



Level 3

Certificate in Mathematical Studies

1350/1

Report on the examination

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Question 1

Part a was a multi-choice question and was answered very well with over 95% of students circling the correct option.

Part b was also multi-choice, and a similar proportion answered it correctly.

Question 2

Part a was generally well done, with many students having a strong understanding of how to get a proportion from a stratified sample. The most common error was rounding 5.66 to 6 before using this in their division if this was their chosen method. This premature rounding led to incorrect values. However, this was reasonably rare, with over 80% of the students gaining full credit.

Part B was largely answered well. A small number of students found each sport separately, which is not efficient and sometimes leads to errors. Common errors included confusion over which values to combine, or the use of an incorrect denominator. Just over 60% of the students could combine the correct values correctly.

Clear communication (AO3) was often missing in **part c** with fewer than half of the students giving an acceptable explanation.

Students still seem to struggle with this with many students simply putting “It’s proportional” without saying what it is proportional to.

Quite a number of students were not clear enough in their explanation; some mentioned ‘proportional to the sample’, which shows a lack of understanding of the relationship between a population and a sample. Some mentioned the sample method being ‘equal’ or ‘fair’ without further context to gain the mark.

Students who used the phrase ‘the data’ were often ambiguous about whether they were referencing the sample or population.

A significant number of students used generic responses such as ‘It’s not biased’ or ‘It’s random, “it’s quick, it’s easy,” which were not appropriate in this context.

Question 3

Plotting the extra point on the graph in **part a** was done well with almost all students following an increasing pattern. Errors were typically plotting beyond the upper value or plotting within the last square rather than on the 2025 line.

Just over three-quarters of the students gave the correct year in **part b**. The most common error was misreading the scale, assuming it was 5000 not 6000 per small square. This led to an incorrect year -usually 2007

There were again errors in reading the scale in **part c**. A misconception seen in a significant number of cases was that ‘estimate’ meant round every value. Students should know that

estimate is used with two different meanings in mathematics. This question involved reading a value from a graph with a scale where the exact value was impossible to ascertain. Therefore, the answer can only be an estimate.

Students often struggled to recall how to work out the percentage change with about 20% just working out one number as a percentage of another so gaining 2 out of the 3 marks. About 40% gained all the marks with very few not scoring at all.

Question 4

Almost all students could make some progress with this Fermi estimation question with about 55% gaining full marks. Another 30% gained 3 of the possible 4 marks with the most common error being to leave their answer as a decimal which should be totally discouraged for any estimation question of this type. Other errors included forgetting to convert to hours.

Assumptions were nearly always valid so the majority of students could gain these marks. Some students converted minutes to hours too early in the question and often had to work through more complex decimals or fractions such as $4/60 = 1/15 = 0.06666\dots$ hour, when it would have been easier to convert minutes to hours at the end or leave as a fraction.

There are still some students who break the question down too much and try to be too accurate in their answer.

Question 5

Students found this reverse percentage question very demanding with only just over 10% giving the correct answer. A small number found the right value but did not round it to the nearest pound as requested. About a quarter of the students gained a mark for realising that they must use 92.5% as the decrease but the majority of these then multiplied 16250 by 0.925^5 instead of dividing.

The least able students just used 1.075 as a multiplier.

Question 6

This averages/spread question allowed most students to score at least some marks. The question differentiated very well although only about 5% gained all 5 marks.

The most successful students used their calculators to find the mean and standard deviation of the table of values, but it was common for students not to read the question carefully (which stated they should use only one of each measure) and try to find the median and interquartile as well. This cost them time but could also cost them one mark if one of these extra values was incorrect.

Even if errors were made, the values could be carried through for the 'comparisons' marks. The comparison of spread was a source of a mark frequently, with students recognising that smaller SD/IQR showed a more consistent set of data, or the reverse for larger values.

Comparing the mean/median often lost a mark because the results were not explained in context, that a higher average showed that year did 'better'

Question 7

The wind farm question **part a** proved challenging, with fewer than 10% gaining full marks. However, most students managed to score some marks, for making sensible assumptions for the wind speed and/or capacity factor. The question differentiated quite well with students gaining the full range of marks and the majority of students gaining at least 4 of the 10 marks.

The majority of students made an attempt to substitute into the given 'power' formula. The calculation of the power output per wind turbine, which this needed to be equated to, proved challenging with students often converting from megawatts to watts incorrectly, or not realising that they needed to divide by the 80 turbines.

Having found the value for the area, it was common to see the circle area formula correctly used, although a minority of students used rectangle/square formula here. When rearranging for r , a small number square rooted before dividing by π

Those using a trial and improvement approach were less successful as there was no indication of a starting point. Often these students either tried many values for the blade length and got fairly close but not close enough, or they did not know what value (the power output) they were trying to get to.

In **part b** there was the usual misconception of what was being asked. Students had simply to focus on one of their assumptions (wind speed or capacity factor) and say what would happen if they had chosen a different value. Those that realised this usually negotiated the 'reverse' effect eg wind speed higher, need smaller blade length.

Question 8

Part a was answered very well despite this being the first time we have asked a question where the personal allowance is reduced.

In **part b** nearly all students made good progress with around 40% gaining full marks. Common errors included using the normal personal allowance for tax rather than the £5120 from part a) or using this lower personal allowance for National Insurance instead of the boundaries given in the table.

Tax was usually more successful than National Insurance where students' errors included using 50270 for the standard rate, instead of 37700, or working the whole salary at standard rate.

A small number of students work out the salary left after tax ie using 80% and 60%. This method can give the correct value for the net after tax but invariably students then struggle to work out National Insurance. Often this is worked out on the amount after tax has been deducted, which is an incorrect method, or at the end the personal allowance is not added back into the final net salary. This method should be discouraged at this level.

The final 3 marks were achieved by the majority of students although a small number made an incorrect decision, particularly if comparing the percentages.

Question 9

The suitable graph chosen for **part a** was more often a histogram than a cumulative frequency curve.

Frequency densities or cumulative frequencies were usually correct and suitable scales and bars/ points drawn. Labelling was equally a weakness on both types of graphs, with the vertical axis label often missed. About a quarter of the students gained 3 out of the 4 marks and this was usually because of an error in the labelling.

Less able students used the actual values to draw a type of bar chart/histogram which was not accepted due to the different width class intervals.

Those who drew a cumulative frequency curve in part a were more likely to work out the correct number jumping at least 145cm for **part b**. Just under half of the students gained full marks with students often struggling to work out part bars for the histograms. A small number compared the numbers of students instead of the percentages and a few used the same denominator for both sets not realising that part a had 80 students and part b had 120. Conclusions were usually correct, and students could gain credit for a follow through conclusion if at least one of their percentages was correct.

Question 10

Students find the topic of AER quite difficult, and few could make much progress with this high demand question. Just over 10% scored at least 2 marks, usually for working out the monthly interest rate and making some attempt to use the AER formula. The majority did not multiply their monthly rate by 12 so could progress no further.

Mark Ranges and Award of Grades

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