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Mathematics 3301

Specification A

Examiners' Report

2005 examination - June series

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Specification A

Paper 1: Foundation Tier

General

The standard of work was similar to last year with the majority of candidates finding enough straightforward questions at the start of the paper – Questions 1 to 9 were a good source of marks for nearly all candidates. Most candidates attempted nearly all the questions and appeared to complete as much as they could in the time available. There were very few poor scripts with most candidates scoring between 20 marks and 70 marks. It was encouraging to see more candidates in this entry gaining marks in the questions at the end of the paper.

The work was better presented this year – more candidates gave their answers on the answer lines and few candidates wrote in pencil. As reported in previous years, centres should discourage candidates from writing answers only as a considerable number of method marks could be lost. It was evident that a significant number of candidates did not possess the necessary mathematical equipment required for the examination, especially in Questions 20 and 21 where candidates were expected to use a ruler and a protractor.

It was surprising how many candidates had difficulty with manipulative number work, such as long multiplication, long division and addition and subtraction of decimals. As in previous years, there was confusion between perimeter and area in Questions 13, 15 and 23. It was also evident that a considerable number of candidates had not covered stem-and-leaf diagrams, a relatively new topic in this specification.

The standard of written English was often poor with the spelling of mathematical words particularly weak, especially in Question 4 where a considerable number of ways of spelling *prism, cylinder* and *pyramid* were seen.

Topics that were done well included:

- sequences of numbers;
- drawing bar charts;
- problems involving money;
- probability;
- reading values off conversion graphs.

Topics which candidates found difficult included:

- converting a percentage to a fraction;
- the vocabulary for angles and 3-D shapes;
- the manipulation of decimals;
- substitution into a formula;
- drawing pie charts;
- drawing stem-and-leaf diagrams;
- bearings;
- finding the area of a trapezium.

Question 1 *(a) 28 and 72 (b) 36 and 86 (c) 28 (d) 45*

This question was done well generally. Part (a) was nearly always correct but there was more difficulty in finding the two numbers in part (b). The vast majority of candidates understood the term 'multiple' in part (c), but in part (d) were unable to interpret the term 'product' and took it to mean 'multiple', giving a multiple of 9 or a multiple of 5 for the answer.

Question 2 *50%, $\frac{7}{10}$ or $\frac{70}{100}$, 0.03*

The majority of candidates obtained 50%, but expressing 0.7 as a fraction caused widespread difficulty. The most common incorrect answers were $\frac{1}{7}$ or $\frac{7}{100}$. There were more successful attempts at expressing 3% as a decimal, but quite a number of candidates wrote down 0.3.

Question 3 *(a) obtuse (b) acute (c) reflex (d) right*

It was surprising to find that the candidates' knowledge of angle terminology is weak. Even many of the more able candidates, who scored very well on other parts of the paper, scored only one mark.

Question 4 *(a)(i) cuboid (ii) prism (iii) cylinder (b) pyramid*

Most candidates recognised the cuboid and the cylinder, but there was a lot of confusion between prisms and pyramids. Common incorrect answers for a prism were 'trapezium' or 'pyramid', for a cylinder were 'tube' or 'circle' and for a pyramid were 'octagon' or 'star'. It was disappointing to see so many incorrect spellings.

Question 5 *£68*

There were many pleasing responses to this question with many candidates scoring 3 or 4 marks. The majority of candidates identified the need to work out a separate cost for the day and for the night and then add the two together, but there were many arithmetical errors in converting from pence to pounds or in calculating 4 × 200, which was often given as 600. Some candidates thought that the amounts should be evaluated by dividing the units by the cost, and others simply added the four numbers and gave the answer as £8.14

Question 6 *45, 140 and 105*

Most candidates were able to interpret the diagram and understand what was required, although there were a number of arithmetical errors.

Question 7 *(a) £1050 (b) 100*

Most candidates scored well on this question, but arithmetical errors prevented some from gaining full marks. Common errors were in part (a) to forget to add on 250 having done 4 ×200, and in part (b) to divide 650 by 4 and then subtract 250.

Question 8 *(a) 5 and 0 (b) 40 and 5*

The majority of candidates knew how to find the missing terms, with the weaker ones scoring well in both parts of the question. Candidates sometimes wrote the term-to-term rule on the working line in addition to the correct answers.

Question 9 *(a) 5, 6, 3, 2, 3* *(b) correct bar chart drawn* *(c) 7*

Most candidates completed the frequency table in part (a) correctly and this was inevitably followed by a correct bar chart in part (b). However, identifying the mode in part (c) proved to be more difficult for a significant number of candidates. Some wrote down the mode as 3, since this frequency occurred the most in the table. It was fairly common to see candidates calculate the mean.

Question 10 *(a) £120* *(b) 21*

It was rare to see traditional methods for long multiplication and long division being used correctly in this question. In part (a), the vast majority of candidates knew that they had to work out £2.50 × 48 and a variety of techniques were employed to perform this calculation, including repeated addition, but arithmetical errors prevented many from arriving at the correct answer. In part (b) the division proved to be too difficult for many candidates with some attempting to count up in twelves to 250, but mistakes were all too common. A few candidates thought that they had to multiply 250 by 12.

Question 11 *(a)* $\frac{1}{100}$ *(b)* $\frac{1}{20}$

This question was done well by the majority of candidates who were able to give the correct probabilities as fractions, decimals or percentages. It is pleasing to report that fewer candidates wrote probabilities as a ratio. The main loss of marks occurred in part (b), where many did not attempt to cancel $\frac{5}{100}$ or did so incorrectly.

Question 12 *(a)(i) 18 litres (ii) 6.6 – 6.7 gallons inclusive*
(b) read off the value for 5 gallons and multiply by 10 or equivalent

Most candidates were able to read the correct values from the graph in part (a), but correct responses to part (b) were not so common. Some candidates appeared to have the idea of multiplying a value by 10 but could not convincingly express this, a common incorrect answer being 'just add a nought'. A significant number of candidates wrote about extending the graph.

Question 13 *a rectangle with an area of 12 cm^2 drawn*

There was the usual confusion between area and perimeter, with quite a number of candidates drawing a rectangle with a perimeter of 12 cm. It was surprising to see rectangles drawn with an area of 24 cm^2 or triangles drawn with an area of 12 cm^2.

Question 14 *23, 35, 43, 4n + 3*

There were many correct responses for the numerical inputs, but the output for *n* proved to be difficult for most candidates. The most common incorrect answers were numerical responses or 7*n*. Even so, a pleasing number of candidates gave the correct answer, but it needs to be noted that a response of *n*4 is not acceptable for 4*n*.

Question 15 *(a) 900 cm^2* *(b) 50 cm* *(c) 60*

Again area was confused with perimeter. In part (a), 4 × 30 was as common as 30 × 30, which, if stated, often led to an answer of 90 or 600. In part (b), 2500 ÷ 4 or 2500 ÷ 2 was a very common incorrect method. In part (c), some of the more able candidates correctly worked out that 10 and 6 tiles would be needed for the length and width of the room, but then proceeded to add rather than to multiply these numbers.

Question 16 *(a) isosceles* *(b) a = 70° and b = 40°*

The description of the triangle in part (a) was often given as 'equilateral' or 'right-angled'. In part (b), some candidates thought that angles *a* and *b* were the equal angles and others thought that the sum of the angles in a triangle was 360°.

Question 17 *£75*

This question was done well by the majority of candidates, once they realised that each pupil pays £3. Common incorrect answers were £65 (90 – 25) and £85 (90 – 5).

Question 18 *(a) 7* *(b) 3*

The substitution of the negative number for *c* proved to be problematic in part (a). Quite a number of candidates, who correctly worked out 5 × 3 for 5*b,* then ignored the multiplication for 2*c* by doing 2 – 4. Some simply substituted 4 for *c* and arrived at the answer 23, for which credit was given. As is often seen in this type of question, some candidates wrote the number for the letters and gave 5*b* as 53 and 2*c* as –24. Part (b) proved more difficult and many candidates who identified that 6 was needed, could not halve it to produce the correct answer for *c*.

Question 19 *(a) 4.12* *(b) 20.98* *(c) 54*

The correct positioning of the decimal point in all parts of this question proved too difficult for many candidates. In part (a) the common incorrect answer was 4.28. In part (b) 7.28 + 13.7 was often given as 20.35 or 8.65. In part (c) 0.3 × 100 was often given as 3 or 0.300. Only the more able candidates were able to give the correct answer.

Question 20 *(a) correct pie chart drawn* *(b) 30%* *(c) correct stem-and-leaf diagram drawn*

It was evident that a high proportion of the candidates did not possess a protractor or a ruler for this question. Many candidates simply drew four random sectors, often freehand, for the pie chart in part (a) and very few showed any working for calculating the angles. In part (b), many answers seemed to be guessed and those candidates who wrote down a method rarely had the correct calculation. In part (c), diagrams were usually partially or fully correct from those candidates who knew what a stem-and-leaf was. Many candidates had clearly not met this topic before.

Question 21 *(a) 300 m (±5 m)* *(b) 215° (±2°)* *(c) C correctly marked on the diagram*

Part (a) produced many correct responses, but parts (b) and (c) rarely had correct answers as candidates did not possess the necessary mathematical equipment. In part (c) many candidates were able to position *C* the correct distance from *A*, but the bearing was correct in only a few cases.

Question 22 *5 weeks*

There were many pleasing attempts at this question. The main difficulty was how to calculate a third of the weekly earnings. A large number of candidates, having worked out £48 correctly, simply divided this by 2 or by 4. Many candidates then scored a mark for attempting to divide £80 by their answer.

Question 23 *22 m^2*

This question was attempted poorly by even the more able candidates. A common method was to multiply the given numbers on the diagram in various combinations. Others invented a number for the length of the sloping side of the building and then added the four numbers, again confusing perimeter with area. Of those candidates who split the shape into a rectangle and triangle, many could not find the area of the triangle. Only a handful used the formula given on the formula sheet at the front of the examination paper. Very few candidates gave the correct units in their answer, for which there was one mark.

Question 24 *(a) even* *(b) odd*

This question was answered quite well with many weaker candidates, perhaps through guesswork, scoring at least one mark. On occasions, there was evidence that candidates were trying examples to see which of the boxes would be the correct one to tick.

Paper 1: Intermediate Tier

General

The paper proved to be accessible to the majority of candidates with many attempting questions throughout although, as expected, those towards the end proved difficult. A sufficient number of straightforward questions enabled most candidates to demonstrate a range of mathematical knowledge. However, many candidates made elementary errors in questions testing basic skills and there was a notable weakness in algebraic topics. In addition some candidates were let down by poor numerical ability with many finding it difficult to deal with negative numbers and basic decimal calculations.

In general, presentation was good – most candidates attempted to show their method and scored marks even when numerical slips produced incorrect final answers. Nearly all the candidates attempted to follow the instructions given although many might have benefited from reading questions more thoroughly – for example in Question 2(b) values were often substituted for the wrong letters, and in Question 7 the wrong triangle was commonly assumed to be isosceles. Also, some candidates had clearly not learned the meaning of some standard mathematical words, for example 'estimate' in Question 18.

The paper differentiated well with about two-thirds of candidates scoring between 40marks and 80marks. Approximately 5% scored less than 20marks and it is likely that these candidates would have been more appropriately entered for the Foundation Tier. There was a small proportion of very high scoring candidates (about 0.5% scored more than 90marks) who might have been more appropriately entered at the Higher Tier.

Topics that were well done included:
- simple proportion
- basic algebraic substitution
- knowledge of quadrilaterals and coordinates
- constructing stem-and-leaf diagrams
- using simple scales
- solving multi-step problems involving money
- numerical input from a given output from a number machine
- algebraic output from a given input from a number machine.

Topics which candidates found difficult included:
- basic decimal calculations
- expressing one quantity as a percentage of another
- bearings
- product of prime factors and least common multiple
- fraction addition
- quadratic graphs
- simple locus
- solving simple inequalities;
- knowing when to multiply probabilities
- converting speed units
- the volume of a cylinder in terms of π.

Question 1 *£75*

Nearly all candidates gained full marks for this straightforward *Using and Applying Mathematics* question. Some weaker candidates lost marks because they were unable to work out $90 \div 30$ accurately. A small minority of candidates failed to appreciate what was required.

Question 2 *(a) 7* *(b) 3*

Part (a) was done fairly well. The majority appreciated that $5b$ meant 5 multiplied by b, but substituting -4 for c in $2c$ caused a problem with $5 \times 3 + 2 - 4$ being seen regularly. Many who appreciated that they needed to work out 2×-4 could not calculate it correctly and some who obtained $15 + -8$ faltered at this stage with answers of -7 seen. The answer 23 was seen often. Part (b) was done less well. A substantial minority substituted incorrectly giving $5 \times 16 + 2 \times 2$ leading to 84. Some candidates who obtained $16 = 5 \times 2 + 2c$ then made errors, often giving $2c = 10 - 16$ leading to $c = -3$. Many candidates scored 2 method marks for $16 = 10 + 2 \times 3$ but went on to give $c = 6$ as their answer. Some simply gave 6 with no method and scored zero.

Question 3 *(a) 4.12* *(b) 20.98* *(c) 54*

In part (a) a straightforward subtraction was not done well with 4.28 being a common incorrect answer. In part (b) many candidates worked out 3.64×2 accurately and went on to obtain the correct answer. However, many errors were seen in attempting to add 7.28 to 13.7, for example adding digits with different place values (20.35 was seen frequently) and failing to 'carry' units to tens (110.98 was also seen). The order of operations was not a problem with this question. Part (c) was a more demanding question that required candidates to multiply decimal numbers by 100 and 10, and also to calculate using the correct order of operations. Most candidates made at least one error in attempting to do this, the most common being to calculate in the wrong order. The incorrect answer of 324, either from $(30 + 2.4) \times 10$ or from $300 + 24$, was seen more often than the correct answer of 54.

Question 4 *(a) rhombus drawn with D marked at (0, −1)* *(b) (4, −3)*

In part (a) most candidates managed to identify *D* and write its coordinates correctly. However, many scored just 1 mark either for writing the coordinates of an incorrect vertex or by writing incorrect coordinates for the correct vertex. Part (b) was a *Using and Applying Mathematics* question requiring candidates to interpret information in a diagram. The majority managed to score both of the available marks although, again, there was a significant number of incorrect coordinates.

Question 5 *(a) correct pie chart drawn*
(b) 30%
(c) correct stem-and –leaf diagram drawn

In part (a) candidates who could calculate the sector angles invariably gained full marks, although some made errors in drawing the angles or forgot to label the sectors. Many others gained 1 mark by labelling incorrect sectors in the correct order. Some candidates did not have a protractor (or a ruler). Part (b) was done poorly. Many candidates either did not know what fraction they should use or combined 18, 60 and 100 incorrectly often leading to 10.8% from $18 \times 60 \div 100$. Many candidates who used $\frac{18}{60}$ did not know how to convert this to a percentage – the most effective method of simplifying to $\frac{3}{10}$ before converting did not appear to be known widely. Some gained one mark by correctly writing $\frac{18}{60} \times 100$ but were let down by subsequent arithmetic. Noting that 10% of 60 is 6 and then deciding that 3×6 must be $3 \times 10\%$

was seen occasionally. Part (c) was generally done well and was a good source of marks for many candidates. However, it is clear that stem-and-leaf diagrams are still not known by many candidates.

Question 6 *(a) 300m (± 5m)* *(b) 215° (± 2°) (c) C correctly marked on the diagram*

Part (a) was done well with most candidates gaining full marks. Some gained only 1 mark because they could not work out 6 × 50 accurately. A minority measured the length of *AB* incorrectly. Part (b) was done badly – many candidates clearly did not appreciate how to measure a bearing, with 125° and 145° given. Some answered with angles such as 225° that were outside the allowable range but seemed to indicate that there had been a slip in trying to measure the correct angle. In part (c) the bearing again caused problems; most candidates gained 1 mark for the correct length.

Question 7 *120°*

About half of the candidates did not read this multi-step question properly and assumed that triangle *ADE* was isosceles leading to the incorrect answer $x = 110°$. Others simply assumed that angle *ADE* was a right angle. Some candidates managed to find the correct value of 100° for angle *ACE* but could not proceed from there despite the fact that there were various ways of doing so.

Question 8 *5 weeks*

This was a multi-step question in which it was important for candidates to do as instructed and show all their working. The majority were successful in doing this and scored 3 or 4 marks. Nearly all candidates scored the first mark for 12 × 4 but weaker candidates often faltered in trying to find $^1/_3$ of 48 – many clearly did not know that this involved division by 3. However, many gained a mark for a valid attempt at finding how many weeks it took to save £80 using the wrong amount for Tom's weekly savings. The most popular way of trying to do this was to use a 'build-up' or 'stepped' approach.

Question 9 *22 m^2*

This question was not as well done as expected. Few candidates attempted to use the given formula for the area of a trapezium, and if they did often made errors. The most frequently used method involved trying to combine the areas of a rectangle and a triangle – however, the area of the triangle was often calculated incorrectly with candidates forgetting to halve 1 × 4. Many candidates showed no understanding and simply multiplied 4, 5 and 6 and some attempted to work out the perimeter either by first attempting to calculate the sloping length using Pythagoras' theorem or by assuming this length was 4 or 5. Many candidates did not give units or gave the wrong units – with cm^2 being seen often. From November 2005 candidates will be instructed to 'state the units of your answer' in one specific question per tier.

Question 10 *(a) even* *(b) odd*

The majority of candidates scored 2 marks for this *Using and Applying Mathematics* question.

Question 11 *(a) 2 × 3 × 3* *(b) 36*

As in previous years, part (a) was not done well with many candidates showing little understanding of either of the terms 'prime factor' or 'product'. To gain 1 mark candidates had to demonstrate an understanding of both terms by giving a product that included a prime factor, such as 2 × 9 and/or 3 × 6. Many did this but failed to score the mark by including 1 × 18 (a product that does not include a prime factor). Many candidates simply gave a list of factors and scored zero. Part (b) was not well done with many candidates demonstrating confused understanding of the term 'multiple' and searching instead for factors – common incorrect answers were 2 and 6, both based on factors not multiples.

Question 12 *8* *4n + 3* $\frac{x-3}{4}$

The majority of candidates obtained 2 marks for the answer 8. Many gained marks for the output when n was the input, although they were often penalised by writing $4n + 3$ as $n4 + 3$ or for rewriting $4n + 3$ as either $7n$ or 7. As expected, the last entry in the table proved more difficult and only the stronger candidates managed to score marks on this part of the question.

Question 13 $4\frac{1}{12}$ *pints*

This question was answered well by many candidates but adding fractions still presents a problem to many with $3\frac{4}{7}$ being seen too often. Most candidates attempted to separate the whole numbers and fractions rather than change to improper fractions first – doing this and using a common denominator gained 1 mark. However, many candidates who managed this could not then find correct equivalent fractions, particularly for $\frac{3}{4}$. Candidates who converted fractions to decimals had some success but few gained full marks because they failed to use enough decimal places to indicate the recurring decimal.

Question 14 *(a) 0 and –6* *(b) correct curve plotted*

Part (a) was not as well done as expected. However, many candidates gained 1 mark for one correct entry in the table. In part (b) most candidates gained 1 mark for plotting the five given points correctly. Some candidates who had also correctly plotted the points (–2, 0) and (4, –6) did not score the mark for drawing the curve either because they drew it inaccurately, joined the points with straight lines or made no attempt.

Question 15 *Straight lines each side of straight sections of the L*
Semi-circles at each end of the L and quadrant at outside corner of the L
All lines 2 cm ± 2 mm from the L

It was rare for a candidate to score full marks for this question and many did not make an attempt. Some were disadvantaged by not using a pair of compasses. However, the minority of candidates who understood what was required invariably scored full marks with accuracy rarely an issue. Some candidates scored part marks by producing only part of the complete locus with the semi-circles or quadrants occurring just as often as the straight lines.

Question 16 *(a)* $x(x + 4)$ *(b)* $y < 1.5$ *(c)* $r = \frac{(p - 3)}{2}$

Part (a) was relatively well done. Common incorrect answers were $4x^2$ and $(x + 2)(x + 2)$. Part (b) was not done very well and the inequality was frequently solved as an equation. Part (c) was done slightly better than part (b) with $2r = p - 3$ being seen regularly. A number of candidates showed an awareness of what was required but could not carry it through accurately. For example, some tried to divide by 2 but did not include all terms in the division, while others added 3 to both sides instead of subtracting.

Question 17 *(a) Red and 2* *(b) 50 is not a multiple of 4 or 20*

(c) $\frac{1}{5}+\frac{1}{10}=\frac{2}{10}+\frac{1}{10}=\frac{3}{10}$

(d)(i) Correct probabilities $\left(\frac{3}{10},\frac{7}{10}\right)$ *on tree diagram (ii)* $\frac{9}{100}$

Part (a) was done reasonably well. Part (b) was a *Using and Applying Mathematics* question that required candidates to give a valid reason why the box could not contain 50 counters. The question was not answered well – the most common response was to show that the sum of the denominators of the given probabilities was not 50, and many candidates concluded that there had to be 39 counters in the box. Some showed a greater appreciation by finding the common denominator of the probabilities and stating that there had to be 20 counters although this was not enough to gain the mark. Part (c) was a *Using and Applying Mathematics* question that required candidates first of all to appreciate that they needed to add the probabilities for Red 1 ($\frac{1}{5}$) and Red 2 ($\frac{1}{10}$) and then show a valid method of adding the fractions involved. Overall this was done well. In part (d)most candidates gained a mark for completing the tree diagram but very few knew that the probabilities needed to be multiplied – most added instead.

Question 18 *36 km/h*

Very few candidates were able to answer this multi-step question although many managed to score one or two marks either by using 20 as an approximation for 20.42, calculating a speed or by converting 200 metres to 0.2 kilometres. Candidates who scored more than two marks and sometimes went on to obtain the correct answer used a variety of methods. The simplest was to calculate the speed in metres per minute (200 × 3) then multiply by 60 and divide by 1000. Another method was to work out that 1 kilometre was covered in 100 seconds and then use the fact that there are 36 × 100 seconds in 1 hour. Those who tried to move on from working out the speed in metres per second (10) were less successful in reaching a satisfactory conclusion. Weaker candidates did not use an approximation and did not know how to convert metres to kilometres.

Question 19 *(a)* $250\pi\ cm^3$ *(b)* $(20\,000-5000\pi)\ cm^3$

In part (a) most candidates did not attempt to express their answer in terms of π but those who managed to follow a correct method using a numerical value of π scored 2 marks. However, most candidates did not know how to work out the volume of a cylinder – for example, some used 'circumference × 10' and others '$\pi \times D^2 \times 10$'. Weaker candidates did not attempt to multiply by the height and showed confusion between their understanding of area and volume. Some better candidates lost 1 mark by giving their answer as π250 rather than an allowed version (250π, 250 × π or π × 250). The mark scheme for part (b) allowed candidates to score follow-through marks on this multi-step question without either knowing how to find the volume of a cylinder or giving an answer in terms of π. Many took advantage of this, particularly those who had attempted part (a). However, there were a significant number of zero scores and some candidates did not attempt the question. Many candidates showed confusion between area and volume with the final answer being given as a mixture of the two. Many could not work out correct dimensions for the box and missed the opportunity to score two relatively easy marks for 40 × 50 × 10. Fully correct answers were rarely seen.

Question 20 *(a) 32* *(b) (i)(x + 7) (x − 2)(ii) −7, 2*

In part (a) many candidates attempted to transpose the letter terms and number terms but found it difficult to do this accurately. Many candidates who arrived at $\frac{1}{4}x = 8$ could not proceed to the correct answer with $x = 2$ occurring regularly. Those who attempted to remove the fractions by multiplying through by 4 were rarely successful. Overall part (b) was answered poorly with relatively few appreciating what was required.

Question 21 *(a)* 10^6 *(b)* 8×10^9 *(c)* 2.4×10^{22}

Part (a) was not done well. Many candidates thought that there were 2 millions in a trillion, probably obtained from 12 ÷ 6. The majority answered part (b) correctly although incorrect notation such as 8^9 was often seen. In part (c) some candidates scored 1 mark with 24×10^{21} being a common response. Many answered with incorrect variations such as 11×10^{21} or 24×10^{108}.

Question 22 *(a) 140°* *(b) 70°*

Part (a) was rarely answered correctly with few appreciating that there is a right angle between the tangent and radius. Some candidates scored 2 marks for 180° – 40° = 140° without showing any appreciation that they knew this fact. A common incorrect answer was 80° from 2 × 40. In part (b) many candidates knew the connection between angles *p* and *q*.

Paper 1: Higher Tier

General

This paper proved to be quite a challenge for many candidates. The first half of the paper was accessible to most candidates, although Questions 8 and 9 were not done well, but there were some difficult questions in the second half of the paper. There were still a reasonable number of very good marks (90+) but rather more marks below 20 than normally. This does suggest that very weak candidates would have been better entered for the Intermediate Tier where they would have been able to demonstrate a higher degree of positive achievement.

One issue worthy of mention is the need for candidates to read questions carefully. Part of the problem some candidates had on Questions 8 and 11 was entirely due to this. It is important for candidates to learn to persevere when a solution is not immediately forthcoming. Setting up two linear simultaneous equations in Question 13 needed care more than anything else – simplifying them to manageable equations was not a difficult task as long as candidates did not give up halfway through.

Presentation was, on the whole, quite good although there were exceptions (notably Question 9), but the need to explain carefully what steps were being attempted was important in Question 12 and in the second part of Question 11. Examiners have to be able to unravel candidates' thought processes and this often proved difficult. Clearer explanation with more working steps shown would help candidates gain some credit in these questions.

Topics that were done well included:

- ratio
- algebra
- quadratic graphs
- locus
- the addition of fractions
- finding the volume of a cylinder
- circle geometry
- the properties of sine graphs
- tree diagram probability.

Topics which candidates found difficult included:

- setting up/solving linear equations
- estimating average speed (many correct ideas but some poor presentation)
- solving two linear simultaneous equations to find the equation of a quadratic graph
- recurring decimals
- simplifying and factorising
- surds problems
- vectors
- solving one linear and one quadratic simultaneous equation.

Question 1 *£2200, £1600 and £1200*

This was done well by almost all candidates and as such provided a welcome 3 marks to start with.

Question 2 *(a)* $y < 1.5$ *(b)* $r = \frac{(p - 3)}{2}$ *(c)* $x=32$

Part (a) was done well, although there was a penalty for further work such as following the correct answer with $y = 1.5$ or listing integer values less than 1.5. Part (b) was done well and part (c) also, apart from those who got as far as $\frac{1}{4}x = 8$ but then offered $x = 2$ as their answer. There was some trial and improvement attempted in part (c) which scored 3 marks for a correct solution, otherwise zero.

Question 3 *(a) 0 and −6* *(b) correct curve plotted*

This was done well by most candidates. There were a few graphs with 'flat tops' which incurred the loss of 1 mark.

Question 4 *(a) 50 is not a multiple of 4 or 20*

(b) $\frac{1}{5} + \frac{1}{10} = \frac{2}{10} + \frac{1}{10} = \frac{3}{10}$

There were a pleasing number of correct explanations in part (a), the most common wrong answer being 'the denominators add up to 39, so there must be 39 counters'. Part (b) was done very well.

Question 5 *Straight lines each side of straight sections of the L*

Semi-circles at each end of the L and quadrant at outside corner of the L

All lines $2\,\text{cm} \pm 2\,\text{mm}$ *from the L*

This question was done very well. 'Construction' lines/arcs were tolerated and many candidates scored full marks.

Question 6 *(a)* 10^6 *(b)* 8×10^9 *(c)* 2.4×10^{22}

A common answer of 2 was given to part (a), although many correct answers were also seen. The use of correct notation was again an issue in parts (b) and (c) – for example 8^9 was unacceptable. There were many answers of 24×10^{21} in part (c), scoring 1 mark but not 2.

Question 7 $4\frac{1}{12}$ *pints*

Although there was some sight of $\frac{1}{3} + \frac{1}{4} = \frac{1}{7}$, this question was answered extremely well. Decimal versions were rare, 2.33 + 1.75 = 4.08 scored 2 out of 3 marks due to lack of retention of enough decimal places in 2.333…

Question 8 *(a) 30 − x* *(b) 4x + 25 − (30 − x)* *(c) 17*

This was the first question to be done poorly by many candidates. Inadequate attention to detail when reading the question undoubtedly contributed to the downfall of many candidates since an answer of $25 - x$ was not uncommon in part (a). Algebraic skills were lacking in a number of candidates, there being some glaring mistakes when expressions were simplified. Even though follow-through marks could be awarded, some of the weak algebra made it impossible to give any credit. A trial and improvement solution (which was accepted) of 17 in part (c) gave some candidates some marks on this question.

Question 9 *36 km/h*

There was a very mixed response to this question. Solutions varied in standard; some were elegant but the presentation skills seen were often weak, making it extremely difficult for markers to unravel the bits of the solution, often found all over the page. Rounding 20.42 to 20 was vital if more than 1 mark was to be scored out of the 4 available. Marks were awarded for rounding (20.42 to 20), for attempting a speed calculation, for trying to convert either distance to kilometres or time to hours, and for the correct answer.

Question 10 *(a) stratified sampling* *(b) 1, 13, 2*

Many candidates got part (a) correct. 0, 14, 2 and 1, 14, 2 were common incorrect answers in part (b) since each type of vehicle had to be represented and the sample size must be 16 not 17 – there were some guesses (e.g. 1, 12, 3). 1 mark was awarded for the 10% figures of 0.4, 13.6 and 2.1, but those who offered no working lost the opportunity of earning this mark.

Question 11 *(a) 250π cm³* *(b) $(20\,000 - 5000\pi)$ cm³*

Part (a) was answered well by most candidates although 1 mark was lost for $\pi 250$ (incorrect notation). Part (b) proved altogether more challenging. This was another instance of the failure to read a question carefully. This made the question difficult for many candidates. There was much misinterpretation of the diagram in part (b), many thinking that the box containing the 20 cylinders was 12.5 cm by 10 cm. This led to the diameter of a cylinder being 2.5 cm with the then uninviting calculation of $\pi \times 1.25^2$ for the cross-sectional area of one cylinder. The mark scheme did allow for errors of this sort. Trial and improvement was possible for candidates with knowledge of the method to gain 3 of the 4 marks. Many of those who managed the correct expression of $20000 - 5000\pi$ did not gain the accuracy mark by then 'simplifying' this to 15000π which is not correct.

Question 12 *(a)(i) 140º (ii) 70º* *(b)(i) 124º (ii) 42º*

Part (a) was done well although the sight of $180° - 40° = 120°$ was worrying. Some thought that q was 40º (equal to the given angle) and so $p = 2 \times 40° = 80°$, earning 1 mark for the p, q connection. In part (b)(i) there were many correct answers of 28º for angle *ABO* and then 124º for x. Follow-through in (b)(ii) gave candidates the opportunity to score 3 out of 4 marks even if an error was made in part (i), for example 18º instead of 28º for angle *ABO*. There were some cases of incorrect assumptions being made in part (b) – for example that angles *TBA* and *BAC* were both 62º (alternate?) or that *AO* bisected angle *BAC* giving rise to two angles of 35º. Candidates using incorrect assumptions of this kind were unable to gain any marks. However, there were very many totally correct solutions to both parts of this question.

Question 13 *(a) p = 2 and q = −8* *(b) (−4, 0)*

This was a question in which the need for candidates to persevere when a solution was not immediately forthcoming was paramount. Most knew to substitute the coordinates of *B* and *C* into the equation of the curve but errors were made at this stage (one error was accepted so long as both sets of coordinates were used). Simplifying the equations to get $2p + q = -4$ and $-3p + q = -14$ should not have been a difficult task but far too many candidates gave up too easily. There were a number of fully correct solutions but usually only from strong candidates. Part (b) could not be successfully attempted by those candidates who failed to reach a satisfactory conclusion in part (a). Those who just looked at the diagram and made a guess of (−4, 0) scored nothing. The answer had to be obtained from some legitimate working following through from part (a), albeit allowing for slight error there.

Question 14 $\frac{47}{110}$

This question met with a very mixed response, varying more from centre to centre than between individual candidates. There were some very good attempts but far too many tried to use $1000x - x$, which was an incorrect pairing. Those who were well prepared for this kind of question had no trouble, although too many left the answer as $\frac{423}{900}$ rather than simplifying fully.

Question 15 *(a)* $8x^{12}y^3$ *(b)* $2(x + 5y)(x - 5y)$

Fewer than half of the candidates scored full marks on part (a). $2x^{12}y^3$ (1 mark) was as common as $2x^7y^3$ (0 marks), and there were many other variations. Part (b) fared even worse. The question asked for the expression to be factorised *fully*. Thismeans that a common factor of 2 was not enough for 3 marks. The failure to spot the difference of two squares was widespread.

Question 16 *(a) explanation involving* $\sqrt{20} = \sqrt{4 \times 5}$ *(b)* $12 + 2\sqrt{20}$ *or* $12 + 4\sqrt{5}$
(c) use of Pythagoras' theorem and a valid comparison with their (a)(ii) followed by a consistent conclusion

Part (a)(i) was done well. Part (a)(ii) was, predictably, less well done – the most common mistake occurring with the two $\sqrt{20}$ terms which often then became $\sqrt{40}$. A score of M1 A0 was not uncommon. Part (b) was too difficult for most candidates. There was a mark for a correct attempt to use Pythagoras' theorem but scoring any more depended on the ability to expand $\left(2+\sqrt{5}\right)^2$ correctly. Only if this was done and then a valid comparison/conclusion reached were full marks scored.
$\left(2+\sqrt{5}\right)^2$ commonly became 4 + 5 = 9 and no further credit was possible. There were a few very elegant and precise solutions.

Question 17 $\frac{1}{4}\mathbf{s} + \frac{3}{4}\mathbf{t}$

As in Question 14, the quality of responses varied more from centre to centre than between individual candidates. Answers such as $\mathbf{s}^2 + \mathbf{t}^2$ or $^3/_4\mathbf{st}$ were seen. Candidates must realise that vectors *CM* and *MC* are not the same, because direction matters. The use of brackets when writing expressions such as $^3/_4(\mathbf{t} - \mathbf{s})$ is essential. The secret is to show step-by-step working (thus gaining credit for correct method) rather than trying to jump straight to the answer. Some correct answers were left in unsimplified form, leading to a loss of 1 mark.

Question 18 *(a) 110º (b) 250º and 290º (c) a correct sketch of y = sin 2x (d) 35º, 55º, 215º and 235º*

Parts (a) and (b) were done quite well– though 430º was not uncommon in part (a) and was correct earning 1 mark. Answers of, for example, sin 110º instead of 110º were accepted. Part (c) was done badly, the most common error being drawing the graph of $y = 2\sin x$. However all was not lost because the mark scheme allowed follow-through – an answer of $(\theta + 180)$º following an answer of θ º earned a mark. It was quite common for candidates to pick up 5+ marks on this question. The symmetry of the graph was being tested and many candidates understood this and acquitted themselves quite well.

Question 19 *(a) x = 2.5 and y = 2 (b) sketch 2 as there is only one solution to the pair of simultaneous equations in part (a).*

It was disappointing to see the poor range of skills in expanding brackets and the simplification needed to make progress in solving this pair of simultaneous equations. $y = 2x - 3$ was followed by $y^2 = 4x^2 + 9$, $4x^2 - 9$, $2x^2 - 9$, $4x - 9$ and many more. Expanding $(2x - 3)^2$ ought to be possible for Higher Tier candidates. Many other examples of inaccurate manipulation were seen in this question. Not surprisingly, many candidates scored no marks in part (a), although there were a relatively small number of candidates for whom this question proved to be no problem at all. To score any marks in part (b), candidates had to state a clear solution, or solutions, in part (a). Then, and only then, was it possible to apply follow-through marks. This was a long question, one in which it was necessary to concentrate all the time to avoid careless mistakes and show a degree of perseverance.

Question 20 *(a)(i) 0.25 and 0.4 (ii) 0.1 (b) 0.729*

This was a reasonable finish to the paper. Putting the probabilities on the tree was probably 99% successful but there were far too many candidates who cannot multiply 0.25 by 0.4. Answers of 0.01, 0.001 and even 1 were seen. A minority of candidates tried to add the two decimals. In part (b) success was a little harder to come by, only a minority realising that it was necessary to state the probability of 'success' (0.9) and then find $(0.9)^3$. There were many $0.9 \times 3 = 2.7$ solutions, which shows a lack of understanding of probability, and many offers of 0.75×3, or sometimes $(0.75)^3$ which shows that the value of 0.75 on the 'first attempt pass' branch of the tree was all that was considered.

Paper 2: Foundation Tier

General

Nearly all the candidates were entered for the appropriate tier and scored between 20 and 70 marks. The paper proved straightforward and caused few unexpected problems for the candidates. All candidates were able to display their knowledge and techniques and time constraint was not a problem.

The presentation of work was good but too many candidates just wrote down answers without showing any method or working. In the area question (Q10c) few candidates tried to divide the shapes into equal sections to compare. Although money notation was much better than last year, candidates need to appreciate that euros need to be treated in the same way as sterling – in Question 14(e) 939.9 was a very common answer. Negative numbers on the graph in Question 20 confused many and in Question 11 the word 'net' was not known to about a third of the candidates. In *Handling Data*, few candidates confused median and mean (Q15) and in general the methods were known. However, the even number of scores caused problems with the median and in Question 23 hardly anyone knew how to find the mean of a frequency distribution.

Topics that were done well included:
- simple application of number and money
- listing outcomes
- co-ordinate points
- sequences of numbers and patterns
- number facts and time
- rounding
- probability.

Topics which candidates found difficult included:
- vocabulary: 'net', 'cube' of a number
- equations
- properties of quadrilaterals, both symmetries and angle facts
- areas of shapes
- reading off values from graphs
- the correct use of a calculator
- drawing a straight line graph
- ratio
- interpreting graphs
- transformations.

Question 1 *(a) £2.34 (b) £2.66 (c) 46p*

Correct answers were seen from 90% of candidates. The mix of £ and p was not a problem.

Question 2 *checked – stripe; spot – grey; spot – stripe; plain – grey; plain – stripe.*

This was done well by all candidates, nearly everyone scoring full marks.

Question 3 *(a) £5 (b) £10 (c) 50 minutes*

Many candidates mixed up money units in part (b) and $750 \div 5 = 150$ was a common answer to part (c).

Question 4 *(a)* $\frac{3}{5}$ *(b) any 12 squares shaded*

(c) $\frac{9}{12}$ *and* $\frac{15}{20}$ *(d)* $\frac{1}{2}+\frac{3}{8}=\frac{7}{8}$

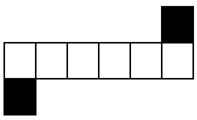
In part (a) many candidates gave $\frac{9}{15}$ as the final answer. In part (c) the majority gave the correct pair but a significant number circled $\frac{9}{12}$ and $\frac{8}{12}$ thinking the same denominator was sufficient for equivalence.

Question 5 *(a) 65p (b) 150*

This question was answered surprisingly poorly. 0.65 p and 50 were common answers.

Question 6 *(a) A (2,1); B (6,3); C (4,7) (b) correct × marked at (0,5)*

This question was answered well by almost all candidates with only a few reversing the co-ordinates or using incorrect notation.

Question 7 *(a)*  *(b) 2 (c) 20*

Correct answers were given by nearly all candidates.

Question 8 *(a) 76cm (b) 340kg (c) 87mph*

About half of the candidates scored 3 marks, but weaker ones often scored 0 or 1. Common errors were 73, 70.3, 75, 304, 300.4, 80.3 or 83.5.

Question 9 *a= 17 b= 47 c= 15*

Most candidates were familiar with this type of question but errors with the calculations were common.

Question 10 *(a) 8cm* *(b) A and C* *(c) C and D*

There was less confusion between perimeter and area this year, but this topic still causes problems. As stated earlier many candidates seem unwilling to write on the diagram.

Question 11 *a correct net*

A 3-D sketch of a cuboid was a common answer. If 'net' was understood the attempt was often correct but there were many nets of open cuboids.

Question 12 *(a) x = 7* *(b) y = 4* *(c) z = 1.5*

Algebra remains a mystery to many candidates with trial and improvement being the most common method used. Consequently many answers were left in an embedded form, for example $5 \times 7 = 35$ and $4 \times 4 - 5 = 11$ but part (c) proved too difficult using this method. The success rate in part (a) was quite high, but was much lower in part (b) with answers 16 and 12 being common. Very few candidates scored any marks on part (c).

Question 13 *(a) 9.16(...)* *(b) 74.1*

This question was not well answered.

Question 14 *(a) 19:23* *(b) T, F, F, T* *(c) 720* *(d) 1 h 59 m* *(e) 939.90 euros*

This question was answered well with many candidates scoring high marks. In part (d) 1 h 99 m and 2 h 01 m were common answers; and in (e), as mentioned, many candidates omitted the final 0.

Question 15 *(a) 29* *(b) 30.5* *(c)* $\frac{2}{5}$

In part (a) the method mark for reordering was gained by over half of the candidates. In part (b) some of those who knew the correct method of finding the mean made calculator errors – they failed to either press 'equals' or to use brackets around the numbers for addition before dividing by 6. Part (c) was done well.

Question 16 *(a) rhombus*
(b) the diagonals cross at right angles; one pair of opposite angles are equal

Some thought that the shape was a kite and too many used the word 'diamond'. Less than one quarter of the candidates gave the two correct statements.

Question 17 *(a) £9* *(b) £25*

£27 was a common answer to part (b). If a candidate explained that a family ticket costing £20 could be bought by counting one of the children as an adult, this was allowed.

Question 18 *£1.98*

Many doubled the 189, took off 4 and gave the conversion as £1.96. Only the more able candidates divided.

Question 19 *(a) (x + 5)cm* *(b) (x − 2)cm* *(c) 2x cm* *(d) 90 cm*

Weaker candidates usually scored only 1 mark on this question. In part (c) $x2$ and x^2 were common answers.

Question 20 *(a) −24°C to −23°C* *(b) −58.5°C to −57.5°C*

The conversion graph was not understood by the majority of candidates. 10 and 50 were popular answers.

Question 21 *(a) 70°* *(b) 60°*

This question was done poorly. In part (a) the final answer was seldom obtained but 1 mark was often achieved from an intermediate answer of 250° or 110°. Part (b) was slightly better done but the angle was often measured.

Question 22 *(a) doesn't start at (0, 0) ; or £600 is three times the height of £400; or 500 is four times higher than 350*
(b)(i) no, his is the highest wage ; or no, median is £370
(b)(ii) no, mode is still £370 ; or no, there is no other value equal to it

Very few candidates scored any marks on this question. In part (a) some wrote about correlation. Others thought it unfair that the manager earned so much more. Others linked in ages saying that a 20-year-old should not earn more than a 25-year-old. In part (b) 'yes' appeared as often as 'no', again with ?????? spurious reasoning.

Question 23 *5.6*

Very few candidates scored any marks on this question. If attempted, the working was invariably $24 \div 5 = 4.8$.

Question 24 *−3.34*

A few correct answers were seen but many worked out the value of $-10 + 1.8 + 3.7$.

Question 25 *7120*

Very few Foundation Tier candidates understand the concept of ratio. Of those who tried the question many divided 35 600 by 4.

Question 26 *correct straight line graph*

Very few candidates attempted this question. Occasionally correct points were plotted but not joined. There were very few correct lines.

Question 27 *(a) correct rotation* *(b) correct translation* *(c) correct reflection*

Unlike the previous three questions, most candidates attempted this but very few scored more than 2 marks. A 90° rotation was often seen but not always anticlockwise, and seldom using the origin as centre. In part (c) many candidates did not know which line to reflect the flag in.

Paper 2: Intermediate Tier

General

Most candidates were correctly entered for this tier of entry with most scoring between 20 and 80 marks.

The standard of presentation was usually good, and there was no evidence that the candidates had insufficient time to attempt all the questions.

Many candidates lost marks by not showing any method for many questions, just their incorrect answer. Trial and improvement is still used too readily for many question with candidates usually scoring no marks. The ability of candidates to explain their answers still needs to improve.

Topics that were done well included:
- money calculations
- simple algebra
- the addition of fractions
- generalising from patterns
- analysing moving averages.

Topics which candidates found difficult included:
- analysing scatter diagrams
- calculating a mean from a frequency table
- reverse percentage
- percentage increase
- relative frequency
- standard form
- sketching graphs
- Pythagoras' theorem and trigonometry.

Question 1 *(a) 9.16(…) (b) 74.1 (c) £1.97 or £1.98*

Most candidates got part (a) correct, but 311 from 4.2^4 was commonly seen in part (b). Many got £1.96 for part (c) from 2 × 189 = 378 and 378 − 4 = 374.

Question 2 *(a) £9 (b) £25*

Most candidates scored well on this question. Part (a) caused no problems, but £27 was a common answer for part (b) and some gave an answer of £20 by counting a child as an adult, which was allowed, provided that there was an explanation for the £20.

Question 3 *(a) (x + 5)cm (b) (x − 2)cm (c) 2x cm (d) 90 cm*

Most candidates scored well on this question. Parts (a) and (b) were usually correct but x^2 was a common answer to part (c). In part (d) 25 was a common error from $2x = 115 - 65$.

Question 4 *(a) −24°C to −23°C (b) −58.5°C to −57.5°C*

Most candidates got part (a) correct but −45 was a common error in part (b). Many forgot the minus signs and gave numerically correct positive answers for which they gained one mark.

Question 5 *(a) 70°* *(b) 60°*

Most candidates scored some marks on this question. In part (a) many got 110 or 250 but could go no further, and some gave 50 as there was a '*Z'* angle *ABCE*. Many candidates gave 120 as the answer to part (b).

Question 6 *(a) doesn't start at (0, 0) ; or £600 is three times the height of £400; or 500 is four times higher than 350*
(b)(i) no, his is the highest wage ; or no, median is £370
(b)(ii) no, mode is still £370 ; or no, there is no other value equal to it

This was answered poorly. Many candidates commented on the poor correlation or the 'anomalous' result for the 45-year-old in part (a). Many said the median was 350 or attempted to give the same reason for the median and the mode by saying the £600 was the highest value.

Question 7 *A, D, B*

This question was answered well. The usual error was an answer of *A*, *C*, *B*.

Question 8 *4 minutes*

Most candidates calculated 100 ÷ 60 and 80 ÷ 50 but some said they were both equal to 1.6 so there was no time difference. Most candidates got 100 minutes for Jack's time but calculating Fred's time was found to be more difficult. Some calculated 1.66 – 1.60 = 6 minutes, or 60 – 50 = 10 minutes, and 100 × 60 and 80 × 50 were seen.

Question 9 *5.6*

This question was answered poorly. Most candidates calculated 24 ÷ 5 or 24 ÷ 15 and it was very rare to see 84 used.

Question 10 $\frac{13}{20}$

This question was done well. Common errors were $\frac{3}{20}$ or $\frac{3}{9}$.

Question 11 *correct straight line graph*

This was not answered as well as might have been expected. Some candidates did not even attempt it and others just plotted the points without joining them up. Some insisted on making the line go through the origin.

Question 12 *(a) correct rotation* *(b) correct reflection* *(c) correct rotation*

Most candidates scored some marks, but very few scored full marks. Most scored one mark for any 90° rotation in part (a) and some did a clockwise rotation. Most did a reflection in y = constant for part (b) but usually not $y = 1$. Part (c) was found to be the hardest and many did a rotation about (1, 2).

Question 13 *(a) −3.34* *(b)(i) x=1.5 (ii) y=3.5 (iii) z=2.2*

Many calculated −10 + 1.8 + 3.7 in part (a) or lost the – sign and gave 3.34 as the answer, with 16.66 being the other common error. Too many candidates tried to use trial and improvement in part (b) usually without success. Those who showed their working were usually able to score marks even if their answer was wrong. In part (b)(i) $\frac{1}{2}$ and 2 were common answers from $6x = 3$. In part (b)(ii) –3.5, 30.5 and –30.5 were common answers while in part (b)(iii) $2z - 3$ was common, as well as answers of $z = \pm 1$ or $z = \pm 11$.

Question 14 *£240*

This question was answered very poorly. Most gave £225 or 720 from 4 × 180.

Question 15 *(a) 7120* *(b) 1.68% or 1.69%*

Part (a) was usually answered correctly but $\frac{35600}{4} = 8900$ was a common error. Most of the candidates got 600 at the start of part (b) but this often led to an answer of 6% or 60%. Some candidates tried a build-up method from 1% = 356 but were almost always unsuccessful. Some divided by 36 200.

Question 16 *(a)* $11x + 14$ *(b)* $4x^2 - 2x^3$

Most candidates scored 1 mark in each part. Many gave expressions involving $5x$ or 22 and $8x - 4 + 3x + 9$ was common in part (a). Most got $4x^2$ in part (b) but usually with $2x^2$ and some tried to factorise as $(x - 2)(x - 2)$.

Question 17 *(a) 2n* *(b) n + 1*

This question was answered well. A common error in part (a) was $n + 2$. Some just gave the numerical value for the next term in the series.

Question 18 *(a) 16* *(b) plot at (80, 0.375)* *(c) yes, with reference to expected value is 20 or probability of 0.25*

This question was answered very poorly. Many candidates gave 15 as the answer to part (a) from 2 + 5 + 4 + 4 . Most had no idea what to do in part (b) and they concluded that the spinner was not biased.

Question 19 *£3649.96*

Most candidates worked out each year separately rather than using $(1.04)^5$. The usual error was £3600 and most made rounding errors in their calculations, even though the method they were using was correct.

Question 20 6×10^9, 5.9×10^9, 5.93×10^9 *km*

Most candidates scored only one mark for the digits 5925 as they failed to give the answer in standard form and did not round their answer to a sensible degree of accuracy.

Question 21 *(a) B, D, A* *(b) correct sketch*

Most candidates got the *D* graph correct in part (a), but not the others. Part (b) was rarely correct with most candidates drawing a line even when they had calculated some points correctly, and others sketched the curve $y = x^2$.

Question 22 *(a) correct plots* *(b) £99.50 to £100.50*

This question was done well with many candidates gaining full marks .The usual error in part (a) was to plot the points at the horizontal values for the actual costs rather than those for the moving average. If part (a) was correct then the answer to part (b) was usually correct.

Question 23 *(a) 16.7cm* *(b) 24.6°*

This question was answered poorly. Answers of 19 − 9 and 19 + 9 were common in part (a) and even when a candidate had written down $BC^2 + 9^2 = 19^2$ they still added the squared terms to get 442. Many guessed an answer of 45°, 90° or 180° for part (b) and some gave 24 + 11 = 35°. Some candidates recognised that the easiest way to do the question was to use the tangent but then got lost and gave answers of $\tan^{-1}\left(\frac{24}{11}\right)$ or $\frac{11}{\tan 24}$.

Question 24 *24.5cm*

Many candidates scored at least one mark for breaking down the problem into lines and semi-circles, but many estimated the lengths of the semi-circular arcs or used πr^2 instead of πr.

Paper 2: Higher Tier

General

The paper proved to be more accessible than those of previous years. There were few marks below 25, the majority were over 40 and many marks were over 80.

Some standard questions proved to be a good source of marks, for example Questions 5 (reverse percentage), 6 (compound interest) and 10 (Pythagoras' theorem and trigonometry). Surprisingly, although marks were lost on the harder questions towards the end of the paper, the least well done questions both involved topics which grade C candidates would be expected to answer– Question 3 (transformations) and Question 4 (relative frequency). The maximum of 9 marks for this double page was a rare occurrence.

The standard of presentation continues to improve with working being shown where necessary. Basic communication and use of mathematical symbolism is still a weak area, as is the use of formulae, even when these are given. For example Questions 12, 14 and 15, which required a clear strategy, were often correct but the working was often not logical. In Question 15 in particular the formula for the volume of a sphere was often misquoted, with $\frac{3}{4}\pi r^3$ or $\frac{4}{3}\pi r^2$ being common.

Future candidates need to develop the skill of answering questions that require a written explanation with a short, clear answer using mathematical words and phrases. The standard of written English was found to be poor. The general rule seems to be that the more a candidate writes then the less likely they are to answer what is being asked for. Accuracy caused problems and loss of marks again. Candidates rounded off to 3 s.f. or fewer during the working again, which often led to an inaccurate final answer. 4 s.f. or more should be the norm for values during working.

Topics that were done well included:
- reverse percentage
- compound interest
- Pythagoras' theorem and trigonometry
- solving linear equations.

Topics which candidates found difficult included:
- transformations
- relative frequency
- moving averages
- proportion
- proof
- interpreting histograms
- Higher Tier algebra
- scale factors for areas and volumes of similar shapes
- solving quadratics by the intersection of a given quadratic graph and a straight line.

Question 1 *(a)* $11x + 14$ *(b)* $4x^2 - 2x^3$

This question was usually done well. Errors were mainly due to carelessness with numeracy, powers or minus signs.

Question 2 *(a)* $2n$ *(b)* $n+1$

Nearly all candidates scored 2 marks in this question. However, some reversed the answers, which indicates that candidates should take care in reading questions – especially early in the paper when questions seem to be straightforward.

Question 3 *(a) correct reflection* *(b) correct rotation*

This question was not well done on the whole. Part (a) was often a 180° rotation about the origin, while part (b) could be anywhere. Common errors were to reflect in the y-axis or $y = x$ and/or to rotate in the wrong direction or about the wrong centre, such as (2, 0).

Question 4 *(a) 16* *(b) plot at (80, 0.375)*
(c) yes, with reference to expected value is 20 or probability of 0.25

This was the least well done question on the paper. The answer of 15 was very common in part (a), which came from 2 + 5 + 4 + 4 or 40 which is the total of the number of *C*s after 10, 20, 30 and 40 throws. Candidates did not seem to understand the cumulative nature of the graph. The common answer for part (b) was 0.45 or 4.5. Part (c) was the most successful although marks were often lost for an answer that did not fully explain the reason.

Question 5 *£240*

This question was done well by the vast majority of candidates. Marks were usually 3 or 0. The common error was to work out 25% of £180 and add it on to give £225.

Question 6 *£3649.96*

This question was done well on the whole with the majority of candidates scoring full marks. It has been said in previous reports that time periods of up to 10 or 12 'years' could be asked for in compound interest questions. This would only be feasible if candidates used a multiplier method. It was pleasing to see that more candidates are now adopting this approach, but too many are still trying to do this calculation by working out the interest each year and adding it on. This approach is lengthy, time consuming and inevitably generates numerical errors, which can lead to a loss of up to 2 marks. Another common error was to round each step to one decimal place, which is unacceptable in a question involving money.

Question 7 *(a) B, D, A* *(b) correct sketch*

This question was done quite well but scoring full marks was rare. In part (a) recognising the two linear graphs gave the most trouble and in part (b) many candidates did not know the graph of $y = x^3$, despite this being a specification requirement (2H 6f).

Question 8 *(a) correct plots*
(b) a value, say £107, calculated from the trend of the moving averages

It is clear that this is not a topic that is well known. It is new to the specification and has not been assessed before. The candidates clearly did not understand the concept of a moving average. Part (a) was usually correct, misplotting in a horizontal direction or misreading scales vertically being the main problems. However, part (b) was done very badly. The question states clearly 'Use the trend of the moving average …'. To gain full credit candidates had to show clearly that they had used the trend to predict the next moving average and use this value to calculate the 4th quarter cost. There are two ways this could be done. A line of best fit (or a slight curve) would be drawn to predict the next moving average, or the table could be used to give a value of 100, say, as the moving average increases by 1 towards the end. Neither of these methods was seen in the majority of cases. Many candidates used the costs to predict the next value, or gave an answer unsupported by working. Working was essential to obtain marks.

Question 9 *6×10^9, 5.9×10^9, 5.93×10^9 km*

Vary few candidates scored full marks in this question but 2 marks were very common. The majority had little trouble obtaining an answer of 5 925 000 000 but few managed to put this into standard form and fewer still managed to round to an appropriate degree of accuracy. The rule in a question that asks for suitable accuracy is to give the answer to the same accuracy as the numbers in the question; in this case 2 or 3 sf., although 1 sf. was also accepted.

Question 10 *(a) 16.7 cm (b) 24.6° (c) 22.6°*

This question was done very well with many candidates getting full marks. However, errors were to be expected. In part (a) the squares were added. In part (b) the wrong ratio or the sine rule was used, which was often then evaluated incorrectly. Some candidates having written $\tan x = 11 \div 24$ correctly then went on to calculate $11 \div \tan 24$, or gave the final answer as 0.46 degrees. Part (c) was more complicated and there was a variety of acceptable methods. The most common was to calculate *AC* – few simply wrote down '13', which may indicate that many candidates do not know the 5, 12, 13 triple or don't trust their knowledge if they do. This was then used with sine to get the required angle. Other approaches were to calculate angle *ACB* then use the sum of the angles in a quadrilateral. Other approaches involved calculating *BC* and using the cosine rule, but once any unnecessary complication was brought in the potential for error was increased and many marks were lost through use of incorrect formulae, poor rearrangement or the use of the wrong trigonometric ratio. Very few candidates used the information that *DA* was parallel to *CB* and therefore the required angle could be found using $\tan^{-1}\left(\frac{5}{12}\right)$.

Question 11 *(a) $x=3.5$ (b) $y= 2.2$ (c) $z= 1.5$*

On the whole this question was done well with many candidates scoring full marks. Common errors in part (a) were usually due to the minus sign in front of x. In part (b) sign errors occurred when moving terms across the equals sign, and in part (c) errors were due to incorrect expansion of brackets. In all three parts, one error caused the loss of only 1 mark, so 2 marks out of 3 was possible. One common problem in part (c) was to get to $10z + 9 = 22z - 9$ and end up with an answer of 0.

Question 12 *24.5cm*

Few candidates scored zero on this question and many scored full marks. Most realised that the answer was found by the sum of the straight sections plus the three semi-circles. Errors were caused by misreading the scale or by using the incorrect formula for the lengths of the semi-circles. Some candidates lost marks by failing to make their methods clear. This type of unstructured question needs a clear strategy. Future candidates would benefit from practice in producing a logical answer to such questions.

Question 13 *20*

This question was done very badly and varied in quality from centre to centre. Marks tended to be 0 or 3. Many candidates did not know how to interpret the initial statement or used $y \propto \sqrt{x}$ or $y \propto x$. Those who did interpret the initial statement correctly almost always went on to gain full marks, although a common error was to get to the statement $5 = 16k$, and then give the value of k as 3.2.

Question 14 *19.6cm²*

The majority of candidates knew that the answer involved the difference between the area of the semi-circle and the area of the circle. Errors were caused by use of an incorrect formula for area of a semi-circle, using the wrong values for the radii, or by rounding too early in the calculations giving a common wrong answer of 19.7.

Question 15 *634 cm^3*

The majority of candidates knew that the answer involved the sum of the volume of the hemisphere and the cuboid. The majority of errors were caused by use of an incorrect formula for the volume of a hemisphere – many candidates failed to halve that for the volume of a sphere. This question included a 'units mark' and the vast majority did write down the unit correctly. This is the last paper in which candidates had to fill in the units without a prompt. From November 2005 candidates will be instructed to 'state the units of your answer' in one specific question per tier.

Question 16 *(a) a valid counter example, with justification* *(b) a complete algebraic proof*

In part (a) most candidates scored 2 marks. The common error was not to justify why, say 169, was not prime. At least one factor other than 1 and itself needed to be clearly stated. Candidates were less successful in part (b) and few scored 3 marks. As this is a proof, some algebraic rigour was expected. The first mark was for an expansion and subtraction of both brackets. The most common error at this stage was expanding as $n^2 + 25 - (n^2 + 9)$. At this stage the (method) mark was awarded for $n^2 + 5n + 5n + 25 - n^2 + 3n + 3n + 9$, even though this was incorrect strictly speaking. Pleasingly many did use a bracket around the second expansion. The next mark was for collecting terms and dealing with the minus sign convincingly. This mark was usually lost as the assumption was made that it was 'obvious'. A common statement was $n^2 + 10n + 25 - (n^2 + 6n + 9) = 4n + 16$ and this did not score the (accuracy) mark. $n^2 + 10n + 25 - n^2 - 6n - 9 = 4n + 16$, or something equivalent, was needed to get the mark. The final (accuracy) mark was for factorising $4n + 16 = 4(n + 4)$. Once again this final step was often not shown.

Question 17 *(a) 102* *(b) 35*

This was done very badly. Method marks were occasionally gained by working out the bar totals and the cumulative total, but few obtained the median. An answer of $90 \leq x \leq 110$ was common. A few more found the interquartile range but on the whole most candidates did not appreciate the fact that frequency is proportional to area. A few drew cumulative frequency graphs, which was an alternative strategy and could lead to full marks.

Question 18 $x = \dfrac{a^2 + ab}{a - b}$ *or an equivalent expression*

This question was not done well on the whole. Many candidates picked up the first mark for multiplying out the bracket but could not make any progress beyond that. In expressions in which the subject appears twice it will, at some stage, be necessary to collect all the subject terms on one side and factorise. It was also necessary to put x = on the answer line. Some candidates, having obtained the correct answer, went on to cancel a's and b's. This prevented the award of the final accuracy mark.

Question 19 *$x=0$ or $x= \dfrac{1}{6}$*

This question was not done well with only a handful of candidates scoring full marks. There were essentially three steps in the process, worth 2 marks each. The first stage was to deal with the numerator of the left-hand side. The method mark was awarded for $4(3x - 1) - (2x + 1)$; note the bracket. Once again the 'invisible bracket' proved to be the downfall. Candidates who wrote $4(3x - 1) - 2x + 1$ did not get the method mark unless they recovered to get the correct expansion of $10x - 5$. Few managed to do this, and even those who used the initial bracket still failed to deal with the minus sign. A common wrong answer was $10x - 3$. The second stage was to deal with the denominator of the left-hand side and the 5 on the right-hand side. The expression $5(2x + 1)(3x - 1)$ was required for the method mark, which then had to be expanded to $30x^2 + 5x - 5$. This was done less well than the first stage, 5 being the preferred answer. The final stage was to rearrange to a quadratic and solve. Many of the candidates who managed the first two stages did not know what to do with the quadratic. Those who did were stumped by the fact that it did not have a constant term, but if they did manage to obtain $x(6x - 1) = 0$, zero was rarely given as an answer and/or 6 was a common wrong answer.

Question 20 *5.63cm*

This question was done quite well. Common errors were to get the wrong lower limit, for example 95. Many candidates knew to divide by π and take the square root. Follow-through marks on a wrong limit were available here. However, answers had to be given to at least two decimal places as many candidates do not have a clear grasp of the concept of a limit and tend to 'round down a little more' just to be sure. Alternatively $\sqrt{100 \div \pi}$ gives 5.64 from which a lower limit of 5.63 is obtained by incorrectly subtracting 0.01. Working had to be seen in this question.

Question 21 *(a) clear explanation* *(b) yes, with full justification.*

As is usual, similar figures caused problems. Part (a) was intended to give a hint for part (b) and candidates should not really expect to get 3 marks on a question at the end of the paper for saying '6 × 8 = 48 cm so it is not justified'. In part (a) few candidates mentioned scale factors. Many did incomplete numerical examples or just repeated the question. A common (wrong) answer was $2^3 = 8$. Part (b) usually attracted 3 or 0 marks. There are many ways of justifying that the alien increases to 6 times the volume. The most common was to cube 14.5 ÷ 8 = 1.825, which gives 5.954.

Question 22 *(a) line $y = 1$ drawn, −3.8, 0.8* *(b) line $y = x – 1$ drawn, −2.4, 0.4*

This question was done very badly on the whole with many candidates not even attempting it, though candidates in some centres did much better than others. It seems to be a topic that many candidates have little or no idea how to approach. There are many ways of identifying the required lines but signs and rearranging equations caused problems. A common error in part (a) was $y = -1$, as was $y = -x \pm 1$ in part (b). Many candidates obtained the answer using the quadratic formula, which gained no credit as it was the wrong method. Correct working needs to be seen in this type of question.

Coursework

General

Moderators and examiners reported that the majority of candidates were better prepared for this coursework component, especially with regard to the handling data task. The using and applying task was invariably better than the handling data task although both suffered from too much repetition and too little development.

Many examiners and moderators felt that candidates were disadvantaged by a lack of understanding about the requirements of coursework, especially the handling data task. In too many centres the work followed the same format making use of the same calculations and representations. Many of the tasks set were decided by the centre and candidates had too few opportunities to pursue work of interest to themselves.

Administration

Examiners and moderators reported that the vast majority of centres were well organised, although a significant number of centres failed to meet the set deadlines for submission of coursework. Some centres did not using the correct Candidate Record Forms or else failed to complete all the required information on these forms, such as candidate names and candidate numbers. Missing teacher and candidate signatures authenticating the work were problematic in some centres.

Centres are reminded that:

- *all work submitted must be authenticated by the teacher/lecturer as well as the candidate – arrangements may need to be made to ensure that this happens;*
- *sufficient work must be undertaken under the direct supervision of a teacher/lecturer for the work to be authenticated confidently;*
- *task starters and/or any other material used (for example writing frames, help sheets or marking schemes) should be forwarded with the coursework for information;*
- *the use of plastic wallets and elaborate folders to contain coursework is actively discouraged and treasury tags should be used to bind work together;*
- *presented coursework should be sequenced with page numbers and should include the candidate details on each page;*
- *deadline dates are not optional and any work received late can put moderators and examiners under considerable time pressure. This may lead, in extreme cases, to late publication of results*

The following comments are offered under each of the three strands for the *Using & Applying Mathematics* task.

Making and monitoring decisions to solve problems

This strand is about deciding what needs to be done, then doing it**.** The strand requires candidates to select an appropriate approach, obtain information and introduce their own questions which develop the task further. For the higher marks candidates need to analyse alternative mathematical approaches and apply, independently and extensively, a range of appropriate techniques.

Communicating mathematically

This strand is about communicating what is being done using words, tables, diagrams and symbols. Candidates should consider the appropriateness of their chosen presentation and amend this as necessary. For the higher marks candidates will need to use mathematical symbols accurately, concisely and efficiently in presenting a reasoned argument.

Developing skills of mathematical reasoning

This strand is about testing, explaining and justifying what has been done and requires the candidate to search for patterns and provide generalisations. Generalisations should then be tested, justified and explained. For the higher marks candidates will need to provide a sophisticated and rigorous justification, argument or proof which demonstrates a mathematical insight into the problem.

The following additional comments from moderators' and examiners' reports might be useful to centres in preparing candidates for the *Using & Applying Mathematics* task.

Making and monitoring decisions to solve problems

- *The provision of three correct results is sufficient for an award of mark 3 under this strand.*
- *An award of mark 5 can only be given where the task is independently extended and generates a further solution.*
- *An award of mark 6 is appropriate where a candidate 'pulls together' their various investigations.*
- *The inclusion of an algebraic formula is, on its own, insufficient to suggest an award of mark 6.*
- *An award of mark 7 can only be given for co-ordinating three features or variables.*
- *An award of mark 8 is appropriate where a candidate explores a task* ***extensively*** *and* ***independently****. Similar work is not likely to be independent.*
- *A fleeting glimpse of calculus is not sufficient for an award of mark 8. The work must be extensive and sustained for such an award.*

Communicating mathematically

- *Candidates should not waste time drawing tables and/or graphs unless they are relevant and are commented on and used in the work.*
- *Candidates should be encouraged to make better use of algebra to provide a commentary for the work.*
- *An award of mark 5 can only be given (as best fit) where candidates make use of algebra rather than simply making an algebraic statement.*
- *An award of mark 6 can only be given where candidates show* ***sustained*** *evidence of correct and convincing algebraic manipulation, factorisation or transposition.*
- *The use of algebra for proving and justifying must be accurate and convincing if it is to be awarded marks.*
- *Centres are advised to check the accuracy of algebraic manipulation and ensure that all working is clearly shown.*
- *Pattern spotting is not a higher technique and an algebraic approach to the work is necessary for the higher marks.*

Developing skills of mathematical reasoning

- *Where generalisations are written down it is important that they are adequately explained in the text to confirm the candidate's own understanding.*
- *Testing should only be undertaken on generalisations arising from the candidate's own work.*
- *Testing should be carried out on new data and include a comment to confirm whether or not the test was successful.*
- *An award of mark 5 can only be given where candidates demonstrate why a generalisation works.*
- *An award of mark 7 under this strand can only be given where strand 1 has been awarded a mark of 7 or 8.*
- *An award of mark 8 would usually require the candidate to give some consideration to the conditions under which their proof remains valid.*

The following comments are offered under each of the three strands for the *Handling Data* task.

Specifying the problem and planning

This strand is about choosing a problem, deciding what needs to be done then doing it. The strand requires the candidate to provide clear aims, consider the collection of data, identify practical problems and explain how they might be overcome. For the higher marks, candidates need to decide on a suitable sampling method, explain what steps were taken to avoid possible bias and provide a well-structured report.

Collecting, processing and representing the data

This strand is about collecting data and using appropriate statistical techniques and calculations to process and represent the data. Diagrams should be appropriate and calculations mostly correct. For the higher marks, candidates need to accurately use higher statistical techniques and calculations from the Higher Tier GCSE Mathematics specification content.

Interpreting and discussing the results

This strand is about commenting, summarising and interpreting data. The discussion should link back to the original problem and provide an evaluation of the work as a whole. For the higher marks, candidates need to provide sophisticated and rigorous interpretations of their data and provide an analysis of how significant their findings are.

The following additional comments from moderators' and examiners' reports might be useful to centres in preparing candidates for the *Handling Data* task.

Specifying the problem and planning

- *Greater consideration needs to be given to the planning of the task and the choice of sample …stratified sampling is not always appropriate or necessary for high marks.*
- *Little thought was given to the sample size and why, for example, 30 people or 100 words might be an appropriate sample size.*
- *Little detail was given of how the sampling was actually undertaken in order to avoid bias and ensure that the sample was truly representative.*
- *Many of the hypotheses set were rather simplistic and there was little consideration given to how the work might be extended and developed.*
- *Candidates are encouraged to pursue one hypothesis in some depth rather than a number of hypotheses superficially.*
- *An award of mark 5 can only be given if the task is substantial and is developed beyond the original task at a level commensurate with grade C.*
- *For the higher marks, work requires careful specification and evidence of extensive, independent thought.*
- *Candidates should be encouraged to make greater use of pilot surveys, control groups and pre-testing as appropriate to the task.*

Collecting, processing and representing the data

- *The inclusion of mean, median, mode and range is not appropriate for all tasks and calculations need to be considered for their relevance to the problem.*
- *Many representations were too small or inaccurate to provide useful information and not all graphical work was provided on graph paper thus limiting their potential.*
- *Calculations should be accurate so that giving the frequency of the mode rather than the mode should not be credited.*
- *Statistical representations and calculations add little to the task unless their inclusion is explained and the outcomes interpreted.*
- *Cumulative frequency diagrams are most appropriate for continuous and/or grouped data.*

- *The use of techniques such as standard deviation and rank correlation are not indicators for the higher marks unless they are appropriate, explained and interpreted.*

Interpreting and discussing the results

- *Comments such as 'mean =' or 'range =' which are related to the task are often worthy of some marks under this strand.*
- *Too often conclusions made little use of the representations and calculations provided and were not always related back to the original hypothesis*
- *Suggestions that the hypothesis is proven or not need to be backed up with evidence from the candidate's own work.*
- *Comments on representations and calculations were often descriptive – e.g. 'the distribution is negatively skewed' – without interpreting this in terms of the hypothesis.*
- *Candidates showed evidence of evaluating their strategy but comments such as 'I thought everything went well' is certainly not indicative of grade C work.*
- *For the higher marks, there was little evidence of candidates recognising possible limitations to their strategies.*

Option T: Teacher-assessed task

General

The tasks set were generally appropriate and allowed candidates to make progress against the criteria on each of them. AQA set tasks were particularly popular, especially *Number Grid* and *Read All About It*. However, these tasks suffered from over-direction by centres so that the work followed the same format with little evidence of candidates really understanding what they were doing.

Moderators reported that some centres again set inappropriate tasks and that, in particular, higher marks were often limited by a number of inappropriate tasks which concentrated too much on the repeated application of a narrow range of (higher) mathematical techniques. Tasks such as investigating $y = ax^2 + bx + c$ or the area under a curve often suffered in this way.

Similarly, tasks such as those titled *The Average Student* are not always appropriate for assessment under these criteria as the work often fails to make use of a hypothesis which candidates are expected to pursue. Furthermore, where candidates are given secondary data there must be sufficient data for candidates to undertake sampling covering a number of different possibilities.

Moderators also commented on the use of databases offered by other unitary awarding bodies and centres are reminded that the use of such databases does not always encourage pupils to think about sampling or to consider the potential for bias. Data held in the databases was rarely interrogated to identify rogue values or to consider what action to take if such a situation arose.

Assessing the coursework

Overall, the work was marked accurately against the coursework criteria and the further exemplification provided by AQA, which was written in conjunction with the other awarding bodies. In a small number of centres there were difficulties such as generous marking at the top end of the mark range and work being undervalued at the bottom end of the mark range.

The *Handling Data* task was not always marked so accurately and centres' attention is drawn to the documentation already provided in the AQA *Teachers' Guide* as well as the latest information from the Joint Council for General Qualifications (dated November 2003) which was sent to all schools.

Finally, centres are asked to consider their arrangements for internal moderation carefully to ensure that the work submitted produces a valid rank order. Regular internal moderation opportunities are essential to keep staff up to date with additional exemplification offered and to ensure that marking is consistent across all staff in each examination session.

Annotation and further information

Moderators confirmed that useful information about the tasks was provided by centres which also made good use of the Candidate Record Forms to support and justify their assessment of their candidates' work. Annotation of scripts was less evident, although where this was provided moderators could more easily provide useful feedback to those centres.

Option X: Externally-assessed task

General

The set tasks allowed candidates the opportunity to make some progress against the given assessment criteria and thus gain credit for their performance. Much of the work received from individual centres was very similar, making it difficult to differentiate between the responses of different candidates. Supporting information, where provided by the centre, was always found to be most useful.

In a number of cases, the work presented was more repetitive than developmental so that most of the marks were awarded on the first few pages and subsequent work did little to develop the task further. In particular, the emphasis on collecting information rather than analysing it was particularly prevalent.

The most popular *Using and Applying Mathematics* task was *Number Grid* but much of the work received from individual centres was very similar in terms of content and routes through the problem. In particular, too many justifications of the generalisation included algebraic manipulation which lacked rigour and correct answers often followed from incorrect working.

The most popular handling data task was *Read All About It* and candidates made good progress by providing comparisons between different types of newspapers, or newspapers and magazines. However the task was rarely extended further to produce a substantial task and, even where candidates considered word length and sentence length, the work was rarely pulled together.

Too much work presented was repetitious and showed little evidence of any statistical thinking or development. Centres are reminded that it is not a requirement of coursework that newspaper and magazine articles are laboriously copied out by hand – original copies are quite acceptable.

The *Guestimate* task was also a popular choice providing opportunities for sampling to take place but rarely giving sufficient detail on how this took place. *Pulse Rates* and *Reaction Times* were less favoured tasks and centres' attention is drawn to the *Census at School* website at www.censusatschool.ntu.ac.uk where candidates may collect data on reaction times from a database.

Annotation and further information

Annotation is not required for work submitted under this option but any information about how the task was undertaken or any comment to explain the candidate's thinking will be considered by the examiner in the marking of the work.

Further support

Additional support for centres is provided through AQA's network of coursework advisers who are assigned to each centre. Further details and contact details for coursework advisers can be obtained by contacting the AQA (Manchester) office.

Mark Range and Award of Grades

In this specification, scaled marks are the same as raw marks.

Foundation tier: written papers (25384 candidates)

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
3301/1F	100	100	44.6	16.4
3301/2F	100	100	43.5	14.1

Grade	Max mark	D	E	F	G
3301/1F scaled boundary mark	100	60	45	31	17
3301/2F scaled boundary mark	100	56	44	32	20
Uniform boundary mark for each written paper	143	120	96	72	48
Uniform boundary mark for the Foundation tier overall	406	300	240	180	120

Intermediate tier: written papers (59074 candidates)

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
3301/1I	100	100	48.6	16.9
3301/2I	100	100	46.6	17.9

Grade	Max mark	B	C	D	E
3301/1I scaled boundary mark	100	63	44	32	20
3301/2I scaled boundary mark	100	60	41	30	19
Uniform boundary mark for each written paper	191	168	144	120	96
Uniform boundary mark for the Intermediate tier overall	502	420	360	300	240

Higher tier: written papers (28316 candidates)

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
3301/1H	100	100	52.9	18.0
3301/2H	100	100	58.9	17.4

Grade	Max mark	A*	A	B	C
3301/1H scaled boundary mark	100	70	52	36	21
3301/2H scaled boundary mark	100	74	55	38	22
Uniform boundary mark for each written paper	240	216	192	168	144
Uniform boundary mark for the Higher tier overall	600	540	480	420	360

Coursework (teacher-assessed) (93034 candidates)

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
3301/TC	48	48	28.9	5.8

	Max mark	A*	A	B	C	D	E	F	G
Scaled boundary mark	48	43	37	31	26	22	18	14	10
Uniform boundary mark	120	108	96	84	72	60	48	36	24

Coursework (externally-assessed) (19740 candidates)

Component	**Maximum Mark (Raw)**	**Maximum Mark (Scaled)**	**Mean Mark (Scaled)**	**Standard Deviation (Scaled)**
3301/XC	48	48	25.4	5.3

	Max mark	A*	A	B	C	D	E	F	G
Scaled boundary mark	48	43	37	31	26	22	18	14	10
Uniform boundary mark	120	108	96	84	72	60	48	36	24

Provisional Statistics for the Award

Foundation tier (25384 candidates)

Grade	D	E	F	G
Cumulative %	16.0	47.5	76.7	91.5

Intermediate tier (59074 candidates)

Grade	B	C	D	E
Cumulative %	20.2	57.0	82.8	95.4

Higher tier (28316 candidates)

Grade	A*	A	B	C
Cumulative %	15.2	51.5	87.2	98.5

Overall (112774 candidates)

Grade	A*	A	B	C	D	E	F	G
Cumulative %	3.8	13.0	32.5	54.6	71.7	85.3	91.9	95.3

Definitions

Boundary Mark: the minimum (scaled) mark required by a candidate to qualify for a given grade. Although component grade boundaries are provided, these are advisory. Candidates' final grades depend only on their total marks for the subject.

Mean Mark: is the sum of all candidates' marks divided by the number of candidates. In order to compare mean marks for different components, the mean mark (scaled) should be expressed as a percentage of the maximum mark (scaled).

Standard Deviation: a measure of the spread of candidates' marks. In most components, approximately two-thirds of all candidates lie in a range of plus or minus one standard deviation from the mean, and approximately 95% of all candidates lie in a range of plus or minus two standard deviations from the mean. In order to compare the standard deviations for different components, the standard deviation (scaled) should be expressed as a percentage of the maximum mark (scaled).