OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL A-LEVEL PHYSICS

PH02 Paper 2

Report on the examination

January 2019

REPORT ON EXAMINATION: INTERNATIONAL A-LEVEL PHYSICS PH02 UNIT 2 JANUARY 2019

GENERAL

This paper was sat by about twice the number of students as in June 2018. The distribution of marks indicates broad accessibility with no time constraints. Overall, students were more successful with questions about electricity, rather than oscillations and waves. Slightly higher scores were seen in the order section C, B then A.

Mathematical answers were generally better than written answers. Some excellent presentation of algebraic manipulation and numerical calculations were seen. Students who clearly showed each step of their answer tended to be more successful.

The treatment of the linear graphs in questions 4 and 10 indicated that a significant number of students didn't identify features (y-intercept, gradient) of the line of best fit to the relevant linear function.

QUESTION 01

About half of the students scored 1 mark for this question, with most giving a precise description of a longitudinal wave. Very few students scored 2 marks. Those who did commonly gave a statement that only transverse waves could be polarised. A statement about what polarisation is was rarely seen.

QUESTION 02

Students found this multi-stage question very accessible, with 85% gaining full marks.

QUESTION 03

Answers to this question suggested students did not comprehend the question. A lot of students gave a description of a superconductor, rather than a reason for its necessity.

QUESTION 04

There were some excellent, coherent answers to 04.1. A "Show that" question should be answered clearly, so that the marker can easily follow the line of argument. A common omission was stating that the gradient was $\frac{f^2}{T}$.

About half of the students scored full marks in 04.2. Many did not see the connection with 04.1 and failed to use the gradient. It was common to see students substituting a pair of coordinates into the equation for the frequency of the first harmonic.

QUESTION 05

This question discriminated well. Students who used technical terms accurately gained more marks. Students would be well advised to read the question carefully and confine their answer to the scope of the question. In question 5 some students went on to describe much more than was required and risked being unable to gain marks by making contradictory remarks.

QUESTION 06

The multi-step calculation in 06.1 was answered very well, with over 75% of students achieving full marks.

The more straightforward 06.2 proved more challenging, despite an allowance of an error carried forward, as many students did not appreciate the potential divider aspect of the circuit.

QUESTION 07

For a knowledge recall question, 07.1 was very poorly answered, with barely 14% of students giving a suitable answer. “Energy per unit charge” was commonly seen.

As with 04.1, there were exceptionally coherent answers for 07.2, but too many students left the marker inferring steps in the argument, which is not the expectation of a “Show that” answer. Overall, 07.2 discriminated well, though. Students are reminded to give a final numerical value in a “Show that” question to more significant figures than given in the question.

A large majority of students answered 07.3 fully.

The discrimination in 07.4 was good. Many answers related to general ideas about electrons or what the experiment demonstrated, rather than the reason that ideas changed following the observation of electron diffraction.

Question 07.5 discriminated well, with many students giving the clarity of response expected for an “Explain” question. There were many incorrect answers describing changes to the current or electron number.

QUESTION 08

A large majority of students answered 08.1 fully. Many students realised 60° was the incorrect angle of incidence and retrospectively corrected their answer. Again, students are reminded, in “Show that” questions, to give a final value to more significant figures than given in the question.

About 50% of students gave a correct answer to 08.2. Common errors were to refer simply to “density” or to give a general statement about the refractive index of one material having to be greater than the other, without relating to the specific context.

Question 08.3 split students between those who realised that the angle of incidence was 68° and those who though it was 22°.

Approximately 35% of students scored full marks in 08.4.

Many sensible suggestions were given in 08.5 but a large number were not appropriate to an AS level standard of practical work.

QUESTION 09

09.1 discriminated well. Many answers compared the time periods or frequencies of the three pendulums. Few students compared the amplitudes. Most who gained full marks did so by giving a quantitative comparison of pendulum X (and/or Y) to pendulum Z. Many answers were close to being creditworthy but were not clear on which property was being compared and referred simply to "oscillations".

A majority of students gained some marks in 09.2 by giving some indication that the amplitude would reduce.

09.3 was well answered with 83% gaining full marks.

09.4 was well answered too with many answers showing clear calculations and a final statement.

SECTION B

QUESTION 10

10.1 was poorly answered. Many answers suggested the lamp was present to see if the circuit was working, not realising that the ammeter would serve this purpose.

The graph skills required in 10.2 were mostly shown to a sufficient standard. 46% gained 2 marks, and 41% gained 1 mark. Omitting the error bars was the most common reason for missing out on full credit.

A line of best fit (10.3) was generally well drawn. Students are reminded that, when obtaining gradients, to use a large portion of the line of best fit and, preferably, show the working on the graph.

Although 10.5 was overwhelmingly well answered, many students did not identify that ε and r corresponded to the y-intercept and gradient, respectively, of Figure 10, and instead pursued a method of simultaneous equations. This was deemed valid if readings were taken from the line of best fit, but not if data points were used.

QUESTION 11

50% of students achieved full marks for 11.1, with many others gaining some credit for a conversion of microseconds to seconds, or use of $f = \frac{1}{T}$.

Many neat, correct answers were seen for 11.2. Some students failed to realise that the ultrasound was a pulse and drew a continuous waveform.

11.3 discriminated well, with many students appreciating the need to halve the overall distance to get the depth.

MULTIPLE CHOICE SECTION

Questions 14, 15, 16, 18, 22, 23 were answered particularly well.

Question 21 was the only one answered particularly poorly, with most students choosing option B.

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