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Mark Scheme (Results)

January 2012

International GCSE Physics (4PH0)
Paper 2P

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INTERNATIONAL GCSE PHYSICS 4PH0 2P – JANUARY 2012

Question number	Answer	Notes	Marks
1 (a) (i)	D		1
(ii)	C		1
(b)	f = 1/T (NO MARK) f= 1/5; 0.2 (Hz);	Bald 0.2 (Hz) scores 2 marks	2

Question number			Answer	Notes	Marks
2	(a)		something to measure length; e.g. (metre) rule(r), tape measure, trundle/click wheel, pedometer, step counter something to measure time; e.g. stopwatch, stopclock, timer	If more than two responses given, each incorrect response negates a correct response Ignore ticker-tape, ticker-timer, video	1 1
	(b)		Correct plotting (ignoring 0,0); Line joins (10,14) to origin; Smooth curve (by eye) to right of (10,14)	Allow ecf on plotting Ignore any kink at (10,14)	3
	(c)		26 (m)	Ecf from graph in (b) Allow ± 0.5 (half a small square)	1
	(d)	(i)	slowed down	Reject: accelerates <u>and</u> slows down	1
		(ii)	graph becomes less steep / levels off	Allow description based on figures from graph	1

Question number			Answer	Notes	Marks
3	(a)		electrons; negative;		2
	(b)	(i)	(droplets) repel each other / repulsive force / like charges repel; (droplets) spread out / finer spray;	Ignore: attraction of paint to object Ignore: references to paint sticking	2
		(ii)	Any two from (object) attracts droplets /paint OR opposite charges attract; paint reaches back of object / obscured places (at same time); less paint wasted;	Ignore: references to paint sticking	2
	(c)		risk of spark / shock /damage;	Accept: lightning, fire, explosion, Reject: risks from current electricity	2
			related risk reduction; e.g. earth connection, appropriate use of insulation	risk reduction method needs to apply to stated risk Accept: earthed, earthing, grounding, rubber gloves Reject: “rubber earth strip (under cars)”	

Question number	Answer	Notes	Marks
4 (a)	Any three of evaporation as liquid→ gas/vapour; higher (kinetic) energy/faster particles/molecules leave/ evaporate; reducing (average) energy of particles left /heat remaining; reducing temperature;	 Accept: water/sweat → gas/vapour Accept: particles leaving take heat with them Accept: lower energy particles remain	3
(b) (i)	(still covered in) sweat /evaporation mentioned; not generating as much 'new' heat;	Ignore: conduction, convection and radiation losses Ignore: reference to shiny sheet	2
(ii)	Either barrier to reduce particle movement; reducing convection / evaporation; OR (shiny) surface reflects/poor absorber; reducing radiation /IR losses;	Ignore: conduction losses Accept: barrier to air currents / air is trapped	2

Question number			Answer	Notes	Marks
5	(a)		A method involving a suitable measurement or comparison; An appropriate check for horizontality; e.g.: measure height between ruler and bench in several places; height readings consistent; OR set a marker level with pivot; same height as end of ruler; OR place spirit level on ruler; bubble should be central; OR measure angle between stand and ruler; check for right angle	Allow assumption that bench is horizontal and /or stand is vertical Allow alternative methods and checks that would work	2
	(b)	(i)	moment = force x (perpendicular) distance (from pivot)	or equivalent	1
		(ii)	2 x 60 / 2 x 0.6; 120 / 1.2; N cm / N m;		3
	(c)	(i)	mass / weight of ruler; weight acts downwards /increases (clockwise) moment;	 Allow: idea that forcemeter also supports ruler	2
		(ii)	off scale on the forcemeter		1

Question number	Answer	Notes	Marks
5 (d)	Explanation including: clockwise and anticlockwise moments equal; (and fish are) closer to A; so to get same moment for smaller distance (force must be larger);	Accept similar points made using mathematical symbols e.g. taking moments – F_A x = F_B y reworking – $F_A = (y/x)F_B$ y > x (so $F_A > F_B$) i.e idea that force and distance are inversely proportional	3

Question number	Answer	Notes	Marks
6 (a) (i)	B turbine		1
(ii)	C generator		1
(b) (i)	power = voltage x current	Allow: equivalent arrangements Allow: P=IV etc Reject use of units for quantities	1
(ii)	Correct equation (any arrangement); e.g.: power in = power out / $V_{IN}I_{IN} = V_{OUT}I_{OUT}$ / $I_{IN}/I_{OUT} = V_{OUT}/V_{IN}$ Correct substitution; e.g.: V_{OUT}/V_{IN} = 115/25 (or 4.6) OR I_{OUT}/I_{IN} = 25/115 (or 0.22) Correct deduction based on working: e.g. output current is smaller	Accept: 5/23 and correct conversion to volts Bald 'output current smaller' = 0 mark Bald 'output current 4.6 times smaller' = 3 marks	3
(iii)	(lower current leads to) less (resistive) energy /heat/ power losses		1

Question number	Answer	Notes	Marks
6 (c)	ANY FOUR FROM Radioactive / emits radiation; High activity; Long half live / need for long term storage; Danger / harm to people /environment; Expensive to contain / dispose of; Need for security /shielding / burial; Social aspect eg. location of storage;		4

Question number	Answer	Notes	Marks
7 (a)	any four from – (at lower temp) particles move at lower speed / lower kinetic energy; on average; so hit sides less often / with less energy; reducing force / pressure; tension in rubber; pulls balloon material into smaller size;	Accept: momentum arguments	4

Question number	Answer	Notes	Marks
7 (b)	Any **three** explanations of faulty method, with a workable improvement. Note that the fault needs to be properly identified, not just "the method is faulty / inadequate", or the method numbered with a comment that "Step 2 is wrong" <u>Fault #1</u> 'different time in freezer' does not give range of temps / always cools to same temp; <u>Improvement #1</u> Way to get range of temp ; e.g use water bath(s), use freezer(s) set to different temps <u>Fault #2</u> Difficult /hard to 'measure temp of balloon with thermometer' OR this doesn't measure temp of gas inside; <u>Improvement #2</u> Measure temperature of surroundings ; e.g. inside of freezer, water bath or air <u>Fault #3</u> Measuring / plotting 'size' is imprecise /too vague; <u>Improvement #3</u> measure / plot a more precise quantity; e.g. volume / length / diameter / circumference	CREDIT any explanation OR improvement, up to three of each, wherever seen i.e. the "Fault" and "Improvement" marks do not have to form a matching pair. Allow answers that mention high and/or low temperatures Needs to be more than: can't + statement from stimulus Ignore reference to room temperature Not temperature	max 6

	<u>Fault #4</u> 'measure size next to ruler' is an inaccurate method / difficult to measure (with a ruler) / <u>comment</u> on shape ; <u>Improvement #4</u> Sensible method to measure (a relevant quantity); e.g. measure volume by displacing water, measure circumference using tape/string, use set squares with ruler <u>Fault #5</u> repeating does not make it a fair test; <u>Improvement #5</u> control a named variable that does; e.g. starting volume of balloon <u>Fault #6</u> balloon may warm up between leaving the freezer and being measured; <u>Improvement #5</u> method of minimising this; e.g. idea of measuring quickly, having whole experiment at the measured temperature	Allow mention of parallax NOT “time in freezer”	

PAPER TOTAL: 60 MARKS

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