edexcel

Examiners' Report/
Principal Examiner Feedback

Summer 2013

International GCSE
Physics (4PH0) Paper 1PR

Science Double Award (4SC0)
Paper 1PR

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. 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 our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2013
Publications Code UG036655

4PH0 1PR

General comments
As in previous examinations for this specification, most students were able to recall the equations and usually they handled the related calculations well. Students who gave the best practical descriptions often appeared to be writing from first-hand experience. Responses to the longer questions showed that the less able students tend to struggle when assembling a logical description or when asked to offer more than one idea. There was a wide range of response and it was good to see that many students were able to give full and accurate answers.

Question 1
Most students recognised the reflection in the first prism. The majority named it correctly as total internal reflection and were rewarded. Most students completed the diagram to show a second prism in the correct position with an acceptable second reflection.

Question 2
Students dealt with the two multiple-choice items in Q2(a) confidently and most showed good understanding of wavelength and amplitude. Most students gained some credit for their diagram to Q2(b), but fewer were able to give adequate descriptions of the two types of wave. The weakest responses usually included a diagram that was without labels. It is important that students read each question carefully to ensure that they understand what is required.

Most students recalled two properties that are common to all electromagnetic waves. Responses to Q2(c) usually mentioned the common speed and the ability to travel through a vacuum. The examiners accepted a wide variety of common properties. Most students did well with Q2(d), they recognised that X rays are used to check for broken bones and were able to explain the treatment of cancer with gamma rays. Far fewer students realised that bone absorbs X rays, however.

Question 3
Most students converted the temperatures in Q3(a) successfully. Graph drawing was generally good, but the weaker responses to Q3(b) usually omitted the extrapolation to the temperature axis. Otherwise, the plotting and identification of the anomaly tended to be good. Where students did choose the wrong point as the anomaly, usually (-20, 0.95), they were still able to gain some credit for their extrapolation, since the student's own intercept was accepted when correctly read.

Question 4
Explanations of the motor effect in Q4(a) were generally good. There were weaker responses that usually included little more than a mention of current or force, but a substantial minority of students did receive full marks for this part.

Most of the students described appropriate ways to affect the rotation of the coil in Q4(b) and responded well. There was some occasional confusion between the number of turns on the coil and the number of coils on the motor. Since students are only required to understand a simple d.c. motor, it is better for them to describe on the number of **turns** in this instance.

Q4(c) was designed to be a little harder. It required students to apply their understanding of magnetic field strength to a novel situation. The responses were fairly good, with more than half of the students gaining some credit.

Question 5
Most students were able to describe the motion of the cyclist in Q5(a) well enough to gain some credit. Nearly all the students were able to relate the slope of the graph to the acceleration in Q5(b).

The idea of finding distance from the area under a velocity-time appears to be well understood. This is also true for calculating average velocity from distance and time. More than half of the students gained full marks for both Q5(c) and Q5(d). Nearly all of the rest showed their working with sufficient clarity to gain some credit for approaching the tasks with appropriate techniques.

Question 6
Q6(a)(i) gave students the opportunity to show their understanding of ideal gas particles. The students displayed a wide range of ability and nearly all offered a creditable response. Some of the weaker answers concentrated on intermolecular collisions rather than collisions with the container as the thrust of the question indicated.

A similar range of response was shown for the evaluation of the stated conclusion in Q6(a)(ii). This question was unusual in that disagreement with the statement was unlikely to produce any valid response. It was therefore very pleasing to see that nearly all students agreed with the statement and gave a worthwhile answer. Many of these responses merited full marks.

Nearly all the students realised that the average speed of the gas particles increases when the gas is warmed.

Question 7
The majority of students produced good responses for Q7(a). A few spoiled their equation by stating "gravity" in place of "g". Others made the error of subtracting atmospheric pressure instead of adding it to find the total in Q7(a)(iii). Some students made an error with the power of ten in their first calculation and care was taken in the marking to ensure that this did not exclude them from the last mark if their total pressure was consequentially incorrect.

In Q7(b), the majority of students completed the calculation successfully and most went on to give correct responses to Q7(c) also.

The experimental description in Q7(d) yielded a wide range of response. These were largely good, with more than half of the students able to score 3 marks or more. The best descriptions appeared to come from students who had first-hand experience of a similar investigation. They usually described the necessary steps in a logical order. Weaker responses tended to omit some essential points, for instance concentrating the measurement of mass only and neglecting volume.

Question 8
Most students selected some suitable apparatus in Q8(a) and nearly all calculated the force correctly.

As has become usual for this specification, graph drawing was generally excellent. Most students can choose suitable scales for their axes, label them properly and plot the points accurately. The majority of students gained at least four marks for their graph in Q8(b). The most common fault was to draw a straight line through the points. The points had been chosen to yield the characteristic force-extension curve that should have been familiar to the students from their own investigations with rubber bands.

During the marking, each evaluation (as to whether the rubber band obeys Hooke's Law) was related back to the shape of the accompanying graph, so that any initial error was not compounded.

Question 9
A majority of students gained full marks for Q9(a). The students who gave weaker responses were generally those who found it difficult to distinguish between the voltage and power values for the whole circuit as opposed to these values for an individual lamp. The use of either the circuit values or the component values provided acceptable routes to showing the current in Q9(a)(iii), however.

In Q9(b) the energy calculation was usually done well, with most students gaining some marks. The necessary equation is given on page 2 of the question paper. The weaker responses usually came from students who omitted to convert the time to seconds. Most students described energy changes well.

Question 10
About half of students completed the circuit diagram in Q10(a) successfully and scored full marks. The most common fault shown in the other responses was the placement of one of the meters so that it could not measure the desired quantity. It was usually the voltmeter that was connected across another component rather than across the wire. The experimental description showed a similar range of response. The weaker descriptions usually omitted to mention the measurement of one of the two variables. Again, this was often the voltage.

For Q10(b), half of the students were able to suggest an acceptable reason why the temperature should be controlled, but very few suggested a suitable way to do this.

Almost all of the students could give the correct equation linking voltage, current and resistance for Q10(c), but very few realised that they should show constant resistance on their sketch graph.

Question 11
In parts (a) and (b) of question 11, most of the students completed the energy calculations successfully. The most common minor error was to spoil the equation by stating "gravity" or "gravitational force" in place of "g".

Most students went on to calculate the velocity of the second ball correctly in Q11(c). Many of those who made an error lost just a single mark when they omitted to find the square root. Students should allow themselves some time to check through their responses after they have completed the paper.

Question 12
It was clear that the process of nuclear fission is generally well understood by the students. More than a third of them gave a response worth full marks for Q12(a). However, two common misunderstandings became apparent. Firstly there are students who, despite an otherwise sound grasp of the process, describe uranium fission in terms of particles other than neutrons – usually electrons or alpha particles. Secondly, there are students who confuse the purposes of the moderator and control rods. Either of these misunderstandings can reduce the credit received for the response.

Very few students realised that fission releases kinetic energy, but more were able to describe the purpose of the shielding around the reactor.

Question 13
Most of the students gave creditable responses to Q13(a), showing a good understanding of the reason why a voltage is induced and that it would be larger when the magnet fell from a greater height. However, very few responses related the induced voltage to the cutting of flux.

Responses to Q13(b) tended to be very good, perhaps indicating that the students had investigated this phenomenon at first hand or seen a good demonstration of it.

Question 14
Most students gave a very good description of isotopes in their response to Q14(a) but very few could give an acceptable description of stable isotopes.

In Q14(b), the students made good use of the data and most were able to calculate the number of neutrons, although fewer went on to identify the beta decay and the changes associated with it.

Q14(c) was an intentionally difficult question at the end of the paper. It required students to synthesise their knowledge of gamma rays and the electromagnetic spectrum together with their understanding of nuclear structure. The question yielded a full range of response, with about a third of the students gaining full marks and a similar proportion scoring no marks.

Summary Section

Based on the performance shown in this paper, students should:

- Take note of the number of marks given for each question and use this as a guide as to the amount of detail expected in the answer
- Be familiar with the equations listed in the specification and be able to use them confidently
- Show all working, so that some credit can still be given for answers that are only partly correct
- Describe experiments in reasonable detail and be ready to comment on experimental data and methods
- Recall the units given in the specification and use them appropriately, for instance when describing the measurements taken in an experiment
- Take care to follow the instructions in the question, for instance when requested to use particular ideas in the answer
- Choose an appropriate format for displaying results, for instance drawing a curved line to show a relationship that they know is non-linear
- Allow time at the end of the examination to check answers carefully and correct basic slips in wording or calculation

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

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