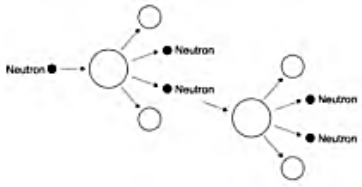
Density GCSE AQA Higher Physics Past Papers Answers

01.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1	Nucleus splitting into two fragments and releasing two or three neutrons (at least one) fission neutron shown to be absorbed by additional large nucleus and causing fission two or three additional neutrons released from fission reaction	This diagram would gain all **3** marks:  	1 1 1	AO1/1 4.4.4.1
2	lowering the control rods increases the number of neutrons absorbed (so) energy released decreases	accept converse description allow changing the position of the control rods affects the number of neutrons absorbed for **1** mark	1 1	AO2/2 AO1/1 4.4.4.1
3	rate of increase between 240 and 276 (MW / min)	allow **1** mark for attempt to calculate gradient of line at 10 minutes	2	AO2/1 4.4.4.1
Total			**7**	

02.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
☐	**Level 3:** Clear and coherent description of both methods including equation needed to calculate density. Steps are logically ordered and could be followed by someone else to obtain valid results.	5-6	6	AO1/2 4.3.1.1 WS2.2 Required practical
	Level 2: Clear description of one method to measure density **or** partial description of both methods. Steps may not be logically ordered.	3–4		
	Level 1: Basic description of measurements needed with no indication of how to use them.	1–2		
	No relevant content	0		
	Indicative content **For both:** • measure mass using a balance • calculate density using $\rho = m/V$ **Metal cube:** • measure length of cube's sides using a ruler • calculate volume **Small statue:** • immerse in water • measure volume / mass of water displaced • volume of water displaced = volume of small statue			
Total			**6**	

03.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1	metre rule has a lower resolution	allow metre rule has a resolution of 1mm / 1cm fewer decimal places is insufficient	1	WS2.3 RP5 4.3.1.1 AO1
	so is less accurate (than the micrometer screw gauge)		1	
2	record the value of the zero error when there is no object on the balance		1	RP5 4.3.1.1 AO3
	subtract / add the value of the zero error		1	
3		an answer of 0.0502 (kg) scores **5** marks		RP5 4.3.1.1 AO2
	$V = (18.45 \times 10^{-3})^3$ **or** $V = 0.01845^3$	this mark may be awarded if width is incorrectly / not converted	1	
	$V = 6.28 \times 10^{-6}$ (m^3)	this answer only	1	
	$8.0 \times 10^3 = \frac{m}{6.28 \times 10^{-6}}$	allow $8.0 \times 10^3 = \frac{m}{\text{their calculated V}}$	1	
	$m = 8.0 \times 10^3 \times 6.28 \times 10^{-6}$	allow $m = 8.0 \times 10^3 \times$ their calculated V	1	
	$m = 0.0502$ (kg)	allow an answer consistent with their calculated V	1	
Total			**9**	

04.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1	density = $\frac{\text{mass}}{\text{volume}}$ **or** $\rho = \frac{m}{V}$		1	AO1 4.3.1.1
2	$998 = \frac{\text{m}}{6\,500\,000}$		1	AO2 4.3.1.1
	$m = 998 \times 6\,500\,000$		1	
	$m = 6\,487\,000\,000$		1	
	$m = 6.487 \times 10^9$ (kg)	allow a correct conversion of their calculated value of mass into standard form	1	
3	energy transferred = power × time **or** $E = Pt$		1	AO1 4.2.4.2
4	t = 18 000 (s) **or** t = 5 × 60 × 60		1	AO2 4.2.4.2
	$E = 1.5 \times 10^9 \times 18\,000$	allow a correct substitution using an incorrectly/not converted value of t	1	
	$E = 2.7 \times 10^{13}$ (J)	allow a correct calculation using an incorrectly/not converted value of t	1	
5	the variation in demand is (much) greater than 1.5×10^9 W	allow the increase in demand is greater than the (power) output of the (hydroelectric) power station	1	AO3 4.1.3
	demand remains high for longer than 5 hours	allow 04:00 to 16:00 is 12 hours allow 04:00 to 16:00 is greater than 5 hours	1	
Total			**11**	

05.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1	balance / scales		1	AO1 4.3.1.1 RPA5
2	density = $\frac{\text{mass}}{\text{volume}}$ **or** $\rho = \frac{m}{V}$		1	AO1 4.3.1.1 RPA5
3	$0.68 = \frac{85}{V}$ $V = \frac{85}{0.68}$ $V = 125\ (\text{cm}^3)$		1 1 1	AO2 4.3.1.1 RPA5
4	repeat readings (of volume) need taking (of each fruit) to show that the readings are close together	allow 'the same' for 'close together'	1	AO3 4.3.1.1 RPA5
Total			**6**	

06.

Question	Answers	Mark	AO / Spec. Ref.
1	**Level 3**: The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO1 4.3.1.1 RPA5
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	3–4	
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content	0	
	Indicative content: • measure mass using a balance / scales • part fill a measuring cylinder with water and measure initial volume • place rock in water and measure final volume • volume of rock = final volume − initial volume • fill a displacement / eureka can with water level with spout • place rock in water and collect displaced water • measuring cylinder used to determine volume of displaced water • volume of rock = volume of displaced water • use mass and volume to calculate density • use of: density = $\frac{\text{mass}}{\text{volume}}$		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2	maximum density = 2.65 (g/cm^3) minimum density = 2.45 (g/cm^3)	both required	1	AO3 4.3.1.1 RPA5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3	chalk or flint		1	AO3 4.3.1.1 RPA5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4	a mean can be calculated which reduces the effect of random errors	 allow anomalies can be identified / removed	1 1	AO3 4.3.1.1 RPA5

Total Question		**10**