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Mark Scheme (Results)

January 2015

International GCSE Physics (4PH0 2P)

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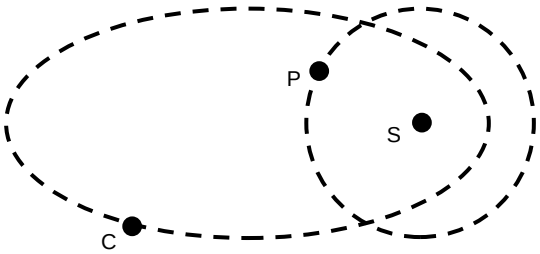
General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Notes	Marks
1 (a)	C (132 000 V);		1
(b)	B (efficiency of transmission);		1
(c)	C (transformer);		1

Total 3 marks

Question number	Answer	Notes	Marks
2 (a)	Gravitational (force)	Allow (force of) gravity Gravitational pull Centripetal (force)	1
(b) (i)	All three labels correct;  	C Comet P Planet S Sun	1
(ii)	Any two of - MP1 Idea that orbits cross/meet/ intersect; MP2 Idea that comet and planet can be (at the same place) at the same time; MP3 Idea that orbit time periods are different;	Allow at the same place orbits overlap idea of orbiting at different speeds	2

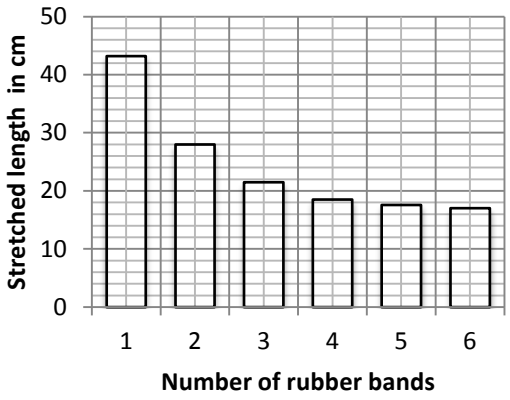
Total 4 marks

Question number	Answer	Notes	Marks
3 (a)	MP1 Due to friction; MP2 Idea of <u>electron</u> transfer;	Allow idea of materials rubbing Ignore “charge” “static” Reject (for MP2 mark) idea of protons moving	2
(b) (i)	Idea of spark / ignition / fire / explosion	Ignore reference to shock and petrol fumes	1
(ii)	Idea of current (in the wire); OR Idea of charge moving (in the wire); Idea that this discharges tanker; OR No voltage/ p.d. remains;	ignore references to positive charges Allow: No charge is left No overall charge Charge is removed Tanker becomes neutral Ignore: “Electricity” further discussion of danger	2

Total 5 marks

Question number	Answer	Notes	Marks
4 (a) (i)	18.7 ± 0.5 (cm);	accept any value between 18.2 and 19.2	1
(ii)	Any two of - MP1 Mention of <u>parallax</u> error; MP2 Idea of zero error; MP3 End of ruler is worn; MP4 Hook is curved; MP5 Hook stretches bands to different lengths; MP6 Bands are not close to ruler; MP7Bands are not parallel to ruler; MP8 Bands are twisted;	Ignore human error Ignore inaccurate scale Ignore anomaly, no average, references to Hooke's law	2
(b)	Idea of a controlled variable; e.g. force kept constant temperature kept constant	Allow properties of bands, e.g. type, brand, material, thickness, elasticity, original length Ignore idea of consistent technique, e.g. using same equipment	1

Question number	Answer	Notes	Marks
4 (c) (i)	Discrete/discontinuous; OR Independent;	Allow non-continuous, categoric	1
(ii)	Axes labelled - quantities and distance unit; Suitable scale chosen - longest bar occupies at least half the grid; All 5 bars for given data correctly plotted;;	Ignore orientation Ignore the 4 band value Bar length plotted to nearest small square. Deduct one mark for each plotting error (max -2) Data plotted correctly, but only as floating "x's" gets maximum of one mark for plotting Reject both plotting marks if a line graph is drawn (only scale and axes marks are available in this case)	4
(iii)	MP1 Idea of inverse relationship; MP2 Idea of non linearity;	Allow: pattern statements negative correlation Accept ecf "curved line"	2



Number of rubber bands	Stretched length in cm
1	43.2
2	28.0
3	21.5
4	(Ignore)
5	17.6
6	17.0

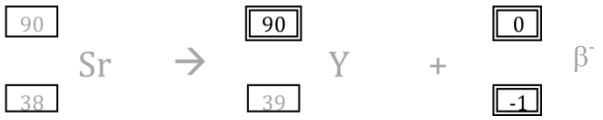
Total 11 marks

Question number	Answer	Notes	Marks
5 (a)	- 268.8 (°C);	Minus sign is essential Allow - 269(°C) - 268.95 (°C)	1
(b) (i)	Any two of - MP1 idea that molecules move faster; MP2 idea that molecules become further apart; MP3 idea that molecules move more freely;	Must be comparative statements relating to boiling Allow increased KE increased vibration Allow (for "freely") idea that forces between molecules have been overcome Ignore ideas of bonding	2
(ii)	Straight line with positive slope; Aimed at origin;	Allow line passing through origin, stopping short or dropping to θ axis at "4.2 K"	2
(c)	Any four of - MP1 Appropriate instrument to measure temperature; MP2 Appropriate instrument to measure volume or length or tube diameter; MP3 Means of varying temperature; MP4 consideration of diameter and volume; MP5 Idea of obtaining a range of values; MP6 Idea of repetition or averaging of readings; MP7 Draw a graph to display results; MP8 Mention of kelvin temperature;	Points may be shown as labelled additions to the diagram e.g. ruler e.g. water bath / heater Allow treatment of anomalies	4

Total 9 marks

Question number	Answer	Notes	Marks
6 (a) (i)	Work done = force x distance moved;	Allow W = F x d and rearrangements	1
(ii)	Substitution into correct equation; Calculation; e.g. 13 x 110 1430 (J)	Correct answer without working scores 2 marks	2
(iii)	Same response as for 3(a)(ii)	1430 (J) or ecf	1
(b)	Any two of - MP1 Idea that GPE depends on height OR Statement that GPE = mgh; MP2 Idea that h is reduced; MP3 Idea that centre of gravity (is now) lower;	 Allow centre of mass for centre of gravity	2
(c) (i)	Moment = force x (perpendicular) distance (from the pivot);	Allow moment = F x d and rearrangements	1
(ii)	Calculate given moment; Equate moments; Calculation; e.g. (150 x 0.32) = 48 for one mark 150 x 0.32 = F x 0.87 for two marks F (= 150 x 0.32 / 0.87) = 55 (N) for three marks	If no other mark gained, allow a statement that "clockwise moment = anticlockwise moment" for one mark 55.172 (N)	3

Total 10 marks

Question number	Answer	Notes	Marks
7 (a) (i)	90		1
(ii)	time; either for amount of (radioactive) isotope to halve; or for (radio)activity to halve;	Allow for amount - (number of un-decayed) nuclei/atoms/molecules (un-decayed) mass of isotope	2
(iii)	Any two of – MP1 Idea that (beta) radiation causes a stated hazard; MP2 Idea that strontium-90 has a long half-life; MP3 Idea that <u>all</u> beta emission will be absorbed by the body;	 e.g. causes cancer, kills cells, mutates DNA, ionises tissue Accept lasts a long time Accept answers in terms of range	2
(b) (i)	90 and 0; -1; 	Must have both Minus is essential	2
(ii)	Any two ideas from – MP1 They are isotopes of different elements; MP2 Strontium-90 (nucleus/atom) has the same number of protons as other strontium (nuclei/atoms); MP3 Yttrium-90 (nucleus/atom) has the same number of protons as other yttrium (nuclei/atoms);	 Allow use of proton number data (38) Allow use of proton number data (39)	2

Total 9 marks

Question number	Answer	Notes	Marks
8 (a) (i)	Any one of- MP1 Speed / velocity (in a vacuum); MP2 Transverse (wave); MP3 Electromagnetic (wave); MP4 A general wave property;	 e.g. reflection, refraction, diffraction, transfer energy	1
(ii)	Any two of- Frequency; Wavelength; Energy;	Any wavelength or frequency relationship if stated must be correct	2
(b) (i)	There are more than two values;	Accept peaks not all same height not just 1 and 0	2
	Reference to shape/slope/ramp(s);	Accept RA Ignore “analogue”	
(ii)	MP1 More than one gap measured / averaging seen; MP2 Value of 1.15 or 1.35 (s);	 Allow 2 marks for bald answers of: 1.15 or 1.35 (s) Allow 1 mark (MP1) for bald answers of: 1.2, 1.25, 1.4, 1.55 (s)	2
(iii)	Calculation of frequency (from f= 1/T); Unit to match value; e.g. f = 1/1.15 = 0.87 Hz	Allow e.c.f from time value given in (b)(ii) 1/1.35 = 0.74	2

Total 9 marks

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