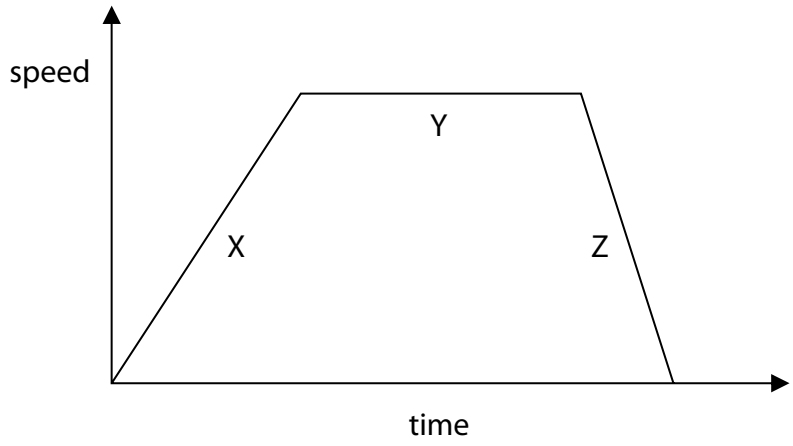


**Figure 7**

Describe the energy transfers taking place during the movement of the car.

You should refer to energy stores as well as transfers between energy stores for all three sections of the graph.

**(6)**

**(Total for Question 6 = 12 marks)**

**TOTAL FOR PAPER = 60 MARKS**