OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL A-LEVEL PHYSICS

(9630) PH02

Report on the examination

June 2019

REPORT ON EXAMINATION: INTERNATIONAL LEVEL SUBJECT CODE UNIT PH02 JUNE 2019

This paper was accessible to the students, with a broad range of marks awarded and no evidence of students running out of time. Students did particularly well in the multiple-choice section.

Students performed generally well in calculation questions, including questions requiring multiple equations in one part (eg 2, 9.2). There was greater spread in marks for the long- and short-answer worded questions. In questions with the command '*Explain*', (4.3, 5.2, 7.1), many students gave descriptions without explanation and so could not access all the marks. Students are advised to study the published list of command words to help them prepare for such questions such as these. In general, students performed well in the topic of electrical circuits (questions 5 and 7) and relatively poorly in the topics of photons and waves, including standing waves (questions 6, 8 and 9).

QUESTION 01

This question was well answered, with around 80% of students scoring full marks.

QUESTION 02

This question was also well answered, with over half the students scoring full marks. Students usually lost marks because they calculated the slit spacing incorrectly.

QUESTION 03

This question was poorly answered by many students, with only about 30% of students scoring 2 or more. Many students made fair attempts at describing both the experimental setup and the variables to be varied and measured. However, many did not understand the concept of polarisation suggesting, for example, that a polarising filter can only reduce the intensity of light that is already polarised.

QUESTION 04

Part 4.1 was not well answered. Many students identified the concept of resonance for one mark, but few could apply it to the context well enough to gain the further two marks. Part 4.2 was well answered. Part 4.3 was poor; the majority of students correctly suggested that the peak amplitude would be lower (for one mark), but only 5% of students went on to give an explanation mentioning energy.

QUESTION 05

Part 5.1 was well answered. Part 5.2 was poorly answered; very few students scored the full four marks. Even though the question required no contextual application, students could not explain the phenomenon of resistance in terms of the interaction of electrons and ions. Part 5.3 was better with students showing that they could retrieve and process data from graphs with confidence.

QUESTION 06

Part 6.1 was well answered. Part 6.2 yielded mixed responses with under half of students scoring any marks, but some well-worded responses were seen. The best responses clearly differentiated between the de-exciting (mercury) atoms and the photon-absorbing (powder) atoms. Part 6.3 was very poorly answered. Only 20% of students recognised that the atoms de-excite via other levels. Parts 6.4 and 6.5 were better answered, and indeed there were some students who scored full marks in the calculation question (6.5), having scored very few marks in the rest of the question.

QUESTION 07

Part 7.1with its command '*Explain*', was not well answered. There were both algebraic and qualitative arguments seen, but in both cases the responses were vague, partial or unqualified. As a point of general advice, when using an equation to justify an explanation, students should list the names of every quantity and also discuss the direction of change of these quantities. Part 7.2 required the abstraction of data from a graph and was well answered. However, a significant proportion of students drew a best-fit line of unacceptable quality. Part 7.3 yielded a spread of marks: while most students recognised the need for a gradient, its execution was poor. Examiners require a large interval between two data points (best demonstrated by drawing a triangle on the graph) determined accurately *from the best-fit line*. Teachers can consult section 7 of the specification to review the mathematical requirements, including those for data handling. Part 7.4 was well answered, although some students left it blank.

QUESTION 08

Part 8.1 was poor. Around half of students were able to identify one difference correctly, but their second response was often not acceptable containing, for example, the ideas that energy is transferred along the wave (already provided in the question) or that there is no frequency of oscillation at a node. Part 8.2 yielded a spread of marks, with most students identifying the correct equation to use, but some making power-of-ten errors or failing to realise that the frequency must be tripled for this harmonic. Part 8.3 was well answered, with almost 70% scoring the full three marks. Part 8.4 was answered successfully by the majority of the cohort. However, part 8.5 was only answered correctly by 20% of students, the remainder displaying the misconception that phase varies continuously along a stationary wave.

QUESTION 09

Part 9.1 was well answered. Students are reminded that questions with a '*Show that*' command require a final answer with one more significant figure than the value in the question. Part 9.2 was meant to differentiate between candidates, and gave a pleasing spread of responses across all the marks. Part 9.3 was also poor, with only 10% of students scoring at least one mark, and even fewer scoring both marks. Students were not familiar with this part of the specification (optical fibres and modal dispersion).

QUESTION 10

Question 10 was the practical-skills question and was not well answered overall. In 10.1, less than 30% of students scored the one mark. Although many calculated the mean correctly, in such practical questions both the unit and the correct number of significant figures are required. Part 10.2 was even less well answered. It was evident that students are unable to calculate an uncertainty where there are repeat measurements; the uncertainty is found using half the range of the raw values. Part 10.3 was well answered, a straightforward calculation. Part 10.4 yielded a spread of marks, and many students showed clearly that they could combine the uncertainties correctly. Part 10.5 also yielded a spread of marks. Although a majority (75%) could determine the half life correctly, only 30% repeated and took an average; this is an expectation at this level.

MULTIPLE CHOICE SECTION

Students scored highly in questions 14, 15, 20 and 22. Again, they seemed to do best in questions with calculations or where equations had to be manipulated.

Students scored poorly in questions 11, 13, 17 and 24. They found questions difficult when a correct choice of graph is needed. Question 17 was about standing waves, an area of weakness for the cohort.

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FAIR ASSESSMENT PROMISE

In line with OxfordAQA's Fair Assessment promise, the assessment design, marking and awarding of this examination focused on performance in the subject, rather than English language ability.

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