



GCSE

COMBINED SCIENCE: TRILOGY

8464/P/2F: Paper 2 Physics Foundation

Report on the Examination

8464

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General

There was no evidence that the timing of the paper was not appropriate, with most students being able to complete all questions. Many students did a correct substitution in calculation questions, but made no attempt at evaluation or made an unsuccessful attempt at either long division or long multiplication.

Levels of demand

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

- **low demand** questions are designed to broadly target grades 1–3
- **standard demand** questions are designed to broadly target grades 4–5.

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 (Low demand)

- 01.1** Just over 20% scored both marks for identifying the non-contact forces. About 65% scored one mark here, usually for 'Gravitational', with the most common incorrect answer being 'air resistance'.
- 01.2** More than half the students were able to answer this correctly.
- 01.3** Nearly 40% scored both marks. Of those who scored no marks, in many cases this was through being vague eg 'put opposite sides together' or using incorrect terminology. Students frequently referred to 'positive' and 'negative' rather than 'North' and 'South'. There were a significant minority who referred to magnets by colour, eg 'put the two red ends together'.
- 01.4** Half of the students answered this question correctly.
- 01.5** Around 27% gained 2 marks and about 17% gained 1 mark, usually for labelling the upper and lower extremity but omitting those where the two paper clips touched. Some students added the words 'north' and 'south' in full, in addition to the 'N' and 'S' on the bar magnets, and some added field lines, apparently not having understood the question. Nearly 18% did not attempt this question.

Question 2 (Low and standard demand)

- 02.1** A quarter of the students chose the correct comparison of the forces.
- 02.2** Just under a quarter of the students identified that weight is a vector.
- 02.3** Just over half of the students knew that the weight of the gymnast acts from the centre of mass.
- 02.4** Over 92% of students were able to do this calculation correctly, many simply adding the answer to the answer line with no working shown.

- 02.5** This was not well answered with less than 1% of students gaining all 4 marks, nearly 60% gaining no marks at all and approximately further 11% not attempting it. Students were unable to link kinetic energy to movement, and change in gravitational potential energy to height.
- 02.6** Around 68% gained one mark here, usually for making reference to the risk of injury. Those who did refer to a reduction in force often failed to gain the second mark for injury. About 5% of students gained 2 marks.

Question 3 (Low and standard demand)

- 03.1** Just over 80% gained this mark for identifying that there was a resultant force on the ball.
- 03.2** Over 92% completed this calculation correctly, with many simply adding the answer to the answer line with no working shown.
- 03.3** Over half of the students gained all 3 marks here. There was a fairly even approach to working out either 75% of 30 or what percentage 25.1 was of 30. There were a number of students who correctly calculated a relevant percentage but then drew the wrong conclusion, so they were discounting the use of the ball because it bounced too high. The ability to work out a percentage was well executed, by iteration of breaking down the 75% into 50%, 10% etc. by those who did not seem to have a calculator. There were a significant number who simply said that the ball could or could not be used without any supporting calculations, so gained no credit.
- 03.4** Over half of the students scored no marks here, and fewer than 4% scored both marks. When one mark was scored it was most often for a statement about area.

Question 4 (Low and standard demand)

- 04.1** Nearly 6% scored both marks here and approximately further 15% scored one mark. The majority failed to score because of vague statements regarding the thinking distance going up. Some responses referred to thinking time, rather than distance.
- 04.2** Around 34% gained this mark. Over 9% did not attempt the question.
- 04.3** Around 39% gained this mark. Common incorrect responses referred to identifying anomalies.
- 04.4** Nearly 79% were able to calculate the mean reaction time.
- 04.5** Around 23% gained this mark, with most correct attempts being within tolerance. A frequent incorrect response was 9.8, achieved by dividing 280 by 30 m/s.
- 04.6** Just over 13% of students gained both marks, with approximately further 36% gaining one mark. Many of the incorrect answers referred to factors that would affect thinking distance or factors relating to the brakes, which were excluded. There were also a significant number who made statements that were too vague to be creditworthy, eg 'weather conditions'.
- 04.7** This equation was known by around 56% of the students.

04.8 Over 65% of students scored 2 or 3 marks. Just under 5% of students successfully converted kN into N.

Question 5 (Low demand)

05.1 A third of students scored no marks here and around 17% scored all three. There was little evidence of any pattern in response.

05.2 Fewer than 2% of students gained both marks. Approximately 12% did not attempt it and common incorrect responses were related to global warming or a need for sunlight for photosynthesis. Some of the responses regarding health issues referred, incorrectly, specifically to skin cancer.

05.3 Fewer than 5% scored here. Many responses suggested that microwaves could be somehow harvested for use on Earth, because they are not absorbed, which meant they could be used for cooking etc.

05.4 Nearly 47% were able to state why UV radiation can be harmful.

05.5 Over 64% were able to gain marks on this question, often by reference to the data. A number of responses referred to the UV index, rather than the risk posed by UV, and there were a significant minority of responses that were given in terms independent of the data, relating to the use of sun beds in the summer months.

Question 6 (Standard demand)

06.1 About a third of students gained both marks, with very few gaining a compensation mark for taking data from the graph.

06.2 Over 80% scored zero for this question, with approximately further 13% not attempting it. The most commonly seen incorrect response was 10/2 (the inverse of what was required).

06.3 Nearly 44% scored for suggesting an advantage of the wireless system.

06.4 Just over 22% of students knew this equation, with nearly 12% not attempting it.

06.5 Nearly 12% gained full marks for this calculation, with very few picking up compensation marks. It was most common to see frequency divided by speed.

06.6 Less than 2% gained both marks, with a quarter gaining one mark. Usually, reasons for the other types being unsuitable were not given.

Question 7 (Standard demand)

07.1 Nearly 17% did not attempt this question. Whilst there was evidence that some students had seen the experiment, indicated by the suggestion that it should be filmed and played back in slow motion, those that did respond in many cases tried to explain what each part of the apparatus was used for rather than explaining how to collect the required data. The term 'frequency' was well known with suggestions to count waves for a given time; there was, however, some confusion evident between period and frequency. Many suggestions were made on how to measure speed; some simply said that waves should be timed to see how long it took them to cross the tank. Around 15% did score 2 or more marks.

- 07.2** About 3% of students scored this mark, with nearly 10% not attempting it. Many responses said ‘the duck goes up and down not side to side’. Some responses did mention perpendicular, but as an isolated word rather than giving the importance and context.
- 07.3** Just over 16% scored one mark, usually for calculating the mean of both the peaks and the troughs. Many then, incorrectly, added these together. Some of the answers gaining 2 marks for ‘11’ were achieved by finding the distance between peak and trough for each wave and then finding the mean. The vast majority of the 58% who gained no marks simply found the mean of all 6 figures, although a significant number simply found the mean of the maximum heights, presumably because they recognised the amplitude was the height of the waves.

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on 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.