

GCSE Science - Physics 3

Mark Scheme - Summer 2014

FOUNDATION TIER

Question		Marking details	Mark	
1.	(a)	circles accept concentric (on its own) or rings. <b>don't accept</b> oval or clockwise	1	
	(b)	reverses [direction] accept changes direction / anticlockwise / opposite direction. Treat as neutral references to N & S.	1	
	(c)	no magnetic field / field disappears / field stops <b>don't accept</b> less field	1	
<b>Question total</b>			<b>[3]</b>	
2.	(a)	<p>red super giant <input type="checkbox"/></p> <p>supernova <input type="checkbox"/></p> <p>black hole <input type="checkbox"/></p> <p>main sequence star <input type="checkbox"/></p> <p>3 marks for all correct 2 marks for 2 or 3 correct 1 mark for 1 correct double lines from or to any box earns no credit</p>	3	
	(b)	radiation pressure / gas pressure / pressure / force due to fusion	1	
	(c)	fusion (1) helium (1) uranium (1) iron (1)	4	
<b>Question total</b>			<b>[8]</b>	
3.	(a)	(i)	steps-down	1
		(ii)	440	1
		(iii)	has a changing magnetic field	1
	(b)	<p><b>Any 2 ×(1):</b>  <u>changing</u> magnetic field (1) which links (or cuts) the secondary coil / passes through the secondary coil (1) <u>induces</u> a current or voltage (1)  <b>To award both marks both statements must be linked.</b></p>	2	
<b>Question total</b>			<b>[5]</b>	

Question		Marking details	Mark
4.	(a)	1	1
	(b)	positron / antiparticle of electron / antielectron	1
	(c)	it is negative (accept different charge or opposite charge) <b>don't accept</b> it is positive	1
	(d)	annihilate / cancel each other out / destroy each other (1) <b>don't accept</b> fuse or neutralise and release energy / creates heat (1) any reference to 2 electrons don't award the 1 <sup>st</sup> mark	2
<b>Question total</b>			<b>[5]</b>
5.	(a)	(i) momentum = $50\,000 \times 6$ (1-sub) = 300 000 [kg m/s] (1-ans)	2
		(ii) mass = $\frac{300000}{4}$ (1-sub) mass = 75 000 [kg](1-ans) <b>ecf from (i)</b>	2
		(iii) mass of B = 25 000 [kg] (1-ans) <b>ecf from (ii)</b>	1
	(b)	(i) loss of momentum = $50\,000 \times 6 - 50\,000 \times 4$ (1-sub) = 100 000 [kg m/s] (1-ans) <b>Accept</b> correct calculation for the momentum gain of B.	2
		(ii) momentum gain = 100 000 [kg m/s] <b>ecf from (b)(i)</b>	1
<b>Question total</b>			<b>[8]</b>
6.	(a)	As time increases, velocity increases ( <b>accept</b> positive correlation) (1) at a uniform rate / uniformly / linearly (1) <b>don't accept</b> at a constant speed N.B. "velocity is directly proportional to time" gets 2 marks	2
	(b)	(i) e.g. $a = \frac{50}{5}$ (Use of paired points for substitution – 1) = 10 [m/s <sup>2</sup> ](1) If paired points chosen should produce an answer of -10 [m/s <sup>2</sup> ] <b>award 1 mark only</b>	2
		(ii) $x = \frac{1}{2}(0 + 40)4$ (1-sub) = 80 [m](1)	2
	(c)	Can't ignore air resistance <b>or</b> friction <b>or</b> drag / acceleration isn't constant	1
<b>Question total</b>			<b>[7]</b>

Question			Marking details	Mark	
7.	(a)	(i)	192 (1) 20 (1)	2	
		(ii)	Correct points plotted – allow $\pm \frac{1}{2}$ small square division on volume axis (2) -1 for each error. Curve of best fit <b>up to (12,8)</b> allow $\pm \frac{1}{2}$ small square division (1) <b>don't allow</b> wispy, wobbly, thick or point to point lines	3	
	(b)	(i)	Volume increases as height increases (1) description of curved relationship e.g. increases at an increasing rate <b>or</b> gradient increases (1) <b>Don't accept</b> non-uniformly / non-linearly / non-proportional	2	
		(ii)	[Air] pressure is decreasing	1	
		(iii)	Best fit line extrapolated (put tick on graph) (1) Answer consistent with graph (1)	2	
	(c)	(i)	[The balloon's volume would] decrease (treat reference to pressure as neutral)	1	
		(ii)	As the helium molecules are moving more slowly <b>or</b> have less [kinetic] energy / taking longer between collisions / less force applied in each collision / less collisions <u>per second</u> <b>Don't accept</b> closer together	1	
	<b>Question total</b>			<b>[12]</b>	
	8.	(a)	(i)	Refraction	1
			(ii)	<u>Total internal reflection / TIR</u>	1
(b)		(i)	Change of speed [at boundary] / change of density <b>Don't accept</b> speeds up or lower density	1	
		(ii)	Hits the edge at an angle <u>greater than the critical angle or greater than <math>42^\circ</math></u> (accept between $41^\circ - 45^\circ$ ) (1) must be travelling [from more dense] to less dense medium (1)	2	
(c)		Emergent straight line should be drawn steeper (put tick or cross on the diagram)	1		
<b>Question total</b>			<b>[6]</b>		

Question	Marking details	Mark
9.	<p><b>Indicative content:</b></p> <p>A surface seismic wave travels across the surface of the Earth as opposed to through it. Surface waves usually have larger amplitudes and longer wavelengths than body waves, and they travel more slowly than body waves do. A P wave is a seismic body wave [that shakes the ground back and forth in the same direction and the opposite direction as the direction the wave is moving]/longitudinal wave. An S wave is a seismic body wave [that shakes the ground back and forth perpendicular to the direction the wave is moving]/transverse wave. S waves do not travel through fluids, [so do not exist in Earth's outer core [or molten rock (magma)]]. S waves travel slower than P waves in a solid and, therefore, arrive after the P wave.</p> <p><b>5 – 6 marks</b> 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><b>3 – 4 marks</b> 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><b>1 – 2 marks</b> 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><b>0 marks</b> The candidate does not make any attempt or give a relevant answer worthy of credit.</p> <p><b>Question total</b></p>	6
	<b>Question total</b>	<b>[11]</b>
	<b>Foundation tier paper total</b>	<b>[60]</b>