AS

Physics

7407/2

Report on the examination

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General comments

Section A assessed practical skills and understanding. Question 1 was explicitly about required practical activity 2 – interference by a diffraction grating – yet many students answered in terms of two-source interference. Question 2 was an unfamiliar context but tested typical knowledge and skills for this section. As in 2023, students showed very little understanding of how to use a set square.

The context of question 3 in section B was straightforward on first appearance: a parallel circuit of two lamps. But very few students considered ideas beyond GCSE to analyse the circuit. Question 4 was a recognisable projectile motion question. Many students coped well with the individual parts, almost certainly as a result of plenty of practice of similar previous exam questions.

The growing percentage of non-attempted questions towards the end of section C suggests that many students did not balance their time appropriately. The advice is to spend about 35 minutes on section C, and therefore about 55 minutes on sections A and B.

Section A

Question 1

01.1 About 50% of students gave a relevant safety precaution when using a laser.

01.2 Just over half the cohort gained one mark for determining Δx. Many percentage uncertainties were quoted to more than two significant figures, which was inconsistent with the data.

01.3 A large majority of students invoked the double-slit equation for this part and were limited to one mark for a determination of the slit separation. Some students who correctly identified the diffraction grating equation had little idea what values to use with each term, for instance using 300 for n. Only about 30% of students gained more than one mark.

01.4 Only about a quarter of students gained any marks here. As with 01.3, many viewed it as a double-slit investigation and so could not provide anything worthy of credit.

Question 2

02.1 Just over 40% identified the appropriate measuring instruments.

02.2 Barely one-fifth of the cohort gained any marks for a correct method to check that the line **P** was horizontal. A common suggestion was to place the set square on balance **2** to make the ruler horizontal and then compare line **P** with the ruler. Others suggested holding the ruler (vertically) and placing the set square against the ruler to see if line **P** was horizontal. A large number of students seemed, from their sketches, to be totally unfamiliar with the shape of a set square. There was also some indication that some students may not be sure of the terms “vertical” and “horizontal”.

02.3 Nearly 90% of students gained some success in this question. A frequently seen mistake was a straight line of best-fit.

02.4 Only one-third of students gained any marks here. The value of the intersection of Figure 5 was often quoted as the answer, without doubling the value. Few addressed the “accurate” part of the question and attempted at least two determinations.

02.5 Over 60% of students gained both marks for this deduction. A common error by students was to take a value from the “balance readings” axis.

02.6 Many students identified that all values of the graph would increase but did not state why. Credit was allowed for this realisation if it was stated in 02.7.

02.7 This question gave a good distribution of marks. For full credit, students needed to refer to the graph for the reason that e would be larger.

Section B

Question 3

03.1 This was anticipated to be far more accessible than proved. Many students made generic statements about conservation of energy, rather than referring explicitly to the three power terms in the equation. Those that did often did not relate them clearly enough to the relevant components.

03.2 About half of the cohort gained marks for this solution to the quadratic equation. As a “show that” question, the working towards the final value needed to be seen. For those using modern calculators, it was expected to see the coefficients for a, b and c stated as a minimum level of working.

03.3 Only about 20% of students realised that the current of $11\ \mathrm{A}$ would be equally split in the headlamps to determine the correct resistance. Students who used $12\ \mathrm{V}$ and $11\ \mathrm{A}$ in $V = IR$ were given no credit as both values are incorrect.

03.4 This question proved to be very challenging to students, with only 10% gaining more than one mark. The analysis of the change to the circuit rarely went beyond the standard of GCSE. A surprising number of students thought the resistance of **X** decreased as the diameter decreased. Credit was allowed for subsequent correct deductions whichever change in resistance was claimed. However, these deductions were often limited. A common error was stating that the decrease in current in **X** meant an increase in current in **Y** because the current was shared in a parallel circuit. This line of argument ignored the fact that the total current decreased. Almost all students did not consider the internal resistance and the effect on the terminal pd due to the decrease in current. A frequently seen misconception was that the total resistance of **X** and **Y** decreased when the resistance of **X** increased.

Question 4

04.1 Nearly 50% of students achieved both marks. Those who gained only one mark often struggled to identify the correct velocity to use when multiplying by $1.7\ \mathrm{s}$.

04.2 The distribution of marks for this question was very uneven, with 35% getting full marks and an equal percentage achieving nothing. Competent students gained the answer succinctly using the equation $s = ut + \frac{1}{2}at^2$. Those students who were used to solving such problems by dividing the trajectory into two (either side of the maximum height) did not identify that the trajectory was not symmetric and struggled to give meaningful working.

04.3 This question discriminated well. Shortcomings were often in the language used. For instance, "arrives faster" is not the same as "arrives sooner". (The ball actually arrives at the basket at the same speed regardless of the launch angle.)

04.4 This was another challenging question. Again, imprecise language – e.g. "air resistance slows down the acceleration" – was frequently seen. Greater success was seen in answers that described the effects during decreasing, rather than increasing, vertical displacement. Some students misread the question and gave answers in terms of a_v increasing and decreasing.

Section C

Students were more successful in answering questions 6, 11, 14, 19, 22, 28, and were less successful in answering questions 10, 15, 21, 25, 29.

For the following questions, the most popular response was not the answer. A possible reason for this is given for some questions.

Q15: Option D (150, away from the centre) was the popular choice. This fails to consider that the wave would reflect off the beaker wall.

Q18: Option B was favoured slightly more than the answer C. While B does have the smallest resistance (at each pd), the characteristics do not correspond to ohmic behaviour.

Q21: Option C was the most popular choice. If the two wires are made from the same material, the Young Modulus is the same.

Q29: Option B (2ρ, $4m$) was the most popular choice. This follows from an incorrect deduction that that the area doubles because the diameter doubles, leading to the conclusion that the volume of the required rod should be twice that of **R**.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.