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Examiners' Report / Principal Examiner Feedback

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IGCSE

IGCSE Physics (4420) Paper 2H

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Questions 1 to 6 inclusive are questions in common with the Foundation Tier Paper, 4420 1F. Questions 1 to 4 inclusive feature on Science DA: Physics Paper 4437 6H and also on 4437 3F. Questions 10 to 17 inclusive (renumbered as 5 to 12) are part of 4437 6H.

The great majority of the candidates entered for the Higher Tier papers had entered what was, for them, the most appropriate tier.

Question 1

This question was well answered although a minority failed to mention that when the fuse wire melts this breaks the circuit. Most secured all three marks in (b) though some tried to force the Ohm's Law equation into giving them the answer. Most chose the 13A fuse and went on to explain that the other fuses would blow or were below the operating current. A wide variety of answers, such as electric kettle, were acceptable in part (d) but 'microwave oven' and 'air conditioning' were not.

Question 2

Most knew that alpha particles are something to do with helium but only a minority were able to gain both marks by stating that they are helium nuclei. Most were able to name a source of background radiation other than cosmic rays. However, much of cosmic radiation is from the Sun so that source is not an appropriate answer. In part (b) the idea that, in space, there would not be any molecules to interact with alpha particles was generally well understood. 'Half life' was generally well understood though some confused themselves with 'half the life of carbon14' and similar examples of poor expression. Most were able to show on the graph how to determine half-life but a minority went on the misread the graph and gave a value 5200 rather than 6000 years. The great majority were able to give another use for radioactivity.

Question 3

Most were able to obtain full marks throughout this question on efficiency; though there were a few who shot themselves in the foot by giving the efficiency as 0.4 % rather than as 0.4 or as 40 %.

Question 4

Part (a) was generally well answered though some did not seem to understand which is the roof and which is the loft and in (ii) though double (and triple) glazing, shutters and curtains were all correctly suggested, 'shut the window' was not. In (b) though many secured two marks for the suggestion that air is heated and then it rises only a minority correctly explained that this is because the air expands or becomes less dense. Some erroneously stated that the air particles expand or become less dense; rather than that the air particles move further apart.

Question 5

Parts (a) and (b) were generally well answered and part (c)(i) was very easy because both a flat circular coil and a solenoid were accepted. However only a small minority understood the term 'uniform magnetic field pattern' with sufficient confidence to be able to explain why the example shown cannot be correctly described in this way.

Question 6
The majority were able to apply the correct term to each of the three examples. Fewer were able to state the wavelength reduces in diagram C but in (c) most obtained full marks with an example showing at least three equally spaced concave wave fronts.

Question 7
The majority of able candidates were able to state that, when the crane is in equilibrium, the sum of the clockwise moments is equal to the some of the anticlockwise moments. However some less able candidates erroneously asserted that, in this case, the forces are equal on either side. Most were able to correctly calculate the weight in (a)(ii), correctly recognised that the diagram identifies weight as a vector, because the direction is shown, and offered another correct example. However 'force' is not, in this case, another example because, of course, weight is a force.

Question 8
Most knew that particles make no movement of any sort at absolute zero and were able to convert 30 °C to the its value on the kelvin scale. However though nearly all stated that, in the given equation, T represents temperature some, despite the theme of the question, lost the mark because they omitted to mention that it's the temperature in kelvin which is being described. In part (b)(ii) some lost marks because they failed to convert their temperatures to the kelvin scale and others because they failed to convert 1188.1…kPa to the nearest 10 kPa or, if they did, suggested that the outcome would be 1180 kPa.

Question 9
This question on the advantages and disadvantages of the wind for producing large quantities of electricity was generally well answered. Most candidates gave renewable energy and no air pollution (in use) as the advantages and its variable nature and the need for a large number of wind turbines, taking up a lot of space, to produce a modest output as the main disadvantages.

Question 10
Few candidates offered both an electric motor and a loudspeaker as examples. Some did not appear to think about the question and erroneous responses, such as transformers and generators, were often suggested. However 'use a more powerful magnet' and 'increase the current' were frequently correctly suggested in part (b). Part (c) was generally well done with the connection between thumb and direction of force being the most popular correct link. In part (d) only a minority realised that when a wire carrying a current is parallel to a magnetic field there will be no electromagnetic force on it.

Question 11
Most got full marks in (a)(i) and (ii) but some, who clearly had the right idea, did not realise that to answer part (iii) both the correct number and the correct unit need to be given. In part (iv) many correctly expressed the idea that 'no energy is wasted' but there was no mark for claiming that the 'assumption' is that 'GPE = work done'. That's how you answer part (iii) and the 'assumption' is whatever you conveniently overlook to get there. Most knew the equation for kinetic energy though some seemed to think that the 'v' refers to velocity; it doesn't, it refers to speed, and most would have probably demonstrated how to use the equation if they had not overlooked the difference between 823.2 kJ and 823.2 joules.

Question 12
Part (a)(i) was generally well answered with the upward slope being calculated and the unit stated correctly, though there were some who offered m/s^{-2} and other mistakes. Some gave a clear indication that the distance is equal to the area under the graph though others tried, unsuccessfully, to use distance = speed × time taken. In part (c) a common careless mistake was to 'misread' the time as 0.6 s rather than as 0.06 s. There was a good response to (b) with most able to state the equation correctly and to use it to calculate the mass of the other car which hits the barrier.

Question 13
A common mistake, by a significant minority, was to fail to convert correctly four hours to 4 × 60 × 60 seconds. In part (b) few knew that in (i) its 'charge' and in (ii) its 'coulomb'.

Question 14
Most recognised the labelled parts as 'prisms' and that the process shown by the path of the light is total internal reflection. Part (b)(i) was generally well answered; most recognised CD as the normal and wrote the required equation as y = x, though a minority suggested y = u, and most remembered the relationship between the refractive index, the angle of incidence and the angle of refraction. In part (ii) some recognised that, in the given diagram, the angle of incidence must be greater than the critical angle and were able to give an equation which relates critical angle and refractive index.

Question 15
Part (a) was well answered and many could have gone on to obtain all six of the other marks if only they had not carelessly overlooked the fact that 1200 kHz is not 1200 hertz.

Question 16
Nearly all were able to relate 'area', 'force' and 'pressure' correctly. In part (ii) many were able to make an appropriate start, for one mark, by stating that the edge of a sharp blade has a smaller area than the edge of a blunt blade. However only a minority were then able to complete the comparison by stating either that for the same pressure the sharp blade will give a greater force or that for the same force it will give a greater pressure. In part (b) candidates were required to make an appropriate connection between two ideas; that 5 kPa is 5000 pascals and that a pascal is one newton per square metre. From this it follows that an example such as '5000 N on 1 m^{2}' is an appropriate example but only a minority got this far.

Question 17
In part (a) some gave a response such as 'heated water produces steam that drives a turbine to rotate a generator' and gained all three marks. Some others contented themselves, but not their examiner, with science fiction answers involving radioactivity. Part (b) was generally well answered with the function of the moderator in (iv) being recognised by nearly all candidates. Most made a secure start, and gained one mark for part (v), by stating that neutrons are emitted and that these collide with other uranium nuclei. However only a minority of candidates went on to convey their understanding of the consequential 'cascade' or 'falling domino' effect.

PHYSICS 4420, GRADE BOUNDARIES

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

	A*	A	B	C	D	E	F	G
Foundation Tier				53	43	33	23	13
Higher Tier	81	68	55	43	32	26		

Option 2: with Coursework (Paper 04)

	A*	A	B	C	D	E	F	G
Foundation Tier				N/A	N/A	N/A	N/A	N/A
Higher Tier	83	70	57	45	34	28		

No candidates at foundation tier entered coursework so there are no grade boundaries for this category.

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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