



GCSE

COMBINED SCIENCE: TRILOGY

8464/P/2F (Physics)

Report on the Examination

8464

November 2021

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General Introduction to the November Series

This has been another unusual exam series in many ways. Entry patterns have been very different from those normally seen in the summer, and students had a very different experience in preparation for these exams. It is therefore more difficult to make meaningful comparisons between the range of student responses seen in this series and those seen in a normal summer series. The smaller entry also means that there is less evidence available for examiners to comment on.

In this report, senior examiners will summarise the performance of students in this series in a way that is as helpful as possible to teachers preparing future cohorts while taking into account the unusual circumstances and limited evidence available.

Overview of Entry

This was not a normal series. The cohort was therefore not a typical cohort. In addition, the cohort was small, so the statistics are based on a much smaller number of students than usual.

The calculations were well answered. The vast majority of students could complete the low demand calculations with ease. Most also did quite well on the standard demand calculations. Questions that required practical knowledge and understanding or skills, were not well answered. Most students were unable to demonstrate any practical experience.

Questions that required extended response were also not well answered. Students would also benefit from more experience of interpreting data.

Comments on Individual Questions

Question 1 (Low demand)

- 01.1** Approximately 60 % of students correctly identified that friction is a non-contact force.
- 01.2** Approximately one third of students knew that the two forces were the same size. Of those that did not, the majority thought that the downwards force was greater.
- 01.3** Approximately one third of students knew that the force acting upwards on the person was a normal contact force.
- 01.4** This calculation was very well answered. Over 90% of students scored 2 marks, and a few students scored 1 mark for correctly substituting, but then not correctly evaluating the final answer.
- 01.5** Just over 50% of students got this question correct by selecting 'The weight decreased'.
- 01.6** 50% of students knew that the point 'X' represented the centre of mass.
- 01.7** Again, 50% of students were able to determine the resultant force. From those that could not, there was a mix of answers. Some students wrote one of the forces down, and some added the forces together.

Question 2 (Low demand)

- 02.1** Less than 40% of students were able to identify the pattern of the field lines around a simple bar magnet.
- 02.2** Approximately half of students correctly labelled the poles on the iron bar. More than 15% of students did not attempt the question. Students should be reminded that they should answer every question part, even where there is no answer line. Where marks are allocated, this is clearly indicated, and each question part has its own question number.
- 02.3** Nearly half of students got this question correct. Most of those that did not, thought the iron bar would be repelled.
- 02.4** Most students were able to identify one magnetic metal, but only about 15% were able to identify two. As expected, steel was the most common correct answer. Aluminium and magnesium were equally commonly seen incorrect answers.
- 02.5** A little over 40% of students correctly selected that the electromagnet can be switched on and off.
- 02.6** 70% of students knew that the iron nail makes the magnetic field stronger.
- 02.7** 70% of students knew that using a greater current would increase the strength of the electromagnet.

Question 3 (Low demand)

- 03.1** This question was very well answered. Over 90% of students were able to identify one factor that affected the reaction time of the driver. Over 75% of students were able to identify both factors.
- 03.2** This question was also well answered. 80% of students were able to correctly read the age of 24 from the graph.
- 03.3** This question was not as well answered as the previous part. 50% of students were able to read the value of 0.55 for the lowest mean reaction time from the graph.
- 03.4** The vast majority of students scored at least 1 mark on this question. 90% were able to score 1 mark, and over 50% scored 2 marks. Of those that scored one mark, there was a mix of correct answers.
- 03.5** Over 40% of students scored full marks on this question - 2 marks for the calculation and 1 for the unit.

Many students were able to correctly substitute the values into the equation, but could not correctly evaluate the answer. If they correctly selected the unit, they were awarded 2 of the

3 marks. This is a good example of why students should be encouraged to show their working, even for low demand calculations.

- 03.6** Less than 15% of students answered this correctly. Most incorrect answers merely stated that the reason was to prevent accidents, without giving the reason why it would prevent an accident.

Question 4 (Low demand)

- 04.1** Very few students demonstrated a good understanding of this Required Practical Activity. 15% of students did not attempt the question, and over 60% of students' answers contained no relevant content. Approximately 15% of students were able to suggest an appropriate measurement using correct equipment, but did not give any description of what these measurements were for. Fewer students wrote level 2 answers that would produce a valid outcome. It is important that students know how to carry out the Required Practical Activities.
- 04.2** Nearly 70% of students were able to calculate the mean in this question part.
- 04.3** 60% of students knew that taking repeat readings and calculating a mean reduced the effect of random errors.
- 04.4** This low demand calculation was very well answered, with the vast majority of students scoring 2 marks.
- 04.5** This low demand calculation was also very well answered, with very few students unable to score 2 marks.

Question 5 (Low demand and standard demand)

- 05.1** Over 50% of students correctly stated that the air resistance would increase. Of those that didn't, many of them failed to answer the question, and wrote answers such as 'the acceleration will overcome the air resistance'.
- 05.2** Only 15% of students correctly identified that the lift force on the wings will be the same as the weight of the rocket aeroplane.
- 05.3** This low demand calculation was very well answered, with the vast majority of students scoring 2 marks.
- 05.4** Over 50% of students correctly recalled the equation.
- 05.5** This standard demand calculation was reasonably well answered. Nearly 75% were able to substitute into the correctly rearranged equation, and the vast majority of those went on to correctly evaluate the answer and score full marks.
- 05.6** This question was an extended response question that was marked with a level of response mark scheme. Over 10% of students did not attempt the question. Of those that did 35% did not write any relevant content. Nearly all these students failed to include any

information from the question. Where students are given an additional instruction such as ‘Use values from Table 2’, they must do so. Of the 35% of students that did score mark the majority made simple statements that the radiation dose for the rocket aeroplane was greater. Very few appreciated that because the rocket aeroplane was much faster, it spent much less time in the air. Only a handful of students wrote level 2 answers.

Question 6 (standard demand)

- 06.1** 30% of students correctly selected the meaning of elastically deformed.
- 06.2** 10% of students scored marks on this question. Most of the answers that did not score marks did not refer to any practical procedure or equipment. Some answers did mention measuring the spring, but did not identify which property should be measured, nor which piece of equipment should be used to take the measurement.
- 06.3** 80% of students were able to select the correct equation from the physics equations sheet, and substitute the values into the equation. Nearly all these students correctly evaluated the answer and were awarded 2 marks. Only 2 students converted 80 mm to metres and scored full marks.
- 06.4** Approximately 25% of students correctly recalled the equation.
- 06.5** Approximately 25% of students were able to substitute the numbers into the correctly rearranged equation and evaluate the answer to score full marks.

Question 7 (standard demand)

- 07.1** 75% of students knew that a vector was a quantity with both magnitude and direction.
- 07.2** 30% of students knew that displacement was the vector.
- 07.3** Approximately 10% of students were able to determine the acceleration from the graph.
- 07.4** Nearly 20% of students were able to describe the motion of the player. Of those that were unable to and scored no marks, most gave answers such as ‘the motion decreased’.
- 07.5** Just under 50% of students correctly recalled the equation.
- 07.6** This standard demand calculation was reasonably well answered. Nearly 75% were able to substitute into the correctly rearranged equation, and the vast majority of those went on to correctly evaluate the answer and score full marks.
- 07.7** Nearly 20% of students wrote a reasonable suggestion that the data could be analysed during the game. Many of the incorrect answers suggested that the data could be analysed after the game.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results Statistics](#) page of the AQA Website.