Examiners' Report

Principal Examiner Feedback

Summer 2017

Pearson Edexcel International GCSE
in Physics (4PH0) Paper 1PR

Pearson Edexcel International GCSE
in Science Double Award (4SC0) Paper 1PR

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by 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 2017

Publications Code 4PH0_1PR_1706_ER
All the material in this publication is copyright

© Pearson Education Ltd 2017

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 usually 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 responses and it was good to see that many students could give full and accurate answers.

Question 1

Candidates performed well in this straightforward set of multiple choice questions at the start of the examination paper. Of the three questions, part 1(a)(i) offered the greatest challenge and a minority of candidates could not use their understanding of comets to identify one. Option A was the common incorrect response, showing that these candidates overlooked the elliptical shape of a comet's orbit.

Question 2

Part 2(a) was well answered. A few candidates used 3 and added it to 1.5 thinking the straight part of graph ended at 3. The following explanation in part 2(b) enabled two thirds of all candidates to gain both marks by showing a clear understanding of why part A was the slowest moving section. Most candidates who did not score had not read the question fully and gave section B or D as their answer despite these sections showing no movement at all.

Three quarters of all candidates could complete the calculation in part 2(c) and give a matching unit. Most attempted to calculate in m/s but a few chose to correctly perform the calculation in m/min or km/h. Some were not clear when using symbols and the use of m/m as 'metres per minute' was insufficient to gain the unit mark.

Just over half of all candidates were awarded both marks in the final part of this question. The most common mistake was giving factors that would only affect the thinking distance of the vehicle. For example, driver intoxication or tiredness.

Question 3

This question assessed candidates' experimental skills and understanding. Part 3(a) required candidates to mark the centre of gravity of a square card with weights attached at the bottom. However, only half of all candidates appreciated the effect of the attached weights and realised this would lower the centre of gravity. Incorrect responses included marking it in the middle of the card or below the centres of the weights at the bottom of the card.

It was pleasing to see three quarters of all candidates being able to identify the dependent variable in this investigation. A similar proportion could also calculate the average successfully and round their answer to two decimal places. Most candidates who lost marks did so by incorrectly rounding their answer as 3.39.

The graph was completed to a high standard by most candidates. Common mistakes included not fully completing axes labels and using non-linear scales. Some candidates drew a curve of best fit that included the anomalous point and these did not score. However, the anomaly was usually identified by candidates who plotted their points correctly. In part 3(c)(v) most candidates gained the first mark but then stated that it was a directly proportional relationship, which was not given credit.

Candidates found the final part of this question much more challenging and showed a poor understanding of the term ‘accuracy’ in an experimental context. Several candidates gave suggestions that would improve precision, such as using a ruler with a mm scale. The most common credit-worthy suggestion was to move the scale so that it was nearer to the card.

Question 4

The first part of this question assessed candidates’ knowledge of electrical circuit symbols. Most candidates could draw the symbol for a lamp but struggled with the variable resistor; the symbol for a thermistor was often drawn instead. Other mistakes included naming the cell as a ‘battery’ and naming the fuse as a ‘resistor’.

The calculation in part 4(b) was found to be straightforward and over three quarters of all candidates gained full marks. A small number of candidates could not recall the equation correctly, whilst others experienced difficulties rearranging the equation to make resistance the subject.

Candidates found the graph sketch in part 4(c) challenging and a large number did not know how the resistance of an LDR varies with light intensity. Some simply got one mark for labelling the axis correctly, but better responses got 2 marks for a descending straight line. It was disappointing to see candidates labelling the axis with current or voltage even when they got the curve correct and this prevented any marks being awarded.

Question 5

It was pleasing to see most candidates correctly identify the amplitude in part 5(a). The most common incorrect response was C, given by candidates who thought the amplitude was measured from crest to trough.

Over half of all candidates used their understanding of frequency to correctly calculate the frequency of the water waves and could give the correct unit. Some candidates thought the time given in the question was the time period and incorrectly attempted to use it with the equation $f=1/T$.

It was very encouraging to see the improvement in the responses to part 5(d) compared to previous examination series. Many candidates attempted to use the words parallel/perpendicular to describe the waves but many also used up and down/back and forth as a substitute. Even if candidates did not gain full marks, it was clear that they knew the difference in the two types of waves lies in their oscillations being in different directions relative to the direction of propagation.

Candidates should make better use of the opportunity to draw a labelled diagram as part of their answer, as this was the simplest way to gain full marks.

Question 6

Although only a small number of candidates drew a reflection that was not from the first surface in part 6(a), most were at least able to get one mark from the question. Three quarters of all candidates gained full marks for carefully drawn rays that clearly demonstrated an understanding of total internal reflection. Some candidates lost marks due to angles being inaccurately drawn or for rays that reflected repeatedly inside the diamond.

Those candidates that knew the critical angle equation could go on to successfully complete the calculation in part 6(b). However, nearly a third of all candidates had not learnt the relevant equation and this prohibited further progress. This part of the question highlighted the need to revise all the equations prior to sitting the examination.

It was surprising to see only a third of all candidates being able to give another use of total internal reflection. A large number gave their answer as simply 'optical fibres' without adding the necessary application. Endoscopes was a popular correct response, either written explicitly or described suitably.

Question 7

The vast majority of candidates could identify the correct energy transfer taking place in the wind turbine. Stating two more methods of generating electricity from renewable resources in part 7(b) proved to be slightly more troublesome and only two thirds of all candidates could give two correct responses. Sometimes candidates were not clear enough in their communication and responses such as 'water' did not get credit.

Candidates found part 7(c)(i) straightforward and most could name one of the wasted types of energy. However, the Sankey diagram in part 7(c)(ii) was much more challenging and it was clear that many candidates did not know what a Sankey diagram should look like. In addition, a larger number did not appreciate that Sankey diagrams should be drawn to scale and consequently did not receive the third mark. Candidates need to take more care over diagrams such as these to ensure their understanding is communicated effectively.

Question 8

Candidates performed well in the closed response style question in part 8(a) on convection. The lowest scoring option was stating whether the density of air increases or decreases but, even so, over 80% of all candidates chose correctly.

The linked calculations in part 8(b) were completed to a high standard and three quarters of all candidates did not make any mistakes. Common errors included using 'gravity' for g when writing out the equation, introducing a power of ten error when incorrectly trying to convert kilograms to grams and not realising that the work done on the rock was equal to the energy transferred.

Question 9
Question 9 proved to be challenging and highlighted issues such as labelling forces on diagrams and dealing with equations containing more than three variables. Most candidates could gain one mark in part 9(a) by drawing a downward arrow labelled ‘weight’. However, some lost this mark by labelling it as ‘gravity’. Fewer candidates received the second mark for an upward arrow of equal length, even though a label on this arrow was not expected.

The calculation in part 9(b) was more straightforward due to candidates knowing what their answer should be. The majority could write the correct equation and use it to get an answer that approximated to 500kPa, recognising that they had to divide by 1000 to change to kilopascals.

Finding the total pressure in part 9(c)(i) proved to be the most problematic part of the question and many candidates did not know they should add the atmospheric pressure to the pressure difference calculated in 9(b). This highlighted weakness in candidates’ understanding of how pressure is affected by depth in liquids. However, more candidates could use their pressure to correctly evaluate the final volume of air in part 9(c)(ii). Mistakes included not using Boyle’s Law and errors in rearranging the equation.

Question 10
The method to find the shape of the magnetic field in part 10(a) was answered confidently by most candidates and two methods were given credit. More candidates chose to use iron filings in their answer. However, some described placing the magnet on top of the paper which is not recommended. In addition, many candidates did not appreciate the need to tap the paper to reveal the magnetic field pattern. When using plotting compasses candidates could communicate a more effective method and it was pleasing to see that this is clearly an experiment that candidates had performed themselves.

Part 10(b) offered further evidence that candidates should take more care over drawing diagrams. Nearly half of all candidates lost marks for drawing field lines that crossed or touched each other, which showed misconceptions in their understanding of this topic. However, most candidates could demonstrate that they knew that general shape of the field and were given some credit.

It was very pleasing to see more than two thirds of all candidates being able to use Fleming’s Left Hand Rule to find the direction of the force on the wire in part 9(c). Most candidates also gained some credit when asked how to reverse the direction of the force on the wire. However, some talked about changing the current or poles without stating that they had to reverse the direction of the current and the position of the poles. In the final part of this question, most candidates gained one mark for saying the force would reduce but often missed the second mark by not stating that the field would be weaker.

Question 11
Part 11(a) was challenging and only one in four candidates gained all three marks. The most common omission was not including any method of changing the current in the circuit, despite this being the aim of the investigation. Other mistakes included not connecting an ammeter and voltmeter correctly or at all.

Most candidates showed that they had performed this investigation and could write detailed methods that covered most of the marking points in part 11(b). Some candidates described taking repeats but did not provide an appropriate justification such as finding an average. Only a small number of candidates chose to provide an experimental precaution but, when they did, it was usually keeping the connecting wires of the circuit at a constant temperature.

Question 12
Brownian motion was poorly understood in part 12(a) and few candidates knew more than it being something to do with random motion of particles. Candidates need to provide more detail and clarity in their responses. For example, when asked to give an example of an experiment that demonstrated Brownian motion, a simple answer of ‘smoke’ is not enough. Instead, candidates needed to say, ‘smoke in air’ or an equivalent example that included both large and small particles. Candidates found the explanation in part 12(a)(ii) more challenging and were not specific enough when saying which particles were moving randomly or why this was.

The standard explanation in part 9(b) was answered to a much higher standard and the question differentiated well. Approximately 25% of candidates received each of the marks in the 0-3 mark range.

The force calculation in part 9(c)(ii) was answered confidently and the vast majority of candidates gained either three or four marks. A common error was failing to convert kilopascals to pascals in the calculation. More serious errors included not knowing the relevant equation or making mistakes when rearranging it.

The final part of this question was intentionally challenging and required candidates to apply their understanding of what happens to gas pressure when its temperature is varied. Most candidates knew that increasing the temperature of the gas would increase the kinetic energy of its molecules and slightly fewer could link this to an increase in pressure. However, many candidates were then confused by how this increase in pressure would affect the contact area between the tyre and the road as they overlooked the force as being the weight of the car. A large number thought the tyre would expand due to the increase in pressure, despite being told in the question that the volume remained constant.

Question 13
Most candidates could correctly find the number of neutrons in uranium in the multiple-choice question. A similar number then went on to identify both the parent and daughter nuclei correctly in the diagram. A small number were confused and marked the neutrons instead.

Part 13(b)(ii) differentiated well and approximately 25% of candidates received each of the marks in the 0-3 mark range. Marks were lost for referring to atoms or U-235 without referring to nuclei. It was also often unclear whether candidates thought the process would repeat itself.

It was encouraging to see that most candidates knew that control rods absorb neutrons. However, only a third could go on to describe the purpose of this. Many simply stated it was to control the reaction. Fewer candidates knew the purpose of the moderator in part 13(d)(i) and just over half could gain the mark.

Many candidates did not understand what was being described in part 13(d)(ii). Some candidates that did struggled to express their understanding sufficiently to get the marks. Lots of candidates repeated information given in the question such as graphite acting as a moderator, but failed to go much further in their answers. Less than 10% of all candidates received both marks for this part of the question.

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

- Take care when drawing diagrams to add labels and draw accurately.
- 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.
- Take note of the command word used in each question to determine how the examiner expects the question to be answered, for instance whether to give a description or an explanation.
- Be familiar with the equations listed in the specification and be able to use them confidently.
- Recall the units given in the specification and use them appropriately, for instance frequency.
- Be familiar with the names of standard apparatus used in different branches of physics.
- Practise structuring and sequencing longer extended writing questions.
- Show all working so that some credit can still be given for answers that are only partly correct.
- Be ready to comment on data and suggest improvements to experimental methods.
- Take care to follow the instructions in the question, for instance when requested to use particular ideas in the answer.
- Take advantage of opportunities to draw labelled diagrams as well as or instead of written answers.
- Allow time at the end of the examination to check answers carefully and correct basic slips in wording or calculation.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom