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# General Certificate of Secondary Education
# January 2012

## Applications of Mathematics (Pilot) 93702F

## (Specification 9370)

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

# *Report on the Examination*

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# Unit 2: Foundation Tier

## General

Overall, this paper proved an appropriate test for students of a wide range of mathematical ability. There were enough accessible questions that allowed all students to demonstrate their knowledge and skills and harder questions provided a challenge for the more able students.

It was encouraging to see that, on the whole, students dealt well with the problem solving and functional questions which made up a large proportion of the paper. However, some questions created problems for some students because they were unable either to choose the correct mathematics to use or, to combine correctly, the variety of required skills.

A number of students lost marks by failing to read questions properly and not following instructions or, in some cases, not actually completing questions. To avoid the possibility of this, students should be encouraged to read questions again after doing them and check they have done what is required.

There were a surprising number of numerical slips indicating either the lack of a calculator or its ineffective use.

Topics that were done well included:

- suitable metric measurements
- non-standard coordinates in context
- rotational symmetry in context
- conversion graph
- word formula in context
- basic area and associated problem
- the perimeter of a rectangle
- equivalent ratio in context
- least common multiple (LCM) in context.

Topics which students found challenging included:

- the equivalence of ratio and percentage in context
- working out the total length of lines in a complex shape
- solving a problem involving the conversion between gallons and litres
- ‘best buy’ problem involving rectangle and circle areas.

### Question 1

The majority of students could identify the correct metric measurement. They were more successful in identifying the suitable capacity rather than the height and weight.

### Question 2

There were some excellent, systematic solutions to this problem but, overall, relatively few students gave fully correct solutions. Most students adopted the strategy of identifying the largest number of coins that made £1.65 but many did not go on from there or made mistakes when they did.

Some failed to find the largest number of coins giving £1.65, with many not choosing all the 10p coins and all the 5p coins and/or not choosing the largest possible number of 1p coins.

### Question 3

Most students answered part (a) correctly.

Part (b) was done less well but the majority identified the two possible winning moves and managed to communicate this effectively.

### Question 4

Errors in this question appeared to occur across the ability range and illustrated the difficulty that many students have in remembering basic mathematical terms.

In part (a), only about half the students could identify that shape B was a parallelogram.

Students were more successful in choosing the correct triangle from the given list in part (b).

Part (c) was done reasonably well by most students and better than in more standard questions, where, for example, the order of 'rotational symmetry' is required.

### Question 5

Part (a)(i) was answered correctly by the majority of students.

Most students obtained the correct answer to part (a)(ii) but a significant minority could not convert 1.5 years to 18 months often giving 17 months instead. Many of these just gave their answer without showing how it was obtained and failed to score the available method mark. A minority of students gave the average age of a girl but failed to do this correctly, often converting 1.7 years to 19 months.

Overall, part (b)(i) was well done with those doing their calculations step by step, first giving 3.41 or 341, being more successful. Typical errors involved the order of operations with many students working out, eg, 160 + 181 + 13 ÷ 2 (347.5) instead of (160 + 181 + 13) ÷ 2. Misinterpretation of the term 'estimate' was fairly common with 180 often being used for 181.

Although many excellent and fully correct answers were seen, identifying the correct strategy in part (b)(ii) proved elusive for many students, who did not appreciate the full meaning of 'within 10'. Some gained 1 mark for a conclusion based on a partially correct strategy or interpreting 'within 10' as $\pm$ 5.

### Question 6

Relatively few students matched all the road signs correctly with nearly one quarter scoring zero marks. Many students matched 5% to 1 : 5 and 20% to 1 : 20. A lot of these students matched 25% to 1 : 4 and, possibly without knowing why, 12.5% to 1 : 8.

### Question 7

A number of students who failed to answer part (a) correctly went on to give the correct area of the letter A in part (b). This possibly indicated that they did not link 'square centimetre' to 'area'. In part (a), a larger than expected number of students did not find the correct area of the letter A with some clearly miscounting squares. A lot of unsuccessful students appeared to relate area to the product of length and width and gave 20 from 5 $\times$ 4 as their answer.

Part (b) was very well done with the majority obtaining the correct solution. A significant minority used 'length $\times$ width' to find the number of square centimetres in each letter. These students usually went on to score 3 marks following through from their area. Some gave their answer as 600 p rather than converting this to pounds as instructed.

Part (c) was well done with the majority of students managing to shade three or four more I-shapes. Some shaded three and failed to add a fourth when there was clearly space available to do so.

**Question 8**

Part (a) was well done with most students managing to find the correct perimeter although some made numerical slips after showing the correct method. Typical errors included adding the lengths of only two of the sides or working out the product of the lengths.

In part (b) most students made a valid attempt to add all the lengths but, overall, less than one-third were completely successful. Many adopted haphazard approaches resulting in missed or repeated lines. Many students unnecessarily worked out lengths that were not given and gave answers such as $6 \times 21 + 4 \times 18 + 3 \times 27 + 2 \times 4.5$. These students tended to be less successful than those who adopted a more straightforward approach and only used the lengths given.

Part (c) was not very well done with a large number of students scoring only 1 or 2 marks because they did not convert the amount of paint needed into the number of 5-kilogram pots they needed to buy. Most of these students attempted to work out the cost of the paint actually used, usually with little success. Many students who adopted the correct approach gave their answer as £59.5 instead of £59.50 and failed to gain the final Q mark.

**Question 9**

Part (a)(i) was well answered although a minority converted 3 litres to 3000 ml and did not continue and some made numerical slips.

Part (a)(ii) was well done indicating that the concept of profit, in this context, was well understood. Again some made numerical slips and some did not continue after they had worked out £6 or 600 p.

Part (b)(i) was virtually always correct.

In part (b)(ii) many students showed good mathematical thinking skills and worked out the number of cups in one stack correctly. However, relatively few of these then multiplied by 4 to obtain the total required. Successful students adopted a variety of approaches. The most common was to continue the sequence of heights up to and beyond 160 mm although some then miscounted giving 11 or 13 cups in one stack. Others subtracted the height of a known stack from 165 and then divided by 6 to find the extra number of cups required. This method was more likely to end with an error often caused by rounding up instead of down, or, in some cases, by failing to add the original number of cups. Some students subtracted from 165 but divided by 94 instead of 6. Others tried to work out the extra number of cups to those given in the diagram. Some students completely misunderstood the concept involved and gave answers based on $165 \div 6$.

**Question 10**

Part (a) was very well done with a high proportion of students scoring full marks. The standard method of dividing 24 in the ratio 4 : 3 : 1 was common although some students could not carry this out fully, often stopping after the first step of $24 \div 8$. Others used an equivalent ratio approach with a minority stopping after 8 : 6 : 2 and others not identifying 12 apples after giving 12 : 9 : 3. Others recognised that half of the pieces of fruit were apples and used $24 \div 2$.

Students found part (b) challenging and, overall, less than one-quarter obtained a fully correct solution using a valid method. Most successful students used the unitary method although some of these based their answer on 10 g of cherries per muffin (from $200 \div 20$) and 7.5 g of chocolate per muffin (from $150 \div 20$) instead of first working out the correct figures of 25 and 20, respectively. A minority used the fractions $\frac{200}{500}$ and $\frac{150}{400}$ but correct answers from this approach were rare. Over half the students failed to recognise a valid procedure in their attempt to solve this problem with a significant proportion of these making no attempt.

**Question 11**

Many students obtained the correct answer to this problem. However, most of these did not score the Q mark because they did not start by setting up an equation as instructed. Acceptable alternatives for the equation were $3x + 240 = 525$ and $3x = 285$.

### Question 12

This was fairly well done with many students obtaining the correct solution with many others giving a possible number of the packs, but not the smallest. Most students started by identifying 60 as the least common multiple of 12 and 15 although some were unable to proceed from this point.

### Question 13

This question is a good example of a challenging question where students with reasonable exam technique and perseverance can have some success. Unfortunately, a significant proportion made no attempt with others giving up after stating they did not know how to convert litres to gallons. A very small number actually knew the correct conversion factor with many using 10, 100 or 1000. (For future examinations, centres are advised to encourage students to try to remember the conversion factors for capacity, weight and length given in the Assessment Guidance.) Generally, most of those students who made an attempt at the problem scored some marks following through from the use of an incorrect conversion factor. The minority of students who clearly identified an incorrect conversion factor before using it could score a maximum of 3 marks and often did. About one-quarter of students scored 1 mark for working out the cost of 1 gallon of crude oil from $52 \div 35$.

### Question 14

This best buy question proved challenging for most students. Relatively few were able to combine all the skills and knowledge required to obtain a fully correct solution although some only failed at the last hurdle, by making an incorrect conclusion after working out correct values. However, many recognised the need to work out the area of both garlic breads, although many stumbled when working out the area of the circle. Many students also obtained one mark for working out the cost of the circular garlic bread. However, using their areas, together with the costs to work out unit costs in order to make a comparison proved to be a step too far for most students. About one-third of students either made no attempt or scored zero marks usually for an approach based on perimeters rather than area.

# Mark Range and Award of Grades

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

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