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(Specification 9370)

Unit A2: Applications of Mathematics (Geometry and Measures) - Foundation

Report on the Examination

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Unit 2: Foundation Tier

General

The majority of candidates were appropriately entered for the tier with the paper differentiating well. In particular, it gave less able candidates an opportunity to tackle problem solving questions which, generally, they managed with some degree of success. Most of the more demanding questions provided an appropriate challenge to more capable candidates.

Question 9(a) proved an obstacle to most. In the responses to this question there was little evidence of attempts to set up an equation, even though they were prompted to do so. Centres are reminded that setting up equations is part of the specification and, consequently, is likely to be tested regularly.

There were a number of data-rich, multi-step functional questions on the paper that required candidates to plan how to use the data. This, as expected, proved to be challenging for less able candidates. Centres are advised to spend some time in preparing candidates to help them answer these sorts of questions, as they are now included as a routine part of GCSE mathematics' papers.

Topics that were done well included:

- money problems involving postage costs
- using unconventional coordinates in context
- symmetry problem
- using a scale drawing
- area and perimeter problems
- drawing and using a linear graph from a practical context (Question 11).

Topics which candidates found challenging included:

- a multi-step functional problem involving perimeter, time and costs
- setting up an equation to solve an angle problem
- an equivalent ratio problem
- a multi-step functional problem involving costs and percentage profit
- a problem involving time and distance at constant speed.

Question 1

All candidates attempted part (a) with virtually all obtaining full marks. A few worked out 90 × 2 and gave their answer as 180 instead of £1.80.

In part (b), most candidates worked out the 1st class cost and the 2nd class cost and then found the difference with the majority doing this accurately. Some made numerical errors and others failed to choose the correct cost for all three weights of stamp.

Question 2

Virtually all candidates managed to identify the correct squares in part (a)(i).

Part (a)(ii) was well done but some candidates scored only one mark for shading 3 squares, or 5 squares instead of 4, or for shading 4 adjacent squares but not in column H. A significant minority did not attempt this question.

Part (a)(iii) was also well done with most candidates identifying two of the four available options. Some identified one option only and a fairly high proportion included square B2 as one of their two squares. A significant proportion appeared to identify squares at random.

In part (b), the majority of candidates completed the task successfully. Some added two ships symmetrically opposite to the two given ships but failed to include two additional symmetrical ships. Some made minor errors in their attempts to shade symmetrically or ignored the requirement for symmetry in some or all of the ships.

Question 3

A high proportion of candidates identified who had the longer garden in part (a) and gave a reason based on a correct conversion, the most common of which was 9 metres → 30 feet. Some candidates made their conversion using the rule given in (c) and others justified Bev's longer garden by comparing points on the line at 8 metres and 9 metres without actually making a conversion. Many candidates who made an incorrect response showed no evidence of using the graph.

In part (b)(i), a high proportion of candidates managed to convert 10 metres to feet successfully.

Part (b)(ii) was well done with most successful candidates multiplying their answer to (b)(i) by 5. Some candidates based their attempt on a different conversion, often 1 metre → 3 feet and often lost accuracy marks. A significant number did not know how to approach this question.

In part (c) the majority scored at least 1 mark for this question but, overall, less than half the candidates were completely successful. Most could use the rule but a large number did not seem to appreciate what they needed to do to show that the graph gave the same conversion. Often candidates used the rule again with a different chosen number of feet. Some candidates used the rule to convert metres to feet. A significant minority made no attempt.

Question 4

Part (a) was well done with a high proportion of candidates measuring the acute angle accurately with only a few candidates attempting to measure the obtuse angle. Some candidates identified an acute angle but failed to measure it accurately, possibly because they did not have a protractor.

In part (b) a high proportion of candidates successfully identified the midpoint of *AB*.

Many candidates identified the diameter and measured it accurately in part (c)(i). Some gave the radius and a few attempted to work out the area or circumference of the pond.

Part (c)(ii) was well done with many candidates able to use the scale correctly. A significant number scored a mark simply by doubling their incorrect answer from (c)(i). A significant number scored zero or made no attempt.

In part (d) many candidates scored at least 1 mark on this data-rich functional question with about a half scoring 3 or more. Candidates who scored zero usually did not attempt to work out the total length of fence to be painted. The gaps in the fence were often ignored when attempting to work out its total length. Some candidates only measured the length of the fence on one side of the field, usually *AB*.

Many candidates had problems in working out the time taken to paint the fence from its length. Successful candidates simply divided by three. Division by five, presumably based on a 100 minute hour, was common. Other errors included multiplication by 20 but then no division by 60 or, simply, division by 20. Many candidates rounded their time to the nearest hour. To score the final QWC mark, candidates had to show their calculation of the length of the fence clearly, followed by their working for the time taken and their calculation of the cost. They could make an error in one of these steps.

Question 5

Part (a) was well done with a relatively high proportion of candidates scoring at least 1 mark by identifying one or both of the nets.

In part (b)(i) many candidates could identify the correct mathematical name of the box in part (b)(i).

A high proportion of candidates worked out that there were 12 dice in the box in part (b)(ii).

Part (c)(i) was not well done with only a minority of candidates able to identify the correct units. Many answered cm^2. Some did not seem to know the meaning of the term "units".

Part (c)(ii) was also challenging with relatively few candidates able to provide two possible sets of dimensions. Very little working was seen. A number of candidates gave three values with the sum of 12.

Question 6

Overall, about one-third of candidates obtained the correct solution to this problem with many of these showing little working. A minority of candidates gained 2 marks, usually for obtaining £1.16 which was the actual value of the coins required. A significant number of candidates gave £1, 10p, 2p and 2p, which were the coins left after paying the shop £2 with six coins. Nearly all of these candidates failed to mention the 2p change and scored zero.

Strategies to solve this problem were difficult to distinguish and few candidates showed a systematic or logical approach. For example, to have four coins left at least seven coins needed to be paid and one coin returned in change to give the four coins required.

Question 7

In part (a)(i), the majority of candidates managed to work out the area but a significant number gave the perimeter.

Part (a)(ii) was well done with the majority of candidates dividing their answer to (a) by 10. Most of those who gave 154 for the perimeter in (a) successfully rounded down.

Part (b) was reasonably well done with most candidates scoring at least one mark and the majority scoring all three.

Many candidates could not work out the length of the missing side correctly with a significant number ignoring it completely. Many obtained 260 m but failed to subtract the 200 m of fencing the farmer already possessed.

Question 8

Those candidates who scored both marks in part (a) managed to find the total length in millimetres and converted it to metres accurately but most scored only one mark as they did not know that 1 metre equals 1000 mm.

A large number of candidates did not attempt part (b) and a significant number of those who did failed to appreciate what was required. Those candidates who adopted a systematic approach generally scored well. Nearly half scored 3 or 4 marks for two ways of finding units with a total length equalling, or close to, 4300 mm. Some candidates did not use the given lengths of kitchen units and instead gave convenient lengths that added up to 4340 mm.

Question 9

Part (a) proved very challenging with hardly any candidates scoring any marks and a significantly large number failing to make an attempt. Of those who scored marks, very few did so by attempting to use either an equation or by identifying the obtuse angle as $4x$.

In part (b) there was full follow through from the answer to part (a) which meant that candidates generally performed slightly better than in part (a). However, the overall response was still poor. Many candidates showed little appreciation of the angle properties involved, particularly those relating to a parallelogram. Successful candidates often subtracted their x from 180 and then subtracted twice this value from 360 but some realised that the value of y was $2 \times$ their x.

Question 10

This question was reasonably well done with most successful candidates usually doubling 84 rather than halving 250. Some realised this and stated 168 but then made the wrong conclusion. Others selected 84 but failed to double. Some unsuccessful candidates doubled the speed instead of the stopping distance.

Question 11

Part (a) was well done with the majority of candidates working out the correct value. Part (b) was also well done with many candidates drawing the correct graph. Incorrect graphs sometimes started at the point (0, 4.8) but either the points did not lie on a straight line or the gradient was incorrect. A significant minority made no attempt.

In part (c), the majority of candidates who had drawn a correct graph managed to find one of the relevant examples. Those who had drawn an incorrect graph or no graph in (b) were less successful with very few finding an example from the possible calculation.

Question 12

Part (a) was a challenging question that was well done by more able candidates but many made no attempt. Most successful candidates showed an appreciation of the principles of equivalent ratios and attempted to use $135 \div (14 + 21)$ and then multiply the value of this by 14 and 21. However, many of those who used this approach did not obtain the correct numbers of beads because of premature rounding with 49 and 74 being an unchecked, common and incorrect answer, usually worth 2 marks, but only if method was shown.

Those candidates who attempted to build up to 50 and 75 by writing equivalent ratios were generally unsuccessful. Often, candidates arrived at values close to 50 and 75 and then added values to give a total of 135 beads. The alternative approach of simplifying 21 : 14 to 3 : 2 and then dividing 135 in this ratio was not seen.

In part (b), many candidates found this data-rich question challenging and made little headway with very few obtaining a completely correct solution. Again there were many non-attempts. Candidates often obtained one mark, usually for working out the cost of 200 bracelet chains correctly.

Errors in working out the cost of the beads were common with candidates not multiplying either by the numbers of beads or by 200. Candidates sometimes included the cost of the necklace chain in their total cost. A significant number of candidates obtained £636, the correct cost of making 200 bracelets, but then either did not go on to increase this by 85% or did not use a correct method to do so. Some correctly found 85% of their £636 but did not add it on with some subtracting it from £636 instead.

Question 13

This was again a challenging question with a high proportion of candidates scoring zero or making no attempt. The most common approach for successful candidates was to work out the speed in kilometres per minute from $24 \div 20$ but not all then used 1.2 km/min correctly with many multiplying this by 30 rather than using $30 \div 1.2$. Some candidates worked out the speed as 72 km/hour but usually could not use this correctly. No candidate successfully used the fact that the two distances were in the same ratio as the two times.

Mark Range and Award of Grades

Grade boundaries are available on the Results statistics page of the AQA Website.

UMS conversion calculator www.aqa.org.uk/umsconversion