Examiners' Report/
Principal Examiner Feedback

January 2012

International GCSE
Physics (4PH0) Paper 1P
Science Double Award (4SC0) Paper 1P

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information, please call our GCE line on 0844 576 0025, our GCSE team on 0844 576 0027, or visit our qualifications website at www.edexcel.com. For information about our BTEC qualifications, please call 0844 576 0026, or visit our website at www.btec.co.uk.

If you have any subject specific questions about this specification that require the help of a subject specialist, you may find our Ask The Expert email service helpful.

Ask The Expert can be accessed online at the following link:

http://www.edexcel.com/Aboutus/contact-us/

Alternatively, you can speak directly to a subject specialist at Pearson about Edexcel qualifications on our dedicated Science telephone line: 0844 576 0037

Pearson: helping people progress, everywhere
Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

January 2012
Publications Code UG030799

<u>**International GCSE 4PH0 & Double Award 4SC0 Paper 1P – January 2012**</u>

Candidates generally found a number of aspects of this paper quite difficult. There was evidence that the questions related to AO3 (experimental skills) in particular caused some difficulty and this is an area centres might look to address for future examinations. There was no evidence that candidates were short of time, although there were rather more blank spaces in scripts than usual. Candidates should also be reminded that the examiners believe that a good answer can be given in the space provided – if candidates are going over this onto additional sheets it often suggests that the candidate is not selecting the information required to answer the particular question being asked.

Question 1

Most candidates were able to identify the circuit symbols correctly. In (b)(ii), many candidates were able to select the correct fuse but were unable to explain why. The ideal answer would explain why the correct fuse was selected and, in doing so, why the others were not. The correct fuse was the **nearest fuse above** the working current. Just "above the working current" was not sufficient since this did not exclude the 13A fuse. Most candidates scored the insulation mark in (b)(iii) and quite a few of these went on to score the electrocution mark. Very few thought that heat insulator was the critical point.

Question 2

Part (a) was, on the whole, answered well. Candidates should, however, be reminded that equation triangles on their own are not a substitute for the equation being written out in full. In (d), most could score one mark for the measuring cylinder. Answers relating to the position of the eye were often quite vague (for example, 'make the measurement at eye level'), but many then stated that they should avoid parallax although the wording indicated that they did not know what this actually meant. Some mentioned the meniscus but then failed to say which part was important. A significant minority talked about avoiding having holes in the side so were either thinking of depth cans or were in centres using old tin cans. A number of responses were seen where the candidate was describing an experiment to find the volume of an object by displacing the water, rather than dealing with the water itself as the question required. Part (e) required the candidate to establish a variable other than the mass and volume which would affect the density. An ideal answer would have stated that the temperature should have been kept constant as a change in temperature would affect the volume of the liquid and hence the density (because the mass would stay constant). Some candidates correctly identified the temperature as being significant, but then went on to suggest that this was linked to the amount of evaporation occurring – this was incorrect since if evaporation did occur, then this would reduce the mass and the volume.

Question 3
Most candidates could relate stopping distance to thinking distance and braking distance correctly. In (b), most candidates scored one mark for one of the quantities that increased with speed. Fewer scored a second mark as they often just repeated a statement for one of the quantities. Mostly, candidates scored a mark for words to the effect that thinking distance increased less than the increase of braking distance. A tiny minority correctly stated that thinking distance was proportional to speed or that increase in stopping distance was not proportional to speed. Some used ‘proportional’ to mean ‘increased’. Despite the fact that the word braking was printed just above the space for their answers a large number insisted on spelling it breaking. For (d), it was very important that the candidate had read the question carefully. This question did not require a standard response about processing data. Whilst calculating a mean is usually a standard process, the question required that the candidate realise that using the minimum values was more appropriate here. In (e)(i), many stated that thinking distance did not change but then failed to give an appropriate reason. Some thought it would decrease because the driver was being more careful or would increase as the driver would be distracted. In (e)(ii), a majority realised the braking distance would increase because friction or grip would decrease but some just said it would be slippery. Quite a few gave answers in terms of time and a number thought that the distance would decrease because there was less friction.

Question 4
An ideal answer to (a) should recognise that the speed (and usually the direction) of a wave changes at the boundary between two media and this is called refraction. Both parts of this were required for a full answer. ‘A change in direction when it goes through a medium’ was insufficient since it did not recognise that a change in medium was required. For clarity in (b), it was important that the correct letter *i* or *r* was placed close to the boundary. Candidates should pay close attention to the direction that the wave is travelling, as a few students labelled *i* and *r* the wrong way round. In (c), candidates should remember that the sine of the angles should be used in the equation, not just the angle itself. In (c)(ii), there were a number of excellent answers that scored full marks (and would have scored more if that had been allowed). Most scored two or three marks for measuring *i* and *r* and possibly measuring from the normal. There were very few who mentioned a range of values: the tendency was to suggest repeating the experiment with no indication of variation. Even those that described the experiment well often plotted *i* against *r* instead of sin *i* against sin *r*. The mark for recognising the refractive index as the gradient of the graph could not be given unless the correct graph had been suggested.

Question 5
Candidates should have selected D in (a), because the field lines were parallel. The answer to (b) should have referred to permanent bar magnets rather than electromagnets. There should be two bar magnets with the north pole of one facing the south pole of the other. When they are close to each other, the uniform magnet field will be between the facing poles of the magnets.

Question 6

Any source of background radiation was accepted in (a)(i). Candidates who wrote food and drink did not score here since there needed to be some appreciation that this arose from the carbon-14 in it. In (a)(ii), there many candidates who clearly did not know about background radiation and answered this question in relation to half life. It was pleasing that a large number of candidates could easily identify the need to remove the source and measure the background rate. However, only a few went on to give the idea of repetition to find an average or a correct method of discounting from source rate. Some candidates had difficulty in expressing the latter idea and subtracted the source rate from the background rate. The majority of graphs in (b) scored 3 or 4 marks. Plotting was usually well done but many missed the labels or units on the axes and very few drew a best fit curve, preferring to join the dots. Most gave a value within the acceptable range, but very few indicated on the graph how they had obtained the value meaning that credit could not be given if they were outside the correct range. In (c), many answers were vague. Some candidates just gave a list of properties of gamma radiation or said that it was ideal as it was a liquid which could flow round the blood. Others thought that the radiation would stop after 6 hours. Only a minority stated clearly that it could be detected outside the body or that it would last long enough for the procedure to be carried out.

Question 7

Few candidates were able to express their ideas clearly in (a). They frequently missed referring to particles or molecules for the first point and also tended to say that the air moved (rather than vibrated) parallel to the direction of propagation. In (b), candidates should be aware that an equation triangle alone is not enough to score on this question. For (b)(ii), overy few candidates grasped the concept of significant figures and most wrote Andrew's speed as 333 or 333.3, so gaining just two marks. A few were unable to calculate the mean time correctly. In (c), most candidates did not seem to understand what this question was about. They almost all gave 341 m/s as the speed of sound and so started from the viewpoint that as Andrew's answer was closer that they would justify his method was better than Kefe's. They rarely scored more than 2 marks and had no idea of typical reaction time, again showing little grasp of significant figures.

Question 8

In (a)(i), it was important that candidates could distinguish between the quantities and their units and be aware that the standard symbol for current is I and not C. For the rest of (a), numerical answers usually score well. Most could get 4.8 and 7.2 and many of those then tried to apply 7.2 to the correct equation with a majority also expressing the time in seconds although that left the time in minutes could still score 2 marks. For (a)(v), the constant temperature arises when the energy lost to the surroundings is equal to the energy supplied by the heater. References to boiling or a change of state were insufficient to score the marks. In (b)(ii), although most knew about series and parallel circuits a number of candidates were not familiar with heated rear windows and interpreted the resistor symbols to represent different windows. Most scored one mark for knowing that if one resistor failed the circuit would not work, but fewer scored a second mark for saying there was no independent control or the reverse argument. An even smaller number said there were fewer wires and those that talked about resistance values commonly said that it would increase resistance. It was difficult to mark some answers as the candidates rarely said if they were advantages or disadvantages.

Question 9

In (a), most candidates knew that the force of gravity kept the satellite in orbit. Part (b)(i) was intended to be a straightforward question. Candidates should have just added the radius of the planet to the orbit height to get the total orbit radius. No complicated equations or calculations were required. In (b)(ii), few candidates quoted the equation they were using. Although many converted the time to seconds they often did not convert km to m. Part (c) typically scored one mark as many wrote answers that mixed gravitational force and energy. Most thought that GPE increased as it got nearer the Earth but then scored for saying KE increased. The conservation of total energy was not seen. Those that used F=ma arguments never said that mass was constant and rarely said it accelerated, but simply repeating the question by saying it got faster. In (d)(ii), candidates were expected to identify two differences between the waves and to use a comparative e.g. the wavelength of visible light is greater than the wavelength of X rays. Candidates should be careful not to just make bald statements like ‘X rays can be used to see inside the body’ as this does not contain any relevant terminology or a comparison with visible light.

Question 10

Candidates are reminded in questions like (a)(i), when they are asked to provide a relationship, that they should use all the terms provided in the question. Parts (a) and (b) contained another numerical question which was often well answered. Most scored 2 marks for (a)(ii), but some seemed confused by being asked for work done in (a)(iii) and gave the unit as Nm even though they had already written J in (a)(ii). Many knew the equation for efficiency but did not always write it the correct way round. Those that knew the correct equation could often have a good attempt at the final calculation. In (c), a good Sankey diagram should have an arrow head going straight on for the useful energy transferred and a curved arrow for the wasted energy. The width of the arrows should be proportional to the amount of energy. All three points on the diagram should be labelled with the form of energy and the amount of energy or power.

Question 11

In graph question such as (a), candidates should use the full length of the graph to work out the gradient of the graph i.e. 78/60 = 1.3 m/s^2. In (b), most candidates knew that air resistance or drag had something to do with the answer and many then stated that it increased as speed increased. Only a tiny minority referred to resultant force. A number of candidates referred to terminal velocity incorrectly and some had missed the context of the question and talked about the velocity changing when the aircraft turned left or right as it went down the runway.

Question 12

Part (a) typically scored two or three marks as candidates rarely used the terms conduction and convection in the correct place and did not break down the steps in the process which were needed to score the marks. In (b), it was clear that a majority of candidates had no idea how a microwave oven works. Many said that the microwaves heated the air which resulted in convection which would heat the potato from the outside. They rarely grasped that microwaves (the cookers) were related to microwaves (the EM radiation). In (c), candidates rarely related the process to electromagnetic induction and had the coil heating air which rose and heated the pan, somehow not heating the cooker surface. Those that did correctly use the information given often described a current (and consequent heating effect) being induced in the cooker rather than the pan.

Further copies of this publication are available from
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467
Fax 01623 450481
Email publication.orders@edexcel.com
Order Code xxxxxxxx January 2012

For more information on Edexcel qualifications, please visit
www.edexcel.com/quals

Pearson Education Limited. Registered company number 872828
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE

Ofqual

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

cea
Rewarding Learning