

OCR

Oxford Cambridge and RSA

Accredited

GCSE (9–1) Combined Science (Physics)**A (Gateway Science)****J250/06 Paper 6 (Foundation Tier)**

Sample Question Paper

F**Date – Morning/Afternoon**

Time allowed: 1 hour 10 minutes

You must have:

- the Data Sheet

You may use:

- a scientific or graphical calculator
- a ruler



First name

Last name

Centre
numberCandidate
number**INSTRUCTIONS**

- Use black ink. You may use an HB pencil for graphs and diagrams.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION

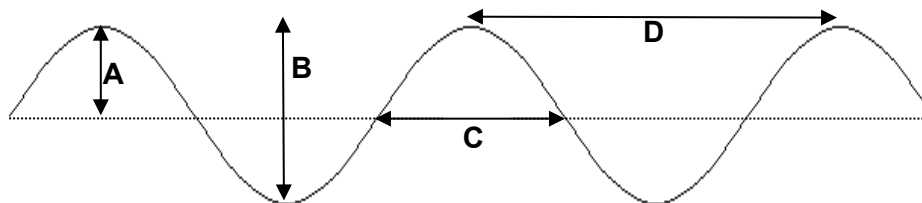
- The total mark for this paper is **60**.
- The marks for each question are shown in brackets [].
- Quality of extended responses will be assessed in questions marked with an asterisk (*).
- This document consists of **24** pages.

SECTION A

You should spend a maximum of 20 minutes on this section.

Answer **all** the questions.

- 1 The diagram shows a wave on water.



Which arrow shows the **amplitude** of the wave?

Your answer

[1]

- 2 Which energy source is non-renewable?

- A bio-fuel
- B coal
- C hydro-electricity
- D solar energy from the Sun

Your answer

[1]

3 Which of these is **not** true of all electromagnetic waves?

- A They are transverse waves
- B They have the same wavelength
- C They can travel through a vacuum
- D They travel at 300 000 000 m/s

Your answer

[1]

4 Which correctly describes electricity supply to homes in the UK?

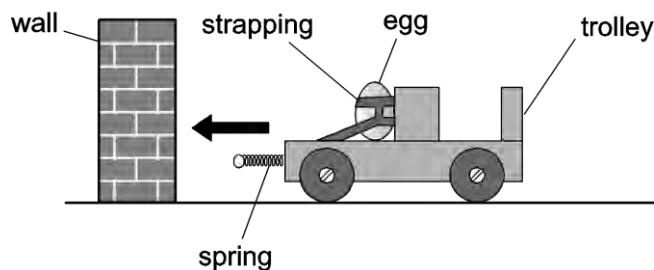
- A 50 Hz a.c.
- B 50 Hz d.c.
- C 230 Hz a.c.
- D 230 Hz d.c.

Your answer

[1]

SPECIMEN

- 5 An egg strapped to a trolley can be used to demonstrate a car crash into a wall.



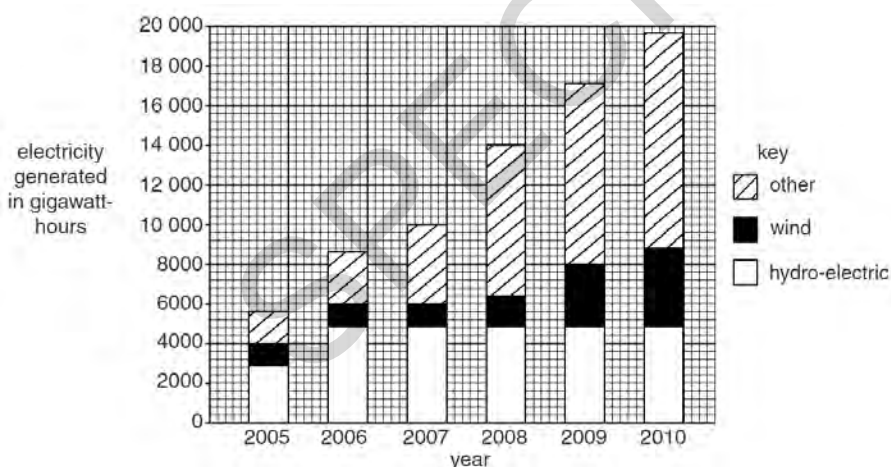
Which would cause the **least** amount of damage to the egg?

- A no spring
- B no strapping
- C a larger egg
- D a smaller deceleration

Your answer

[1]

- 6 The bar chart shows the electricity generated using different sources from 2005 to 2010.



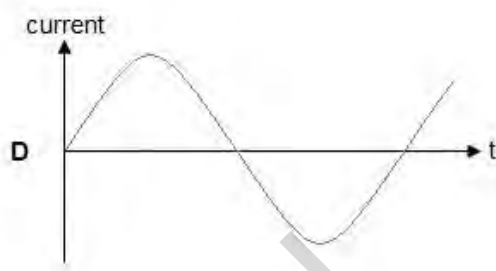
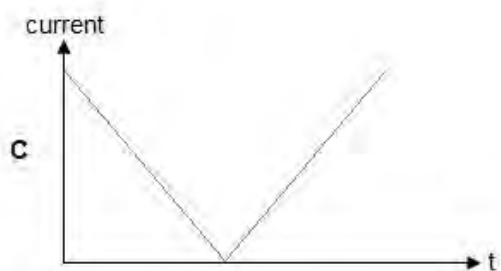
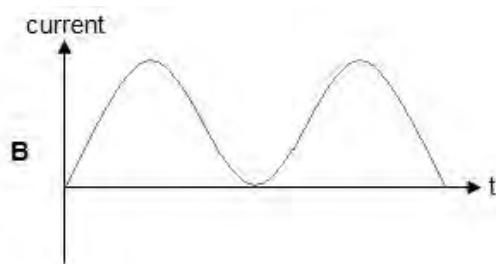
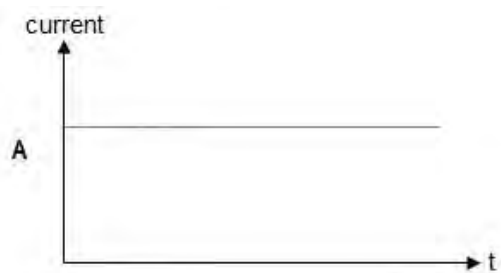
Which statement is correct about the information in the bar chart?

- A Each year more electricity is generated by hydro-electric than by wind.
- B The amount of electricity generated by hydro-electric is constant from 2005 to 2010.
- C The electricity generated by wind has increased every year from 2005 to 2010.
- D Total electricity generated has increased to 19 000 gigawatt-hours.

Your answer

[1]

7 Which graph shows an alternating current?



Your answer

[1]

8 All radioactive sources have a half-life.

Which statement about the half-life of a source is correct?

- A It is half the time for the radioactive source to become safe.
- B It is the time it takes for half of an atom to decay.
- C It is half the time it takes the activity of the source to decrease to zero.
- D It is the time it takes the activity of the source to decrease by half.

Your answer

[1]

- 9 A boy kicks a football.



The football has a mass of 400 g.

What is the potential energy of the football when it is 0.8 m above the ground?

Use the constant: gravitational field strength (g) = 10 N/kg

- A 0.032 J
- B 3.2 J
- C 320 J
- D 3 200 J

Your answer

[1]

- 10 The National Grid transfers energy efficiently using high voltages.

Why are high voltages more efficient?

- A Increasing the voltage increases the current, which heats the wires less.
- B Increasing the voltage decreases the current, which heats the wires more.
- C Increasing the voltage increases the current, which heats the wires more.
- D Increasing the voltage decreases the current, which heats the wires less.

Your answer

[1]

BLANK PAGE

PLEASE TURN OVER FOR THE NEXT QUESTION

SPECIMEN

SECTION B

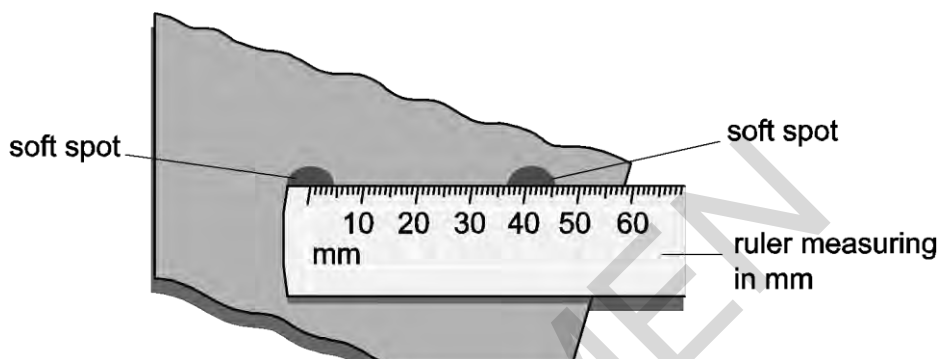
Answer **all** the questions.

11 Microwaves are part of the electromagnetic spectrum.

(a) The wavelength of microwaves can be measured using chocolate.

The turntable is taken out of the microwave and the chocolate is put in the microwave.

The chocolate is left on full power for 10 seconds.



(i) The soft spots are half a wavelength apart.

Use the picture to measure the distance between the centre of the two spots.

answer mm

[1]

(ii) A full wavelength is the double the distance between two soft spots.

What is the wavelength of this microwave in mm **and** m?

.....

Wavelength: mm

Wavelength: m

[1]

(b) The frequency of the microwave is 2 450 000 000 Hz.

Use the formula:

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

to calculate the speed of this microwave.

Use the wavelength that you measured in part (a)(ii).

.....

.....

.....

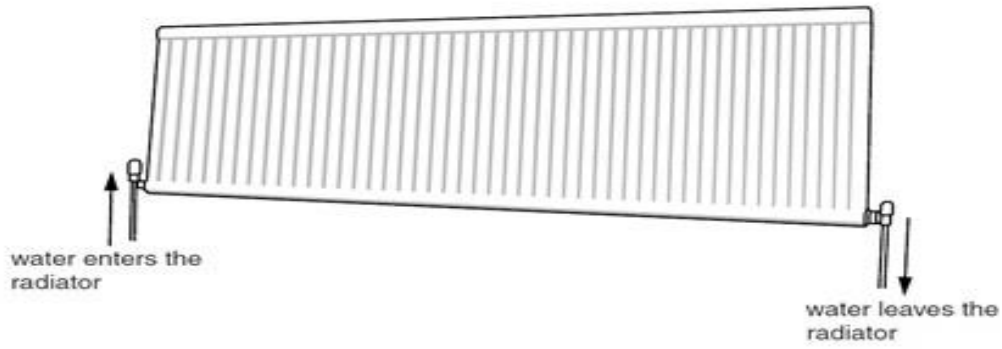
.....

answer:m/s

[2]

SPECIMEN

- 12 The picture shows a radiator in one room of a house.



This radiator is full of water.

- (a) The water enters the radiator at a higher temperature than when it leaves.
Suggest why this happens.

.....
.....

[2]

(b) There is a temperature change of $3\text{ }^{\circ}\text{C}$ in the room.

1.5 kg of water flows through the radiator each second.

The specific heat capacity of water is $4200\text{ J/kg}^{\circ}\text{C}$.

- (i) Calculate the amount of energy given to the room by the 1.5 kg of water as it passes through the radiator.

Show your working and write down the unit.

.....

answer **unit**..... **[3]**

- (ii) The radiator has air trapped in it.

The specific heat capacity of water is $4200\text{ J/kg}^{\circ}\text{C}$.

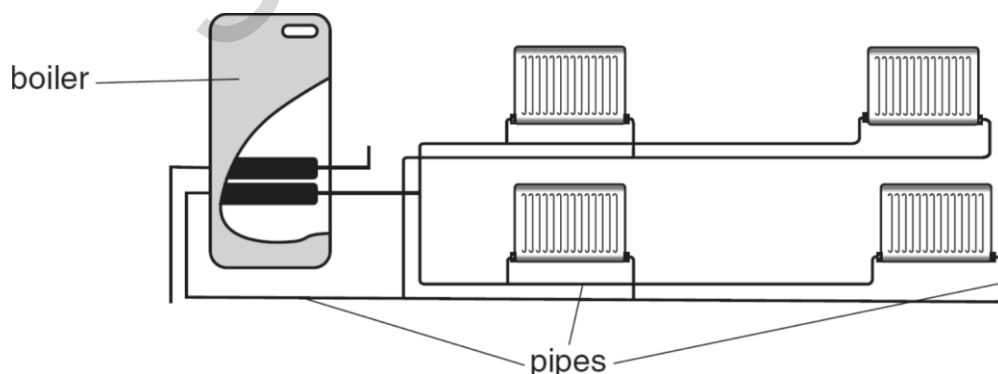
The specific heat capacity of air is a third of water.

Calculate the specific heat capacity of air.

.....

answer $\text{J/kg }^{\circ}\text{C}$ **[1]**

- (c) The picture shows the radiators in the house connected by pipes to the boiler.



Why are the pipes covered with foam?

.....
 **[1]**

BLANK PAGE

TURN OVER FOR THE NEXT QUESTION

SPECIMEN

13 Molly pulls toy cars along the floor in a laboratory.

She measures the force and distance moved each time.

Her results are shown in the table below.

Toy car	Pulling force (N)	Distance moved (m)
A	10	2
B	5	6
C	4	5
D	2	7

(a) Which **two** cars took the same amount of work to pull?

.....

.....

.....

.....

answerand

[2]

- (b) In another experiment to look at work done, Molly uses different electric motors to lift a large mass to find out which motor is the most efficient.

She measures input and output electrical energy to calculate the work done on the mass.

Look at the table of her results.

Electric motor	Input energy (J)	Output energy (J)
Q	800	760
R	2 000	1 920



Molly's statement is only partly correct and partly wrong.

Use the data and calculations to explain why.

.....

.....

.....

[2]

- (c) Motor **R** takes 20 seconds to lift the mass.

Calculate the **difference** between the input and output power.

.....

.....

.....

answer:W

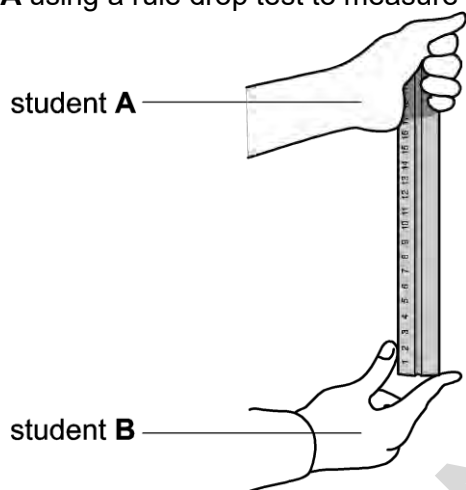
[3]

SPECIMEN

14 The stopping distance of a car is important for road safety.

One factor that affects stopping distance is reaction time.

The picture shows student **A** using a rule drop test to measure the reaction time of student **B**.



(a) (i) Use the picture to describe how this method measures reaction time.

.....

.....

.....

[2]

(ii) Write a method to compare the reaction time of boys and girls.

In your method describe how you will make the measurements **accurate**.

.....

.....

.....

.....

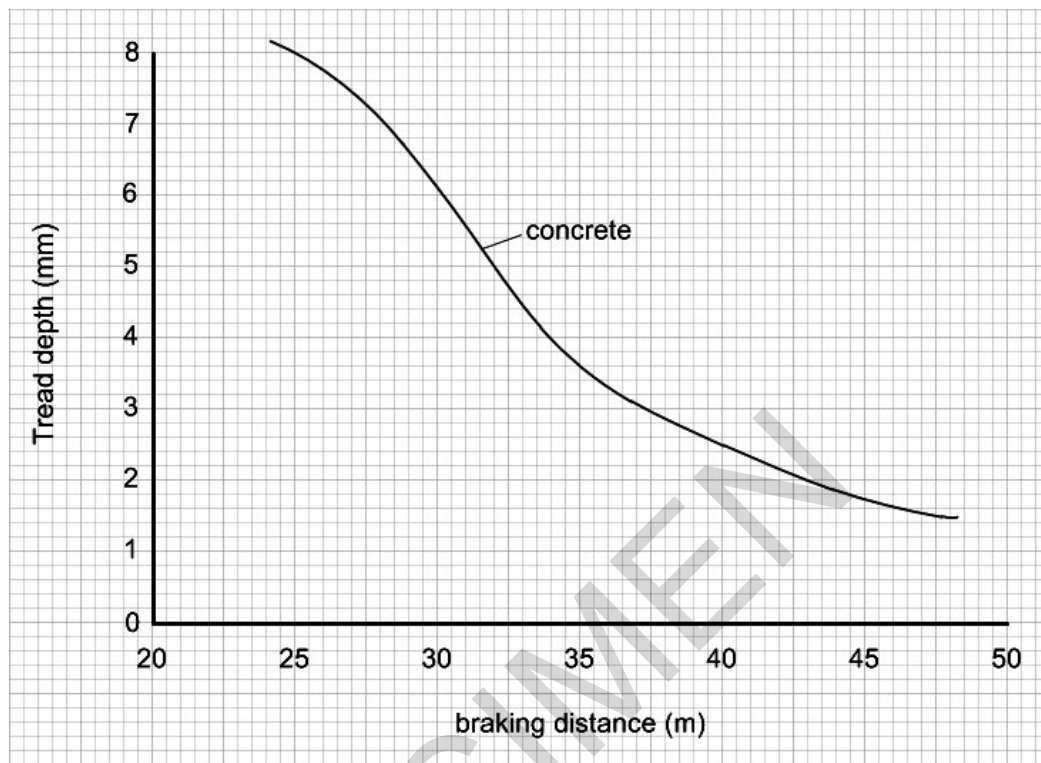
.....

.....

[4]

(b) Another factor that affects stopping distance is braking distance.

The graph below shows the braking distance for tyres of different tread depths on concrete.



(i) What trend does the graph show?

.....

[1]

(ii) Use data from the graph to calculate the difference in the braking distance between a tread depth of 2 mm and 5 mm.

.....

.....

.....

.....

[3]

- (c) A car has a mass of 2 tonnes (1 tonne = 1000 kg) and decelerates at 2.8 m/s^2 .

Calculate the force being applied to the brakes.

Use the formula:

$$\text{force} = \text{mass} \times \text{acceleration}$$

.....
.....

answer N

[2]

SPECIMEN

- 15 (a) A student has made some notes on a simple model of an atom.

An atom consists of a negatively charged nucleus surrounded by protons.

Most of the atom is just empty space.

The nucleus contains neutrons and ions.

The student has made three mistakes.

Write down the **three** mistakes that the student has made.

.....

.....

.....

.....

[3]

SPECIMEN

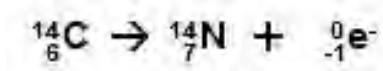
- (b) Some nuclei are radioactive because they are unstable.
The nucleus of an atom can be shown as:



- (i) Z is the atomic number. What is A?

.....[1]

- (ii) Equations can be used to show radioactive decay.



Describe what is shown in this equation.

.....
.....
.....[3]

- (c) These cotton wool buds have been treated with gamma rays.



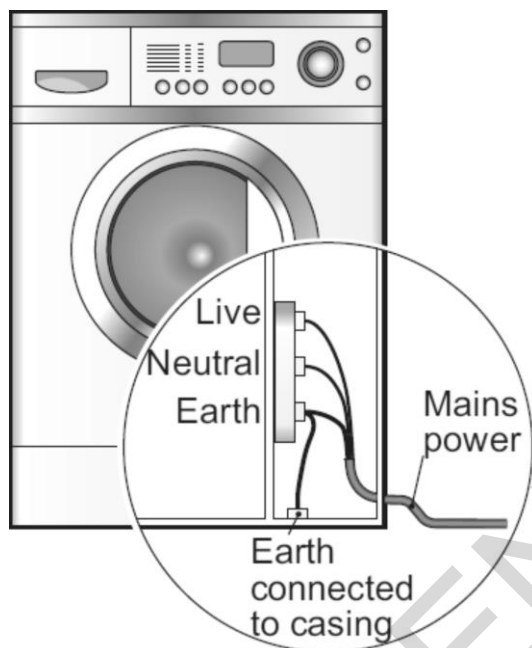
The cotton wool buds have been **irradiated** but not **contaminated**.

Describe the difference between irradiated and contaminated.

.....
.....
.....
.....
.....[3]

- (b) Washing machines have an outer casing made of metal.

The picture below shows the earth wire connected to the outer casing.



The live wire becomes loose and touches the outer casing.

- (i) Explain why this does **not** give you an electric shock.

.....

 [3]

- (ii) The earth wire is thicker than the live wire and neutral wire.

Suggest why the earth wire is thicker.

.....
 [1]

END OF QUESTION PAPER