

GCSE Science - Physics 2 Mark Scheme

January 2015

FOUNDATION TIER

Question			Marking details	Marks
1.	(a)		increases (1) decreases (1) no change (1)	3
	(b)	(i)	$\frac{18}{30(1)} = 0.6$ [s] (1) First mark is for dividing by 30	2
		(ii)	$1\,200 \times \underline{75}$ (1) = 90 000 [J] (1)	2
		(iii)	$\frac{30}{5}$ (1) = 6 [m/s ²] (1)	2
			Question total	[9]
2.	(a)	(i)	current	3
		(ii)	current	
		(iii)	voltage	
	(b)	(i)	subs $\frac{12}{8}$ (1) = 1.5 [A] (1)	2
		(ii)	3 [A] ecf - answer must be double the answer to (b)(i)	1
		(iii)	12 (1) \times $\underline{1.5}$ (1) (ecf must be 12 \times answer to (b)(i)) = 18 [W] (1)	3
	(c)		reduces current (1) by factor of 4 / to 0.75 A (1) Don't accept slows down current	2
			Question total	[11]

Question			Marking details	Marks	
3.	(a)	(i)	15 [m/s] (1)	1	
		(ii)	900 [kg m/s] (1) ecf	1	
		(iii)	$\frac{900(\text{ecf})}{6} = 150$ (1) N or kg m/s ² or Newtons (1)	2	
	(b)	The same change in momentum happens in a shorter time / change in momentum per second is greater / increased deceleration (1) so force increases / is greater (1) The 2nd mark must be linked to the 1st mark.	2		
(c)	Any 2 × (1) from: Air bag, crumple zone, head rest, passenger cage, ABS (anti-locking) brakes, laminated windscreen, collapsible steering-wheel / side impact bars / child safety seat Do not accept flexible bumper / crumple zone / crash zone / head support	2			
			Question total	[8]	
4.	(a)		[He] 2 (1) [Fe] 56 (1)	2	
	(b)		H or hydrogen	1	
	(c)	(i)	${}^{207}_{82}\text{Pb}$	1	
		(ii)	${}^{90}_{36}\text{Kr} + {}^{144}_{56}\text{Ba}$ (1) ${}^1_0\text{n}$ (1)	2	
				Do not accept krypton and barium written in full	
				Do not accept Kr^{90}_{36} or Ba^{144}_{56}	
(d)	(i)		slows down		
	(ii)		absorb	2	
			Question total	[8]	

Question		Marking details	Marks	
5.	(a)	To smooth out random fluctuations in data / even out variations / reduces [the effect of] anomalies Accept less anomalies / odd results / closer estimate Do not accept prevents anomalies / more reliable / more accurate	1	
	(b)	Plots (allow $\pm \frac{1}{2}$ small square division) (2) -1 for each error to a maximum of 2. Smooth curve of best fit drawn from last given point (4 rolls) onwards but must encompass all points (1)	3	
	(c)	(i)	About 4 [rolls]. Accept any x where $4 > x > 3.6$ inclusive	1
		(ii)	Method shown on grid (1)[line across or down probably at 200] ~ 3.8 [rolls] (1-value taken from their graph ± 0.1)	2
		(iii)	Allows (more) <u>precise / accurate</u> value to be obtained / to nearest 0.1 of a roll Accept graph is more accurate Don't accept exact value / more reliable value	1
	(d)	(iv)	7.6 (1-value taken from graph ± 0.1) value is approximately 2 half-lives (1) Don't accept $\frac{1}{4}$ of original value	2
		(i)	Identifying 3 half-lives (1) $\frac{210}{3} = 70$ [s] (1-ans) Don't accept 80 \rightarrow 40 \rightarrow 20 \rightarrow 10 without any qualification	2
		(ii)	5 half-lives required (1) 5×70 (ecf) = 350 [s] (1)	2
		(iii)	becquerel, accept bq, Bq, any reasonable spelling	1
	Question total			[15]

Question		Marking details	Marks
6.	(a)	$\frac{(800-200)(1)}{80(1)} = 7.5 \text{ (1-ans) [m/s}^2\text{]}$ <p>Award 1 mark for 600 anywhere</p>	3
	(b)	<p>Indicative content:</p> <p>When the parachute is opened, a big air resistance force is produced that acts upwards. This is bigger than the person's weight (downwards), the resultant force is upwards and so the person decelerates. As the speed decreases, the air resistance (or resultant force) decreases and the deceleration decreases. Eventually the speed becomes so low that the air resistance and weight become equal and the person falls at a (low) constant speed.</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> <p style="text-align: right;">Question total</p>	6
Question total			[9]
FOUNDATION TIER PAPER TOTAL			[60]