GCSE Science - Physics 2

Marking Scheme - Summer 2014

FOUNDATION TIER

Question				Marking details	Marks
1.	(a)	(i)		ammeter (1) series (1)	2
		(ii)		same as	1
		(iii)		variable resistor	1
	(b)	(i)		plots (2) -1 for each error. (allow ± ½ small square division) line (1) allow ± ½ small square division. Don't allow wispy, wobbly, thick lines	3
		(ii)		(1-sub of any corresponding values from graph) e.g. $R = \frac{5}{2.5} = 2$ [Ω](1) **ecf**	2
				Question total	**[9]**
2.	(a)			Ticks in boxes 2, 4 and 6 (3). Lose a mark for any extra tick.	3
	(b)			Momentum = 100 × 373 (1-sub) = 37 300 [kg m/s] (1-ans)	2
	(c)			$F = \frac{37300}{42}$ (allow **ecf** from (*b*)) (1) = 888.095 [N] (**ecf**) (1) Accept 888 or 888.1 or 890 but not 888.09 (i.e. correct rounding off is required)	2
				Question total	**[7]**
3.	(a)	(i)		4 (half-lives) (1)	1
		(ii)		2 or 120 (allow **ecf** from (i) above) (1). Hours or minutes (1). **Unit must complement the answer.** Accept min or h but not m for unit. If the unit is given with the answer, the unit given must agree with it.	2
		(iii)		4 [grams] (allow **ecf** from (i) above) If answer of 16 in (i) then award **no mark** here for 64/16	1
	(b)			Emits gamma (1) so it would not ionise [cells] much / radiation can be detected outside of the body / can get out of the body (1) **Don't accept** doesn't harm. Only gamma passes through the skin **award 1 mark** only **OR** Has a short half-life / has a half-life of only 30 mins (1) but doesn't last for long in the body / decays quicker (1). **Accept** safe after a short time. **Don't accept** escape quickly. **To award both marks both statements must be linked.**	2
				Question total	**[6]**

Question				Marking details	Marks
4.	(a)	(i)		9 [m]	1
		(ii)		2 [s]	1
	(b)			Speed = $\frac{9}{2}$ = 4.5 (**ecf** on (i) or (ii) above) [m/s] (1-ans)	1
	(c)			The distance**s** get / are bigger / balls get further apart. **Don't accept** further away.	1
	(d)			Distances between the ball positions would be less / the balls would be closer together.	1
				Question total	**[5]**
5.	(a)	(i)		Mass is the amount of inertia or material (accept "stuff" (1), whereas weight is the pull of gravity on the car (1). **Do not accept** that mass is measured in kg, weight is measured in Newtons.	2
		(ii)		weight = 800 × 10 = 8 000 [N] (1-ans)	1
	(b)	(i)		3 000 [N]	1
		(ii)		1 200 [N]	1
		(iii)		$a = \frac{1200(\text{ecf})(\text{ii})}{800}$ (1-sub) = 1.5 [m/s^2] (1-ans)	2
		(iv)		The [horizontal] forces become balanced (accept match / equal / level out) (1) because the air resistance (or drag) increases [with speed] (1) **To award both marks both statements must be linked.**	2
				Question total	**[9]**
6.	(a)	(i)		0.8 [s]	1
		(ii)		3.2 [s] (allow **ecf** from (i)) If answer is 3.2 in (i) then **don't accept** 0.8 as **ecf** in this part.	1
		(iii)		subs $\frac{15}{3.2(\text{ecf})}$ (1) = 4.69 or 4.7 or 4.6875 [m/s^2] (1) Ignore the signs. **Don't accept** 4.68 or 4.687. A common **ecf** is $\frac{15}{4.2}$ = 3.57 or 3.6	2
		(iv)		Horizontal line would be longer (1) because the reaction (or thinking) time (or distance) would be longer / would travel further [at constant speed] / slower reactions (1) **Don't accept** slower reaction time **To award both marks both statements must be linked.**	2

Question				Marking details	Marks
		(v)		Less steep graph / sloping line is longer (1) because braking distance (or time) increases / takes longer to stop / smaller deceleration / less friction or grip (1) **Don't accept** not as fast to mean a greater braking distance. **Accept** slippery road. **To award both marks both statements must be linked.**	2
	(b)	(i)		250 **and** 24 from graph (1) subs 250 × 24 (1) = 6 000 [J] (1)	3
		(ii)		6 000 [J] (**ecf**)	1
				Question total	**[12]**
7.	(a)	(i)		38 (1) 2 (1)	2
		(ii)		Neutrons produced [go on to] cause more reactions **or** collisions **or** bombards (1), number of neutrons doubles (accept increase / multiply / triple) [each time] (1) Treat reference to fast neutrons as neutral. N.B. reference to 3 neutrons could arise from the equation above. **To award both marks both statements must be linked.**	2
	(b)			They contain same number of protons / 1 proton (1) but different number of neutrons / 1 neutron and the other has 2 neutrons (1) Reference to electrons loses 1 mark. **Don't accept** nucleons / mass number / atomic number	2
	(c)			**Indicative content:** In fission a heavy element such as [U 235] absorbs a neutron and splits into lighter nuclei [releasing energy]. In fusion, light elements [such as hydrogen isotopes] collide [in high energy collisions and join together] to produce a heavier element, [also releasing energy]. The main problem with nuclear fission is that it produces waste products which are highly radioactive for a long time. The main problem with nuclear fusion is that it requires very high temperatures and pressures which need lots of energy so it is not yet easily contained. **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. **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.	6

Question				Marking details	Marks
				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. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit. **Question total**	**[12]**
				Foundation tier paper total	**[60]**