# LEVEL 3 CERTIFICATE
# MATHEMATICAL STUDIES
1350/1 Paper 1
Report on the Examination

**General**

This paper was accessible to the cohort and evidence suggests that a lack of time to complete the paper was not an issue this series. All questions were attempted by the vast majority of students. Working was usually shown and clearly laid out.

**Question 1**

Part (a) was answered well, with the most common error being the choice of quantitative rather than qualitative.

In part (b), relatively few students gave a satisfactory explanation. The majority of either stated that it was a systematic sample, therefore not random, or said that because she was selecting every 20th car it was not random. The main point that we were looking for was that the starting point was not random; had the starting number been chosen at random then the whole method would have been random. Those students who gained credit usually stated that not every car had an equal chance of being chosen.

**Question 2**

The vast majority of students understood which formula was correct in part (a).

Part (b) was answered well, with the majority of students calculating the correct values. Common errors included switching the 5% and 2% or not giving answers correct to the nearest penny. Students in the latter category tended to round to the nearest 10p or the nearest pound.
Part (c) proved to be straightforward, with just a small number of students giving only the month while omitting the year.

Only a few students gained full credit for part (d), as a large number gave the loan repayment for the first year. Generally, students knew that they had to subtract 21 000 from their first value over 21 000 and knew how to find 9% of this value. A small number of students did not subtract 21 000, and a very small number of students used 0.9 instead of 0.09

**Question 3**

Part (a) was answered well, with all the correct values seen in the majority of cases. The most common errors were with the quartiles. The least able students usually gained credit for just the lowest and highest values.

Students usually knew how to take their values and draw correct box plots in part (b), although some did not label their plots to distinguish between the 2 time periods.

The comparison of the distributions caused more problems in part (c) but differentiated well between students. The majority did generally understand that they should use medians and the interquartile range, but failed to understand the need to compare in context. The most common responses were that the median was higher in 1970 than 2000, with no indication of what this meant. An even larger group just stated that the interquartile range was lower in 2010 than 2018, with either no explanation of what this meant or statements that this range meant the lengths of intros were shorter on average.

**Question 4**

Students generally understood that they had to use 1.055 in this question, but the majority used trial and error and therefore did not get to the exact minimum value required. Less than half of all students realised that they should divide 20 000 by $1.055^{18}$ to find the exact value. A small number of students tried years one at a time instead of using a multiplier. This will have used up valuable exam time and rarely gained any credit.

**Question 5**

This question differentiated well between students. As with all years so far, the main problem with the estimation question was that students overcomplicate the question and try to split it up into too many component parts. Some students stated the number of minutes for showering, dressing and breakfast to get a reasonable overall time, but others went into far too much detail about the difference between the time needed by girls and boys, how many might wear make-up or may need more time to do their hair. This can still gain full credit, but will take them more time than a fast rough estimate. The most common errors were usually in the class size, with some students only using 1 person and others using a full year group. Some students did not seem to know how often they were at school, with many counting 7 days a week.

**Question 6**

It was clear that many students did not know how to deal with the 'minimum value' or 'lower bound' of 2.5(%) to 2 sf. Only a small proportion of students could answer the question correctly. The most common approach was to use 1.025 in the calculation, which could gain a special case mark for a fully correct calculation using this value. It was also common to see students who did use the correct 'lower bound' giving the expected value of the house as the answer, rather than the increase in value.

**Question 7**

This taxation question proved a challenge to many students and differentiated well. Students could almost always make some progress; a large number could work out basic rate tax and National Insurance. However, the majority of students either did not include higher rate tax or National Insurance, or had incorrect figures to work from. The majority of students used the whole new salary to work from, with very few students just considering the extra tax and National Insurance payable on the extra £5250.

A common error was then to forget to subtract the personal allowance, the value of which was given on the preliminary material. For the National Insurance, a large number did not subtract the £8424 at 0% or subtracted it from £47 750 instead of from £46 350. A small number of students subtracted the personal allowance before working out the National Insurance, which then meant they had no income in the higher National Insurance bracket.

The less able students gained some credit for working out the monthly figure from their annual salary and deciding whether or not he could afford the mortgage. Some students worked out 40% tax on the full new taxable income, so had new salaries that were lower than the original salary. A small number of students started by working on the original salary of £42 500 despite being given the original net pay.

**Question 8**

The histogram was drawn very well in part (a), with the majority of students showing a good understanding of frequency density. A small number of students had an incorrect width for the first bar.

Part (b) proved to be more challenging, with only a few of the students finding the correct number of applicants. The most common error was to use the same scale as the histogram in part (a). Students who did this could find the proportion of applicants they needed, but usually failed to realise that using this scale only gives a total of 60 applicants, so their answer was half of the correct answer. Some students could not work out any scale or used the whole bar for 15 to 20

Part (c) proved straightforward for about half of the students, with the most common error for the rest being to calculate 36 out of 76 (the total number of females) rather than 36 out of 120.

**Question 9**

Part (a) was accessible, with almost all students making some progress. Very few non-attempts were seen. The majority of students gained over half of the marks available, as they could use the information given in the paper and on the preliminary material to start to work out distances and areas. The use of the scale on the map was generally quite good, but a significant number of students just worked with the 36 miles given for the portion from Northampton to Luton. The more successful students worked out a distance for the whole motorway and then used a sensible proportion, often with good rounding, for the 3 lane and 4 lane sections. The majority of these students used 3 lanes and 4 lanes for the whole motorway but a small number had read that nearly all the rest was 4 lanes and so introduced a small section of either 2 lanes or 5 lanes. This was entirely acceptable. The most common error seen was for students to use 3 lanes for the whole motorway.

A small number of students only considered the cost for one direction or failed to include the hard shoulder. A small number of students tried to work out the volume of the road surface by making up a depth. A very small number of students did not seem to consider the data on the preliminary material as they made up their own values for the width of lanes and the hard shoulder. Students occasionally added in other costs such as labour, showing a lack of understanding that the £15 per square metre is based on all these costs.

Part (b) was poorly answered, as students tended to just state that their answer would change if, for instance, there were more miles of 4 lanes. They must state how it would change, such as 'If there were more 4-lane sections the cost would be greater than my answer'. More able students mentioned this in their response, or commented how their answer would change if the total mileage was less, or the hard shoulder did not continue for the whole of the motorway.

**Mark Ranges and Award of Grades**

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