GCSE

COMBINED SCIENCE: TRILOGY

8464/P/2H: Paper 2 - Physics (Higher tier)
Report on the Examination

8464
June 2022

Version: 1.0

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General

The advanced information made a difference to this paper. It had the biggest impact on the calculation questions, as students were given the equations, so those question did not discriminate in the same way that they would in a typical series. The calculations were well answered. The vast majority of students could complete the standard demand calculations with ease. Most also did quite well on the higher demand calculations.

Questions that required practical knowledge and understanding or skills, were generally less well answered. Most students were unable to demonstrate any practical experience. Questions that required extended response were also quite well answered in this paper.

Levels of demand

Questions are set at three levels of demand for this paper:

- **standard demand** questions are designed to broadly target grades 4–5
- **standard/high demand** questions are designed to broadly target grades 6–7
- **high demand** questions are designed to broadly target grades 8–9.

A student's final grade, however, is based on their attainment across the qualification as a whole, not just on questions that may have been targeted at the level at which they are working.

Question 1 (Standard demand)

01.1 Of the 90% of students that scored marks on this question, the majority were able to identify the wavelength for 1 mark. 35% of students also identified the rarefaction to score 2 marks.

01.2 10% of students scored full marks on this question. 25% of students scored 3 marks, the majority of whom did the conversion, but did not give the unit. 50% of students scored 2 marks on this question, failing to do the conversion or recall the unit.

01.3 Over 99% of students were able to select the correct equation.

01.4 The majority of students understood what was required to answer this question. Nearly 65% of students gained full marks. Some students read the correct value from the graph, but then wrote this as their final answer. Some students just multiplied 300 by 28.

Question 2 (Standard demand)

02.1 Over 99% of students were able to select the correct equation.

02.2 This was a relatively straight forward calculation, with nearly 90% of students gaining full marks.

02.3 Over 99% of students were able to select the correct equation.

02.4 Over 95% of students gained full marks on this speed calculation.

02.5 30% of students were able write a response that contained logically linked statements. The most common creditworthy responses described competitors getting tired. Of the students that did not get into level 2, most just gave reasons why the speed may change, but did not link this to an increase or decrease in speed.

Question 3 (Standard and standard/high demand)

03.1 This question was very well answered. Nearly 60% of students used the equation correctly and carried out the conversion to kg and scored full marks. Approximately 30% of students used the equation correctly but did not carry out the conversion and so scored 3 marks.

03.2 Only about 5% of students scored more than 2 marks. 40% of students were able to score 1 mark for either stating that momentum is conserved in the collision or for stating that the momentum of the stationary carriage increased. A significant number of students did not mention momentum at all in their answer.

Question 4 (Standard and standard/high demand)

04.1 Nearly 50% of students were able to gain at least 1 mark. This was mainly for stating that there is a magnetic field due to the permanent magnets, or describing the field. Only about 10% went on to say that a current in the wire produces a magnetic field.

04.2 Nearly 50% of students were able to gain at least 1 mark on this question. Those that only scored 1 mark correctly stated that Fleming's left hand rule, or just the left hand rule, should be used. Half of students that scored the first mark failed to gain any further credit as they were then unable to describe what the direction of each finger represents.

04.3 Just over 50% of students scored at least 1 mark for giving one change that would increase the speed of rotation. Less than 10% were able to explain that the change would increase the force exerted on the coil. Many students mentioned using a bigger magnet instead of stronger magnet.

Question 5 (Standard/high and high demand)

05.1 Approximately 60% of students were able to suggest one improvement to the method. Normally this was to use two flasks the same size and shape. 30% of students gained 2 marks - in the majority of cases they suggested two improvements. Only about 10% of students scored 3 or 4 marks for explaining why the changes improved the investigation.

05.2 90% of students scored 1 mark on this question. Approximately 50% were able to score both marks.

05.3 Approximately 75% of students gained the mark on this question. Answers that were not given credit often referred to a higher final temperature, and not that the initial rate at which the temperature increased was higher.

05.4 This question was a high demand question and proved to be the most challenging on the paper. Very few students appreciated that the flasks were both absorbing radiation and losing energy to the environment. Most incorrect answers just stated that the water had reached its maximum temperature, with many stating that it had reached its optimum temperature.

Question 6 (Standard/high and high demand)

06.1 As students were provided with the equations, this question proved to be more straight-forward than originally expected. Students had to interpret the graph to determine the reaction time. As they were given the equation over 70% were able to read two values off the graph, and correctly determine the reaction time. Nearly all students that did read two correct values scored full marks. Those that did not usually rearranged the equation incorrectly.

06.2 Only a small percentage of students appreciated that they had to determine the area under the graph. Of those that did, only about 1% failed to go on and score all the marks. About 6% of students scored on this question. Most incorrect answers gave two values from the graph and multiplied them together.

06.3 This was a high demand question, and approximately 30% of students gained some marks. Nearly all answers that did not gain any marks did not mention the gradient at all. Only about 3% of students went on to say that the gradient represents the acceleration, and very few stated that acceleration was proportional to force or that force is equal to mass times acceleration.

Question 7 (Standard/high and high demand)

07.1 20% of students scored both marks on this question. Incorrect answers often had arrows that did not point up or down, or were drawn on the apple. Many incorrect answers had labelled the diagram rather than drawn force arrows. 5% of students gained 1 mark, for two correct arrows that were not the same length.

07.2 This question was well answered with over 40% of students arriving at the correct final answer and scoring 6 marks. Approximately 15% of students were able to correctly work out the change in velocity, but then failed to use that the determine the distance, most of these students scored 3 marks. Students should always show their working out for extended calculations.

07.3 20% of students gained at least 1 mark, and approximately 10% gained more than one mark. A small number of students scored all 4 marks. Incorrect answers usually demonstrated a poor understanding of acceleration, with a significant number stating that the apple would accelerate more and more, so the acceleration would increase.

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account of how students have performed for each question.

Mark Ranges and Award of Grades

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