Examiners' Report

Principal Examiner Feedback

Summer 2022

Pearson Edexcel GCE

In Physics (8PH0)

Paper 02 Core Physics II

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Introduction

This paper assessed topic 4, Materials, and topic 5, Waves and Particle Nature of Light. The paper provided candidates with the opportunity to demonstrate progression from GCSE and consolidate their knowledge at the end of the first year of the A Level qualification.

Section A, a total of 60 marks, consisted of 8 multiple-choice questions and questions of differing style and length, drawing on a range of different concepts. Section B, a total of 20 marks, consisted of two synoptic questions drawing on content from the whole of the AS specification.

Following the disruption that candidates had experienced due to the pandemic, advanced information had been made available. The advanced information highlighted those 8PH02 topics that contributed to more than 5% of the total for the paper. There was evidence to suggest that this did have a positive impact in helping to prepare candidates, particularly noticeable in Q10.

Practical skills and knowledge of aspects of each of the core practicals were assessed throughout. There was little evidence to suggest that candidates had been unable to access practical skills. However, Q12 and Q13 required the candidates to interpret graphs. Candidates could do with developing the skill of referencing a graph – line of best fit/gradient/area under line, to support an idea.

	Comment	Percentage of correct responses
Q1	Classic question on the particle model of electromagnetic radiation	63%
Q2	Testing candidates' knowledge of core practical five	93%
Q3	Classic question on SI base units	65%
Q4	Interpretation of a ray diagram showing the formation of a virtual magnified image produced by a converging lens. Focal length worked out knowing that one of the rays must pass through the focal point.	31%
Q5	Compounding uncertainties within the context of the cross-sectional area	45%
Q6	The signals are one sixth of a cycle out of phase, equating to 2Pi/6.	45%
Q7	A classic question on energy level diagrams. Longest wavelength emitted by the lowest energy change as an electron falls to a lower energy state.	43%
Q8	The x-axis is time so wavelength cannot be determined.	43%

Q9(a)

Generally well answered with candidates accessing all marking points. Candidates remembered that a conclusion was needed at the end of this deduce question.

Q9(b)

Many were not quite sure how to answer this with many vague answers. Only 29% scored the mark.

Q10

This proved to be a relatively successful six mark question. The pulse-echo technique had been highlighted on the advanced information and candidates were well prepared. The most common loss of marks was due to missing detail such as the use of pulses, and that lasers emit light. Some candidates answered a different revised question on the use of pulse-echo using ultrasound. Candidates need to show use of A level notation, for example, in this case v=s/t

Q11(a)

Use of a measuring device was commonly scored. There was a loss of marks from some other missing detail such as finding a mean and the realisation that the measured quantity was diameter whilst the question referred to radius.

Q11(b)(i) and (ii)

Both calculations were tackled well with over half of candidates scoring full marks. The equation for the volume of a sphere was recalled by most candidates but many did not multiply the mass by *g* to convert mass to weight.

Q11(c)

This was well answered with candidates recalling conditions for Stokes law. The most common answer was the use of a wide container to maintain laminar flow.

Q12(a)(i) and (ii)

The most straightforward way to answer this question was to compare the Young Modulus/stiffness of the lenses with a comparison of the gradients. A significant number of candidates attempted explanations of stress or strain and got themselves in a muddle.

Q12(b)

It was pleasing that over half of candidates scored full marks with this multistep calculation. A common error was forgetting to convert cm to m which caused confusion when their answer for power was very different to those in the question.

Q13(a) and (b)

It had been hoped that all abilities would be able to access some marks in this question. However, this question proved a challenge for many. Most were able to draw a reasonable line of best fit although it was not uncommon for the line to be omitted completely, or simply drawn by joining the first and last points. Calculation of their gradient was generally done well.

In part b candidates were very poor at interpreting their graph to support their observations. For MP1, whilst most recognised the significance of Hooke’s law, they failed to refer to the shape of their graph to justify their statement. Some students recognised there was insufficient data for MP2. Comparison of their value for k with the information was often done well.

Q14(a)

This multi-step calculation was generally well tackled and a conclusion given at the end comparing the angles.

Q14(b)(i) and (ii)

Part (i) was very well answered with the majority scoring full marks. Part (ii) however was less well attempted. Incorrect responses often related to sound being able to travel through the rock or sound going in all directions. Diffraction was mentioned fairly frequently, but less frequently with a comparison between wavelength and the rock size.

Q15(a)

Many completed this calculation successfully. A significant number having correctly selected the equation and made correct substitutions, then struggled with the algebraic manipulation.

Q15(b)(i) and (ii)

Quite a few didn't know what to do here and tried a momentum calculation with p=mv using the mass of the electron and a velocity.

The second part was challenging and very few were able to make the link between the diameter of the atom and the discrete number of half wavelengths, often discussing electrons jumping to energy levels. A few more students were able to make a statement regarding E=hf and score a mark although this was often by luck rather than fully understanding the question.

Q16(a)

Most students could correctly use the efficiency equation but it was not uncommon for the useful output energy to be multiplied by 0.8, giving a smaller total input energy. After that, some candidates tried to use the kinetic energy equation not realising that it wasn't in free fall.

Q16(b)

It was evident that candidates understood the relationship between power, energy and time but struggled to relate this to the context. Attempts at both marking schemes were observed. In the first scheme candidates realised that the mass needed to be lowered quickly, for MP1, but did not then relate this to the depth giving a limited time. In the second scheme reference to E=Pt was scored frequently but then candidates struggled to apply this to the system in terms of the finite depth of the mineshaft.

Q16(c)

Around 85% scored both marks. A few candidates struggled to know what to use as the force and the use of g to calculate the force from the mass was omitted. Working was often not clearly shown.

Q16(d)

The connection from speed to force to stress was not well made with candidates missing out on at least one. Frequently there was a confusion between stress and strain for MP3.

Q17(a)

MP1 was infrequently scored – linking light intensity to the rate of photons. It was more common for the idea of more conduction electrons to be seen. It was surprising that more students did not refer to I=nAvq given that many referred to charge carriers or charge carrier density. This significantly weakened their answers. Several incorrect responses involved confusing LDRs with the photoelectric effect.

Q17(b)

Candidates performed well with most scoring both marks. The most common mistake was to confuse power and energy when using P=E/t.

Q17(c)

It was clear that most candidates knew about polarisation but couldn't explain themselves in correct language. Candidates needed to use the terms oscillations and planes, but a common mistake was to write about light in many directions with no reference to oscillations. Some failed to apply their knowledge of polarisation to the situation in the question, but instead, described a system of two polaroids (a common class demonstration).

Summary

Based on their performance on this paper, students should:

- consider a range of applications for each area of physics. They should get used to applying and explaining the physics in different contexts, so they are less dependent on "learning the answer".
- approach problems from different angles to develop a variety of strategies to solve problems.
- Make a reference to the shape of a graph and/or equations to support an idea
- revise the difference between stress and strain

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