GCSE

COMBINED SCIENCE:TRILOGY

8464/P/2H (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 that usual.

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 not well answered. Most students were unable to demonstrate any practical experience.

Questions that required extended response were also not well answered, with poor use of scientific terminology. Students would also benefit from more experience of interpreting data.

Comments on Individual Questions

Question 1 (Standard demand)

01.1 30% of students correctly selected the meaning of elastically deformed.

01.2 Approximately 25% of students scored at least 1 mark on this question for suggesting that the length of the spring should be measured with a ruler. Nearly 15% correct suggested that the initial and final length should be measured, then subtracted.

01.3 85% 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. Around 15% of these students converted 80 mm to metres and scored full marks.

01.4 Approximately 65% of students correctly recalled the equation.

01.5 Approximately 65% of students were able to substitute the numbers into the correctly rearranged equation and evaluate the answer to score full marks.

Question 2 (standard demand)

02.1 85% of students knew that a vector was a quantity with both magnitude and direction.

02.2 50% of students knew that displacement was the vector.

02.3 Approximately 40% of students were able to determine the acceleration from the graph.

02.4 Just over 35% of students were able to describe the motion of the player. Of those that were unable to and scored no marks, most wrote answers such as 'the motion decreased'.

02.5 Just under 80% of students correctly recalled the equation.

02.6 This standard demand calculation was very well answered. Over 85% 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.

02.7 Nearly 25% 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.

Question 3 (standard demand and standard/high demand)

03.1 Over 10% of students did not attempt the question. Very few students demonstrated a good understanding of this Required Practical Activity. Approximately 35% 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 than 10% of students wrote level 2 answers that would produce a valid outcome.

03.2 Nearly 30% of students calculated a mean value for the wavelength and the frequency, and then went on to determine the speed the wave. These students were given 3 marks. Only approximately 5% of students also converted the wavelength from cm to m and were awarded full marks.

Over 30% of students were awarded 1 or 2 marks for a mean calculation or for calculating the speed without calculating means first.

03.3 15% of students correctly gave the advantage of taking repeat readings and then calculating a mean as reducing the effect of random errors. Most incorrect answers stated that it makes the answer more accurate.

03.4 Just under 20% of students scored marks on this question. Most that scored 0 marks did not refer to the information given in the question. Many stated that the deeper the water the slower the wave.

Question 4 (standard demand and standard/high demand)

04.1 33% of students knew that the field was strongest at the poles.

04.2 12% of students were able to correctly describe how the diagram showed that the field was not the same at all places. Many incorrect answers did not refer to ay feature of Figure 4.

04.3 40% of students gained 1 mark on this question. Most of them identified that the electromagnet could be easily demagnetised. A further 8% went on to say that this meant that the pieces of metal could be easily removed.

Some of the 40% that scored 1 mark scored the mark because they said that electromagnets are (generally) stronger.

04.4 20% of students could name one of the magnetic metals, and 20% of those students could name both the metals. Of those that could only name 1 magnetic metal, there was an approximately even number for each correct answer.

04.5 Approximately 35% of students scored one mark, nearly all of these suggested increasing the current. Only a handful of students also suggested moving the electromagnet closer and scored 2 marks.

04.6 This standard/high demand calculation was reasonably well answered. Nearly 40% scored 3 or 4 marks for a correct calculation, but either did not recall the unit, did not convert the length or did neither. 5% of students scored full marks.

04.7 30% of students scored at least 1 mark for getting at least 1 word correct and in the correct place. 10% were able to write the correct word in the correct place for each finger.

The majority of students that scored 0 marks wrote words that were not related to electromagnetism.

Question 5 (standard/high demand and high demand)

05.1 Only 10% of students scored marks on this question. At high demand it is expected that where a question follows a figure, students should use information from the figure. Very few students linked the amount of infra-red radiation to temperature, or stated that different temperatures are displayed at different colours, despite that information being given in Figure 8.

05.2 This was a demanding question - students had to compare wavelengths given in nm and mm and in standard form. They then had to use their understanding of the electromagnetic spectrum. Less than 30% of students answered this question correctly.

05.3 The vast majority of the 40% of students that scored marks on this question only scored 1 mark, and that was mostly for saying that there is some risk of cancer with both.

05.4 This question performed as expected with 30% of students scoring 2 marks. Only 8% of students included the conversion to gain full marks.

05.5 20% of students gained at least 1 mark. Most of those stated that the energy from the electrons would cause heating and increase the temperature. Some went on to say that tungsten could be heated to a higher temperature than any other metal. No student scored full marks for explaining this meant that more electrons could be collided.

Question 6 (high demand)

06.1 Very few answers to this question were well structured or contained anything creditworthy. Many did not contain any scientific terminology, and most that did used it incorrectly. There were lots of incidences of students describing acceleration as being equal to air resistance, or stating that because speed is increasing acceleration can't be constant.

06.2 Nearly 30% of students scored some marks on this question. 10% were able to convert the change in velocity to m/s and score 1 mark. Only 10% of students scored 5 or 6 marks. The answer line now reminds students to give their answer to 2 significant figures, however, some students still did not do this.

Mark Ranges and Award of Grades

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