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Examiners' Report November 2008

IGCSE

IGCSE Physics (4420)

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4420 Physics Paper 1F

Too few candidates entered for this paper to be able to compile a meaningful report. Please refer to report Examiner's Report for **Physics 4420 2H** for feedback relating to common questions.

4420 Physics Paper 2H

General Information

Some of the work was of a very high quality with only a few candidates entered for the wrong tier.

Question 1

In (a) many scored two out of four almost always managing to identify B and failing to identify M.
Part (b) was poorly answered with the meters often the wrong way round. Misspellings such as 'ampmeter' and 'voltameter' were common and the unit was given instead of the quantity measured.

Question 2

In (a) the common error was 8÷4 = 2 although the unit hertz was known.
In (b) a frequent wrong answer was 'sound'.
In (c) few candidates knew that waves can transfer information or data or signals as well as energy.
Part (d) was well answered although 'time period' was sometimes confused with 'frequency' or an expression like 'the time between waves in one second' was seen.

Question 3

In (a) few identified kinetic energy as the output energy of a fan giving 'wind' or 'electrical' instead but most recognised that energy is wasted as heat and sound.
In (b) the equation for efficiency was often inverted and the word 'useful' was often missing.
In (c) most candidates gave the correct unit for energy but failed to convert 15 minutes into seconds giving a final answer of 750 J.

Question 4

In (a) a wide range of answers was acceptable for a source of background radiation but not 'radioactive sources' which were often seen.
Part (b) was very poorly answered with many candidates making statements about types of radioactive radiations that did not answer the question. In (i) reference was made to the behaviour of alpha particles in air rather than their absorption by thin card.
Answers to (ii) and (iii) did not often refer to the metal absorber.
Part (c) was well answered although the wrong answer of 50 Bq often appeared even though a time equivalent to four half lives had been identified.

Question 5

This question was very well answered by a wide range of candidates.
Very occasionally a power of ten error was seen in part (c).

Question 6

In (a) very few candidates realised that the point where the weight of the barrier arm acts must the centre of gravity of the barrier arm. P was a very common answer.

In (b) a common answer was 'insulator' instead of 'electromagnet'.
In (c) the most likely correct answer was 'to prevent a short circuit' although many thought that there was a safety issue.
In(d) many realised that the weight of the iron sphere is the cause of the force at A.
In (e) candidates scored three or zero for the calculation with many unable to correctly use the dimensions given on the diagram.

Question 7

Part (a) saw many confused answers because although the sharp blade was generally associated with a smaller area the relationship was incorrectly presented.
In (b)(i) most candidates showed a pair of arrows in opposition to the original arrows and gained both marks but (ii) did not score because few realised that the assumption must be that this point is at rest.
In (c) the value of g was often left out of the calculation and the value 41 derived from 1025÷25 was often seen.

Question 8

In (a)(i) the arrow drawn in the resistor was often at an angle giving the appearance of a variable resistor. In (a)(ii) the mark for stating that electrons are negatively charged was not always scored.
In (b)(i) answers of 2.4 J and 8640 J were often seen and in (b)(ii) 'electrical' rather than 'heat' was commonly seen.
In (c) the idea that halving the voltage also halves the current resulting in quartering of the energy is not understood. The energy was shown either halved or the same as before.

Question 9

Part (a) was poorly answered with I marked on the wrong side of the normal and C as the right angle on the other side of the normal to where it should have been.
In (b)(i) the meaning of critical angle was well answered in a number of different ways although the relationship often missed out 'sine' or stated that they were inversely proportional so that the calculation in (iii) was 1÷1.6.
In (c) the path was usually shown as the same as in (a) with reflection or transmission away or towards the normal.
Explanations in (c)(ii) often failed to score because 'less refraction' was confused with 'angle of refraction is less'.

Question 10

An answer of 500 kPa rather than 125 kPa was usually seen for one mark but the assumption in (b) scored well. About half of the candidates scored (c)(i) and went on to score one mark in (ii).

Question 11

In the experiment of Geiger and Marsden, the small particle was frequently named as 'electron' and the large particle as 'nucleus' or 'gold atom'. Part (b) scored well.
The graph work in (c) usually scored well except where the axes were reversed, units were missing and the last point was plotted as 21 instead of 22. Reading the value off the graph in (ii) was always correct.
Part (d) was very poorly answered and in (e)(i) the property kept constant was usually given as 'mass'.
Part (f) rarely scored with 'plum pudding', 'Rutherford's', 'Dalton's' and 'gold leaf' often seen.

Question 12

This question scored well. Many candidates successfully identified X as a neutron. In (b) the subscript and superscript for ß were often reversed but a follow through mark was often scored in (ii) for neptunium.

Question 13

In (a) candidates knew that distance travelled could be determined from the area under the graph but acceleration was often associated with the letters A, B and C shown on the diagram rather than the slope or gradient.
The answers to (b) were often guesswork and in (c) only (ii) was consistently correct.
Descriptions in (d) of terminal velocity continue to show little understanding and expressions like 'no acceleration so no velocity' were often seen.
In (e) the height of the cliff and the depth of the water related to the areas under the graphs but most candidates linked them to the values on the time axis.

Question 14

In (a) the commonest answer was 'magnitude' rather than 'direction' and in (b) displacement was often identified as a scalar and density as a vector. Part (c) was very well answered.

Question 15

Parts (a) and (b) were very well answered. In (c) the three marks were available for

- showing an alternating wave
- two and a half cycles or a period of 4 squares
- an amplitude of 2 squares.

The best answers seen scored the first mark and one other.
In (d) references to diffraction were rare. Many scored one mark for stating that C would hear the sound due to reflection.

4420 Physics Paper 03

General Information

The examiners were pleased to note the high quality of the work from many candidates.

Question 1

In general this was the best answered question. In (a), nearly all gave filter funnel or funnel. Only a small minority suggested either a cork or rubber bung with a hole or a piece of rubber or (flexible) plastic tubing in (b)(i). Some indicated in (b)(ii) that the glass could break but few suggested that the student might cut herself. Nearly all recognised that (c)(i) is a measuring cylinder or a graduated cylinder. In (c) (ii), most gave the correct reading of 13 (cm^3) though 10.3 (cm^3) was sometimes suggested. Most suggested a stop watch or a stop clock in (d). Many candidates obtained all three marks in (e)(i). The commonest errors were to omit any units for volume and/or to fail to arrange the data in numerical order. Many candidates gained full marks in (e)(ii) but some failed to follow the instructions. The most common errors were either not to give units, to have the axes the wrong way round, to fail to indicate which point is the anomalous point and/or to fail to draw an appropriate line of best fit. In (f), many mentioned that oils are more runny at a higher temperature but few explained that it would not be possible to make a fair comparison unless the temperature was the same for both the engine oil and for the cooking oil.

Question 2

Nearly all candidates were able to suggest a suitable safety precaution in (a) such as noting that no bare wires were exposed or not touching the hot lamp. Most explained in (b) that the black tube prevents entry of light from the side but few explained that as the tube has a relatively small opening then, apart from the light which comes from the lamp, very little light will get in this way. Most suggested a metre rule in (c)(i). Many recognised in (c)(ii) that getting a true reading for the position of the filament and /or the position of the LDR at the end of the tube is the problem in attempting to measure the distance. Some clear, well expressed solutions were suggested in (c)(iii) such as measuring the diameter of the spherical part of the lamp, dividing by two to get the radius and adding this dimension to the distance from the outside of the lamp to the far end of the tube. Both (d)(i) and (d)(ii) were generally correctly answered. Some could not express the answer in (d)(iii) to two significant figures but a similar proportion could not convert milliamps to amps with the result that only a minority gained the marks. In (d)(iv), a significant majority noted that it is not justified to give the answer to more than two significant figures because the values of the voltage and the current are given to only two significant figures. A fairly common error was to suggest that the problem lay with the recurrent figure in the answer to the calculation. Only a minority noted the absence of one or both of the units in (e)(i). Most noted in (e)(ii) that as the distance increases the resistance decreases though some erroneously claimed that the numbers are inversely proportional. Only a minority also noted that as the distance increases the intensity of the light decreases.

Question 3

Most candidates obtained a smaller proportion of their total mark on this question than on either of the other two. Some candidates noted in (a) that dry sand will be more realistic because there is no water on the surface of the Moon. Another sensible suggestion was that dry sand will more easily move to form a crater than damp sand which is more likely to be too firm to do this. In (b), only a minority suggested that the starting conditions need to be the same if fair comparisons are going to be made or that the previous crater needs to be removed to avoid confusion with the most recent crater. A significant minority recognised in (c) that if the experiment is repeated a number of times an average result can be calculated. However few mentioned that the identification and elimination of any erroneous results is another reason. A significant mistake was to assert that this will make the results 'more accurate'. Most correctly measured the diagram and recorded the result in (d). Most correctly noted in (e) that, as the height from which the ball is dropped is increased, the radius of the resulting crater increases. However, only a minority made the point that the rate of increase in the size of the crater gets less as the height increases. Diameter or radius needs to be on the *y*- axis and mass on the *x*- axis and the curve should be convex from the origin. Many candidates gained two marks in (f) but a common mistake was to make the curve form a plateau or to rise to, and then fall from, a maximum value. Some good answers in (g), for example, 'Only one independent variable, either the mass or the height from which it is dropped, should be changed and other variables should remain constant. Otherwise you will not know which variable has caused the change in size of the craters'. However weaker candidates were often unsure or had difficulty in expressing themselves clearly.

PHYSICS 4420, GRADE BOUNDARIES

Option 1: with Written Alternative to Coursework (Paper 3)

	A*	A	B	C	D	E	F	G
Foundation Tier				55	44	34	24	14
Higher Tier	71	59	47	35	25	20		

Option 2: with Coursework (Paper 04)

	A*	A	B	C	D	E	F	G
Foundation Tier				58	46	35	24	13
Higher Tier	75	63	51	39	27	21		

Note: Grade boundaries may vary from year to year and from subject to subject, depending on the demand of the question paper.

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