

Physics 2 Summer 2015
Foundation Tier

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept						
1		(a)		3	<p>All 4 correct – 3 marks 2 or 3 correct – 2 marks 1 correct only – 1 mark</p>	Squiggly lines		2 lines to one box (award no mark) 2 lines from any box (award no marks)						
					(b)				(i)	1	5 [s] and 65 [s] (both answers required for 1 mark)			
									(ii)	2	acceleration = $\frac{40}{10}$ (1-sub), = 4 [m/s ²] (1-ans)	$\frac{10}{2.5} = 4$ or any correct gradient calculation		
					(c)				(i)	2	momentum = 1 200 × 40 (1-sub) = 48 000 [kg m/s] (1-ans)			
									(ii)	2	$F = \frac{(0 - 48\,000)}{30}$ (ecf on 48 800) (1-for 30 shown anywhere) = [-] 1 600 [N] (1)	(48 000 – 0) or 48 000 in the numerator		30 on answer line
Total Mark				10										

Question Number								
FT	HT	Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
2		(a)		2	Ticks in boxes 3 and 4 (2)	Crosses in boxes		Extra crosses in other boxes (minus 1 for each)
		(b)	(i)	1	400 [counts/min]			
			(ii)	1	100 [days]			
			(iii)	1	Same answer as (ii)			
			(iv)	1	Line drawn below the curve from (0,800) Allow \pm one small square tolerance on (0,800) plot	Line that curves upwards at the end Line that does not extend all the way to 400		A straight line. A line that crosses / touches the one given / touches the time axis. Line on previous grid.
		Total Mark		6				

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
3		(a)		2	$\frac{1.8}{6.0}$ (1-sub) = 0.3 (1-ans)	0.3 anywhere		$\frac{6.0}{1.8} = 0.3$
		(b)		1	Current			Amps
		(c)	(i)	3	Points plotted within $\pm \frac{1}{2}$ small square division (2) (-1 mark for each incorrect plot to a maximum of 2 marks) Straight line of best fit $\pm \frac{1}{2}$ small square division on each point within the range of values plotted (i.e. 10 - 75 cm) (1)			Line joined dot to dot, wispy lines, double lines
			(ii)	2	As length increases resistance increases (1) In a uniform way / steady rate (1)	Bigger wire / In a linear way / In proportion. Resistance is [directly] proportional to length gets 2 marks. It is proportional gets 2 marks. For <u>every</u> 10 cm resistance increases by 2Ω gets 2 marks. Length is equal to 5 times the resistance gets 2 marks. 10 cm has 2Ω resistance and 20 cm has 4Ω resistance gets 1 mark. As length increases resistance increases equally gets 1 mark		

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
		(d)		2	The resistance of 100 cm would be $20\ \Omega$ / $30\ \Omega$ requires a 150 cm length (1) therefore the statement is not true (1) ecf it must be consistent with the first mark The 2nd mark can only be awarded if it is linked to the 1st mark.	10 cm has $2\ \Omega$ so 100 cm is not $30\ \Omega$ gets 1 mark only		
		(e)		1	Yes - To check <u>repeatability</u> or No- Results all lie on a straight line / there are no anomalous results	To check if the results match.	Any reference to reliability or accuracy.	To make it more repeatable. Make sure they're right / ok
Total Mark				11				

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT							
4		(a)		2	$P = 120 \times 5$ (1 - substitution) = 600 [W] (1)			
		(b)	(i)	2	Mass is a measure of inertia of the bricks (1) Weight is [a measure of the force of] gravity acting on the bricks (1)	Mass is the amount of material (stuff) / matter / particles in an object. Mass is in kg and weight is in N gets 1 mark		Number of particles. Weight is how heavy it is.
			(ii)	1	$\text{mass} = \frac{5\,000}{10} = 500$ [kg]			
		(c)	(i)	2	5 000 and 400 used in addition or subtraction (1) 5 400 [N] (1)	Answer only of 4 600 gets 1 mark		
			(ii)	I	1	"bigger than"		
				II	1	"equal to"		
Total Mark				9				

Question Number								
FT	HT	Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept	
5		(a)	(i)	2	Uranium [nucleus] / it absorbs neutron[s] (1) splits into <u>2</u> [smaller] nuclei <u>and</u> neutrons [are released] (1)	Atoms Neutron capture Named elements		Force of impact shatters nucleus. Don't accept collides.
			(ii)	2	Slows down the neutrons (1) so they can be absorbed / captured <u>by uranium</u> [nuclei] (1) The 2nd mark can only be awarded if it is linked to the 1st mark.	For 2 nd mark: Split <u>uranium</u> nuclei or they cause fission of <u>uranium</u> or the reaction of uranium		
			(iii)	2	Fewer or no neutrons absorbed (1) so increase [in rate of] fission [of uranium nuclei] (1) The 2nd mark can only be awarded if it is linked to the 1st mark.	For 1 st mark: So more neutrons available for fission		Taken out / removed / more energy released
		(b)	(i)	3	Ticks in the 2 nd , 3 rd and 4 th boxes A nucleus of U-230 least number of neutrons (1) A nucleus of U-235 contains 143 neutrons (1) A nucleus of U-234 contains 92 protons (1)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>		Extra tick attracts -1
			(ii)	2	234 (1) ${}_{92}^{234}\text{U}$ (1) as shown here			
	Total Mark			11				

Question Number		Sub-section		Mark	Answer	Accept	Neutral answer	Do not accept	
FT	HT								
6		(a)	(i)	2	<p>No credit is given for just naming the radioisotope</p> <p>Astatine Alpha particles highly ionising or easily absorbed [by cancer cells] or would not penetrate beyond the tumour [to affect healthy cells] (1) It decays [to a safe level] quickly or equivalent (1)</p> <p>Alternative solution: Tellurium Beta penetrates all of the tumour (1) It decays [to a safe level] quickly or equivalent (1)</p>	Alpha is not able to spread far [The source] won't last long in the body		Answers for any other radioisotope Attacks / kills the cancer cells the best. It is highly ionising. Any statement implying that it leaves the body quickly / the half-life is short.	
			(ii)	2	<p>Cobalt / Caesium Beta / gamma will penetrate the <u>packaging/box</u> or kills bacteria (1) It won't need replacing for a long time / it lasts a long time (1)</p>			It has a long half-life	
		(b)	(i)	1	5				
				(ii)	2	<p>288 – 144 – 72 – 36 – 18 – 9 Process of halving from 288 (1) 5 times to arrive at 9 (1) ecf</p>	Answer only of 9 gets 2 marks		An incorrect answer with no workings shown <u>e.g. 18</u> except for 4 half-lives in (b)(i) which gets 2 marks
Total Mark				7					

Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
7					6	<p>Indicative content: If the vehicle is travelling faster then the thinking distance is increased and the braking distance is also increased. This means that the overall stopping distance is greater (or the converse for a vehicle travelling more slowly). If the brakes are worn (or poor road surface conditions) the thinking distance is unaffected but the braking distance is increased. This again leads to an increased stopping distance (or the converse for new brakes). If the driver has drunk alcohol or is tired the reaction time is bigger and so the thinking distance is greater. Although the braking distance is unaffected the overall stopping distance is greater.</p> <p>5-6 marks The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p> <p>3-4 marks The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p> <p>1-2 marks The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</p> <p>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.</p>			
		Total Mark			6				