OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL A-LEVEL PHYSICS

9630 Paper 2

Report on the examination

June 2018

REPORT ON EXAMINATION: INTERNATIONAL AS LEVEL PHYSICS 9630 UNIT 2 JUNE 2018

There was a broad range of marks obtained by the cohort indicating the paper was accessible to all students. There were no indications of time constraints. The general performance in Sections A and B was similar; students generally did better in Section C (multiple choice questions). Throughout the paper, students had most success with questions about electricity.

Calculations were handled better when the context was clear. However, the layout of numerical answers was not often easy to follow. Students would benefit in all numerical questions (calculate, determine, show that) by using a common format. Students should expect to see quantities given in non-SI units and to convert them. This would be a useful first step. It would then help to see the formula to be used, rearranged if necessary for the desired subject.

SECTION A

QUESTION 01

Part 1 tested knowledge of voltage-current characteristic graphs and the majority of students were successful.

Most students achieved some success in part 2. The most common errors were an inaccurate reading from the graph or a failure to convert from mA to A.

QUESTION 02

A precise explanation of work function was required in part 1, which only about one third of students could provide.

Just over 50% of students made the connection between the work function and threshold frequency in part 2 and gained full marks. Students should consider converting eV to J, especially in connection with the photoelectric effect, a routine exercise.

Part 3 tested knowledge of unit prefixes and a rephrasing of the frequency (850 THz) with appropriate powers of ten was expected. A significant number of students failed to give a clear numerical comparison as part of their explanation.

QUESTION 03

This question discriminated well with a little over half of students gaining full marks and nearly all students gaining some marks. Many did not appear to realise the first step was to determine the time period, or they had difficulty rearranging the equation to make the spring constant the subject.

QUESTION 04

This question about optical fibres was not well answered by nearly all students. Few knew the name of the effect and even fewer could give the correct cause. Total internal reflection was a frequently seen answer.

QUESTION 05

Many students were successful at gaining some marks in this question, although only 25% appreciated that the mass per unit length was needed in the formula. Students who used the string mass (rather than mass per unit length) were still able to gain some credit.

QUESTION 06

Part 1 was a straightforward recall of the property of an ideal voltmeter but just a quarter of students knew this. “Zero ohms” was often given as an answer, suggesting some confusion between the properties of an ideal ammeter and an ideal voltmeter.

Although part 2 was correctly answered by most students the clarity for a “show that” question was often marginal. Students should be aware that such questions require their method to be very clear to the marker. In this case evidence of determining the gradient of Figure 4 was expected.

There were several numerical approaches to answer part 3 and all were seen. Limited credit was given to students who extrapolated the grid of Figure 4 to gain the potential difference but this is not a method to be encouraged.

QUESTION 07

Many students in part 1 conveyed the sense that the air particle oscillated but there was often a lack of precision in describing the relative direction of oscillation. Students would benefit from learning precise definitions of longitudinal and transverse waves.

Part 2 was tackled well by most students. The best answers were clear to follow because formulae were written first. Some students simply manipulated the values to arrive at number close to 870, which is not sufficient for a “show that” question.

Few students understood how to answer parts 3 or 4, which may be down to a lack of understanding about phase. In part 3, students could have expressed the phase difference as either 0.2 or 0.8 of a cycle.

Only about 15% of students appreciated in part 4 that the sound wave would need to complete 13 cycles before reaching the microphone.

QUESTION 08

This question is based on a common practical investigation into diffraction.

Part 1 was clearly answered by about half the students. Answers to “show that” questions must be given to more significant figures than the approximate value given.

About 30% of students scored well on part 2. Others realised the need to use the diffraction grating formula but either did not convert the 600 lines per millimetre correctly or used it directly as the slit width. A significant number of students misunderstood the question and tried to calculate the wavelength using the double slit formula.

Most students found the explanation needed in part 3 to be challenging even though many marking points were available. Those who gained some credit made remarks about the formation of a diffraction maximum. Hardly any students addressed the specific detail of a how a second-order maximum occurs.

Some excellent answers were seen to part 4 but a large proportion of students did not seem to know how to proceed.

QUESTION 09

Few students were familiar with the production of characteristic X-rays. The alpha and beta labelling of the peaks led some students to refer to alpha and beta decay processes. Other students gave descriptions of medical uses of X-rays.

Most students dealt with the calculation in part 2 but, as in question 2, a conversion from eV to J was needed and not always handled correctly. A common misconception was that the question was about the de Broglie wavelength of the electron, rather than the X-ray wavelength.

About half the students gained one mark in part 3, by appreciating either that the two peaks remained in the same position or that the minimum wavelength would halve. Few students indicated that both changes would occur. Students who didn’t sketch carefully were penalised.

SECTION B

QUESTION 10

This question was about data analysis.

Accurate measurements were required for part 1, which many students did. Those who measured inaccurately could still gain partial credit by showing their working out.

Many students didn’t know how to propagate the uncertainties in part 2, with some leaving the percentage uncertainty as their answer.

While most students appreciated in part 3 that ray Z would give the smallest percentage uncertainty, they did not give a satisfactory reason and often repeated the information in the question.

QUESTION 11

Most students made good progress with part 1, with the best responses showing a formula, followed by the substitution of values, and an answer to more than two significant figures.

About 40% of students gave a correct answer to part 2. Increasing the height of the fall was a frequent incorrect response.

In part 3, many students did not appear to be sure what the input power was or used 0.18 W as an output power. About one-fifth of students managed to get the overall efficiency for one mark but did not go further.

Half of the students calculated the resistance in part 4 without difficulty. Some did not convert the power from mW to W.

Section C

Students scored well on questions 12, 13, 14, 15, 17 and 23. These were mostly about electricity.

Questions 19, 20, 21, 22 and 24 were found to be relatively challenging. These were most about waves.

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