Density GCSE AQA Higher Physics Past Papers Questions

01.

Electricity is generated in a nuclear power station.

Fission is the process by which energy is released in the nuclear reactor.

. 1 **Figure 14** shows the first part of the nuclear fission reaction.

Complete **Figure 14** to show how the fission process starts a chain reaction.

[3 marks]

Figure 14

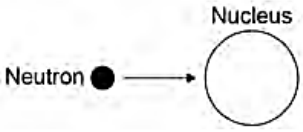
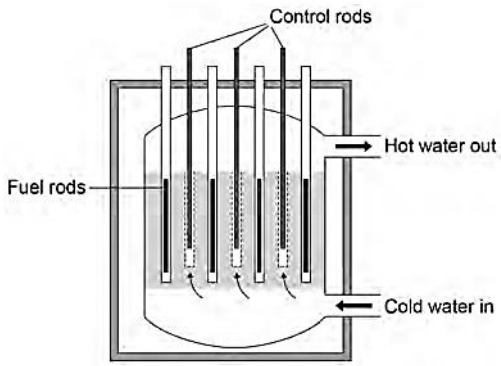


Figure 15 shows the inside of a nuclear reactor in a nuclear power station.

Figure 15



2 In a nuclear reactor a chain reaction occurs, which causes neutrons to be released.

The control rods absorb neutrons.

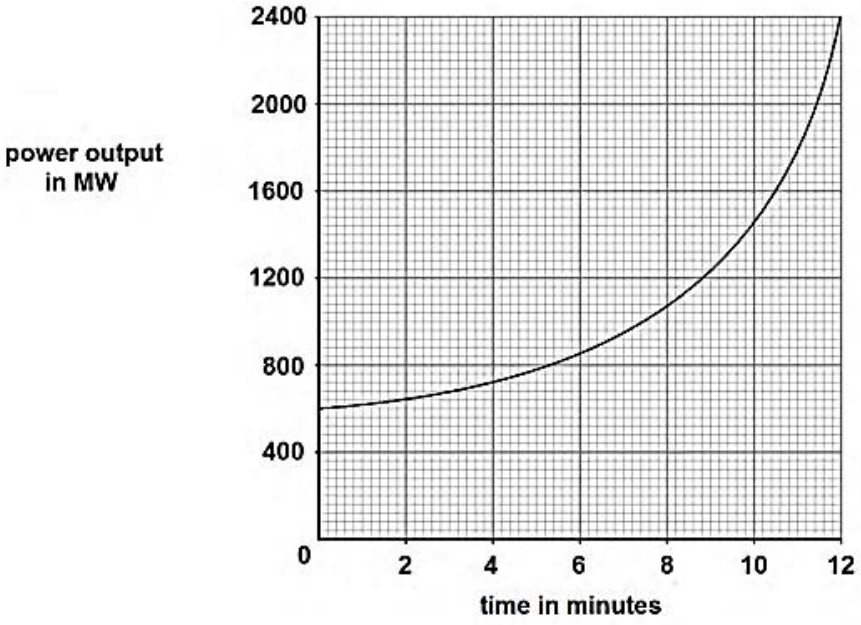
The control rods can be moved up and down.

Explain how the energy released by the chain reaction is affected by moving the control rods.

[2 marks]

Figure 16 shows how the power output of the nuclear reactor would change if the control rods were removed.

Figure 16



3 Calculate the rate of increase of power output at 10 minutes.

[2 marks]

Rate of increase of power output = _____ MW / minute

02.

A student wants to calculate the density of the two objects shown in **Figure 18**.

Figure 18

Metal cube

Small statue

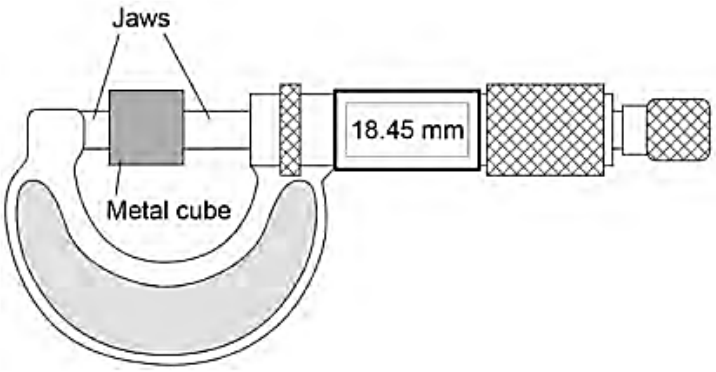
Describe the methods that the student should use to calculate the densities of the two objects.

[6 marks]

03. A student measured the width of a solid metal cube using a digital micrometer.

Figure 11 shows the micrometer.

Figure 11



. 1 The resolution of the micrometer is 0.01 mm

The student could have used a metre rule to measure the width of the cube.

Explain how using a metre rule would have affected the accuracy of the student's measurement of width.

[2 marks]

. 2 The mass of the metal cube was measured using a top pan balance.

The balance had a zero error.

Explain how the zero error may be corrected after readings had been taken from the balance.

[2 marks]

. 3 The width of the cube was 18.45 mm. The density of the cube was 8.0×10^3 kg/m^3

Calculate the mass of the cube.

[5 marks]

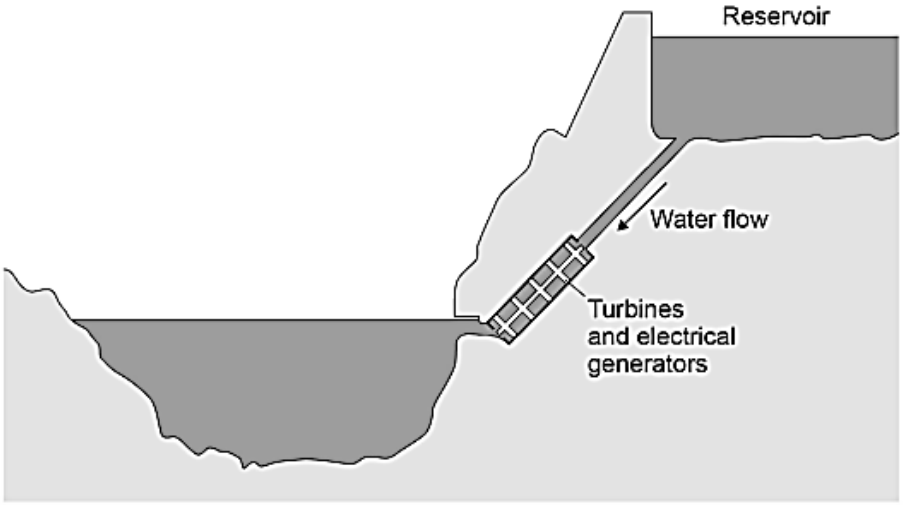
Mass = _____ kg

9

04.

Figure 4 shows a hydroelectric power station.

Figure 4



Electricity is generated when water from the reservoir flows through the turbines.

1 Write down the equation which links density (ρ), mass (m) and volume (V).

[1 mark]

2 The reservoir stores 6 500 000 m^3 of water.

The density of the water is 998 kg/m^3.

Calculate the mass of water in the reservoir.

Give your answer in standard form.

[4 marks]

3 Write down the equation which links energy transferred (E), power (P) and time (t).

[1 mark]

4 The electrical generators can provide 1.5×10^9 W of power for a maximum of 5 hours.

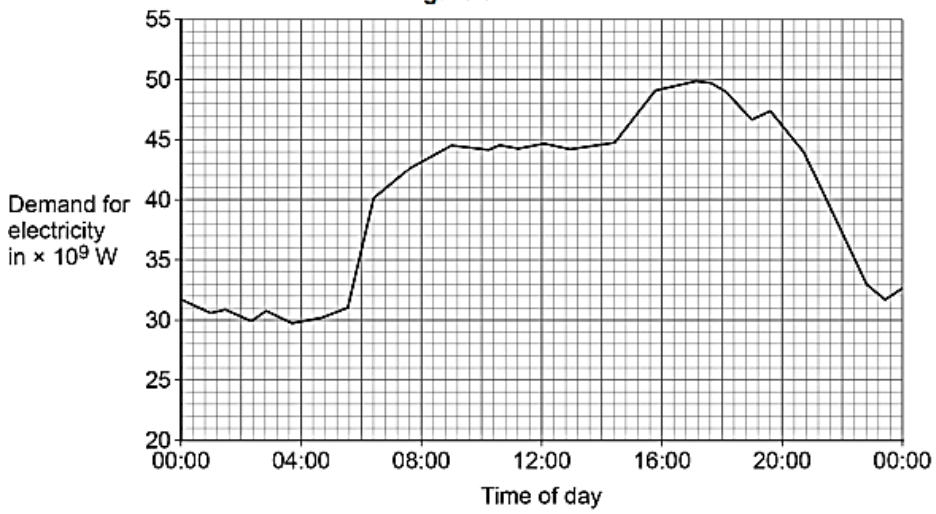
Calculate the maximum energy that can be transferred by the electrical generators.

[3 marks]

Energy transferred = _____ J

. 5 **Figure 5** shows how the UK demand for electricity increases and decreases during one day.

Figure 5



The hydroelectric power station in **Figure 4** can provide 1.5×10^9 W of power for a maximum of 5 hours.

Give **two** reasons why this hydroelectric power station is not able to meet the increase in demand shown between 04:00 and 16:00 in **Figure 5**.

[2 marks]

1 _____

_____

_____

2 _____

_____

_____

11

05.

A student investigated the density of different fruits.

Table 1 shows the results.

Table 1

Fruit	Density in g/cm^3
Apple	0.68
Kiwi	1.03
Lemon	0.95
Lime	1.05

1 The student determined the volume of each fruit using a displacement can and a measuring cylinder.

What other piece of equipment would the student need to determine the density of each fruit?

[1 mark]

_____

. 2 Write down the equation which links density (ρ), mass (m) and volume (V).

[1 mark]

. 3 The mass of the apple was 85 g.

The density of the apple was 0.68 g/cm^3.

Calculate the volume of the apple.

Give your answer in cm^3.

[3 marks]

Volume = _____ cm^3

. 4 The student only measured the volume of each fruit once.

The volume measurements **cannot** be used to show that the method to measure volume gives precise readings.

Give the reason why.

[1 mark]

—
6

06.

Figure 2 shows a rock found by a student on a beach.

To help identify the type of rock, the student took measurements to determine its density.

Figure 2

. 1 Describe a method the student could use to determine the density of the rock.

[6 marks]

The student determined the density of the rock to be 2.55 ± 0.10 g/cm^3.

. 2 What are the maximum and minimum values for the density of the rock?

[1 mark]

Maximum density = _____ g/cm^3

Minimum density = _____ g/cm^3

. 3 **Table 1** gives the density of five different types of rock.

Table 1

Type of rock	Density in g/cm^3
Basalt	2.90 ± 0.10
Chalk	2.35 ± 0.15
Flint	2.60 ± 0.10
Sandstone	2.20 ± 0.20
Slate	2.90 ± 0.20

Which two types of rock in **Table 1** could be the type of rock the student had?

[1 mark]

Tick (✓) **one** box.

Basalt or chalk ☐

Chalk or flint ☐

Flint or sandstone ☐

Sandstone or slate ☐

4 The student only took one set of measurements to determine the density of the rock.

Explain why taking the measurements more than once may improve the accuracy of the density value.

[2 marks]

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