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Examiners' Report
October 2025

Pearson Edexcel International Advanced Subsidiary level In Physics
WPH12/01

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October 2025
Question Paper Log Number P78832A
Publication Code WPH12_01_2510_ER
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Q11 The main issues were either an inability to rearrange the equation properly or to substitute a correct value for q in the drift velocity equation. Common mistaken values were 1 and the mass of the electron, although some used the mass of the proton or even the Planck constant.
Even those who inserted the correct values had trouble with the powers of 10, getting an incorrect power at the end. Just a few unit errors too with a number of candidates just writing the units as ms−.

Q12(a) Mostly well done. Some common incorrect approaches came from an inability to rearrange V = IR when using P=IV or an incorrect substitution into P=E/t, although a number of 1-mark answers stopped after a single calculation. Some unusual approaches thought that 230 was the power and all of those attempted to use this to calculate V.

Q12(b) Some candidates failed to consider what was happening inside the wire. A significant number of candidates referred to the kinetic energy of particles (or atoms) increasing but took this no further. Lower scoring candidates were often vague when referring to increased collisions; some inferred that electrons collided more, some suggested that “particles” collided more and others did not refer to an increased rate of collision. It was not uncommon to see the generic term particle used in this answer. In better answers there was often a confusion between the frequency of collisions and the frequency of lattice vibration. There were also a number of answers that implied the lattice only started vibrating when it was heated up.

Q13 Many candidates stated their calculation to an incorrect power of ten and included units therefore the fourth marking point was not awarded, even for candidates whose calculations were entirely correct. Furthermore, most candidates neglected to compare their calculated value from those in the table which meant that many responses that correctly identified constantan as the metal were not awarded the fifth marking point. Most candidates did not calculate gradient and instead opted for a pair of points from the graph, not realising that this would lead to an incorrect value as the line did not pass through the origin.

Q14(a) A significant number of candidates muddled their response to this item by not clearly stating whether they were referring to the normal line or the surface of the glass block. Some candidates inadvertently implied that the angle of incidence was ninety degrees. There was often confusion with some responses as there were contradicting statements.

Q14(b)(i) The majority of candidates scored both marks, but some confused the angles of incidence and refraction and calculated 22 degrees.

Q14(b)(ii) Generally consistent with answers from (b)(i) although quite a few had a refraction the wrong side of the normal or a reflection back into the block.

Q14(c) Most candidates were awarded the first marking point. However, quite a few used an incorrect trigonometric function and were not awarded the second marking point. Some of those who were awarded the second marking point doubled the 30mm to get 60mm as an answer rather than adding on 45mm. A few also felt that the 45mm given was the diameter not the radius, so made errors in their calculation.

Q15(a) The first and fourth marking points were the most common and the third was the least common. There were a lot of references to kinetic energy, but this was commonly the idea that electrons use kinetic energy to escape from the metal. Many descriptions were disjointed and confusing. Most responses included terms like 'work function' and 'threshold frequency' but many had little understanding of what they meant For example answers would refer to 'work function of the electron' or that once energy equal to(or greater than) the work function was received by an electron it would rise energy levels and then fall back emitting a photon or once an electron receives energy equal to the threshold frequency it will be emitted.

Q15(b)(i) Generally most scored all 3 marks. The most common wrong answers just assumed that wavelength was f and multiplied it by h.

Q15(b)(ii) Very well answered on the whole, although quite a few failed to convert energy properly or didn't realise that you could not put a J energy in the same equation as an eV energy. Also, some felt that they were meant to be calculating the velocity of the electrons, so inserted the mass of the electron too.

Q15(b)(iii) The first marking point was usually awarded but many candidates divided the answer by electron charge and were given no further credit. There were some power of ten errors.

Q15(c) There were quite a lot of vague responses here. Most candidates scored one mark for the consolation response and the idea of increase in frequency of photon and electron release was usually omitted.

Q16(a)(i) This mark was often awarded, although quite a few candidates said "same phase difference" which is not correct. Also, some mixed up path difference and phase difference, while quite a few others just stated it would have the same frequency and nothing else of merit.

Q16(a)(ii) It was reasonably common here for candidates to go into detail about why waves diffract before discussing the interference. The third marking point was the most common although many two-mark responses were awarded the first and third marking points. Many responses focused on the amplitude of the wave due to constructive interference. There were a significant number of answers which used words associated with stationary waves.

Q16(b)(i) The main error here was caused by incorrect powers of ten.

Q16(b)(ii) The majority of candidates failed to appreciate that answers to this question required a calculation. In most cases even those that realised that sin would be greater than 1 did not substitute or evaluate the calculation. A small minority of candidates believed that a sin of greater than 1 would lead to an angle greater than 90. A common issue was to assume the double slit equation under small angle approximation held so simply multiply the distance to n=1 by 3, which gave an answer less than 90.

Q16(c) A common theme was that white light would produce rings rather than spots. Candidates who failed to score the first marking point usually found it difficult to score the third. A significant number of candidates realised that the position of the violet and red ends would be determinable but made vague statements such as f at the top/bottom/left/right.

A number of responses focussed on the difference between a laser and a lamp instead of monochromatic and white light.

Q17(a) A significant number of candidates were awarded the 2nd, 3rd and 6th indicative content marks. The first indicative content mark was not often awarded and often when it was awarded it was for the wrong reason. This was because the responses did not really refer to electrons gaining the energy they needed to be released from the valence band.
The second indicative content mark was very commonly awarded, perhaps as the question had prompted candidates to talk about conduction electrons. The third indicative content mark was commonly seen but was often withheld as it was not always clearly related to the thermistor.
The fourth indicative content mark was the least commonly awarded. The fifth indicative content mark was rarely seen, but some candidates did link the increased current to a larger p.d. across the fixed resistor (the first version of this indicative content mark was hardly ever seen as answers usually jumped straight to the ratio of p.d.s rather than resistance). The sixth indicative content mark was, in a sense, a 50/50 choice, so relatively commonly seen as correct.

Q17(b) Generally very well answered with many candidates scoring all the first 4 marking points. The conclusion was, however, quite often incorrect. The main errors prior to the fifth marking point were linked to using the wrong resistance in calculations (not adding the two together at the start).

Q18(a)(i) Some candidates did not refer to vibrations or oscillations and therefore achieved no credit for their responses. A significant number of candidates referred to the “direction of motion” rather than the direction of energy transfer. Some candidates referred to “motion in every plane” rather than oscillations. A few candidates simply stated that “polarised light moves in one plane/direction” and that “unpolarised light moves in many planes/directions”. This is a common question, and responses continue to contain the same errors.

Q18(a)(ii) A common incorrect answer was the idea that polarising filters only block one plane and let all the others through. Another common incorrect idea was that the intensity of unpolarised light isn’t changed when it goes through a filter. Responses rarely articulated well enough to score anything. Better answers still referred to the light that was blocked rather than the light that was transmitted, so didn’t score well.

Q18(b) The most common idea in this answer was the reduction in intensity of light passing through filter 2. This led most candidates to claim that the intensity would decrease through the third filter. This happened even in examples where candidates had claimed that the original set up would block all of the light! Candidates who failed to discuss the original set up often scored 0, although there was sometimes the idea that there was light passing from 2 through 3. Generally, very poorly attempted with the majority of candidates immediately starting to discuss the rotation of the filter with no mention of the original setup.