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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Mathematics 4301

Specification A

Paper 1 Foundation

Examiners' Report

2008 examination – June series

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Specification A

Paper 1: Foundation

General

Since this is the first year of the new specification, with candidates now able to obtain a grade C, the standard of work clearly showed an improvement and candidates were able to answer more of the demanding questions on the paper. The majority of candidates found enough straightforward questions at the start of the paper and questions 1 to 10 were a good source of marks for nearly all candidates. More candidates than usual attempted the last few questions and gained quite a number of marks. It was clear that nearly all of the candidates completed the paper in the time available. There were few very poor scripts, with most candidates scoring between 30 and 75 marks. Again there was a noticeable improvement in the candidates' presentation this year, with more candidates giving their answers on the answer line. As reported in previous years, centres should discourage candidates from writing answers only, as a considerable number of method marks could well be lost.
As in previous years, it was surprising how many candidates, even the more able, found difficulty with manipulative number work, such as subtraction in question 3, addition and subtraction of fractions in question 17 and finding a $\frac{1}{3}$ of £600 in question 23. There was also some confusion between volume and area in question 7.

Topics that were done well included:

- rounding numbers
- drawing bar charts
- sequences
- probability
- stem-and-leaf diagrams
- isometric drawings
- simple percentages.

Topics which candidates found difficult included:

- planes of symmetry
- conversion between imperial and metric units
- addition and subtraction of fractions
- enlargements
- angles in parallel lines
- volume of a cylinder
- drawing quadratic graphs.

Question 1

The majority of candidates scored well on this question and obtained at least 3 marks. In part (d), the most common incorrect answer was 33.

Question 2

The majority of candidates answered both parts correctly. In part (b), the most common incorrect answer was 15300.

Question 3

In part (a) the majority of candidates could put the heights in correct order, although a few did put them in descending order and occasionally some miscopied one of the heights.

While the correct answer of 157 was seen on many occasions, in part (b), there were numerous errors in the subtraction. Some candidates wrote the larger number under the smaller, while others simply subtracted the digits in any order. The candidates who chose to use an adding on method from the smaller number to the larger number were usually successful.

Question 4

Many candidates chose the correct word 'parallel' in part (a). However, the words 'perpendicular' and 'acute' were less well understood. 'Straight' was a popular alternative for part (b) as was 'obtuse' for part (c).

Question 5

The vast majority of candidates drew a fully correct bar chart, for part (a). A few candidates drew the two bars with the same shading or with the shading the wrong way round.

Only a very small proportion of candidates did not choose 'Corn Flakes' as the answer for part (b). Of these, nearly all chose 'Salad Cream', perhaps because this had the bar with the greatest height.

In part (c) while the answer 'Oven Chips' was seen far more often than any other product, some candidates could not always give a convincing reason and simply restated the question. Those who attempted to work out Oven chips $2\frac{1}{2} \times 2$ or identified 2 g and 5 g usually scored the mark.

Question 6

A fair number of candidates gave all the responses as 'true'.

Question 7

Many candidates confused volume with surface area in part (a). Consequently, incorrect answers of 52, the surface area, and 26, the area of the three faces showing, were almost as common as the correct answer. Some candidates added the dimensions or tried to multiply the areas of the faces showing.

The concept of planes of symmetry was largely not understood, in part (b), and the correct answer was rarely seen. Many candidates appeared to give the number of faces or edges or vertices.

Question 8

Nearly all the candidates succeeded in obtaining at least two marks for this question. However, there was some confusion between perimeter and area.

Question 9

A large number of candidates correctly identified the pattern in part (a)(i) and there were many fully correct answers seen. A few candidates added 6 or subtracted some other number, often 4 or 5. There was slightly less success in part (a)(ii), but a large number of correct responses were seen. Among the incorrect answers, 24 and 32 was probably the most common.

Many candidates spotted the rule, in part (b), although some had difficulty in explaining it coherently. The most common explanations were to say how the differences between successive terms changed or how to generate a term from the previous one. Occasionally it was difficult to know whether the candidates were referring to the terms in the sequence or the differences between them. A few candidates attempted to express the rule as an algebraic formula, but this was usually written incorrectly as $2n + 1$.

Question 10

Throughout the question, there were many correct answers. However, some candidates gave their probabilities in words, such as '1 out of 9', or used a ratio. A few candidates gave answers such as 'unlikely'. Of those candidates who chose to use the correct format, the most common errors were to give the answer $\frac{5}{9}$ in part (a), $\frac{4}{5}$ in part (b) and in part (c), to give answers as a fraction with an incorrect denominator, such as $\frac{0}{8}$, or write 'nothing'.

Question 11

A few candidates simply subtracted 56 p from £ 10 and gave an incorrect answer of £ 9.44, but the majority of candidates knew how to proceed. However, there were a number of errors made in the calculation of 5 × 56 or in subtracting £ 2.80 from £ 10 to give an incorrect answer of £ 8.20 which was surprisingly common.

Question 12

Many candidates employed a correct method and the correct answer was seen a pleasing number of times, for part (a). Some candidates were confused as to whether they should multiply or divide by 30. Those candidates who used a build up method of 3 × 10%, were usually successful, but some found 25% by halving twice and then adjusted their answer to account for the extra 5% by simply adding on £ 5. A few candidates went on to subtract their answer from £ 80, but were not penalised.

A common misconception, in part (b), was that the answer was 5 or 15; often this was simply stated, but on occasions it came from 3 × 5. Some candidates correctly found $\frac{1}{5}$ of 20, but then did not go on to multiply by 3.

Question 13

Part (a) was answered correctly by the majority of the candidates. The most common errors arose in arithmetical mistakes or by assuming that angle *a* was 90°.

A large number of correct responses for the two angles were seen, in part (b). Most errors occurred in the calculation of angle *b,* where some candidates doubled 50° and then subtracted 100° from 180°. Some candidates simply wrote down 100°.

Most candidates preferred to add 90° and 62° and then subtract their answer from 180°, for part (c), although quite a number of errors were seen in the subtraction. Other common errors were to give 152° as the answer or to subtract the sum of the angles from 360° or to ignore the right angle and subtract 62° from 180°. Another misconception was to think that angle *d* was half of 62°. Quite a number of candidates opted not to write down any working, thus penalising themselves a method mark when mental subtractions went wrong.

Question 14

This question was poorly done by the majority of the candidates. Various conversion factors to convert miles to kilometres were used; the most common ones being: 1 mile ≈ 1.5 km or 1.6 km or $\frac{5}{3}$ km or 2 km, which were all accepted. A considerable number of candidates had the conversion factor the wrong way round:
eg, 8 miles = 5 km, or thought that there were 10, 100 or even 1000 km in a mile. Some went on to divide when they should have multiplied (or vice versa) when converting to a common unit. Many candidates attempted no conversion factor and merely wrote down a name or stated that miles were longer than kilometres.

Question 15 *(a) 27* *(b) 3*

Many candidates knew how to proceed and obtained the correct answer of 27, for part (a). The main errors were to calculate 3 × 4 + 5 or 3 + 4 + 5. Other candidates left letters in their answer eg, 12*a* + 15*b*. A few candidates did not go on to get a final answer having obtained 12 + 15 or 3 × 9.

In part (b) the substitution of a negative number proved much more difficult for a considerable number of candidates, sometimes the answer was left as 12 + –9 and even occasionally as 12 – 9. 3 × –3 was quite often stated to be 9 or ±6. Some candidates evaluated 12 + 3 – 3 and some worked out 62 ± 33.

Question 16

Although the correct answer was seen very often, for part (a), some candidates thought the answer was 10 and a few candidates simply wrote down 5×5 without evaluating it.

There was less success with part (b) of the question. The most common incorrect answers were 25, 50 or 200.

In part (c) it was quite common to see 4^2 and 2^3 evaluated to 8 and 6 respectively. A considerable number of candidates gave an incorrect answer of 6^5.

Question 17

The vast majority of candidates wrote down $\frac{8}{12}$ as the fraction in answer to part (a). Some candidates did not then cancel this down or did so incorrectly, but many candidates proceeded to give the correct answer of $\frac{2}{3}$.

The correct answer was seen often for part (b). 5, 12 or 16 were amongst the most commonly seen incorrect answers.

It was pleasing to see many candidates trying to find a common denominator, in part (c)(i), although an incorrect answer of $\frac{3}{7}$ was all too common. Some candidates had difficulty calculating the numerators, but those who correctly obtained $\frac{8}{12}$ and $\frac{3}{12}$ usually proceeded correctly, although a few obtained an incorrect answer of $\frac{11}{24}$. The small number of candidates who converted both fractions to decimals were usually more successful.

In part (c)(ii) many candidates did not attempt to find a common denominator and simply subtracted numbers. The most common correct method was to deal with the whole and fraction parts separately. Although 20 was usually used for the denominator, there were many errors in finding the numerators. Some candidates then went on to add instead of subtract the fractions. A few candidates successfully converted to decimals and were awarded full marks.

Question 18

The vast majority of candidates were able to give the correct answer for part (a).

Many candidates performed equally well in part (b) of the question. The most common errors were to find $3y$, giving an incorrect answer of 12, or to subtract 3 from 12, giving an incorrect answer of 9. A few candidates gave an embedded answer of $3 \times 4 + 4 = 16$ and were awarded 1 mark.

All manner of inventive algebra was shown in part (c). Many tried to substitute in numbers for z, but ultimately failed because the nature of brackets was not understood. $z = 4$ was often a popular choice and many candidates then wrote down $3 \times 4 - 1 = 11$. Some candidates attempted to multiply out the brackets but $6z - 1$ or $5z - 2$ was often obtained. Of those candidates who successfully arrived at $6z = 15$, some gave an incorrect answer of 2.3

Question 19

Some candidates did not seem to know how to calculate 10% of 400 with many of them beginning by subtracting 10 from 400. Quite a number of those candidates who knew it was 40, then proceeded to divide this by 30 instead of subtracting it from 400. Nevertheless, there were some very good attempts at this question. A good proportion of candidates were able to get to $360 \div 30$ and while this calculation proved too difficult for some, a good number of the candidates were able to obtain the correct answer.

Question 20

This question was attempted well by many candidates. The main errors were to draw extra lines or omit lines or add an extra cube. A few candidates drew the same arrangement or an enlargement of it.

Question 21

Many candidates attempted to enlarge the given shape with the centre at the origin or at one of the vertices of the triangle instead of the point (0, 2). Very few fully correct enlargements were seen.

Question 22

Some candidates simply wrote 10 – 54 or gave an incorrect answer of 64, for part (a). Some candidates confused the range with the mode, so that 28 and/or 29 were sometimes given as an incorrect answer.

Many candidates attempted to find the middle number, in part (b), and correctly arrived at 33, but common errors were to give an incorrect answer of 3 or to write out all the numbers and find the middle value, often incorrectly. A few candidates confused the median with the mean or mode.

In part (c) a large number of candidates scored the mark by giving the correct reason that the median is the middle value and a few also mentioned that it is unaffected by extreme values.

Question 23

Some candidates began by dividing £600 by 4 and often went on to give this as their final answer. Others tried to find $\frac{1}{3}$ of £600, but calculated this to be £150. Some candidates tried a percentage approach, but gave $\frac{1}{3}$ as 30%. Of those candidates who successfully obtained £200 as the reduction, quite a number then divided this by 4 instead of first subtracting it from £600.

Question 24

For part (a) quite a number of candidates embarked on various calculations in order to find angle x, and 85° was equally as popular an answer as the correct answer of 128°. Mention of 'corresponding angles' was not seen very often, with candidates preferring explanations such as: 'the angles are on a straight line', 'the angles are opposite', 'they are parallel lines', '*F* angles' or 'it's the same as 128'.

Part (b) also proved to be equally demanding. Many candidates opted to state the answer as 128° or to calculate 180° – 128°. A few candidates thought it was the same as 85°. Some candidates attempted the question by using the interior angles of the trapezium, but were usually unsuccessful.

Question 25

Although a good number of candidates correctly stated 90% in part (a), it was common to see incorrect numbers, particularly 9%, 10%, 25% or 45%.

In part (b), many candidates attempted to use their percentage from part (a), but often did not add it on to £80 000. Build up methods to find the percentage often failed because figures were simply written down without any working, eg 10% was said to be £800 or 90% was stated to be £70 000. Another common incorrect method was to double £80 000 and subtract £10 000. Only a few candidates achieved fully correct answers.

Question 26

This question proved to be too difficult for the majority of candidates. Few candidates knew the formula $V = \pi r^2 h$ or were able to adapt the formula for a prism given on the formula sheet in the examination booklet. Answers of 80 or 80π were very common incorrect answers. Some candidates substituted a numerical value for π. Units were often not stated or were incorrect.

Question 25

This was a demanding question for many candidates. Substituting into the equation in part (a) proved too difficult, particularly the x-value of –3. Many candidates were not able to plot their points, but those who could, often did not join them up, or did so with straight lines. A few treated the points as a scatter diagram and attempted to draw a line of best fit. Correct curves were rare.

In part (c), a large number of candidates did not attempt an explanation and some thought this part was a trial and improvement question or tried to substitute 2.8 into the equation. Other candidates referred to lines of best fit or averages. Only a few candidates could adequately explain that it was where the graph crossed the *x*-axis.

Mark Ranges and Award of Grades

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