GCSE

COMBINED SCIENCE: TRILOGY

8464/P/2F

Report on the Examination

8464/P/2F
June 2023

Version: 1.0

Further copies of this Report are available from aqa.org.uk

General

There was an increase in the number of students, but the general standard of the responses was broadly in line with that of 2019. It was noticed that students had benefitted from being given the equations, which meant that the equation recall question and the calculations performed better than in 2019. As a result, the mean mark on the paper went up.

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.

Question 1 (Low demand)

01.1 Over 95% of students knew that weight acts downwards.

01.2 Approximately 90% of students knew that weight is a gravitational force.

01.3 A little over 90% of students correctly calculated the weight. Nearly all students that substituted correctly also gave the correct final answer.

01.4 Over 80% of students scored 2 marks for this calculation. Again, nearly all students that substituted correctly also gave the correct final answer.

01.5 Approximately 85% of student knew that inelastically deformed meant that the spring will not go back to its original length when the force is removed.

01.6 This question was not as well answered, but over 60% of students were able to identify which length was the extension.

01.7 Nearly 80% of students were able identify which graph shows that the extension of the spring is directly proportional to the force applied to the spring.

01.8 Only 5% of students were able to suggest two improvements to the investigation. Most of the 45% of students that gained one mark suggested using a greater number of forces, or a bigger force. There were lots of vague responses that suggested repeating but not taking a mean.

Question 2 (Low demand)

02.1 Approximately 65% of students knew that the line being straight showed that the speed was constant.

02.2 Only 40% of students interpreted the question correctly. Nearly every student that correctly read the values from the graph gave the correct braking distance.

02.3 Nearly 90% of students correctly calculated the deceleration.

02.4 A little over 20% of students selected the two correct answers. 60% of students gained one mark for one correct answer. A significant number of students only ticked one box.

02.5 20% of students were able to describe the relationship. Most correct answers stated that increasing speed increases the braking distance. Many students wrote vague statements such as ‘it increases’ or ‘speed increases the braking distance’.

Question 3 (Low demand)

03.1 75% of students correctly selected that iron is magnetic.

03.2 40% of students gained at least one mark for drawing the field lines. Most students who only scored one mark were able to draw the correct pattern but did not draw the arrows in the correct direction.

03.3 Over 90% of students knew that the magnets attract each other because opposite poles were facing each other.

03.4 25% of students knew why all the compasses point in the same direction. The most common correct response was that they are all pointing north.

03.5 Nearly 70% of students knew that the field lines would be circular.

03.6 Nearly half the students knew that the current was a control variable.

03.7 Just over half of students were able to correctly read the value off the Newton meter. 4.4 was a common incorrect response.

03.8 About 40% of students knew that the force would decrease if the distance increased. Many incorrectly stated that the force would increase.

Question 4 (Low demand and standard demand)

04.1 Nearly 30% of students scored two marks on this question. Of the 50% that scored one mark, the majority correctly labelled the compression.

04.2 75% of students knew that longitudinal waves transfer energy.

04.3 Approximately 40% of students knew that the amplitude changes. The most popular incorrect response was wavelength.

04.4 90% of students read the correct speed off the graph. As the line does not cross at exactly 340, a tolerance was allowed and many students picked up the mark for an answer between 339 and 340.

04.5 Over 80% of students used their value from question 04.4 in the equation and scored two marks. A small number of students did not use their value from question 04.4 despite the instruction to do so.

04.6 Approximately 25% of students identified that when the temperature of the air increases, the speed increases. Of those that did, only a very small minority of students went on to state that therefore the time would decrease. Many students contradicted themselves by stating that the speed would increase with temperature, but then said that the time would increase.

Question 5 (Low demand and standard demand)

05.1 A little over 70% of students were able to convert cm to m.

05.2 80% of students were able to use their value from question 05.1 correctly and calculate the work done. Very few students correctly substituted in the equation and did not calculate the correct value. Of those that did, it was clear that they did not have a calculator.

05.3 Nearly 70% of students correctly stated that the force / weight would increase.

05.4 Approximately 10% of students scored two marks on this question. Despite the question stating that the engineer was stationary, many incorrectly selected kinetic energy.

05.5 This question was well answered with the vast majority of students getting the mark. Students were given the equation sheet, which will have contributed to the overall performance on this question.

05.6 Nearly 75% of students calculated the correct value, and 35% of students were able to correctly give the answer to 2 significant figures.

Question 6 (standard demand)

06.1 Fewer than 25% of students could identify all the missing parts of the spectrum. 70% of students either scored zero marks or did not attempt the question. A significant number of students wrote answers that were nothing to do with the electromagnetic spectrum.

06.2 Only 2% of students we able to give a similarity and a difference. The similarity was more accessible and was how the majority of the 15% that scored one mark got the mark. Many

identified that they are both transverse. For the difference, most students did not refer to a property of electromagnetic waves. A little over 15% of students did not attempt the question.

06.3 Approximately 20% of students knew that the process is refraction. A little over 15% of students did not attempt the question.

06.4 This question was well answered with over 90% of students getting the mark. Students were given the equation sheet, which will have contributed to the overall performance on this question.

06.5 25% of students were able to substitute correctly and give the correct answer to the question to the correct order of magnitude. Approximately 20% of students correctly rearranged and substituted but did not use their calculator to evaluate the numbers in standard form, so scored 2 marks.

Question 7 (standard demand)

07.1 Students found describing the method for this investigation very challenging. This is a required practical, but fewer than 1% of students wrote a level 3 response that would lead to a valid outcome. The vast majority of students just suggested some measurements that could be taken, such as timing with a stopwatch or measuring the length of the runway with a ruler. Very few students suggested a valid way of varying the force and described taken measurements, so 50% of students wrote level one responses.

07.2 Approximately 50% of students knew that Newton's second law predicts that the acceleration of the trolley is proportional to the resultant force on the trolley.

07.3 A third of students calculated the correct acceleration. A variety of methods were seen, and any that used ratios and gave the correct answer were given credit. A third of students scored one mark for calculating the mass, but then not continuing with the calculation.

07.4 This question was well answered with nearly 90% of students getting the mark. Students were given the equation sheet, which will have contributed to the overall performance on this question.

07.5 This was a challenging calculation for foundation students, but nearly 60% of them scored full marks. Most students substituted into the correctly rearranged formula and then calculated correctly. Only a small percentage of students scored one or two marks.

Mark Ranges and Award of Grades

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