AQA

AS LEVEL
PHYSICS

7407/2 Paper 2
Report on the Examination

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General comments

Section A assessed a range of practical skills, from the use of equipment, to the analysis and interpretation of data. There was some evidence in 01.2 and 02.1 of a lack of familiarity with practical methods.

The context of question 4 in Section B was more accessible to students than that of question 3.

Students, on average, achieved the greatest success in Section C.

Section A

Question 1

01.1
About 85% of students gave the correct reading of the micrometer.

01.2
Only about one-third of the cohort gave a relevant reason for using the ratchet on the micrometer. Common inadequate responses referred to checking for zero error or the comment that the wire would be held more tightly.

01.3
This question discriminated fairly. A frequent error was the use of the factor of four in some part of the calculation.

01.4
Barely 10% of students gave two appropriate control variables for this experiment. Students should be advised to give specific answers. For example, “length of wire” was a common example of an insufficiently detailed response.

01.5
Most students struggled with this question with fewer than 20% gaining any credit. Those who correctly obtained a constant of proportionality often concluded that the suggestion was not correct. This was based on a comparison at more than two significant figures. The data from the graph did not warrant scrutiny at that precision. A common misinterpretation was to expect that calculated values of $\frac{1}{d}$ would directly equal the corresponding *f*. A disappointing number of students expected a linear relationship.

01.6
There was frequent confusion in this question over the factors that would be affected by the added mass. Many students considered it to increase the mass per unit length of the wire, and so concluded that the frequency decreased. Others failed to connect the mass to the tension in the wire.

Question 2

02.1
Barely one-eighth of the cohort gave a suitable procedure for this experiment. Use of a set square and ruler, or a plumbline, were rarely seen in answers. Often the plumbline was described (eg "hang a mass on a string") rather than using the term "plumbline". The most common incorrect response was to drop a ball from the end of the track.

02.2
There was a good success in this question, with over 74% gaining two or more marks.

02.3
This data-analysis question proved challenging to most students. Some misunderstood how to interpret the *y*-axis values of "x^2" when using them in a gradient calculation, and either squared, or took the square root, of a reading. Even when a line of best fit was drawn, students commonly opted to use a data point from the graph or line, rather than determine the gradient.

02.4
Only about one-fifth of students gave a suitable reason for the reduction in percentage uncertainty. Responses that were almost creditworthy referred to the increase in time *t* but failed to state that the absolute uncertainty would be the same. A frequently-seen notion was that the percentage uncertainty would decrease because the student would be able to gauge more accurately when to stop the stopwatch, ie that the absolute uncertainty in *t* would decrease.

02.5
There was reasonable spread of marks for this question. Students commonly gained the first marking point about how to identify the angle that would produce the maximum velocity. The second point was less commonly answered successfully with comments such as "repeat readings" being too vague for credit.

Section B

Question 3

03.1
Students struggled to make comments about moments that related specifically to this context. Generic statements about balanced moments were insufficient. Students regularly failed to comment on the relevant forces, eg weight of the food, when describing moments.

03.2
This relatively simple derivation was not attempted well by a large majority of the cohort. Few students started with an expression of moments and commonly omitted *g* in their working.

03.3
There was a good spread of marks in this question, although many students failed to connect the equation from the previous question and therefore gained no credit. A large number tried to obtain a gradient.

03.4
Very few students gained any credit in this question. Most students presented arguments in terms of a percentage uncertainty. This, they argued, would decrease as *M* increased because the absolute uncertainty in *M* would be constant. This is not the case: the absolute uncertainty in a value of *x* is constant but, as **Figure 11** shows, this leads to an increasing uncertainty in *M*.

Question 4

04.1
There was near enough a 50:50 split in the mark distribution for this question about a lack of deviation during refraction.

04.2
Over 77% of students gained both marks for this Snell's Law calculation.

04.3
About 40% of the cohort gained one mark for explaining that total internal reflection would occur at **T** (and beyond). Few students addressed the reason, for a second mark, why the intensity was lower to the left of **T**. Students were told in question 04.2 that there was partial refraction, so repeating this information was not creditworthy. Their answer needed to be in terms of partial reflection.

04.4
Those students who grasped what to do in this question generally went on to gain full credit. However, more than half of the cohort did not make the connection between the refractive index and the change in critical angle.

04.5
Nearly one-fifth of students gained full marks in this question but the rest struggled to make much progress. Some determined the angle of 49° but did not realise that this was the critical angle. Students who correctly calculated the refractive index needed to use the value to three significant figures, to correspond to the scale of the *y*-axis in **Figure 14**.

Section C

Generally, students were more successful in answering questions 9, 15, 16, 19, 25, 27, 28 (these all had a success rate of at least 65%) and were less successful in answering questions 6, 7, 18, 23 and 31 (answered correctly by 35% or fewer).

Mark Ranges and Award of Grades

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