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Examiners' Report  
Principal Examiner Feedback

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Pearson Edexcel International GCSE  
Physics (4PH1) Paper 2PR

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### **Question 1**

Most responses to Q1(a)(iii) were acceptable, but a small number of students opted to fill the entire space with particles, which would represent a solid or a liquid, rather than a gas. It was pleasing to see Q1(c) answered to such a high standard. Without the need for any rearrangement of the given formula the vast majority of students were awarded all three marks for their calculation.

### **Question 2**

Q2(b) proved to be a straightforward calculation for most students. Most gave the correct formula although sometimes using an incorrect symbol for moment. Students usually calculated the correct value for the moment, but a number then did not write the principle of moments in words while effectively using it in the calculation. The most common error was using 6.7 for the distance instead of 11.

### **Question 3**

The use of the word "alike" in Q3(a) confused some students who then thought that the poles were opposite and explained that they attracted. A common error was saying that glider A moved to the left rather than that the force was to the left. However, the majority of students gained the mark for repulsion.

Most students gave the correct answer for Q4(b)(i) but the majority then gave 0.024 or 0.21 rather than 0.066 for the momentum of glider B after the collision, having not considered the vector nature of momentum. The error carried forward (ECF) for Q4(b)(iii) meant that most students went on to gain both marks. Most students were able to give the correct direction of the force on glider B in Q3(b)(iv).

### **Question 4**

Students experienced little difficulty recalling the formula in Q4(a)(i) but the subsequent calculation proved to be more challenging. Few students said how many squares corresponded to one period to work out the time, first in milliseconds and then converting to seconds. The most common problem was not being able to calculate the correct frequency although credit was given for use of an incorrect frequency to calculate their speed.

With 9 marking points available in Q4(b) most students could score at least 3 or 4 marks and the question was generally answered to a high standard. Many students mentioned reaction time and the problem the teacher would have in flashing the light and making the sound at the same time. Many also mentioned that the distance was too short and suggested better methods of measuring it instead of using a metre ruler. The lack of repeats was also commonly seen. Some students missed the reference in the question to "this method" and wrote about other ones which failed to gain any credit. Weaker students merely reworded the steps without evaluating as was required.

### **Question 5**

The given formula was used correctly in Q5(a) and most students completed the calculation successfully. The most common mistake was to forget to square 75.

Some students opted for an alternative approach of calculating the time using the acceleration, but then didn't use average speed to get their answer and only scored 2 marks. Few students had a clear idea of what background radiation was in Q5(b)(i), frequently just saying it was natural radiation which was not enough. However, most students could give a valid source of background radiation. Most students had the idea that the pilot might be harmed in Q5(b)(ii) but then talked of either the pilot being tired, suffering from the effects of low or high pressure or of the plane running out of fuel or becoming charged up which might make the plane explode. Although some students mentioned cosmic rays they did not relate them to the lack of atmosphere instead confusing them with cosmic microwave background radiation. They frequently mentioned the risk of mutations or cancer.

### **Question 6**

Q6(a) was mostly answered well, although some students got diverted into too much discussion of red-shift. Weaker students became confused with the energy of the Big Bang and took no account of elapsed time. Although some students had heard of CMBR they found it difficult to explain what it was. Many realised that it meant that matter came from one point or that wavelengths had been stretched by the expansion of the universe. Although some students mentioned that energy had been released at the time of the Big Bang they rarely said that the universe was hotter at the start.

Students who used the formula from the front page of the paper could usually score at least three marks in Q6(b) using 605nm as the wavelength emitted. The change of wavelength was usually identified as 78nm. Several students used 683nm as the source wavelength and lost one mark.

### **Question 7**

Surprisingly students struggled with Q7(a) and very few talked about the movement of electrons. Students performed better in Q7(b) and most knew that the dispersion of particles was due to repulsion. However, some were unable to score a second mark due to not qualifying the reason for the repulsion.

In Q7(c)(i) most students remembered the correct formula for kinetic energy although they often forgot to square the speed in the calculation. They also often made a power of ten error when writing out the answer as displayed on their calculator instead of writing it in scientific notation. Rounding errors were often seen. More marks were generally awarded in Q7(c)(ii) with rearranging the formula being the most common source of error. Those who recalled the formula  $E=QV$  usually gained full marks in Q7(c)(iii), although some failed to convert from kilovolts to volts. Those students who used  $E=VIt$  often lost marks by attempting to use charge stored as the value for current.

### **Question 8**

Students performed well in Q8(a) and there were many good explanations. As there were seven marking points for four marks, many students scored three or four marks and all marking points were seen. The most common correct point was

that the step-down transformer reduced the voltage. No credit was given for a detailed description of the use of transformers to provide energy from the national grid as the question required an explanation of how a transformer actually worked.

Many correct versions of the transformer formula were seen in Q8(b) but some students just gave the turns ratio in words. Those who recalled the transformer formula would usually obtain the correct output voltage, although inability to rearrange the formula lost marks.

## **Paper Summary**

Based on their performance in this examination, students are offered the following advice:

- Attempt all questions in the examination, even if they are unsure of the quality or accuracy of their response.
- 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 formulae listed in the specification and be able to use them confidently.
- Know the SI units for physical quantities and be able to convert from non-SI units to SI units when required.
- Show all working so that some credit can still be given for answers that are only partly correct.
- Take advantage of opportunities to draw labelled diagrams as well as, or instead of, written answers.
- Be ready to comment on data and suggest improvements to experimental methods.

