Examiners' Report
November 2012

GCSE Mathematics (Linear) 1MA0

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Paper 1F: Introduction

All questions on this paper were accessible by the great majority of the candidature. There were, however, two questions that proved more of a challenge: Q21, which was made more difficult by candidates using inappropriate methods, and Q22, where very few candidates understood the concept of drawing a plan in a 3-D configuration.

Poor presentation of worked solutions in some cases made it extremely difficult for examiners to follow. This was true particularly in Q14(c), Q15 (b), Q20 and Q21. Failure to show working in many cases prevented candidates from having the opportunity to gain method marks.

Paper 1F: Reports on individual questions

Question 1

Most candidates were able to identify the sphere in part (a).

In part (b), although the spelling of 'cylinder' varied, most knew what shape A was. It was sometimes described as a 'tube'.

In parts (c) and (d) many candidates confused faces with edges and vertices. It was not uncommon to see answers of 3, 5 or 8 in part (c) and 5 in part (d).

Question 2

507 was given by most candidates as their correct answer to part (a).

Although 40 was by far the most common response to part (b), the most common error was to give an answer of 'tens', thus failing to give the value of the 4.

In part (c), 6400 and 7000 were often seen but usually the answer was correct.

Question 3

In part (a), many candidates made hard work of finding 50% of 86, ignoring the fact that 50% is equal to $\frac{1}{2}$.

In part (b), failure to take BIDMAS (bodmas) into consideration often left candidates with the most common error of 16 for their answer.

Estimating the square root of 60, in part (c), proved difficult for many candidates; 6 and 8 were common answers approaching the required answer, which did allow a range from 7.1 to 7.9. Many tried to square 60; halving 60 to give 30 was also common.

Question 4

Many candidates demonstrated competent use of a protractor and ruler in this question. However, the angle in part (a) was often incorrect as a result of poor reading of the protractor scale; 142, 41 and 42 were often seen.

Most candidates were able to draw an accurate line of length 5cm in part (b), although some candidates drew a 4cm line, measuring from 1 to 5 on their ruler instead of 0 to 5.

Question 5

The correct drawing of a pictogram was achieved by virtually all the candidates in part (a).

In part (b), misreading of the required days was the most common cause of error. The difference between Monday and Thursday was often seen; 1.5 was sometimes given as an answer.

Question 6

This question was often answered well in its entirety. It was rare to see working to part (c) but the answer of Wednesday was usually given. Friday was a fairly common incorrect answer (difference worked out as ‘9’).

Candidates who showed their working found the calculations involving two negative temperatures difficult.

Question 7

In part (a), most candidates scored at least one mark for $\frac{9}{15}$. Too many, however, failed to gain the second mark as a result of not doing what the question asked, ie giving their answer in its simplest form. However, it was encouraging to see that almost all candidates gave their answer in the required format, very few using words or ratios.

In part (b), it was disappointing to see so many candidates unable to write $\frac{9}{10}$ as a decimal; 0.09 and 9.1 were the most common errors.

To gain the credit in part (c), in addition to recognising that Tania was wrong, candidates had to convert the given values into like formats, percentages or decimals being the most common approach. Many said that 75% is greater than 0.8, ignoring the % sign and just comparing numbers. Of those who did manage to convert 75% to a decimal, a large proportion still claimed that 0.75 was larger than 0.8. Some used fractions but not with common denominators, e.g. $\frac{3}{4}$ and $\frac{8}{10}$. Some based their reason on the proximity to 1 or 100 or thought it depended on what they were finding 75% of. Some candidates contradicted themselves by answering ‘Yes’ when their explanation indicated a ‘No’ answer. Candidates need to be encouraged to check that they have answered the question set.

Question 8

Part (a) was usually correct.

In part (b), many candidates failed to read the question carefully and assumed line symmetry again.

Question 9

Most candidates gained the mark in part (a), showing a good understanding of a probability scale. Many estimated a value for the probability of the spinner landing on blue; others simply referred to the relative positions on the scale. However, some ignored the scale, thinking that blue and red would have the same probability as there were two colours. A few failed to answer 'No'.

Parts (b) and (c) were generally well done but many misread the demand in part (c) and gave an answer of $\frac{3}{7}$.

Question 10

Most candidates were able to score well in this question. Those candidates who realised that the purchase of a family ticket was the more economical route usually went on to gain full marks. Others simply found the total of the individual tickets and found the change from £60, gaining 2 of the 4 available marks.

Question 11

Most candidates were able to write down correctly the coordinates of *P* and *R* although a significant number did write the coordinates in reverse.

In part (c), incorrect answers tended to reflect candidates' inability to complete a parallelogram. Those who did generally gave (3, –2) as their correct point although some did give (–3, –4). Very few opted for the point (–1, 6). It was not uncommon for candidates to transpose their coordinates.

Question 12

Both questions in part (a) were answered well, although answers of '$n + 4$' and 'the difference is 4' were not uncommon. These gained no credit.

In part (b), most candidates found that 20 was the difference between the 10th and 15th terms even if these were never explicitly stated. Failure to score any marks here was usually the result of incorrectly stating the two terms without showing any evidence of their origin. Candidates who listed the 15 terms usually gained some credit even when their arithmetic was incorrect. Failure to add 4 accurately ten times was common. There was some incorrect use of 2×19 and 3×19 for the 10th and 15th terms respectively, thinking that the 10th term is twice, and the 15th term three times, the 5th term.

Question 13

$5f$, $4f$ and 4 were the most common mistakes in part (a). Many candidates failed to score because of one of these answers.

In part (b), an answer of $5m$ was very common indeed.

Even though the demand was slightly greater, part (c) was answered well. The usual errors included answers of $4a + 5h = 9ah$ (or often just 9) or $4a$, $5h$ or $3a^2 + 5h$ or $3a^2 + 5h^2$.

Question 14

Only a handful of candidates were unable to gain the mark in part (a).

In part (b), the answer was usually correct although poor arithmetic prevented many from gaining any credit.

Part (c) was the most demanding part of this question and it required some organised thought processes. There were very many pleasing solutions here, describing a plan with structure and accuracy. Those who failed to offer a correct complete plan usually ignored the requirement for the 3-hour stay in Swipe Crescent. Justification for a 3-hour stay needed to be explicitly stated. This was a requirement of the QWC element in this question. When referring to particular buses, candidates were expected to quote the departure and arrival times in each case.

There were many errors made by candidates' poor reading of the timetables; often buses were arriving before they had set off or they set off on one bus but arrived on another, the result of reading from the wrong part of the timetable. Many candidates added 3 hours to the arrival time and assumed there was a bus at this time, including some working out what time the imaginary bus should arrive. Quite a few candidates also thought that they could follow a bus route from the bottom of one column into the top of the next.

Question 15

Most candidates accurately read from the conversion graph to give an answer of $32 in part (a); careless readings of 33, 31 and 30.2 were sometimes seen.

In part (b), completely correct answers were not the norm. Many chose to ignore their answer to part (a) and convert lower values, for example $10 (= £6 or £7), from the graph. These usually resulted in incorrect answers, although method marks were available if their conversions had been explicitly stated. Some misread the scale on the horizontal axis, assuming one square was £1 rather than £0.50. Some candidates seemed to think pounds and dollars were equivalent, with an answer of 40 being common. The omission of the correct unit of currency lost some candidates the final mark. Another common error was to correctly find $96 but then subtract 60. Converting £60 to dollars was usually more successful than converting $100 to pounds.

Question 16

Very few candidates knew that 3^4 is the same as $3 \times 3 \times 3 \times 3$ in part (a) and many who did know this could not actually compute an answer of 81 owing to arithmetical errors; 12 was the most common incorrect answer seen.

Part (b) was even less well done, 8 or 4^3 being the best of the incorrect answers.

Question 17

In part (a), the correct answer of 7 was given by most candidates.

Although the modal answer in part (b) was the correct answer 12, an answer of 1 was commonplace.

In part (c), there were very few pure algebraic solutions, most candidates realising that the answer came from adding 6 to 10 then dividing by 5, usually with the decimal answer of 3.2. Many found this division difficult without a calculator, answers of 3.1 and 3r1 being common. Candidates should be encouraged to write their divisions in fractional form. Most seemed unaware that $\frac{16}{5}$ is a valid answer. The correct answer was sometimes found by 'trial and improvement' techniques but more commonly this method failed.

Question 18

This question was usually well answered, although an answer of 7 in part (b) was common.

In part (c), the usual error was to subtract 15 from 50 or 0 from 9.

Question 19

Very few candidates gained the full 4 marks in this question simply because they were unable to give satisfactory reasons for their calculations. Many gave a commentary on what they were doing. Centres should be aware of the requirements in this respect and encourage candidates to correctly explain the theory that they often know very well indeed. Mark schemes identify the minimum 'word' requirement for these reasons. Often the word 'angles' was omitted. The most common loss of the final communication mark was for using 'circle' rather than 'angles at a point'. Many candidates thought the equal sides were parallel.

In this question, many candidates picked up 2 marks for correctly finding the angle of 55°; some did then give one correct reason for an extra mark.

Common errors were to correctly find the angle of 70° and then halve it or simply to say that y was equal to 70, or to stop once they had found 70 and simply state $y = 70$. Quite a few candidates thought that the triangle was equilateral and gave an answer of 60°.

Question 20

Full marks in this question were not often achieved and this was usually the result of candidates' inability to find $\frac{1}{3}$ of the correct amount, often finding $\frac{1}{3}$ of the number of bags once the first 30 had been accounted for. After gaining one mark for $30 \times 5 = 150$, candidates needed to work out the profit still required after the sale of the bags at £5 and £4. Having made the error concerning $\frac{1}{3}$ of the number of bags, many candidates were able to successfully attain a follow-through answer but often lost marks due to lack of clarity and an unsystematic approach in an otherwise correct method. Candidates should be encouraged to write down every step, however simple, in a multi-stage calculation.

Many candidates calculated the correct totals for selling the bags but then failed to take this into account and simply divided £75 by their remaining bags.

Question 21

The majority of candidates were unsure of how to start tackling this question; many simply manipulated the figures given with no real purpose. Candidates who worked separately with boys and girls often gained some success and those candidates who put the given information into a two-way table usually gained full marks. Candidates should be encouraged to use such methods with questions of this type.

Many candidates found the 19 girls who walked to school, but then failed to simply add this to the given number of boys, often choosing instead to add it to 14 (boys who came by car). Other candidates simply added up all of the numbers given and subtracted from 100 or subtracted the listed numbers from 49.

Question 22

Clearly very few candidates understood the concept of a plan. Many drew nets or 3-D configurations. These gained no credit. Many drew more than one rectangle, also gaining no credit. Many of the candidates who did simply draw a single rectangle often got the dimensions wrong, usually just copying one of the given elevations.

Question 23

This very common type of question was poorly answered. Many candidates tried to divide each amount by 16 and multiply by 24, not seeing a connection between the two figures. This did gain some credit. Others simply found the amounts for 8 gingerbread men but then never made any attempt to add to the 16 for the required 24. Some candidates simply added 8g to each of the amounts. Other attempts included doubling the amounts or multiplying by either 16 or 24, or both. Some got the first answer wrong (‘$3 \times 90 = 240$’) with the remaining three answers correct.

Question 24

Most candidates recognised that the scatter diagram illustrated positive correlation. Estimation of the arm length for a student of height 148cm was usually within the required range of values, despite many choosing not to draw a line of best fit. Some attempts to draw lines of best fit were poor, often starting from (60, 120) as their origin. Lines of best fit (although not specifically a requirement) were drawn by only a minority of candidates.

Question 25

Very few candidates used the given formula for the area of a trapezium to find the area of the garden, most choosing instead to find the sum or difference of the areas of a rectangle and triangle. Unfortunately, far too often, the area of the triangle was incorrect, usually simply 54 (6×9). Candidates who found the correct area usually went on to complete the solution correctly, although multiplication of £4.99 by 6 or 7 was often strewn with error. Some lost the final accuracy mark for rounding 7×4.99 to 7×5 and deducting the wrong number of pence, usually 5p not 7p.

Question 26

Most candidates were able to score at least one mark in this question. A time period, per day or per week, was the usual omission. Units of time, minutes or hours, were also required to gain full credit. Response box labels containing any inequalities automatically gained no credit although they were only required to be either non-overlapping or exhaustive. Most incorrect questions had left out a time frame. Some misread the question and asked about the number of books read or types of books preferred. Some asked how often they read rather than asking for specific timings. Many boxes overlapped or left gaps but most were exhaustive.

Question 27

It was encouraging to see a good number of candidates successfully finding the volume of this prism. However, many misread the question and attempted to find the surface area; others found the sum of all the edges, or just the perimeter of the cross section. Methods to find the area of the cross section varied but far too often 4 × 7 + 9 × 2 (= 46) was calculated. Even when multiplied by 10, no credit was given. One mark was available for candidates attempting to find the volume of part of the prism, 4 × 7 × 10 or 9 × 2 × 10, etc.

Question 28

This question was very poorly answered, with only a few candidates understanding the need to construct loci about the given points. Those who did were usually accurate. A few candidates clearly realised arcs were needed but had no compasses. A few constructed the arcs correctly but shaded the complement of the intersection.

Question 29

Candidates who realised the need to divide 180kg in the ratio 1:3:5 often succeeded in gaining at least 3 out of the 4 marks available. Often candidates would find the correct amounts required but then incorrectly compare them with the amounts already there. Many tried to divide 200 (15 + 85 + 100) in the given ratio. Others just thought that 200, being greater than 180, was sufficient.

Some candidates correctly found the sum of 15, 45 (3 × 15) and 75 (5 × 15) but were unable to correctly determine that more cement was needed.

Many weaker candidates chose the easier option of totalling the ingredients, gaining no credit.

Paper 1H: Introduction

Many candidates were able to make inroads into some of the unstructured questions, while still gaining marks on questions that had a more traditional style.

The inclusion of working out to support answers remains an issue for many candidates; it is extremely difficult to track the method used by some candidates who present a page of disorganised working spread across the answer space. Presentation of ordered method is key to gaining the many method marks that are available on this paper.

This is the non-calculator paper and many different ways of performing calculations were seen. Those candidates who attempted multiplication and division calculations by addition and subtraction respectively not only paid a time penalty, but rarely obtained the correct answer. Work with directed numbers was frequently poor and many candidates lost marks throughout the paper whenever they had to manipulate either numbers or algebra involving negative signs.

Paper 1H: Reports on individual questions

Question 1

When candidates realised that 'add on half' was what was required they generally gained full marks. Some realised that they had to find out the ingredients for 8 cakes and then used these as their answers. A surprising number of candidates gave three answers correctly, but lost a mark through poor arithmetic.

Question 2

Nearly all candidates gained the mark in part (a).

Part (b) was also well answered; the only candidates who did not gain marks were those who drew a line of best fit badly.

Question 3

This question highlighted some considerable misunderstandings from candidates. Far too many either added the units, or simply gave the two amounts from multiplying each of the units by 15. Worst was a division of 15. Many candidates arrived at amounts of money of many thousands of pounds, and clearly did not see the significance of their errors. On a Higher Tier paper it was disappointing to see many final answers written in incorrect money notation (e.g. 9.0) and without monetary units. This was a QWC question (marked with an asterisk) and an incorrectly expressed answer lost the QWC mark. There were arithmetic errors associated with multiplication of 15.

Question 4

This was well answered, with many candidates giving an unbiased question with a good selection of responses to pick from. Common errors included a failure to state a time frame for the question, a lack of units, or boxes that limited responses. In some cases, candidates did not read the question properly and instead gave questions such as 'How many books do you read?' Candidates who gave a frequency table or data collection sheet gained no marks.

Question 5

Those candidates who attempted to obtain the answer through calculation and not rounding were awarded zero marks. Most candidates used numbers such as 30, 10 or 0.5 and gained a mark through realising that simplified numbers were needed. Having worked out a simplified numerator, many candidates then appeared to be confused as to what to do with their 0.5, many multiplying by 0.5 or dividing by 2 to get 150. It was unusual to see candidates stating that they wanted to calculate 300 ÷ 50; they more usually gave an incorrect answer arising from these two numbers.

Question 6

Most candidates realised that the transformation was an enlargement and there were very few statements involving more than one transformation. A scale factor of 2.5 was the most common answer, but there were many examples of other scale factors stated. Many candidates failed to get the full 3 marks because they did not give the three aspects of the necessary description; stating the centre of enlargement was the description that was most commonly missed.

Question 7

Most candidates understood they needed to find an area, divide by 20, and round appropriately to find the number of bags, then lead on to a money calculation. Many fell at the first hurdle: there were some disappointing attempts at finding the area. Few used the formula for a trapezium provided at the front of the paper, preferring instead to make an attempt to divide up the shape which was frequently done very badly. This was another question in which poor arithmetic skills spoilt many solutions. Some candidates failed to work with full bags (e.g. 6.75 bags) and others tried to work out the number of bags needed for each section, which was not efficient.

Question 8

In part (a), a significant number of candidates demonstrated problems with decimals, confusing 0.015, 0.1.1 and $0.1\frac{1}{2}$. Some added 0.5 and 0.2 and then divided by 2, but generally halving a decimal was a major weakness. Quite a few showed 0.3 in their working but then failed to give 0.15 as their answer.

In part (b), the most common error was dividing 240 by 0.2 rather than multiplying. 12 was a common incorrect answer which was arrived at from 240 ÷ 2, then a division of 10. Some divided 240 by 4 because there were 4 colours.

Question 9

Those candidates who calculated areas in order to find a surface area did not receive any marks. Equally, there was a significant minority of candidates who attempted to find the perimeter of the cross section and then multiplied by 10. There were many incorrect divisions of the cross-sectional area, the most common being (9 × 2 + 7 × 4). Poor arithmetic affected even the simplest calculation: 9 – 4 was not uncommonly stated as 4. However, having said this, the majority of candidates gained full marks.

Question 10

This was usually answered well, by those with the correct equipment. Common errors included drawing the circles with an incorrect radius, and failing to indicate the region by shading. There were some candidates who drew alternative lines, or attempted to shade a region without drawing arcs. These attempts did not usually receive any credit.

Question 11

Part (a) was usually well answered, with $12x + 5$ being the most common incorrect answer.

This error was commonly replicated in part (b), where both $2x – 4$ and $3x + 5$ were seen. Many candidates could not resolve $–8 + 15$ into a single number correctly, thereby losing the second mark. An answer of 23 was common when the negative sign was ignored.

In part (c), some answers were spoilt by candidates adding together the x and x^2 terms. A common error was in giving 10 as the number term rather than 24, or writing $x \times x$ as $2x$. Although there were no negative signs in the question, some candidates included them in their solution.

Question 12

The majority of candidates recalled and used the correct area of a circle formula; in nearly all these cases the correct radius was also used. Many forgot to divide by 4 near to the end. Some candidates failed to realise they were asked to work in terms of π and attempted numerical calculation. However, those who were working in terms of π also made many errors, particularly in over-simplifying their answer: $144 – 36\pi = 108\pi$ was not uncommon.

Question 13

This was a good differentiator. There were some good attempts at the question, but all too often candidates lost themselves in random calculations, frequently confusing what they wanted with how much they had. Most tackled the question by dividing 180 by 9, then arriving at the amounts 20, 60, 100 though, for some, poor arithmetic of $1 + 3 + 5 = 8$ spoilt their solution. It was disappointing when a minority then gave the wrong conclusion, believing these were the amounts that Talil actually had. A number of candidates divided the sum of the quantities Talil had (200 kg) by 9; there were also some issues in adding the parts of the ratio, with answers of 6 and 8 being used.

Question 14

Some candidates attempted this question with a diagram, either a sketch or scaled. In very few cases did this approach help them, since there was clearly little understanding of bearings as drawn clockwise from a north line. It was also common to see reflex angles drawn as obtuse, and vice versa. The most common incorrect answer was 310°, from 360° – 50°. Other common errors involved confusion of the relative location of the ship and the lighthouse.

Overall, this was a poorly answered question showing bearings as a general weakness.

Question 15

Most candidates earned the mark in part (a). The only common error was where candidates added the indices rather than taking them away.

In part (b), there was a general understanding as to what to do with the individual number and algebra terms. y^3 and y sometimes ended up as just y^3 and the 5 sometimes became a 6. However, by far the most common error was in writing the answer with an operation embedded, $5x^6 + y^4$ and $5x^6 \times y^4$ being the most usual.

Question 16

Most candidates demonstrated an understanding of perimeter by attempting to sum the three expressions, but there were many examples of incorrect algebraic manipulation as part of that process. The majority arrived at $x = 8$, but there were few who could then correctly substitute this value in order to find the area, with many typically forgetting the division of 2 in finding the area of the triangle.

Question 17

Many candidates failed to attempt this question, and of those who did, it was most common to see a plethora of crosses, usually well away from the desired region. Many ignored the line $x = 3$.

Question 18

Candidates drew on a number of different methods in making progress with this question. Those who gained the most marks generally worked on, and with, the diagram, making clear which angles were being found. When calculating angles, it was not always clear whether it was an internal or external angle that was being found. Sometimes an angle was calculated in the working but then shown to be a different angle on the diagram; in these cases there was a penalty since it was not clear the candidate understood what they were finding.

Question 19

In part (a), the main error in drawing the box plot was in misreading the scale, resulting in a box plot that was drawn at all the wrong places.

In part (b), comments were too general. Sometimes the comment was a false statement, using incorrect values read from the box plot. Some candidates were also confused by the context: for example, stating that the girls were quicker when in fact they meant that the girls' times were greater. Some candidates listed figures without making any comparison. Few candidates used the IQR in their comparisons; the median was used far more often.

Question 20

This was a well-answered question. Some candidates deduced the correct order by considering the power of ten associated with the number, while others converted the standard form numbers into ordinary numbers before comparing them. Some confused 10^2 with 10^{-2}. It was often the case that 3800×10^{-4} was in the wrong place, with candidates either thinking the 3800 made it the biggest number, or that the –4 index power made it the smallest.

Question 21

Parts (a) and (b) were usually well answered. There were a few candidates who failed to accumulate the numbers in part (a), or who plotted at the mid-points of the intervals in part (b), but these were the minority.

However, part (c) was poorly answered with many candidates not gaining any marks. Some gained only 1 mark for reading from the graph, or failing to subtract from 100.

Question 22

There were many instances where arithmetic errors spoilt otherwise sound method. Rearrangement usually led to error, but there were very few trial and improvement approaches. The elimination method was used by nearly all candidates, though $7x = 14$ was the common error.

Question 23

Few candidates gained many marks in this question. Some demonstrated some knowledge relating parallel to perpendicular lines and an association with gradients, but few realised that this was what the question was about. Some tried drawing accurate diagrams, which rarely assisted them in working towards a solution; similar attempts to use Pythagoras on *OAD* did not help. Some gained credit through recognising the length of *OD* and *OA* from the information given, but many chose not to attempt this question.

Question 24

This question was poorly completed, with few candidates managing to gain more than one mark for an intention to multiply through by $4 + t$. Often the bracket was missing and $p(4 + t)$ became $4p + t$. Candidates did appear to realise that they needed to find 't = something' but lacked the ability to achieve this. Of those who did successfully isolate the term sin t, only the most able went on to factorise correctly.

Question 25

Correct answers were rare in this question, with most candidates incorrectly assuming a scale factor of 2 and giving the answers 160 and 80. Attempts to work out the surface area or the volume frequently led nowhere.

Question 26

In part (a), common errors included candidates squaring the numerator and denominator or just multiplying 5 by $\sqrt{2}$, but many of those who attempted it did get the correct answer.

Part (b) was attempted far less frequently. There were some marks given for correct expansion of brackets, but in only a few cases were candidates then able to simplify their expressions correctly. It was disappointing to find many who missed the middle terms in the expansion. There were many errors with signs. Very few candidates recognised this as the difference of two squares.

Question 27

Many candidates failed to attempt this question, and there were quite a number of attempts that failed to score any marks.

In part (a), many tried to draw a quadratic curve or a straight line. Some managed to draw part of a circle, or a circle with a radius of 4.

In part (b), many candidates ended up drawing a variant of the curve $y = \sin x$. Some credit was given where it was clearly a cosine curve that was being attempted, but there were frequent errors in either amplitude or period.

Question 28

Although many candidates gained the mark in part (a), in part (b) few understood what was needed to show that *NMC* was a straight line. Those who did make an attempt found expressions for some of *NM*, *MC* or *NC* but rarely knew how to use their values to make a correct deduction. Some tried reasoning in words, but these failed to gain any credit without direct reference to vectors. Once again, negative signs caused problems for some candidates, spoiling their route to a solution.

Paper 2F: Introduction

Candidates appear to have been able to complete the paper in the allotted time.
The paper gave the opportunity for candidates of all abilities to demonstrate positive achievement.

Many candidates are setting out their working in a clear, logical manner. The performance of other candidates might be helped if they improved this aspect of their work.

Candidates are advised to write down their method before using a calculator, for example by calculating and writing down the numerator and denominator of a fraction prior to division.

Examiners sometimes found it difficult to tell what the candidate intended after they had altered an answer or a diagram. Candidates are advised to use a pencil when drawing diagrams.

In responses to questions which specifically assess the quality of written communication, candidates have improved this aspect of their answers in recent examination series. However a minority of candidates do not write a clear statement, are still giving just one word answers or merely circle a word or phrase to indicate a decision. A few candidates fail to make any decision at all.

A significant number of candidates appeared not to have access to a calculator or a ruler or a protractor.

Paper 2F: Reports on individual questions

Question 1

This question was also well answered. The majority of candidates gave the correct answer to part (a) of the question. Most of the incorrect responses to this part were either “3060” or “3006”.

The majority of candidates also gave correct responses to parts (b) and (c) of this question.

Question 2

Candidates generally made a good attempt at this question. More than three quarters of the candidates were awarded at least 5 of the 6 marks available.

Nearly all candidates understood what was required to complete the table in part (a). However a lack of accuracy led to many candidates losing a mark. Centres are advised to remind candidates to check their working. The stem of this question stated that 24 people were included, yet the sum of many candidates' frequencies was not 24.

The vast majority of candidates chose a bar chart as their "suitable diagram" in part (b). These candidates nearly always gained some credit. A relatively small proportion of candidates were awarded all three marks. The main errors involved an inaccuracy in scaling or a lack of labelling of the vertical axis. Many of the scales seen either did not start at zero or were unclear with numbers written in the spaces instead of being clearly attached to points on the y axis. Labelling of the vertical axis, for example with "frequency" or "number of people", was often omitted or incorrect. A surprising number of candidates did not use the grid given to draw their bar chart. Other forms of diagram were not seen often but when they were seen they usually scored well.

Question 3

A number of candidates were able to score the available mark for parts (a) and (c) of this question. The majority of candidates were able to score the available mark for part (b) of this question.

In part (a) "10" was a commonly seen incorrect answer and in part (c) a significant proportion of candidates confused the term "factor" with the term "multiple" giving "60" as their answer.

Question 4

Most candidates were able to complete both parts of this question successfully. There were no particularly common errors in part (a).

In part (b) the possible correct operations of "+30" and "×2" were equally popular. Some candidates did not give an operation and wrote "30" to complete the number machine. This, of course, could not be awarded the mark.

Question 5

Candidates were generally able to reach a correct conclusion by either comparing £18 with £20 or £198 with £200. Only a small proportion of candidates were unable to work out 10% of 180.

A few candidates treated a 10% increase as £10. It was pleasing to see that only very few candidates missed out a direct response to the question "Is the offer from Jim's boss more than Jim asked for?" and that more candidates are now writing a statement in response to the question instead of single word answers.

Not surprisingly, hardly any candidates tried the alternative method of working out 20 as a percentage of 180 then comparing this to 10%. Candidates generally worked with accuracy and almost two thirds of them scored full marks. About 5% of candidates worked out the "£18" or "£198" thereby scoring two marks but then either forgot to use their calculation to make a deduction in order to answer the question or they made the wrong deduction. It was usually the former case.

Question 6

In part (a) of this question many candidates found it difficult to express clearly what they wished to say. The terms "evens" and "even chance" were used indiscriminately. Examiners were hoping to see a direct answer to the question posed together with an explanation, for example "No, she has the same 1 choice out of 3 as Mike". Clear responses which did more than repeat the information given in the question and which were not marred by contradiction were not seen frequently.

In part (b) a majority of candidates could list at least five distinct combinations but very few candidates could list all of the possible nine combinations. Many candidates missed out the three outcomes describing the situation where Mike and Ellie take out a counter of the same colour. Other common errors were to give just three pairs with each pair giving two different colours, for example RB, GR, BG or to write a list of combinations of the 3 colours, RGB, RBG etc. Candidate should always be advised to refer back to the stem of the question when answering later parts of the question. They may then have been reminded that the counter Mike took out had been put back in the bag.

A correct answer to part (c) was seen only rarely. Candidates who had listed at least 5 outcomes in part (b) qualified for the award of the mark in part (c) provided that they used their outcomes correctly to form the required probability. Very few were successful in doing this. It was common to see candidates list two probabilities in response to this question, the probability that Mike takes a blue counter and the probability that Ellie takes a blue counter, rather than the probability of a combined event. While about three quarters of candidates gained some credit for their answers to this question, less than one in ten candidates scored 3 or more marks.

Question 7

It is encouraging to report that over half of all candidates gave fully correct responses to this question. It was common to see the correct method for each part clearly written in the working space. Where candidates had identified a correct method, some made careless errors.

For example the answer "5.5" was seen often for part (a) and in part (b) candidates often totalled the numbers correctly only to divide their total by 8 or 10 instead of by 9. In working out the mean candidates often omitted brackets and wrote "4 + 8 + 5 + 9 + 10 +5 + 6 + 3 + 4 ÷ 9" instead of the correct "(4 + 8 + 5 + 9 + 10 +5 + 6 + 3 + 4) ÷ 9". When trying to find the median many candidates forgot to order the list before selecting the "middle number".

A significant minority of candidates were confused between the different statistical measures and it was not uncommon to see the mean worked out for part (a) and the median for part (b).

The range also appeared in some candidates' responses to either part (a) or part (b).

Question 8

This question was very well answered with few candidates getting confused between perimeter and area.

A number of candidates gave the correct perimeter with a similar proportion of candidates gaining the mark for the area in part (b). The reflection was carried out correctly by the majority of the candidates.

Question 9

Responses to this question were disappointing with less than a half of candidates able to find the volume of the cuboid. Many candidates merely added the three measurements given on the diagram whilst others gave varying combinations of multiplying and adding the dimensions of the cuboid, sometimes confusing volume with the total length of the edges or with the surface area. Those candidates showing a correct method sometimes wrote down "1600" as their answer. Candidates are advised to check the number of zeros after such calculations. Of those candidates who worked out the volume correctly, many missed out suitable units or gave incorrect units (usually cm or cm^2). Some candidates gave the correct units but earned no marks for their working. They were awarded one mark.

Question 10

The concept of a hire charge consisting of £30 then a further £8 for each day the concrete mixer is hired seemed unfamiliar to many candidates. Consequently the answer "£152" was often seen. Candidates who did understand the price structure usually worked with accuracy to score both of the marks available in part (a). Part (b) was also often successfully completed. Approximately two thirds of candidates scored full marks in each of the two parts of this question. A significant number of candidates appeared unaware that an inverse process to that in part (a) was required to solve the problem posed in part (b). These candidates often used a trial and improvement method.

Question 11

Each of the four responses required in this question attracted correct answers from between 40% and 60% of candidates. “Centimetres” was the expected unit for the diameter of a football though “millimetres” was also accepted. Similarly, “gallons” was the expected unit for the amount of fuel in a car fuel tank, but “pints” was also accepted by examiners on the basis that the conversion between pints and litres is a common one.

It was disappointing to see that less than half of the candidates could change kg to grams and/or ml to litres in part (b) of the question.

Question 12

Most candidates were able to use the table to find the cost of parcels of weight 6 kg and 10 kg but only just over 1 in 8 candidates could use the table for intermediate weights. Many candidates assumed that they needed to calculate the price of parcels not listed explicitly in the table by interpolation, so for example estimated the price of posting a 3 kg parcel as halfway between the price of posting the 2 kg and 4 kg parcels. Once they had worked out the their total cost for posting the parcels, most candidates were able to compare their cost with £55 and make a sensible deduction in response to the question posed. Only a small number of candidates used the alternative method of subtracting the cost of the parcels from £55 and found the amount of money Umar should have left after posting the parcels.

Question 13

Nearly half the candidates were able to get correct answers for parts (a), (b) and (c) of this question. Some candidates who were not successful in parts (a) and (b) gave the correct area of triangle E in part (c) of the question.

Question 14

This proved to be a challenging question for most candidates at this level and a good discriminator of ability. Of those candidates who made some headway, the majority of them tried to find the total cost of the tiles needed and compared it with £1000. Relatively few candidates tried to find the number of tiles needed and then compare that with the number that could be bought for £1000.

Conversion of units was poorly done in general. Candidates who converted 3m or 4m to cm were more successful than those who tried to convert 120000 cm^2 to m^2. They often divided by 100 to get 120 000 cm^2 = 1200 m^2. Candidates should perhaps be advised to change units of length rather than units of area. However, there were a number of candidates wrote 3m = 30 cm or 3000 cm. Many candidates earned 1 mark for multiplying 3×4 or 300×400, but most of these candidates then failed to find the area of the tile and divided the wall area by 0.2 or 20 instead of 0.04 or 400. Examiners were able to reward some candidates who did not earn all the method marks available but who carried on to find a total cost and make a correct deduction. These candidates earned the communication mark.

A more successful approach adopted by candidates was to work out how many tiles would fit along each side of the wall. Reaching 20 and 15 automatically earned the first 3 marks. Some of these candidates spoiled further working by considering the perimeter of the wall rather than the area. Too many candidates showed insufficient working and could not be awarded marks because of this.

The question discriminated well between those candidates who could identify and carry out a clear strategy, recording their method in an intelligible way and those candidates who had little understanding of the processes required and/ or did not communicate them clearly to the examiner. The best candidates produced a clear and accurate solution in a few lines. However, many responses seemed disjointed comprising of several apparently unrelated calculations scattered all over the page.

Question 15

About two thirds of the candidates gained 2 marks for adding one square in a correct position to the incomplete net and then identifying two opposite faces of the cube. A further one in ten candidates scored one or other of these two marks. Only about one third of candidates could give the correct number of edges for a cube to answer part (c) correctly. Some candidates sketched a cube to help them. Commonly seen incorrect numbers were “8” and “24”

Question 16

This question, worth 6 marks was well done by many candidates with almost 40% of candidates scoring full marks. The best candidates presented clear and concise solutions.

Of those candidates who did not score full marks, the majority of them tried to find the cost of 9 tins of paint at each store in order to make a comparison and calculated that they only need pay for 6 tins at “Paints R Us”. There were some, but not many candidates who realised that they could compare the total cost of 3 or 6 tins from each shop. Some candidates had difficulty in working out the price after discount at “Deco Mart” and either ignored the discount altogether or worked out the discount but did not subtract it from the normal price.

It was not unusual for candidates to reduce the price of a tin by subtracting 10p from it or to give 10% of £1.80 as £1.08 without working. The working for this question was generally well set out with candidates doing the working out for each shop separately and clearly.

Some candidates merely circled the name of the shop Ashley should buy the paint from. This was insufficient for the award of a communication mark. Candidates are advised to write a clear statement in words in order to be sure of qualifying for this mark. Three quarter of candidates were awarded some credit for their responses to this question.

Question 17

Almost 60% of candidates scored 2 or 3 marks for their response to this question. The most successful answers were from candidates who calculated the angle for each sector (usually from 360 ÷ 72 rather than 75 ÷ 15), and wrote them in the table. This scored 2 out of the 3 marks available these candidates usually went on to score full marks. However it was more usual to see little or no evidence of working. Two marks were awarded to candidates who drew and labelled one sector correctly.

Several common but incorrect methods were seen. These included dividing 360° by each frequency and dividing 360° by 4 (the number of categories in the table). Some candidates used the frequencies as angles.

Some candidates produced pie charts without using a ruler or protractor. Very few of these candidates could be awarded any marks

Question 18

About two thirds of candidates gave a correct answer to part (a) of the question. Those candidates who could substitute the values given generally went on to evaluate y correctly. Some weaker candidates added 4 to 7.5 or added 7.5 and 5.4 then multiplied the result by 4 or multiplied 7.5 by 5.4, indicating a clear lack of understanding of algebraic notation and/or knowledge of "BIDMAS"

Attempts to part (b) were much less successful. The negative sign appears to have confused many candidates and a final answer of "4.1" was often seen. There was little evidence of candidates checking their answer to this part of the question by substitution. Some weaker candidates substituted 18.8 as the value for *x*. A flow diagram approach was rarely seen in candidates' responses to either part of the question.

Question 19

This question was a good discriminator. Candidates were usually able to make some headway with this question, whether by calculating that it would take Tom 6 hours to lay the bricks or by working out the number of bricks he lays in the first two hour period. However, many candidates did not take account of both of the breaks. The incorrect answers 3 p.m. and 3.30 p.m. were often seen.

Other candidates used a time line showing hours worked and breaks taken and writing the number of bricks alongside. Some candidates did not organise their working very well and it seems likely that more organisation in this respect may have helped them to avoid errors.

A common error was for candidates to record that 30 bricks were laid at 9 a.m., 30 at 10 a.m. and 30 at 11 a.m., leading to the deduction that 90 bricks had been laid before Tom took his first break. Some candidates chose to subtract the break times from the 6 hours need to lay the bricks rather than add them.

Candidates generally gave their answer using an acceptable time notation. The majority of candidates were able to score some credit for their answer with almost 40% of candidates scoring full marks.

Question 20

The full 2 marks in this question was scored by 38% of candidates, with 22% scoring mark. Under half of the candidates earned no marks for their response to this question. It seems that many candidates are still not well practised in using a calculator to work out more complex calculations. Candidates still expect to be able to so questions such as this without giving thought to the correct sequence of operations that are needed when putting the expression into their calculators. Candidates who are not confident in evaluating expressions using one sequence of operations are advised to break the calculation down into several intermediate calculations and record the results of these calculations in the working space. In this question many candidates gave the answer to the calculation $\frac{\sqrt{20.4}}{6.2} \times 0.48$ or to $\sqrt{\frac{20.4}{6.2 \times 0.48}}$ rather than a correct evaluation of the expression given. Candidates who wrote down the value of $\sqrt{20.4}$ or the value of 6.2 × 0.48 as an intermediate calculation could earn 1 mark. The wording of the question advised candidates to write down all the figures from their calculator display but despite this many candidates lost marks because they rounded numbers in intermediate working or they rounded their answer. Candidates who wrote down all the figures from their calculator before rounding were not penalised.

Question 21

This question was answered quite well by candidates of all abilities. Over half of all candidates scored all four marks and only about 20% of candidates were unable to score any marks. The main error made by candidates in both parts of the question was to read off from the wrong graph. This error should surely have been detected if candidates had checked their working.

In part (b) a significant minority of candidates worked out the difference in the delivery costs for bricks delivered 5 miles from Barry's Bricks and bricks delivered 4 miles from Bricks ArUs. Again this error could have been avoided. Most candidates correctly interpreted the scales used on the axes.

Question 22

This question was answered well by many candidates though there was often little or no working shown. More three quarters of candidates were awarded 2 marks or more for their responses.

In part (a) a significant number of candidates struggled with the concept of a biased coin and so gave an answer of either "0.7" (by assuming that the probability of throwing tails is the same as throwing heads) or "0.5" (by ignoring the bias of the coin completely). Some candidates worked out "2 – 0.3" and gave their answer as a number greater than 1 apparently not realising that there must be an error.

For part (b) the most common incorrect answer given was "100" presumably again from a consideration of a fair coin. Other common responses seen included "200 × 0.3" and 200 ÷ 0.7". A few candidates gave their answer as the fraction "$\frac{140}{200}$". Examiners awarded these candidates 1 mark.

Question 23

This question was not well done. Less than 1 in 10 candidates scored full marks with a further 2 in 10 candidates scoring part marks. The most successful candidates used a common sense approach realising that at an average speed of 50 mph Aysha would cover a distance of 25 miles in half an hour and that for the second part of the journey, a speed of 60 mph is equivalent to an average of 1 mile per minute.

A significant proportion of candidates earned the mark available for the time it took Aysha to drive from A to B, the first part of her journey. Fewer candidates obtained the correct time for the second part of the journey. Many of them gave the time taken to travel from B to C as 24 minutes. Evidence seen suggested that these candidates had worked out 60 ÷ 25 (= 2.4) and interpreted their answer as 24 minutes. Many of these candidates went on to work out “30 – 24” and so earned a second mark for working out the difference of their times (with at least one correct).

Another error commonly seen was for candidates to divide speed by distance getting answers of 2 and 2.4 and then interpreting the difference as 40 minutes. Candidates often made errors converting between units of time and some weaker candidates either multiplied the speed by the distance for each part of the journey or simply found the difference between the two speeds giving their answer as “10”.

Question 24

This question discriminated well between the more able candidates taking this paper. More than 40% of candidates were able to work out the size of at least one of the missing angles (candidates were given credit for these written clearly on the diagram). About a half of these candidates made further progress and worked out the size of several angles but only the more able candidates were able to get as far as finding the size of angle x. Very few candidates gave correct reasons in an acceptable form and so candidates could rarely be awarded all four marks for their response. In particular, candidates did not accurately articulate properties involving angles and parallel lines. Weak candidates often added the sizes of the angles given on the diagram and then found the difference between their answer and 180° or 360°.

Question 25

Over half of the candidates scored at least one mark for their responses to parts (a) and (b) of this question which tested an understanding of the notation and diagrams used to illustrate inequalities. About 1 in 20 candidates scored all four marks.

In part (a) most candidates did not interpret the “≤” and “$<$” signs correctly and either did not include “–1” in their list of integers and/ or did include “4”.

There were few totally correct answers to part (b) of the question. It was common to see “–4 ≤ 3” or “$-4 < 3$”. These answers could not be awarded any marks. Of those candidates who could be awarded partial credit, many gave an answer in the form ““‘$-4 \leq x < 3$” showing an incorrect understanding of the notation using empty and full circles. Many candidates gave the range of the two endpoints, “7”, as their answer.

In part (c) of this question, candidates rarely tackled the inequality with confidence. Of those candidates who did show some correct working, many either spoilt their answer by rounding $\frac{7}{3}$ to 2.3 or treated the question as one with an equation rather than an inequality. These candidates could not, of course, be awarded full marks but often could be awarded 1 mark.

Question 26

Simple factorisation questions continue to prove to be very challenging for candidates entered for Foundation tier papers. About a quarter of candidates scored the mark available in each part of this question.

Commonly seen incorrect answers to part (b) included $7x^2$, $8x^2$, $8x$, $9x$, $x(x + 7x)$ and $x(x^2 + 7)$. Candidates who gave one of the first four of these answers seemingly thought that some simplification or combining of terms was needed. Candidates who gave one of the last two answers might have spotted their errors if they had attempted to reverse the process and multiply out the brackets as a check.

Question 27

The majority of candidates knew what was meant by the term “translation” and nearly 1 in 6 candidates could be awarded a mark for translating the triangle albeit often by the wrong vector. Twenty two per cent of candidates gave a fully correct answer. There was no single common error though errors usually involved an incorrect interpretation of one or more of the components of the vector. Very few candidates tried to rotate, reflect or enlarge the triangle and in most cases their transformed shape was congruent to the original shape.

Paper 2H: Introduction

Candidates generally responded well to the questions testing quality of written communication (QWC). However, not all showed all necessary working in an ordered fashion. It is important in all questions that working is set out appropriately but this takes on even more significance in questions testing QWC. Candidates should also ensure in such questions that any necessary decisions are clearly communicated as well as the final answer. Correct money notation (such as in question 3) must be used and correct units, where appropriate, should also be given.

When the answer to a question includes geometric reasons these must be given in full with correct mathematical language.

Where candidates employ a build up method for percentage calculations then it is vital that they get their first value correct or show how this value is arrived at. Without this correct value or a correct method seen to find this value, no marks can be awarded. Incorrect or inaccurate methods to find 15% were frequently seen in question 3.

Premature rounding was an issue for many candidates leading to the loss of many marks across the paper. Where the solution to a question involves a two stage calculation it is vital that accuracy is maintained to the end. Premature rounding in such situations often means that the final accuracy mark is lost.

Report on Individual Questions

Question 1

The vast majority of candidates were able to gain full marks for showing that they could use their calculator correctly. Some of those who did not gain full marks were able to pick up a mark for showing the numerator or denominator evaluated correctly. It was evident that some candidates worked out the value of both the numerator and denominator correctly but then reversed the division and so divided the denominator by the numerator.

The two most common errors were to have the complete fraction under the square root sign rather than just the numerator or to fail to work out the denominator (or use brackets) before carrying out the division. Candidates should be reminded to read the demand of the question carefully as some failed to give all the figures from their calculator.

Some incorrect answers would probably have gained 1 mark if the intermediate working had been shown. Encouraging candidates to estimate the answer before using calculator may help to avoid calculator errors.

Question 2

The reflection in part (a) proved demanding for many. Reflections in vertical or horizontal line were common as were translations. A significant number of candidates were able to reflect the vertex at the right angle correctly but then had the vertical side of the reflected triangle as 3 cm rather than 2 cm. Some tried to use different lines of reflection other than the given line.

In part (b) candidates had to name the transformation as a translation rather than give a written description. Likewise, giving a written description of the translation such as ‘2 left and 4 down’ was insufficient; the correct vector had to be seen in order to gain full marks.

Common errors were incorrect signs on one or other of the vector components or incorrect order. The vector was inverted by many candidates with fewer either writing the vector as coordinates or omitting the brackets.

Question 3

Many correct answers were seen. It was disappointing that a significant number of candidates were unable to work out 15% of £581.58 accurately. This was usually due to a build up method using 10% and 5% being used. Candidates often failed to show the method to describe how they achieved their 10 and 5% values. In this event, candidates frequently gave the wrong values for either 10% or 5% (or both) or else lost accuracy through premature rounding. This was a question testing the quality of candidate's written communication. It was therefore important that all steps in the working were shown; which they usually were. However, done less well was giving the answer in a correct form.

The answer was an amount of money so did need to be given in correct notation which meant being rounded or truncated to two decimal places with a pound sign present. A significant number of candidates gained 4 marks out of the available 5 for giving their final answer as 494.343 rather than £494.34

Another commonly seen example of poor notation was £494.34p. Quite a few candidates were also confused by the extra unnecessary information that boxes were sold in packs of 1000, misreading the question and calculating the cost of 3000 packs.

Candidates routinely failed to subtract their value of 15% from the £581.58 giving a final answer of £87.23. A few candidates added, rather than subtracted, the discount.

Question 4

The vast majority of pie charts drawn were labelled correctly but there were still a few seen without any labels at all. Most candidates used the information provided in the table to work out the size of angles for the sectors. Some, but not many, candidates used the size of the drawn sector in their calculations. It was common to see pie charts drawn without any calculated angles written down.

Candidates would be well advised to show their angle calculations when working out angles for pie charts. It was disappointing that a significant number of candidates were able to calculate the angles correctly but were then unable to measure them accurately.

Question 5

Candidates who worked in minutes from the start were generally more successful than those who worked with fractions of an hour. Those who used fractions of an hour frequently carried out the conversion from hours to minutes incorrectly; multiplying by 100 rather than 60 was a common error. It was quite clear that a significant number of candidates did not understand the concept of speed and common errors were incorrect division or multiplication of given quantities. Confusion over what to do with the speed and distance was evident with many candidates producing answers that were clearly incorrect. A few candidates, having arrived at the correct times of 25 minutes and 30 minutes then added rather than subtracted their answers.

Question 6

This question has an asterisk next to the question number indicating that the candidates' quality of written communication was once again being tested. This time, the communication mark was for ensuring that the candidate both communicated the correct answer clearly and gave the correct geometric reasons.

Probably less than half the candidates were successful with ensuring that they concluded their working by stating $x = 19°$ but were even less successful in writing down correct geometric facts. Working was sometimes difficult to follow; values written on the diagram in angles were accepted and frequently seen.

When geometric reasons are asked for, these should be stated clearly and in full. It is not, for example, sufficient to say ‘triangles are 180°’, the full reason ‘angles in a triangle sum to 180°’ (or equivalent) should be given. Both Z angles and complementary angles are not acceptable reasons and were rarely seen. Candidates are not penalised for incorrect spelling but, for example, ‘alternative’ and ‘alternating’ are not accepted in place of ‘alternate’.

Candidates regularly confused alternate and corresponding angles. A common error was to see candidates subtract all given angles from 360 thus demonstrating a misconception of what an interior angle is.

Question 7

Many candidates clearly did not understand the concept of density. A common error was to start with 160 ÷ 17.8; the vast majority of candidates who did this failed to gain any marks as they went onto multiply their result by 210. Candidates who carried out the correct method in two steps frequently lost marks due to premature rounding.

The majority of candidates found the weight of 1 cm then scaled this up to find the weight of 210 cm. However, some candidates successfully found the weight of either 50 cm (the difference in the two lengths) or 10 cm and used these weights to give the right answer.

A common error was to state that the weight of 10 cm was 1.78g. A relatively high proportion of candidates lost the accuracy mark when using the latter method, however. Candidates who used repeated division to get 80, 40, 20 and 10 often lost marks due to premature rounding.

Question 8

The most common errors in part (a) were to either include 4 or exclude –1.

Candidates were less successful in answering part (b). Common errors included writing ≤ instead of < and vice versa. Some candidates didn't give an inequality but gave a list of integer values instead and so gained no marks. Others had one end of the inequality correct and so gained one mark. In part b, a significant number of candidates omitted *x*, -4 < 3 gaining no marks.

Some candidates had 4 as their upper limit. In part (c) the most common error was to give their final answer as $y = \frac{7}{3}$ rather than $y > \frac{7}{3}$.

Another common error was to go straight from $7y > 3$ to $y > 2.3$ without showing the correct accurate answer; candidates who did not show the accurate answer were not awarded the associated accuracy mark.

The correct statement $3y > 7$ was sometimes followed by the incorrect answer of $y > \frac{3}{7}$. Candidates who used a trial and improvement approach rarely gained any marks. Too many candidates tried a ‘substitution’ method and resulted in no marks. There is still a reluctance from many candidates to give answers in fraction form and this often led to the loss of the accuracy mark by giving 2.3 as their answer.

Question 9

Part (a) was well answered although some candidates failed to interpret the diagram correctly and gave 2 rather than 32 as the median.

In part (b) 49 was a common incorrect answer from those candidates who worked out the range rather than, as requested, the interquartile range. Others attempted to work out the interquartile range by halving the range. Some candidates worked out that the lower and upper quartiles would come from the 7.75th and 23.25th (or 8th and 24th) values but then went onto subtract 7.75 from 23.25 rather than use the values of the variable associated with them.

Question 10

Too many candidates presented examiners with a mass of calculations involving all possible products and quotients, many of which were not valid and which were difficult to interpret. This was a question testing quality of written communication where there had to be a final comparison statement. However, too often, it wasn't clear which monetary values candidates were comparing. As the values being compared could be in pounds or dollars, be two values that the candidate had calculated or one of their values and one given value, it was essential that the monetary values being compared had the correct currency associated with them.

The majority of candidates compared the cost of one litre or one gallon of petrol but some chose to compare some other number of litres and gallons or show that 3 litres of petrol in the UK cost less than 1 gallon (3.79 litres) of petrol in the US. In the latter case, having clear unambiguous working was essential. It was common for candidates to begin to compare using one method and then switch to comparing another method, failing to fully complete either.

The large difference in the cost of petrol in the USA and UK made valid methods using approximations available to the candidates. Where such methods were used, candidates rarely explained what they were doing and failed to gain credit for what may have been a valid method.

Question 11

Candidates were more successful in answering the familiar looking question in part (b) than part (a).

Correct solutions were seen in part (a) but errors such as showing that x^3 came from $x + x + x$ were commonly seen.

In part (b) there was no starting point given to candidates but this did not appear to faze them and many fully correct answers were seen. It is vital that candidates evaluate the trials completely and not just write too small or too large. The most common errors are still to either give too many decimal places in the solution or to fail to carry out a trial to two decimal places. Some students truncated the expression substituting only into x^3 rather than $x^3 - 10x$. Too many candidates are still using a differencing method to test which answer using x to one decimal place is ‘closest’, this method never achieves the final method mark.

Question 12

The most common error in part (a) was to plot the points at the end of each interval rather than at mid-interval. Other errors included joining the points with a curve rather than line segments.

Part (b) was generally well done although some candidates gave the answer as 35 rather than the class interval. Some students also gave the value of the frequency, 16, rather than the class interval.

Part (c) was not as well done as might have been expected.

Question 13

The volume calculation was frequently incorrect with the formula for the volume of a cuboid being calculated rather than the volume of the given triangular prism. The other common error was to divide, rather than multiply, the volume by the density to obtain the mass of the prism. Some candidates attempted to work out the surface area or find the sum of all the edges; such incorrect methods gained no marks.

Question 14

Part (a) was generally well answered although some candidates did attempt to simplify rather than factorise the given expression with $7x^3$ being a common incorrect answer. Other incorrect attempt at factorising $x^2 + 7x$ were $(x + 3.5)(x + 3.5)$, $(x + 4)(x + 3)$ and $(x + 1)(x + 6)$.

Those candidates who knew how to factorise quadratic expressions were generally successful in finding the numbers 2 and 8 in part (b) although these frequently appeared with the wrong signs. Given that there was a negative term in the given quadratic expression it was surprising to see so many factorised expressions containing two addition signs.

Part (c) was, not surprisingly, less well answered with $(2t + 2)$ $(t + 1)$ being a common incorrect answer. There were many very poor attempts to factorise and some tried to simplify the expression. Very few correct answers to part (c)(ii) were seen. However, it was pleasing to see a number of very carefully considered fully correct explanations. The most common answer was to simply define a prime number which gained no marks. Other candidates started to try to explain why the original expression could not be prime starting with an explanation that $2t^2$ and 2 would always be even. Such attempts fell down when the $5t$ term was taken into consideration.

A more successful approach adopted by candidates was to work out how many tiles would fit along each side of the wall. Reaching 20 and 15 automatically earned the first 3 marks. Some of these candidates spoiled further working by considering the perimeter of the wall rather than the area. Too many candidates showed insufficient working and could not be awarded marks because of this.

The question discriminated well between those candidates who could identify and carry out a clear strategy, recording their method in an intelligible way and those candidates who had little understanding of the processes required and/or did not communicate them clearly to the examiner. The best candidates produced a clear and accurate solution in a few lines. However, many responses seemed disjointed comprising of several apparently unrelated calculations scattered all over the page.

Question 15

A common incorrect answer was 10.4 cm which came from attempting to use Pythagoras's theorem in triangle *ADC* which clearly does not contain a right angle. Other incorrect assumptions were that *BC* was 9 cm and/or angle *ACB* was 45°. Those candidates who drew a line parallel to *BC* from *D* generally went onto gain either full marks or at least one mark as errors occurred while using Pythagoras's theorem. It was disappointing that relatively few candidates realised that the trapezium could be divided in such a way that the length of the base could be found using Pythagoras's theorem. Many candidates stated the length of the upper part of *AB* was 6 but then did not always use the information correctly. A significant minority of candidates calculated the area of the trapezium. A few candidates used trigonometry to find angle *ADC* and then used the cosine rule in triangle *ACD*.

Question 16

There was an easy first mark available to those candidates who worked out the difference in the two weights but many failed to even get this far into the question. Trial and improvement was a method seen from some candidates but this rarely gained more than the first mark as they failed to give an answer in the range 8.48 – 8.49%. When the weights were divided candidates were often unable to interpret the answer or they carried out the division in the wrong order. A common error was to use 59.3 as the denominator in their calculations.

Question 17

On the whole, candidates either scored full marks or no marks in this question. A few candidates were unable to recognise the correct trigonometric function even having written SOHCAHTOA, others were able to start with a correct trigonometric statement and then made errors when rearranging their initial statement but most who got this far went onto obtain full marks. It was evident that some candidates had their calculator in the wrong angle mode. It was surprising the number of candidates who confused lengths and angles in their calculations. Some candidates seemed to take a lucky guess that the adjacent side was half of 32 with no evidence of the use of cos 60° and were then able to use Pythagoras to find x correctly.

Question 18

Part (a) was well done by the majority of candidates. However, there were a significant number of candidates who made no attempt to complete the table.

Most candidates who completed the table went onto score at least one mark in part (b). Common errors were (0.5, 3) and (5, 1.25). There continues to be a number of candidates who plot the points from the table and then just leave the graph as a series of plotted points rather than attempting to draw a smooth curve. Some candidates did join their points but with straight line segments rather than a smooth curve.

One fairly common incorrect response was to plot all of the points but only join the points from (1, 6) to (6, 1), not from (0.5, 12).

Question 19

This question was poorly answered. Those who had some idea of what to do generally picked up a mark for dividing the real distance by the distance between the models. However, few realised that they also had to deal with inconsistent units having failed to notice that one distance was in m and the other in km and made no attempt to convert between m and km. Some candidates who did spot that units had to be consistent were then unable to change metres into kilometres successfully.

Question 20

It was obvious that many candidates had been taught to cross multiply without understanding that they were still dealing with a fraction and so a common error was to multiply both fractions by 6 and so clear the fractions giving an answer of $5x + 9$. Incorrect attempts to add the fractions were common; multiplying the numerators and adding the denominators was a fairly common mistake. The most common incorrect answers were $\frac{(2x+4)}{5}$ or $\frac{(x^2+4)}{6}$. Candidates who attempted this incorrect method gained no marks. It was disappointing to see a number of candidates get the correct two equivalent fractions and then fail to expand the brackets in their numerators correctly. Others failed at the final stage. Having reached the correct answer of $\frac{5x+9}{6}$ they then attempted to simplify this further inappropriately, sometimes to $5x + 1.5$ and thus failed to gain the final accuracy mark. Some candidates did not see this as an expression but tried to turn it into an equation to solve for x.

Question 21

Common incorrect answers were $\frac{2}{7}$ in part (a) and $\frac{5}{7}$ in part (b). When seen, the correct two probabilities in part (a) were often added rather than multiplied. Other errors seen included evaluating the correct $\frac{2}{7}\times\frac{1}{6}$ as $\frac{3}{42}$.

It was disappointing to see so many candidates going straight to often incorrect fractions in part (b) without giving any indication as to what outcomes they were considering.

Surprisingly few candidates tried to use tree diagrams to answer this question leading to few correct answers. Very few candidates thought to construct a sample space.

Question 22

Those candidates who realised that the best method of solution was to use the quadratic formula were generally successful in gaining all three marks in part (a). However, some candidates either copied the formula incorrectly (an addition sign in the discriminant or only dividing the discriminant by $2a$) or substituted the wrong values for a or b or c.

Any candidate successful in part (b) got the correct answer by rearranging the given equation into a quadratic form and then using the quadratic formula but most candidates failed to gain any marks on this part of the question.

Question 23

It was essential in part (a) that candidates made it clear which lengths they were attempting to calculate. Some correct solutions were seen but the majority of candidates were unable to make a start on this question.

Common errors included the belief that the height of a sloping face was also 10 cm, or that their correct calculation to find the height of the sloping face meant that they had found the height of the pyramid, that the diagonal of the base was 10 cm and that base angles on the sloping faces were 45°. Some candidates who did successfully find the height of the pyramid then went on to use the wrong formula for the volume. Using $\frac{1}{2}$ × base area × height or introducing π were common errors.

Many candidates were successful in part (b) without showing any working and having failed to give an answer in part (a).

Question 24

As has always been the case, the most commonly drawn incorrect histogram used the frequency rather than frequency density on the y axis. Such incorrect attempts gained no marks. Candidates who did successfully work out the correct heights of the bars then did sometimes make errors in their plotting, usually with the two final bars. Other errors included omitting to provide a scale on the height axis and using the class intervals as labelling rather than a linear scale. A small minority of candidates worked out the correct heights but then ignored the class intervals in the table and drew all their bars the same width. Cumulative frequency graphs and frequency polygons were also common answers.

Question 25

The majority of candidates who realised that they had to use $\frac{1}{2}ab\sin C$ for the area of the triangle often substituted the given lengths and angle correctly but then could not progress any further. Some good fully correct proofs were seen but a very few candidates were unable to gain full marks because their calculators were clearly set in radian or gradian, rather than degree mode.

STATISTICS

MARK RANGES AND AWARD OF GRADE

Unit/Component	Maximum Mark	Mean Mark	Standard Deviation	% Contribution to Award
1MA0/1F	100	55.3	17.0	50
1MA0/1H	100	37.5	19.8	50
1MA0/2F	100	52.8	18.8	50
1MA0/2H	100	33.3	19.1	50

GCSE Mathematics Grade Boundaries 1MA0 – November 2012

	A*	A	B	C	D	E	F	G
1MA0_1F				70	58	46	34	22
1MA0_1H	80	61	42	24	12	6		
1MA0_2F				69	56	43	31	19
1MA0_2H	78	59	40	22	11	5		

	A*	A	B	C	D	E	F	G
1MA0F				139	114	89	65	41
1MA0H	157	120	83	46	23	11		

Grade boundaries are set by examiners at A, C and F and the intermediate grades are calculated arithmetically. Thus, for example, the overall grade for B at Higher tier falls midway between 120 and 46 at 83. By the same token the grade boundaries on each of the higher tier papers are strictly 42.5 and 40.5 but are rounded down for the purposes of the table above.

Boundaries for A* are determined statistically; for more information, see the JCQ Notice to Centres – Setting A* in GCSE.