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Mark Scheme (Results)

Summer 2013

International GCSE
Physics (4PH0) Paper 2PR

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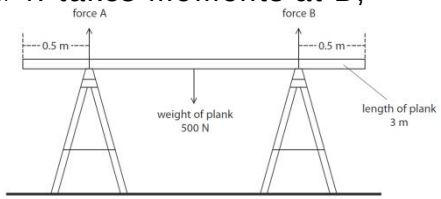
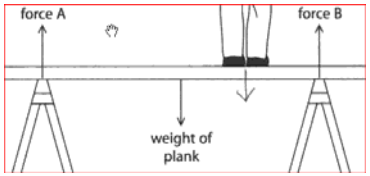
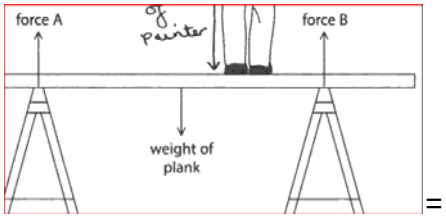
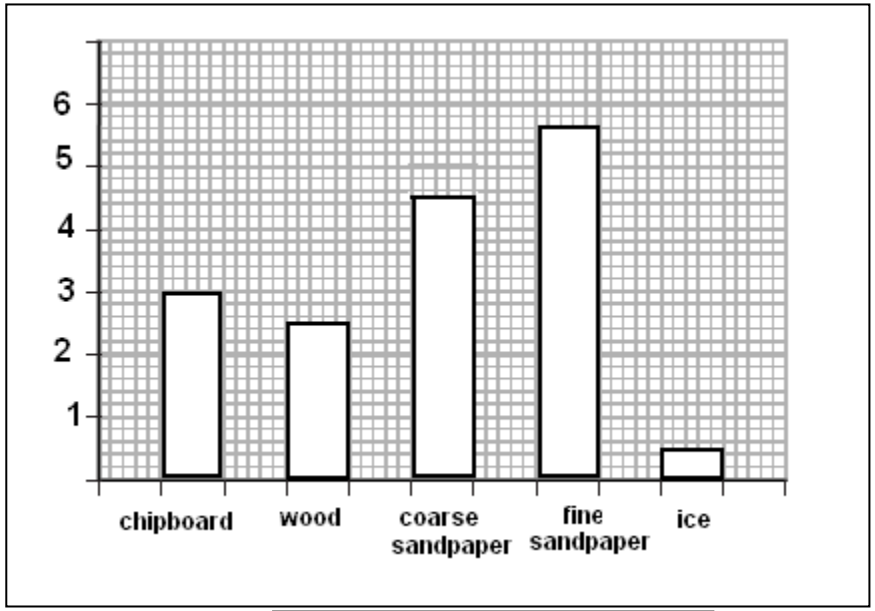
Question number	Answer	Notes	Marks
1 (a)	A activity		1
(b)	A alpha particle		1
	B beta particle		
(c)			1
(d)	A alpha particle		1
		Total	**4**

Question number	Answer	Notes	Marks
2 (a)	B		1
(b) (i)	#1. states principle of moments ; #2. moment= force X (perpendicular) distance from pivot: #3. calculates **one** moment about either A or B; #4. takes moments at B;  e.g. moments clockwise = moments anticlockwise • moment = weight x distance • 500 x 1 • 1 x 500 = Ax2	Ignore bald '500/2 =250' Accept for #2: in words or in recognisable symbols or in numbers from the diagram Accept qualitative alternative for last 2 marking points: '2 forces so divide weight in half' OWTTE = 1 mark if then qualified by distance consideration = 2 marks	4
(ii)	Upward Force at point B 250(N);	allow arrow for clockwise or anticlockwise	1

Question number	Answer	Notes	Marks
(c) i	Arrow down from painter; (vertical, below feet)	  =0	1
ii	Both **forces** increase; Force at B larger than force at A / RA ;	ignore: • both moments increase • 'force B is larger'	2
		Total	**9**

Question number	Answer	Notes	Marks
3 (a) i	Any ONE sensible suggestion from ensuring good contact; increasing friction; increasing pressure;	allow: • to prevent slipping sideways • make it easier to control	1
ii	Keep a fair test / controlled variable;	allow: it not an independent variable ignore: all mention of accuracy	1

Question number	Answer	Notes	Marks
3 (b) (i)	(Type of) surface(s);	do not accept: • a (single) named surface • type of block • material of block	1
(ii)	4.5;		1
(iii)	**Axes labelled**- quantity and unit; **Linear scale** such that longest bar occupies at least half the grid; **Plotting---ignore order of bars** 5 bars correctly plotted;; If only 3 bars correctly plotted allow 1 mark for plotting  	allow force (N) force/N tolerance is +/- 0.5 small sq allow ecf from table ALL data plotted correctly as floating "x's" gets only one mark for plotting Reject both **plotting** marks if a **line** graph is drawn (only scale and axes marks are available in this case) Type of surface / Average chipboard 3.0 wood 2.5 coarse sandpaper 4.5 fine sandpaper 5.7 ice 0.5	4

Question number	Answer	Notes	Marks
3 (c)	Any two of the following five ideas: #1 different experimental set-up; e.g. • different masses/weights • different kind of wooden block • different speed of pull #2 variable friction; e.g. • the surfaces were not uniformly smooth • the wooden block did not move evenly across the surface #3 errors in the force meter reading; e.g. • errors recording the force on the N-meter • faulty scale on N-meter • zero errors / different ranges of N-meters used • different angle of N-meter #4 different contact; e.g. • the weights on the block may not have been evenly placed on the block • the block was not pressed down onto the surface evenly #5 friction reduces as the experiment progresses; e.g. • the wooden block becomes smoother as the experiment proceeds • it moves over the surface more easily as the experiment progresses • lubricant on block	Ignore: • unqualified 'broken N-meter' • human error • 'strength of pull' • anomalous results • surface area of surface	2

Question number	Answer	Notes	Marks
3 (d)	Any two from: Pressure less; Area larger; Use of formula P =F/A;	 Load is the same/wood is thinner	2
(e)	Any TWO sensible suggestions;; e.g. place a lubricant between the two surfaces make the surfaces smoother decrease weights /masses on block	allow: • named lubricants • change the surfaces so that are not so rough • reduce the area (of contact) • decrease mass of block	2
		Total	**14**

Question number	Answer	Notes	Marks
4 (a)	C Silver		1
(b)	Must be in the correct context Any **two** from: • negative charge moves or electrons move; • (charge moves through wire) from plate B / to lifting sheet A; • therefore produces unbalanced /net charge on A/B;	*Do not award marks for repeat of stem* Accept: lifting sheet for A, metal plate for B charge is not enough for first MP A has gained electrons /B has lost electrons for 2 marks Ignore references to 'poles' 'current' Reject ideas about positive charge moving	2

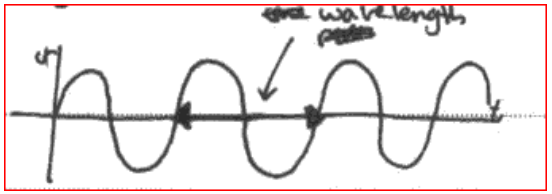
Question number	Answer	Notes	Marks
4 (c)	Must be in the correct context Any two from • (top of) dust becomes positive; • negative **charge** on lifting sheet A **attracts** dust; • force of attraction > weight of dust;	Ignore unqualified 'opposite charges attract' allow an answer in terms of charge separation e.g. induced charge on dust ('top' positive 'bottom' negative)	2
(d)	Answers must be in the context of the stream of water and charged rod • the water (molecules) have a charge; • opposite charges attract / like charges repel;	do not credit repeat of stem allow (negatively) charged rod attracts (positively) charged water	2
		Total	**7**

Question number	Answer	Notes	Marks
5 (a) (i)	idea that Energy source which cannot be **replaced**;	allow: • can't be used again • supply is limited in time • can't be replenished (for a long time) • can't be regenerated ignore: • can't be recycled • can't be stored • unqualified 'finite/limited/will run out' • not sustainable • can be used up	1
(ii)	Any from for 1 mark; Coal Oil or named fuel Gas	allow: crude oil fossil (fuel(s)) petrol diesel gasoline kerosene paraffin methane butane propane ignore: burning fuel(s)	1

Question number	Answer	Notes	Marks
5 (b) (i)	AT WIND FARM: any one from • Step-up transformer used at the wind farm; • voltage increased (for transmission); DURING TRANSMISSION: any one from • transmitted at (high voltage and) low current; • no/little energy is wasted during transmission; AT CITY END: any one from • Step down transformer at 'other end'/OWTTE; • voltage reduced to 230V/for safety/for homes;	allow: description of a transformer Allow small voltage loss in transmission	3

Question number	Answer	Notes	Marks
5 (b) (ii)	Answer to a maximum of SIX marks to include: up to 4 **ideas** from advantages and up to 4 **ideas** from disadvantages **Annotate with ticks / underlining** advantages 1. Renewable energy resource; 2. No /little carbon emission or air pollution *OR* will not add to global warming OR little pollution; 3. Source of energy is free *OR* low running costs; 4. Brings employment/construction to some remote areas *OR* good for the local economy; 5. Lots of energy available OR abundant source *OR* wind farm can generate large amounts of electricity; 6. wind turbines can be more **efficient** than conventional power stations; disadvantages 1. Unsightly/ugly *OR* can damage views/ blight landscapes / local people may find them an intrusion; 2. Can be noisy/ causes noise pollution; 3. Only work when the wind blows/ above certain wind speed *OR* no constant output of electricity OR not reliable; 4. Each generator can only generate a small amount of electricity *OR* many are needed to supply the amount of electricity required for a city; 5. Costly to construct /maintain; 6. can only be placed in certain areas OR require large areas;	If a single word list, penalise by ONE mark accept suitable/sensible alternatives ignore: • environmentally friendly • cheaper than fossil fuels • kills birds /harming animals • unqualified 'expensive' /'high costs' • safer • carbon-neutral • unqualified 'more efficient'/ 'high efficiency'	6
		Total	**11**

Question number	Answer	Notes	Marks
6 (a) (i)	Momentum = mxv;	in words or in recognisable symbols	1
(ii)	Substitution into correct equation; Evaluation; consistent unit; E.g. Momentum = 0.1 x 3 Solution 0.3 kg m/s	Allow: use of g ($\rightarrow$300) but unit *must* match allow: • kg m s^{-1} • N s	3
(iii)	Momentum is conserved	ignore: • because it has the same mass and velocity any discussion of energy	1
(b)	prediction: Two balls at the opposite end of the cradle move up/away; (balls D and E rise up) any one sensible reason: • **idea** that momentum is still conserved in this collision • total momentum of the system is constant • there is twice the momentum of one ball so the momentum is transferred to two balls;	Allow: E moves off with 2v ignore • 'the other balls remain still' • inelastic (collisions) • mention of energy	2
		Total	**7**

Question number		Answer	Notes	Marks
	7 (a)	standard definition of wavelength; e.g. • distance between two points on a wave/ two peaks/ two troughs • distance between each wavefront • distance travelled by wave in one time period 	allow: from clear diagram crest for peak ignore: • 'the length of a wave' • 'distance taken for 1 cycle' • distance between one wave and the next one	1
7	(bi)	Speed of wave = frequency x wavelength;	allow: in any rearrangement $v = f.\lambda$	1
	(bii)	substitution into any form of the equation ; evaluation; e.g. $3(m/s) = 1.5(Hz) \times \lambda$ $(\lambda) = 2(m)$;	 accept for 1 mark $\frac{3}{1.5}$	2

Question number	Answer	Notes	Marks
7 (ci)	Diffraction; And one of • The incoming wave spreads out at the gap; • The energy carried by the wave spreads out ;	allow: • diffraction seen in (cii) • recognisable spelling for 'diffraction' ignore: • the wave gets bigger • wave is bent • (wavefront is) curved	2
7 (cii)	idea that (diffraction only apparent when) λ and size of gap comparable/RA; wavelength of light is very small / smaller than water waves /smaller than the gap;	Allow RA	2
		Total	**9**

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