



Mark Scheme (Results)

Summer 2013

International GCSE
Physics (4PH0) Paper 2PR

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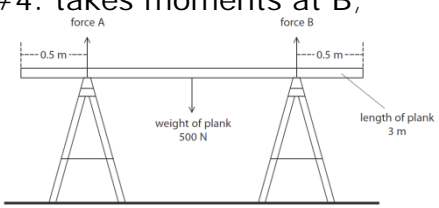
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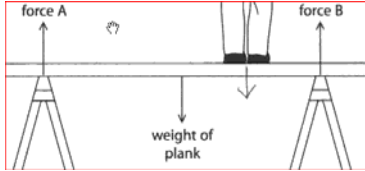
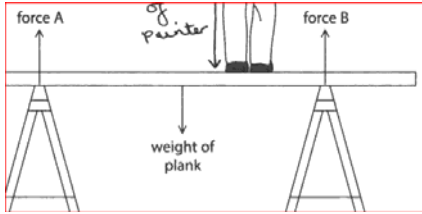
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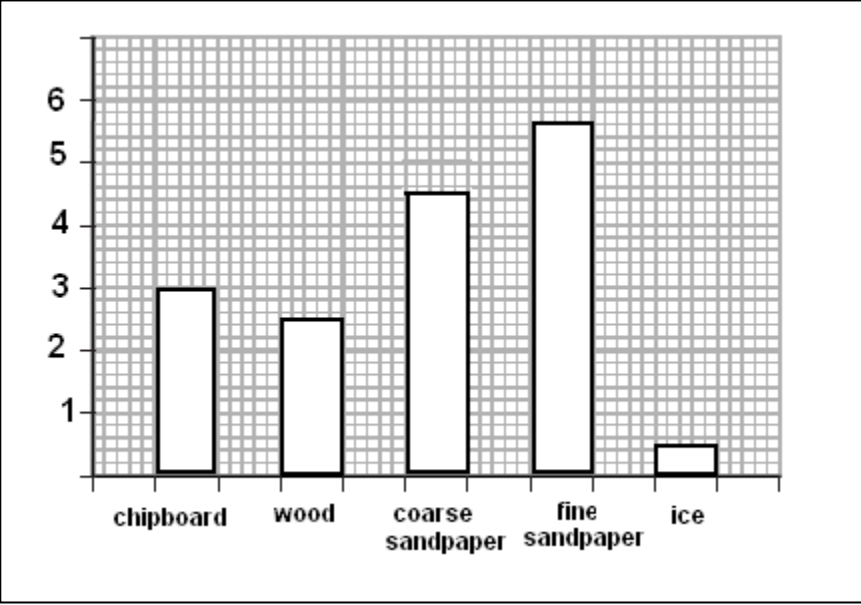
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Question number	Answer	Notes	Marks
1 (a)	A activity		1
(b)	A alpha particle		1
(c)	B beta particle		1
(d)	A alpha particle		1
		Total	4

Question number	Answer	Notes	Marks
2 (a)	B		1
(b) (i)	<p>#1. states principle of moments ;</p> <p>#2. moment= force X (perpendicular) distance from pivot:</p> <p>#3. calculates one moment about either A or B;</p> <p>#4. takes moments at B;</p>  <p>e.g.</p> <p>moments clockwise = moments anticlockwise</p> <ul style="list-style-type: none"> • moment = weight x distance • 500 x 1 • 1 x 500 = Ax2 	<p>Ignore bald '500/2 =250'</p> <p>Accept for #2: in words or in recognisable symbols or in numbers from the diagram</p> <p>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</p>	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)	 	1
ii	Both forces increase; Force at B larger than force at A / R_A ;	ignore: <ul style="list-style-type: none"> • 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	1												
	4.5;	• type of block • material of block	1												
(iii)	<p>Axes labelled- quantity and unit;</p> <p>Linear scale such that longest bar occupies at least half the grid;</p> <p>Plotting---ignore order of bars 5 bars correctly plotted;; If only 3 bars correctly plotted allow 1 mark for plotting</p> <div data-bbox="152 890 309 1023" style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">(Average) force in N</div>  <div data-bbox="651 1406 1086 1453" style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;">(Type of) Surface</div> <table border="1" data-bbox="1523 1093 1966 1412" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="background-color: #cccccc;">Type of surface</th> <th style="background-color: #cccccc;">Average</th> </tr> </thead> <tbody> <tr> <td>chipboard</td> <td>3.0</td> </tr> <tr> <td>wood</td> <td>2.5</td> </tr> <tr> <td>coarse sandpaper</td> <td>4.5</td> </tr> <tr> <td>fine sandpaper</td> <td>5.7</td> </tr> <tr> <td>ice</td> <td>0.5</td> </tr> </tbody> </table>	Type of surface	Average	chipboard	3.0	wood	2.5	coarse sandpaper	4.5	fine sandpaper	5.7	ice	0.5	<p>allow force (N) force/N</p> <p>tolerance is +/- 0.5 small sq</p> <p>allow ecf from table</p> <p>ALL data plotted correctly as floating "x's" gets only one mark for plotting</p> <p>Reject both plotting marks if a line graph is drawn (only scale and axes marks are available in this case)</p>	4
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chipboard	3.0														
wood	2.5														
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ice	0.5														

Question number	Answer	Notes	Marks
3 (c)	<p>Any two of the following five ideas:</p> <p>#1 different experimental set-up; e.g.</p> <ul style="list-style-type: none"> • different masses/weights • different kind of wooden block • different speed of pull <p>#2 variable friction; e.g.</p> <ul style="list-style-type: none"> • the surfaces were not uniformly smooth • the wooden block did not move evenly across the surface <p>#3 errors in the force meter reading; e.g.</p> <ul style="list-style-type: none"> • 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 <p>#4 different contact; e.g.</p> <ul style="list-style-type: none"> • the weights on the block may not have been evenly placed on the block • the block was not pressed down onto the surface evenly <p>#5 friction reduces as the experiment progresses; e.g.</p> <ul style="list-style-type: none"> • the wooden block becomes smoother as the experiment proceeds • it moves over the surface more easily as the experiment progresses • lubricant on block 	<p>Ignore:</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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)	<p>Must be in the correct context</p> <p>Any two from:</p> <ul style="list-style-type: none"> • 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; 	<p><i>Do not award marks for repeat of stem</i></p> <p>Accept: lifting sheet for A, metal plate for B</p> <p>charge is not enough for first MP</p> <p>A has gained electrons /B has lost electrons for 2 marks</p> <p>Ignore references to 'poles' 'current'</p> <p>Reject ideas about positive charge moving</p>	2

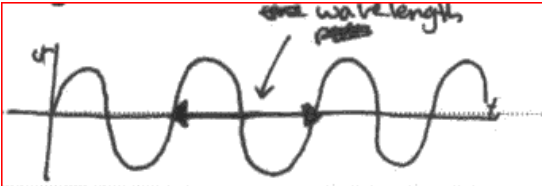
Question number	Answer	Notes	Marks
4 (c)	<p>Must be in the correct context Any two from</p> <ul style="list-style-type: none"> • (top of) dust becomes positive; • negative charge on lifting sheet A attracts dust; • force of attraction > weight of dust; 	<p>Ignore unqualified 'opposite charges attract'</p> <p>allow an answer in terms of charge separation e.g. induced charge on dust ('top' positive 'bottom' negative)</p>	2
(d)	<p>Answers must be in the context of the stream of water and charged rod</p> <ul style="list-style-type: none"> • the water (molecules) have a charge; • opposite charges attract / like charges repel; 	<p>do not credit repeat of stem</p> <p>allow (negatively) charged rod attracts (positively) charged water</p>	2
		Total	7

Question number	Answer	Notes	Marks
5 (a) (i)	idea that Energy source which cannot be replaced ;	allow: <ul style="list-style-type: none"> • can't be used again • supply is limited in time • can't be replenished (for a long time) • can't be regenerated ignore: <ul style="list-style-type: none"> • 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)	<p>AT WIND FARM: any one from</p> <ul style="list-style-type: none"> • Step-up transformer used at the wind farm; • voltage increased (for transmission); <p>DURING TRANSMISSION: any one from</p> <ul style="list-style-type: none"> • transmitted at (high voltage and) low current; • no/little energy is wasted during transmission; <p>AT CITY END: any one from</p> <ul style="list-style-type: none"> • Step down transformer at 'other end'/OWTTE; • voltage reduced to 230V/for safety/for homes; 	<p>allow: description of a transformer</p> <p>Allow small voltage loss in transmission</p>	3

Question number	Answer	Notes	Marks
5 (b) (ii)	<p>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</p> <p>advantages</p> <ol style="list-style-type: none"> 1. Renewable energy resource; 2. No /little carbon emission or air pollution <i>OR</i> will not add to global warming <i>OR</i> little pollution; 3. Source of energy is free <i>OR</i> low running costs; 4. Brings employment/construction to some remote areas <i>OR</i> good for the local economy; 5. Lots of energy available <i>OR</i> abundant source <i>OR</i> wind farm can generate large amounts of electricity; 6. wind turbines can be more efficient than conventional power stations; <p>disadvantages</p> <ol style="list-style-type: none"> 1. Unsightly/ugly <i>OR</i> 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 <i>OR</i> no constant output of electricity <i>OR</i> not reliable; 4. Each generator can only generate a small amount of electricity <i>OR</i> 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 <i>OR</i> require large areas; 	<p>If a single word list, penalise by ONE mark</p> <p>accept suitable/sensible alternatives</p> <p>ignore:</p> <ul style="list-style-type: none"> • 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 = 0.1×3 Solution 0.3 kg m/s	Allow: use of g ($\rightarrow 300$) but unit <i>must</i> 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. <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • '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 $v = f \cdot \lambda$	1
(bii)	substitution into any form of the equation ; evaluation; e.g. $3(\text{m/s}) = 1.5(\text{Hz}) \times \lambda$ $(\lambda) = 2(\text{m});$	accept for 1 mark $\frac{3}{1.5}$	2

Question number	Answer	Notes	Marks
7 (ci)	Diffraction; And one of <ul style="list-style-type: none"> • The incoming wave spreads out at the gap; • The energy carried by the wave spreads out ; 	allow: <ul style="list-style-type: none"> • diffraction seen in (ci) • recognisable spelling for 'diffraction' ignore: <ul style="list-style-type: none"> • 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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