Principal Examiner Feedback

November 2013

Pearson Edexcel GCSE
Mathematics Linear (1MA0)

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GCSE Mathematics 1MA0
Principal Examiner Feedback – Foundation Paper 1

Introduction

The work of some candidates was spoiled because they had missed crucial details in many questions sometimes leading to answers which did not make sense in context. Centres should encourage students to look closely at the detailed wording of all questions and pick out the most important pieces of information. A common sense check of final answers could often indicate that an error had been made and would be worth searching for.

On this non-calculator paper there was much evidence of poor arithmetic and inefficient methods. Students need to ensure that they set out their working in a clear, structured manner to enable them to scrutinise it carefully to check for errors themselves.

Conclusions given in starred Quality of Written Communication (QWC) questions were generally good but more care needs to be taken using correct geometrical language for vertically opposite angles and the description of a rotation.

Where candidates had to solve equations, answers were often seen embedded in a trial used rather than presented on the answer line as a final solution. Students need to understand that the solution itself needs to be given separately and should do so even if the unknown is not given printed on the answer line.

Report on individual questions

Question 1

Some candidates misunderstood the context of this question and did not realise that the stated booking fee of £2.50 per ticket meant that the total of 3 tickets and 3 booking fees needed to be found. Where the total ticket price of £150 and total booking fee of £7.50 were found, some candidates made decimal point errors and added an incorrect £1.50 to £7.50 to give a total cost of £9 or £900 which was presented as a final answer without further consideration. Weaker candidates should be encouraged to set out their work as column addition on non-calculator papers.

Question 2

Candidates were very successful interpreting the pictogram in parts (a) and (b) and dealt with the key correctly.

Incorrect answers of 12 in part (a) suggest that candidates read the total for Thursday rather than Tuesday. Some successful candidates labelled every whole and half circles a 4 or a 2 or showed labels counting up 4, 8, etc

In part (c) most candidates showed a clear attempt at three quarters of a circle with a 90° sector shown missing from a full circle. A successful strategy was used to show lines dividing all circles into 4 and this helped the candidates draw the final part circle. Attempts to represent three quarters using a segment of a circle were not accepted.

Question 3

The hour hand caused most difficulties in part (a) with the clock time read as 9.55 rather than 8.55 leading to answers of 9.40 rather than 8.40 in (i) and 10.40 rather than 9.40 in (ii). Some candidates annotated the clock face with loops around the circumference or radius lines or drew timelines to help deal with the time intervals accurately. In part (b) many candidates converted the time to the 24-hour clock correctly but then spoilt their answer by adding a.m. or p.m.

Question 4

Some candidates added the 5 and 3 as unit digits forming 45 and 23 to give a final answer of 68. Others interpreted $4a$ and $2b$ as $4 + a$ and $2 + b$. Where 20 and 6 where evaluated, they were usually added correctly but sometimes a and b were retained giving $20a + 6b$ or reintroduced into a final answer of $26ab$.

Question 5

In part (a) some candidates did not realise that the use of the word digit meant that this question was focused on place value. In part (i) they misinterpreted “make” to mean “add” and selected 2 and 8 from the list to give their total 10. Similarly, in part (ii) various operations were used for 3 numbers in the list to produce a 3 digit final answer. Of those candidates who did attempt to use the digits correctly, many chose 324 rather than 284.

In part (b) most had the 9 digit used in the tens column for the first number but did not realise the need to use 7 in the tens column for the second number; instead they gave 97 + 51, usually followed by a correct total 148. There were a few who lost marks due to poor arithmetic even after a correct selection of numbers was made.

Students need to be encouraged to take care that they are using the correct numbers for the question part as a few returned to the part (a) digits of 8 2 4 and 3 to answer part (b).

Question 6

Errors with all parts of this question would appear to come from candidates using the wrong colour for a question part or misinterpreting the spinner. There were only a few where the cross was positioned slightly inaccurately and so marks lost.

Question 7

Candidates were rarely successful with all parts of (a) with errors appearing to mix up the terms as well as suggesting miscounting. Edges and vertices appeared to be the most commonly interchanged.

In (b), where the correct method for volume was given, some candidates made arithmetic errors with their calculation of $3 \times 4 \times 10$. When the correct method was not given, many attempted to add the 3 given lengths or find the area of a single face or complete surface area.

Question 8

In part (a) where the correct order of operations allowed for the candidate to just work from left to right, the correct answer was usually seen.

In contrast, in part (b) where working from left to right did not yield the correct answer more candidates gave the incorrect answer of 18.

In (c) the most common incorrect answer was 11. Students need to be made aware that whilst remembering "two negatives make a positive" may serve them well for multiplication and division of directed numbers, this must not be misused when adding two negative numbers.

Some appeared to ignore the negative symbol for either −5 or −6 or possibly found the difference instead and gave final answers of −1 or 1. Similarly, in part (d) incorrect answers of 11 appeared to have ignored the extra – symbol.

Candidates appeared to have found part (e) very difficult. Those that were successful sometimes showed working and a strategy of positioning the brackets in various places and evaluating until they achieved a correct answer of 4.

In part (f), candidates needed to give an answer that explained equivalence rather than just stating it. Many good answers referred to the same operation of × 2 or ÷ 2 being applied to both the numerator and the denominator. Incorrect responses often stated that $\frac{2}{8}$ is double $\frac{1}{4}$.

Some candidates gave good explanations that involved 2 similar diagrams with $\frac{2}{8}$ and $\frac{1}{4}$ shaded and a few converted both fractions to either decimals or percentages.

Question 9

Candidates were very successful interpreting the dual bar chart for their answers in parts (a) and (b) and to find the daily figures for both Jack and Graham in part (c).

The majority of candidates took heed of the statement "You must show your working" in the starred part (c) which was testing Quality of Written Communication; they listed their readings and found totals for Jack and Graham.

A few made arithmetic errors and or incorrect conversions to hours and minutes but the majority reached a correct conclusion for their calculated totals. The final conclusion needed to be clearly stated and students need to be aware that simply circling or otherwise highlighting one name in their working will not suffice.

Question 10

Where candidates understood the question and started to present the 9 combinations, they were usually successful when a systematic approach was adopted. Setting the answers out in columns and using initial letters appeared to help avoid omissions and duplicates. Attempts to avoid writing individual combinations as pairs such as "Soup with Beef or Tuna or Veg" were not awarded marks.

Question 11

This whole algebraic simplification question was well done. The most common error in part (a) was to give b^4 rather than $4b$.

In part (b) some candidates appeared to think that subtraction would eliminate the *n* variable and gave just 5 or they combine the *n* from both terms to give $5n^2$.

The most common errors in (c) were to remove only one of the × symbols or rewrite the 3 as cd^3. There were a few arithmetic errors in part (d) but the most common cause of a lost mark was from incorrect further “simplification” of correct answer with $11xy$ typically given.

As in part (b) some thought the subtraction of the *y* terms would eliminate the *y* part and gave just $5x + 7$ or made a sign error giving $5x – 6y$.

Question 12

Candidates lost marks through missing a crucial piece of information in both parts of this question.

In part (a) the fact only numbers from 0 to 9 were on the cards was missed and so the answer 10 was offered.

For part (b) candidates missed not only the fact that the numbers on the card were different but also that they were asked to give **all** the possible answers. Part marks were often awarded where an understanding of median was shown by correct ordering of the 4 given numbers. Students need to be aware that where slips and errors are made, some marks can be retrieved if they have shown some evidence of understanding in their method.

Question 13

Many candidates were successful in applying inverse operations. An algebraic approach to this question was rarely seen. Some appeared to use a trial and improvement method and were usually successful. Unfortunately, 4 was often not presented as a final answer but instead left embedded in 3 × 4 – 7 = 12 thus losing the final mark.

Question 14

In part (a), there was a little evidence of a lack of rulers to measure accurately with some candidates resorting to marking off centimetre intervals along the line.

The angle 78° was given correctly by most in part (b)(i) with some errors involving subtraction from either 180° or 360°.

There was a wide variety of incorrect answers for part b(ii) with references to alternate angles seen as well as incomplete reasoning involving angles on a straight line.

Fully correct geometrical language was very rare indeed with the word “vertically” frequently omitted leaving just “opposite angles are equal” which was not awarded the mark. Students need to be encouraged to learn and use the fully correct terms for such explanations.

Question 15

As with question 1, the context of this question caused many candidates difficulties. They failed to realise that while 3 of the costs were fixed, the entry fee needed to be multiplied by the number of tickets sold. This meant that a total cost of £324 was often given but candidates were not prompted to spot their error by finding this value low compared to the ticket sales in this context. Others who did realise that the £14 ticket price needed to be multiplied by 100 used 140 as the answer to this calculation and so spoiled their work. Some otherwise excellent calculations were spoilt by lack of a final concluding statement.

Question 16

The fact that the sides of the original kite sloped on the grid caused most difficulties. Some candidates drew diagonals of the kite along the actual grid lines and this helped them count the squares more easily and complete the enlargement correctly. A few used a centre of enlargement or overlapped the enlargement with the original kite; both these methods helped ensure accuracy.

Question 17

Successful candidates had usually shown correct conversions to either decimals or percentages. Particularly where conversions were all given to the same degree of accuracy, typically 3 decimal places for decimals, the correct ordering nearly always followed. There were, however, many incorrect conversions seen with 0.606 and $\frac{2}{3}$ causing most difficulties. A common misconception was that 0.6 is greater than 0.606.

Question 18

In part (a) the correct method was occasionally followed by incorrect evaluation but most incorrect answers were due to use of an incorrect operation, typically 30 ÷ 4. This sometimes followed an incorrect formula triangle diagram. Where students use such diagrams they need to ensure that they memorise the correct positions for the component parts.

Part (b) was a starred question where candidates needed to follow their correct working with a conclusion showing correct units miles or km as appropriate. Many struggled with the arithmetic in this question and made slips with long lists of repeated additions instead of using more efficient methods. A lack of knowledge of the relative size of kilometres and miles was evident and meant candidates were not able to spot arithmetic errors after unexpected answers.

Question 19

Incorrect answers in part (a) gave 3.5 from 7 ÷ 2 or 5 or −5 from a subtraction of 7 and 2.

Although this question was presented as an equation, many candidates did not use a formal algebraic approach but instead applied inverse operations. Some who did so then checked their answer by substitution and others used trial and improvement as an initial method. In both these cases, the final answer was frequently not given but left embedded in the working.

Students need to recognise that solving an equation means the value of the unknown needs to be explicitly given, even when, as here, there is not the g = reminder on the answer line.

Question 20

Some candidates gave either a questionnaire or an attempt at a bar chart or similar to display the data. Those who did give a data collection sheet usually gave months but many expected individual names to be collected along with months of birth. Some gave just one of either a tally or a frequency or included frequency and total not realising that they were the same. Students need to think about whether a data collection sheet is actually fit for purpose.

Question 21

Where an equilateral triangle was attempted, it was often drawn accurately using either compasses or, more often, ruler and protractor. Some blank responses suggested a lack of equipment and a few attempted isosceles triangles with one or two 5 cm sides.

Question 22

Arithmetic errors for both 6 × 12 and 72 ÷ 2 caused most errors in part (a) where candidates appeared confident using a familiar formula.

Use of the inverse formula caused more difficulties in part (b) with failure to multiply by 2 leading to many answers of 5. Some did not present their final answer but left it embedded in the formula in the working.

In both parts there was evidence that the need for a 2 stage process was beyond the weaker candidates who stopped working after attempting just one calulation.

Question 23

Errors in part (a) involved transposing the x and y parts of the vector or moving the shape to a position where one vertex was at (−3, 2). Others used the vector incorrectly to move the top right (5, 3) vertex to (0, 6), the position that top left (3, 4) vertex should have after translation.

Incorrect mathematical language and lack of detail spoiled many descriptions in part (b) with "turn" often given instead of rotation and errors or omissions with the direction or centre. Students need to be clear about which of the 2 diagrams is being rotated to prevent errors with direction. All marks were lost when a candidate introduced a second transformation, usually a translation.

Question 24

In this question, good organisation in a candidate's working often appeared to enable accuracy. There were some unfortunate slips with area calculations including some where calculated areas overlapped. Weaker students need to be clear about whether area or perimeter needs to be used in a particular context.

Arithmetic errors were common when dividing to find the total cans needed or deducting a 30% figure from £19. Students need to be aware that when build up methods are used to find a percentage, the full method needs to shown otherwise no marks are awarded if the final answer is incorrect.

A few perfectly correct numerical answers did not get full marks as they were accompanied by an incorrect final decision. Students need to be encouraged to consider whether a final figure is reasonable in the context of the question and thus highlight possible errors in their working.

Question 25

Many candidates gave overlapping response boxes as issue in question 1 for part (a) but some did not appreciate that this was only a problem for age 25 but instead referred to only ages 15 and 40 where there was no actual overlap. The vague response boxes, lack of time frame and lack of option for no exercise were all identified as reasons for question 2.

In part (b), candidates needed to take care to note the detail that the question was to be about time and not frequency, with questions about how often exercise is done not worthy of full marks. Response boxes were generally good although a few candidates who had criticised overlapping boxes in part (a) went on to show them in their own part (b) question. Others replicated the vague response boxes or omitted a time frame or units.

Question 26

The lack of coordinate axes did appear to trouble many candidates with many blank answers seen. Those who did draw axes and make an attempt at the question often lost a mark through omission of x or y labels or O marked on their grid.

Use of a table of values often preceded correct work but errors when dealing with negative values of x were common. Students could be encouraged to plot coordinates for positive values of x and then extend their line to check all calculated values.

Question 27

There were many correct solutions to this question but, once again, arithmetic errors spoiled much work, particularly where lists of multiples were attempted.

Some candidates who reached the correct 3 and 5 in part (i) doubled the common multiple they had used and gave 120 instead of 60 in part (ii).

Question 28

Fully correct algebraic solutions were rare and where sometimes attempted with an assumption that the question would involve a perimeter or even angle total equation.

Some candidates set up a correct equation and found $x = 6$ from incorrect algebra so failed to gain maximum marks. Many candidates used trial and improvement to find $x = 6$ and proceeded to gain full marks following correct substitution in individual side lengths that were then added.

GCSE Mathematics 1MA0
Principal Examiner Feedback – Higher Paper 1

Introduction

This was a paper which allowed good candidates the opportunity to demonstrate their skills and it also allowed weaker candidates to achieve a reasonable level of success. Overall, the paper was done very well by the majority of candidates.

There were several questions in which basic arithmetic let many candidates down. Errors in calculations were particularly prevalent in questions 1, 7, 10, 11 and 19 and numerous marks were lost due to careless arithmetic errors. Weaknesses in working with negative numbers were highlighted by questions 4(d), 12 and 15.

Candidates should be encouraged to check the reasonableness of their answers. In question 11, for example, £7.20 is clearly not a sensible cost for posting 120 letters at 60p each.

Centres should remind candidates that when units aren't given on the answer line they need to include them with their answer.

Candidates need to use the correct language in their geometric reasoning if they are to gain the QWC mark(s). Using "edge" instead of "circumference", for example, or "angles in a circle" rather than "angles around a point" or "a quadrilateral which touches all sides of the circle" rather than "a cyclic quadrilateral" is not acceptable.

While it was very pleasing that some candidates set their solutions out clearly and logically the poor presentation of working was a concern, particularly in questions10 and 11. Too many candidates gave a variety of calculations scattered across the page which required much searching by the examiner in order to identify any relevant working. Candidates should consider the layout of their working as well as their calculations. They should be encouraged to set out working clearly and to communicate the meaning of their calculations.

Report on individual questions

Question 1

This question was answered well with most candidates scoring at least two of the three marks. Marks were generally lost through arithmetic errors rather than for using an incorrect method. The calculations caused difficulties for some candidates, particularly if they were attempting to divide by 4 and then multiply by 6. An answer of 2 onions was only accepted if it was clear from the working that the candidate had rounded $1\frac{1}{2}$ onions to 2 onions.

Question 2

In part (a) most candidates plotted the point correctly. Errors were usually due to misreading the vertical scale and plotting the point two small squares above 15 or three small squares below 20. A few candidates failed to plot any point at all on the scatter graph.

In part (b) The correlation was described as "positive" by most candidates. Incorrect answers seen included "no correlation" and "negative" and describing the relationship, not the correlation, between the number of documents checked and the number of errors.

The vast majority of candidates in part (c) scored both marks with many having drawn a line of best fit. Candidates not scoring full marks could often be awarded one mark for drawing a line of best fit. These lines were generally too high and resulted in an estimate above 20.

Question 3

The method of volume = area of cross-section × length was well known and regularly quoted. If candidates remembered how to find the area of a triangle they generally went on to find the correct volume of the prism. The vast majority of errors came from candidates failing to divide by 2 in their area calculation for the triangle which meant that 240 was a very common incorrect answer. Centres need to ensure that candidates know how to find the area of a triangle and use it in a context. A few candidates attempted to find the surface area of the prism rather than the volume. Some candidates failed to give any units with their answer or wrote cm or cm^2, losing the independent units mark.

Question 4

In part (a) most candidates gained at least one mark for collecting either the x terms or the numbers correctly and many gave fully correct answers. Errors were often due to candidates failing to deal correctly with the –3 and the +8. $4y + 5x - 11$ and $4y + 5x + 11$ were common incorrect answers.

Part (b) was generally well attempted. Many candidates managed to identify a common factor. Some gave a partial factorisation, $x(9x - 6y)$ or $3(3x^2 - 2xy)$, as the final answer and others made errors inside the bracket. Incorrect answers included $3x(3x + 2y)$, $3x(x - 2y)$ and $3x(3x - 2xy)$. Some candidates attempted to factorise using two brackets.

In part (c) the vast majority of candidates were able to expand $4(x + 2)$ correctly. A few incorrect answers of $4x + 2$ or $4x + 6$ were seen.

The majority of candidates in part (d) were able to gain at least one mark by expanding the brackets to give four terms and many went on to give the correct answer. Sign errors were frequently made in the four terms and some candidates added the –5 and the +3 instead of multiplying. Errors often occurred in the collecting of the x terms.

Question 5

Part (a) was answered correctly by most candidates.

In part (b) many gained one mark for 200×0.75 but a surprising number failed to evaluate this correctly. Some candidates over-complicated the calculation and attempted to use a long multiplication method. Other common errors were working out an estimate for the number of seeds that would **not** grow, giving $200 \times 0.25 = 50$ as the answer, and misunderstanding the meaning of the word 'estimate' and working out 200×0.8.

Question 6

In part (a) the vast majority of candidates understood what was meant by translation and many were able to translate the shape correctly. Incorrect answers were often the result of translations in the wrong direction or of the x and y movements being interchanged.

Part (b) was generally answered well with the majority of candidates being able to identify the transformation as a rotation. Common errors were to give the direction of rotation as 90º clockwise or to give no direction at all and some candidates failed to give a centre of rotation. A significant number of candidates failed to score any marks as they applied two transformations, usually a rotation combined with a translation, despite the question asking for a single transformation.

Question 7

This question was generally answered very well. Candidates usually attempted it by listing multiples of 12 and multiples of 20. Arithmetic mistakes were surprisingly common and some candidates miscounted the multiples or transposed the two answers.

Some wrote the common multiple, not the number of boxes of each required, on the answer lines in part (i). Relatively few candidates expressed 12 and 20 as a product of prime factors although those that attempted this method were often successful.

Part (ii) was usually answered correctly, although some candidates did double their LCM to 120 and some halved it to 30.

Question 8

Many candidates were unable to make any meaningful progress because they failed to spot that the triangle was isosceles and consequently this question was answered very poorly. Candidates who did recognise that $AB = AC$ usually wrote the equation $3x – 5 = 19 – x$. Isolating the x terms and the non-x terms in this equation proved a challenge for many with $2x = 14$ being quite a common error. Those who solved the equation correctly almost always went on to work out the perimeter as 38 cm. There were a number of trial and error attempts to find the value of x. The majority of candidates worked out the perimeter as an algebraic expression which was usually simplified to $4x + 14$. This was often turned into the equation $4x = 14$ (or $4x = –14$) and solved to give $x = 3.5$ (or $x = –3.5$). Many candidates scored just one mark for this question for substituting their value of x into either $4x + 14$ or into the three expressions and adding to find the perimeter.

Question 9

It was encouraging that almost all candidates attempted this question and it was generally answered well.

In part (a) most candidates realised that there was an overlap at 25 in question 1, but a significant minority thought there was also an overlap at 15 and 40. Most candidates were able to write down one thing wrong with question 2. This was usually related to the lack of a time frame, the vagueness of the response boxes or the absence of a box for those who do not exercise. Some gave a reason for question 2 in the answer space for question 1. A few candidates found it difficult to express their criticisms in a coherent manner or were too vague in their answers.

The questions designed in part (b) were generally well presented and often gained full marks. Some candidates omitted a time frame or the units of time, e.g. hours, and some designed a question to find out how often people exercised instead of how much time people spend exercising. A small number of candidates wrote an appropriate question but failed to include any response boxes. Too many candidates are still losing marks by using inequality signs in their response boxes. These are not acceptable.

Question 10

The majority of candidates were able to split the shape into two rectangles in order to find the total area. Some failed to calculate the missing lengths correctly and if no working was shown the opportunity to gain a second method mark was lost. Those using the 'missing rectangle' approach were generally successful though some failed to recognise the missing rectangle and just did 16 × 8, gaining no credit. Having obtained an area there was usually an attempt to to find the number of tins of paint needed by dividing by 12. A common error was 114 ÷ 12 = 12. Some candidates used 9.5 tins of polish and lost the accuracy mark as well as presenting themselves with some awkward calculations. Many candidates were able to gain the method mark for reducing either £19 or their total cost by 30%. Errors were often made (e.g. in 1.9 × 3 or 19 – 5.7) but the mark could be awarded when a clear method was shown. A good number of candidates were able to communicate their conclusion in a suitable way to be awarded the final mark but a few just wrote ‘no’ or ‘yes’ which was not sufficient. Some candidates confused area with perimeter and thus limited themselves to scoring a maximum of one mark. As always, centres should try to impress upon candidates the need to set their work out carefully. The vast majority of those scoring full marks did so with well-structured answers and the minimum necessary working shown for calculations. This question showed lots of arithmetic errors being made but credit could be given for correct methods if they were shown.

Question 11

There was a lot of information in this multi-stage functional question and candidates found sequencing their work a challenge. Many candidates used the ratio correctly although some took 120 to be the number of large parcels. A significant minority found 70% of 200 and ignored the small parcels. A build up method to find 70% was used by many candidates, with a mixed level of success. The majority of candidates multiplied their totals by the correct unit price and added. Many responses exhibited basic arithmetic errors, both addition and multiplication. Some errors could have been avoided if candidates had considered if their answer was reasonable, e.g. 120 × 60p = £7.20. Some candidates set their solutions out clearly and logically, often gaining full marks, but too many gave a mixture of calculations in no particular order without any explanation of what it was they were attempting to work out. Candidates should be encouraged to set out working clearly and to communicate the meaning of their calculations.

Question 12

The majority of candidates gained 3 marks for plotting and drawing the correct line segment. It was very encouraging to see a substantial number of correct tables of values prior to the drawing of the graph. Most errors in the table were incorrect values of y for negative values of x. It was disappointing that relatively few candidates managed to get the additional mark for correctly scaling and labelling the axes. The absence of 0 at origin or the absence of x and y on the appropriate axes or the use of a non-linear scale meant that this mark could often not be awarded. When the scaling on the axes was inconsistent further marks were usually lost as it became difficult for the candidate to draw the correct line segment through the points plotted. It was disconcerting to see a small proportion of candidates drawing axes on the left of the grid and at the bottom instead of drawing axes that intersected at the origin.

Question 13

One mark was often awarded for 35×10 (=350). Some candidates went on to work out 33 × 11 and to then find the difference between their two answers. Many failed to gain full marks because they made arithmetic errors. Errors in the evaluation of 33 × 11 and in the straightforward subtraction were very common. Candidates must be encouraged to check their answers, as working such as 33 × 11 = 330 and 363 – 350 = 10 went unnoticed. Some candidates worked out both 35 × 10 and 33 × 11 but got no further. Many candidates worked out $\frac{33}{11}$ = 3 and $\frac{35}{10}$ = 3.5 which lead nowhere and some subtracted 33 from 35 and gave 2 as the answer.

Question 14

In part (a) many candidates did not know the meaning of the word ‘reciprocal’. A variety of incorrect answers were seen with the most common being 25.

Part (b) was poorly answered. The most common incorrect answers were –9 and 0.03. Some candidates with the right idea failed to evaluate 3^{-2} and gave the answer as $\frac{1}{3^2}$.

In part (c) Many candidates were able to gain one mark for evaluating $9 \times 10^4 \times 3 \times 10^3$ as 270 000 000 or as 27×10^7. The difficulty for many was changing their answer to standard form. Many thought 27×10^7 was in standard form and failed to do the final step. Candidates who first converted the numbers in the question to ordinary numbers often ended up with too many or too few zeros. Some evaluated 9 × 3 incorrectly.

Question 15

Many candidates appeared familiar with simultaneous equations and were able to achieve a pair of equations which they could add or subtract to eliminate one of the variables. However, simple errors in multiplication, addition or subtraction and a failure to deal correctly with the negative numbers involved hampered many. Candidates who tried to eliminate y first were usually more successful as they had to add the equations rather than subtract although 51÷17 caused problems for some. Those who attempted to eliminate x often struggled with subtracting $-9y$ from $8y$ or vice versa. Some of the candidates who successfully eliminated x could not deal with $-17y = 17$ (although $17y = -17$ seemed to pose fewer problems). Having found one value, candidates usually went on to substitute their value into an equation to find the other value. There were many candidates who had a correct first answer (mostly $x = 3$) who substituted their value but then couldn't rearrange the linear equation correctly. Candidates should be encouraged to substitute their answers into one of the original equations to check they are correct. Only few candidates attempted the substitution method and generally these candidates were not as successful as those using the elimination method.

Question 16

Only a minority of candidates gained full marks in this question. Most worked out the scale factor as 6 but the majority then proceeded to use this as their area factor giving an answer of 1800. Some candidates treated the shape as a rectangle measuring 20 cm by 15 cm which they then enlarged into a rectangle measuring 120 cm by 90 cm to get the correct answer. A very common incorrect method was 300 ÷ 20 = 15 followed by 15 × 120 = 1800.

Question 17

A significant number of candidates did not attempt this question. There were few clear strategies used and many correct answers showed no working at all. Many candidates did get at least 2 of the 3 numbers correct. Brackets were often omitted from the answer but this was not penalised. Common errors were to try to find the midpoint of the two sets of coordinates given or to give the differences between *A* and the midpoint as the final answer.

Question 18

In part (a) many candidates correctly read the value of the median from the cumulative frequency graph. Incorrect answers were usually due to misreading the scale. Both 64 and 69 were common wrong answers.

Most candidates gained at least one mark in part (b) with many giving fully correct answers. The most common approach was to read from the graph at 60 seconds (28) and compare this with 25% of 80 (20). Some candidates worked out 25% of 80 but failed to obtain a comparative statistic. Sometimes candidates stated 'yes' without providing sufficient evidence to show why.

Part (c) was attempted by the majority of candidates and most were able to produce a box and whisker diagram and show an understanding of the five measures required, even if they failed to read the scales correctly. Most errors were made with the two quartiles.

Question 19

Overall, this question was not answered well with a large number of candidates unable to use an appropriate method. It was rather disconcerting that many answers were greater than 1. Drawing a correct tree diagram seemed to be the key to success. Most candidates made an attempt at drawing a tree diagram and many recognised the need to find $1 - 0.4$ and $1 - 0.7$ though very few actually wrote these calculations down. Not all candidates, though, recognised that the probabilities of 'not fruit' and 'not vegetables' were relevant and tree diagrams were often used with all branches having 0.7 and 0.4 on them. Candidates with a correct tree diagram usually attempted to multiply their probabilities in some way. Some candidates obtained probabilities for 'fruit', 'vegetables' and 'both' from three correct products but failed to add them and gave three answers, thus losing 2 marks. Those that did add them often went on to get the correct answer but some made arithmetic errors ($0.3 \times 0.6 = 1.8$, for example). Of those scoring full marks, the vast majority added the probabilities of the three favourable outcomes with surprisingly few candidates using $1 - 0.3 \times 0.6$.

Question 20

The majority of candidates made an attempt at this question and most managed to gain the first mark for multiplying out the bracket. Many, though, were then unable to rearrange the equation correctly. Common errors were to add 8 to both sides before multiplying by $3x$ or to subtract $3x$ from the RHS. Some candidates who did multiply both sides by $3x$ to give $32x - 8 = 10 \times 3x$ then subtracted $3x$ from $32x$. Those who did get as far as $32x - 8 = 30x$ usually completed the solution to $x = 4$ and gained full marks. A few candidates slipped up when multiplying out the bracket (e.g. $24x$ or $36x$) but then rearranged correctly to get two marks.

Those candidates who were able to attempt part (b) often gained the first mark for using a common denominator of $(y + 3)(y - 6)$ or $y^2 - 3y - 18$. Many of the candidates who used the correct denominator gained the second mark for dealing with the numerators correctly. At this stage the subtraction was often written as two separate fractions. A very common error was to then simplify $2(y - 6) - (y + 3)$ to $y - 9$. It was a shame that some candidates with the correct answer lost the accuracy mark because they went on to do further incorrect algebra. Inappropriate cancelling was a feature of many candidates work.

Question 21

Many of the attempted solutions demonstrated that candidates were not conversant with this part of the specification. A large proportion of candidates used $y = kx$ leading to an answer of 60 and gained no marks. A minority understood that $y \propto x^2$ or $y = kx^2$ was the essence of this problem and most of these candidates gained full marks. Some, however, correctly worked out $k = 4$ but then went on to multiply 4 by 5 instead of by 5^2 and lost two possible marks. Some candidates doubled the value of x and then squared to get the correct answer of 100, i.e. using $y = (2x)^2$.

Question 22

This question was not answered very well and many candidates did not even attempt it. Many candidates appeared unable to cope with an angle of y and although some knew that angle *ADC* was half of y they were unable to express it as such. Often candidates gave y a value and worked with numbers. These candidates gained no credit even if their reasons were correct. Those who did attempt to answer it using algebraic terms often gained one mark for identifying angle *ADC* as $\frac{y}{2}$ with some also then working out angle *ABC* as $180 - \frac{y}{2}$. Fewer candidates used the solution involving the reflex angle *AOC*. Many candidates incorrectly thought *OABC* was a cyclic quadrilateral leading to an answer of angle *ABC* being $180 - y$. Some thought that angles *BAD* and *BCD* were 90°. It was pleasing to see candidates using the correct terminology but there were still many who lost the QWC marks through the use of the wrong words. Angle at the ‘edge’ rather than at the ‘circumference’, and ‘arrow’ or ‘arrow head’ occurred regularly. Many quoted ‘quadrilateral’ and not ‘cyclic quadrilateral’. Some candidates listed any theorem or rule they could think of that related to angles or circles in the hope of finding the right one without actually offering an expression for *ADC* or a final answer. These candidates gained no credit since the QWC marks could only be awarded if the reasons given were appropriate to the method shown.

Question 23

This was a challenging question that was attempted by most candidates but poorly done by many. Those who drew guide lines from the correct centre often got full marks. Many of the incorrect responses were due to candidates using the wrong scale factor (often ½) or using the wrong centre of enlargement.

Question 24

The biggest difficulty for those who made a serious attempt at part (a) was getting the direction signs of the vectors correct. Relatively few candidates chose to write a simple vector equation such as *ON* = *OA* + *AN* or *ON* = *OB* + *BN* as their starting point. Candidates who worked with $\mathbf{a} + \frac{2}{3}AB$ were generally more successful. Those who started their path with vector **b** frequently used $\mathbf{b} + \frac{1}{3}AB$ instead of $\mathbf{b} + \frac{1}{3}BA$. Difficulty in expanding brackets or omitting brackets altogether prevented some candidates from gaining marks even though their reasoning appeared to be correct.

In part (b), relatively few candidates achieved any marks. Some candidates were able to find a correct expression (usually simplified) for *OD*. A smaller number were able to give a correct expression for *ND*. Often, however, unsimplified or incorrectly simplified answers for *ON* meant that candidates were unable to prove a straight line relationship. Those candidates obtaining all 3 marks were generally very coherent in their justification though few were actually explicit in their recognition of a common point. Some explanations were unclear with candidates mentioning ‘gradient’ or ‘same amounts of **a** and **b**’ rather than stating that one vector was a multiple of the other. Some candidates set about proving *ON* + *ND* = *OD*.

GCSE Mathematics 1MA0
Principal Examiner Feedback – Foundation Paper 2

Introduction

This paper was found to be reasonably straight forward at the start with a number of questions that caused some candidates problems towards the end of the paper. The paper produced a good range of marks for the award of grades. Errors were often made where the candidates did not read the question carefully.

Generally speaking, the standard of straightforward algebraic knowledge was not very good as candidates tended to use trial and improvement methods. Unless a trial and improvement method leads to a correct answer then no marks are awarded unless trial and improvement is the focus of the question. Candidates usually gained more marks for using an algebraic solution in those questions where an algebraic method could have been used rather than by using a trial and improvement method.

A significant number of marks were lost where candidates did not write down a statement of the result in the starred questions. Circling an answer is insufficient as we need to see a statement giving the required decision. A statement of how to work something out will also not gain any marks when a question ask for an explanation.

It is still surprising to see the number of candidates who did not have access to a calculator on this paper. Some repeated additions were seen for multiplication and when working out percentages without using a calculator.

Some students give more than one method and more than one answer. If they choose one of the answers to write on their answer line that is the method which will be awarded marks, but many do not do so. This was often apparent in question 17.

Questions 1 – 8, 10 – 12, 14(a), 16(a), 22(a), 23(a & b) were tackled with the most success while questions 9, 13, 14(c), 16(b), 19, 21, 24 – 28 were less successfully completed.

Report on individual questions

Question 1

A well understood question with almost all parts well answered. There were a small number of candidates that wrote 2019 as two thousand one hundred and 9 and gave the answer of tens instead of 70 for the value of the 7 in the number 4571.

Question 2

Almost all candidates could recognise the hexagon but there were many interesting incorrect answers to the decagon with the most common being tenagon and octagon. Only a third of candidates could name this correctly.

Question 3

This was a well answered question with almost all candidates being able to gain the marks in parts (a) and (b). Part (c) was answered well but some candidates were unable to subtract 77 from 102 but did gain one mark for showing an intention to subtract these two numbers though some lost both marks here as they were unable to choose the appropriate values from the table, selecting 88 instead of 77 was a common error.

Question 4

Candidates almost always recognised the angle as acute in part (a) though there was the occasional cute angle and the correct angle was usually measured although a significant minority gave the answer as 115° instead of 65°. For part (b) the correct answer of 53° was almost always given though we still continue to see explanations of how to work out the answer rather than writing angles on a straight line add to 180°. The reason here was often partially remembered and the word ‘angles’ was often missing, while some thought there were 160 or 360 degrees on a line.

Question 5

Almost all candidates understood that they had to find the difference between the two times of 17 50 and 19 30 but many candidates “forgot” that there are 60 minutes in an hour and subtracted two numbers on their calculator giving the answer of 180 which they often wrote as 1 hour 80 minutes or even 2 hours 20 minutes and so failed to gain any marks. The most successful candidates were those that counted on from 17 50 to 1800 then 1800 to 19 00 and then on to 19 30 and gained full marks for 100 minutes or 1 hour 40 minutes. Some candidates correctly recognised the answer was 1hour 40minutes, but used poor time notation, e.g. 1:40, 140, 1–40 etc. and did not gain the accuracy mark. In part (b) many candidates did not read the question properly and based their answer on one £20 note instead of two, this usually earned them just one method mark for subtracting £8.50 from £20.

Question 6

A well understood question with almost all candidates gaining the marks in part (a) though a small minority of candidates worked from right to left and added on 3 marks and did not score. In part (b) many candidates were able to give the correct answer but there were a few that only gained 1 mark as they went on too far with their number of terms or only recognised that one needed to add 5 to generate the next term. Again a few candidates worked from right to left and continued the sequence by subtracting 5 so did not score.

Question 7

Part (a) was well answered by almost all candidates with part (b) being slightly less successful. In part (c) the success rate was also quite high though some candidates divided by 2 and multiplied by 3 and of course did not gain any marks. Some candidates attempted to convert $\frac{2}{3}$ to a decimal or percentage, often using 60% or 75% and as a consequence earned no marks.

Question 8

This question was well answered though relatively few candidates gained all 4 marks. This was usually because they omitted the frequency label on the vertical axis. Almost all candidates chose to draw a dual bar chart and the modal mark was 3 marks as they were able to draw the bars to the correct height and correctly label the bars and the horizontal axis. Very few candidates scored no marks in this question as marks could be earned for a key to distinguish between the two types of bikes and for labelling the days of the week, usually on the horizontal axis.

Question 9

This question was not very well answered as many candidates did not remember the number of metres in a kilometre with 10 and often 100 being used as the number to multiply or to divide by being used. If the candidates showed their method then they could get a mark for showing they were adding their two lengths though many candidates did subtract instead. The most common wrong answer was 600 obtained by subtracting 650 from 1250 and this would have gained 1 mark if the 1250 metres had been seen and used.

Question 10

A very well answered question though 5 was often seen as the input to get an output of 27 as though the candidate had correctly subtracted 7 they divided by 4 instead of multiplying by 4 as they needed to do for the correct inverse operation.

Question 11

Almost all candidates were able to give the coordinates of the point *M* correctly and there were some good responses for marking the position of the third point of the isosceles triangle correctly. However, many candidates did not take heed of the information that *LM* was in fact the shortest side of the triangle so that the correct answer needed to be above 6.2 on the line $x = 5$ or at (2, 7) or (8, 7). Candidates that placed *M* below the 6.2 were given one mark if their triangle was isosceles.

Question 12

As is usual many candidates mixed up the area and perimeter in this question. Almost all candidates were able to write down the number of lines of symmetry as 1 in part (a) but in (b) the perimeter was often given as 28 (the numerical value of the area) or as 24 as the internal corners had been miscounted. Many candidates gave the correct answer of 144 but some then shot themselves in the foot by dividing (or multiplying) 144 by 2 as if they were finding the area of a triangle thus gaining no marks, whilst others gave the answer as 50 (the numerical value of the perimeter).

Question 13

This question was only correctly answered by about half the candidates. There was confusion on two fronts, one was the different factors of 40 where candidates often gave two the same and the other was multiples of 9 where 3 was often seen as one of the three numbers. Answers such as 24, 26, 28 failed to score through lack of working shown. Many also chose three numbers totalling 20 or 30, not recognising they were not included in the range.

Question 14

Parts (a) and (b) were well answered with fewer than usual candidates selecting the incorrect average. There were a significant number of candidates that added the ten numbers and divided by ten but forgot to press the equals sign before the two operations. In part (c) most candidates gave an answer of 20 which was the total of all the frequencies but the correct answer of 55 was given by a pleasing number of candidates and those that showed that they understood that they had to multiply number of birds by their frequency gained a method mark if they did it for 4 readings. Other incorrect answers often seen were 15 (the sum of the number of birds) and 35 (the combined total of frequencies and number of birds). A common error was to calculate 3×0 as 3 to reach a final answer of 58.

Question 15

In this starred question about a third of the candidates were correctly able to multiply 12, 4.5 and 5 and then divide by 8. Full marks were awarded for an answer of 33 or 34 but many candidates were able to score one mark for multiplying two of the three numbers or two marks for multiplying all three or multiplying two numbers and dividing by 8. Inevitably some candidates multiplied all four numbers whilst a small minority did not know how to start the problem. Some candidates were still not aware you cannot have 33.75 boxes and some gave the wrong answer to $12 \times 4\frac{1}{2}$ through misuse of the fraction button on the calculator whilst some misunderstood $4\frac{1}{2}$ hours each day to mean four lots of half hours each day, i.e. 2 hours a day, and some candidates wrote $4\frac{1}{2}$ as 4.30.

Question 16

Almost all candidates were able to answer part (a) correctly but part (b) was not well understood. Some candidates were able to gain a mark for establishing 14 as a key number in solving the problem whilst others gained this mark for establishing a fraction equivalent to two sevenths with four fourteenths being the most common.

Question 17

As one might expect many candidates made the usual mistake of reflecting in the wrong axis but were awarded one mark, as were those that reflected in a line parallel to the *y*-axis. Some candidates hedged their bets and drew two or three triangles, and therefore gained no marks whilst others drew translations instead of reflections.

Question 18

Though most candidates understood how to use the conversion graph most candidates were not able to string together the correct argument to explain which car had the most petrol. Many candidates were also unable to read off the scale correctly on the gallon axis and this often led to the loss of a mark, candidates should be advised of the need for accuracy when taking readings. It was obvious when the graph had been used to obtain a conversion factor, but often no marks were apparent on the graph, sometimes losing the candidate marks. Some candidates used a conversion factor from memory without reference to the graph at all and units were at times confused or missing.

Question 19

Best buy questions are a common visitor to our papers and one would have thought by now these questions would be very well answered. Unfortunately this is not the case; whilst many candidates divided the cost of the tray by the number of plants in the tray they did not write the answer to a sufficient degree of accuracy to differentiate between the cost of one plant for each size of tray. This may be because candidates are 'drilled' into writing monetary values to 2 decimal places rather than looking at the size of their answers. When candidates divided the number of plants by the cost to find the number of plants per pound they often did not understand what they were calculating and stated it was the cost of one plant. However, about a quarter of the candidates were able to give the correct answer from correct working out of comparable results.

Question 20

This question was well understood with candidates' responses to part (a) being slightly more successful than those to part (b).

Question 21

The most successful responses to this question were those where the candidate had changed 1800 yards into inches and then into centimetres before then changing the centimetres into metes and dividing by the number of metres in a ball of wool. While a good number of candidates scored the first mark for multiplying 1800 by 36, only about a quarter of candidates could put this chain of reasoning together and come up with the correct answer. Many candidates again could not change between centimetres and metres whilst others came up with the correct answer of 7 by a wrong method and failed to score any marks. A common error was to begin by dividing 1800 by 36 rather than multiplying.

Question 22

This question should have been well answered by all candidates, particularly as most calculators these days allow for the calculation to be entered as it looks on the page. Part (a) was almost always correct but the modal answer to part (b) was to try and evaluate the answer to $\sqrt{(500 + 12.8)}$ rather than $\sqrt{500}$ then add 12.8. Whichever the result given it was possible to gain the mark in (b)(ii) for writing their answer correct to one decimal place even if it was the answer to part (a).

Question 23

In this algebra question there was a good range of marks with few candidates scoring zero marks. Parts (a) and (b) were the most successful but it was common to see 1 mark being gained for expanding the bracket in (c) and writing it as an equation though only a small number of candidates on this tier were able to go on and give the correct answer of 17 with 7 and 14.5 being a common wrong answer. Factorisation still remains a mystery to many foundation tier candidates with only about a quarter of the candidates giving the correct answer.

Question 24

The modal mark for this question was 2. This was usually obtained by those candidates that worked out (360 – 4 × 25) ÷ 4 by using the central point of the diagram. Few candidates were able to then work with a rhombus to find the value of the obtuse angle marked *a*.

Question 25

This was a very well understood question with almost all candidates being able to obtain one mark either for finding out the cost of a computer from Logic or for finding 15% of £359. It was pleasing to see about a third of the candidates being able to work right through the problem and come up with the correct answer of £6.45 though many candidates lost marks either from not being able to work out 15% of 359 or for not taking a correctly worked percentage away from £359. Despite it being a calculator paper, some candidates found 15% by breaking it down into parts. However, most do not show their method and if errors are made will not earn marks; many using this approach had problems with the decimal point. Some candidates quoted 10% as 35 and 5% as £17.50 either because they chose an easier number to work with or had decided to 'round' £359', Even those who found 15% to be £35.90 frequently failed to get a correct value for 5%, probably through premature rounding or truncation. With no evidence that they were trying to halve their £35.90 this gained no marks.

Question 26

This question was not well understood and most candidates could not develop a strategy for tackling the problem. The most successful candidates realised that they needed to use a two way table and if they used one of these they usually gained at least 3 marks for this question. Those candidates who tried to deduce their answer from the information given usually restricted their number of marks to one or two usually for finding 34 men and 18 men studying Spanish. It would have helped the candidates and the examiners had they written what their calculations represented, e.g. 130 – 96 = 34 men.

Question 27

About a half of the candidates used the wrong formula for the circumference of the circle with the area formula often being used. Full marks were awarded for those candidates that gave an answer in the range 439.6 to 440 but only one mark if they rounded to down to 439 on the answer line unless the correct answer was seen in the working space whereupon they could score both marks.

Question 28

This question was very poorly answered with very few candidates at all gaining full marks. A minority of candidates were able to make a start on the problem and gain one mark for calculating the distance travelled in one minute by dividing 30 by 26 but usually could go no further and some divided 30 by 70 but again could make no further progress. These were the most popular options. The most popular wrong answer was 2.3 from dividing 70 by 30 showing they did not understand the problem. Many candidates were confused by having three pieces of data and attempted to perform calculations with all three instead of using two to find a value they could compare with the third value. Incorrect units showed many were guessing.

GCSE Mathematics 1MA0
Principal Examiner Feedback – Higher Paper 2

Introduction

The majority of candidates made an attempt to set out their working in a logical manner. When method was unclear or incomplete examiners find it difficult to award credit for working. Candidates using calculators remain too prone to rounding answers to calculations, sometimes inappropriately or prematurely. A greater proportion of candidates are taking insufficient care in writing figures which are ambiguous, which again prohibits the award of marks. The performance on starred questions remains good overall; weaknesses include those cases where comparisons are needed, supported by numerical evidence, or geometrical statements of rules and theorems are needed. Algebraic manipulation was flawed in the work of many candidates, who were not comfortable working with negative values and did not understand the concept of isolating terms.

Report on individual questions

Question 1

Most students answered part (a) of this question correctly, though the absence of working to accompany incorrect answers prohibited the award of method marks. In part (b) most rounded incorrectly, often rounding to decimal places rather than significant figures.

Question 2

Part (a) was usually well done but a significant minority divided 38 in the ratio 3:8 which resulted in answers of 8 or 9. The success rate of part (b) was higher. This is a calculator paper, and success rates were highest when candidates used direct methods to calculate the percentage. Build up (non-calculator) methods were less successful. Candidates who calculated 55% of 80 failed to earn any marks.

Question 3

Many correct answers. A few favoured investigation of equivalent fractions using 21 as a denominator, whilst some tried to add $\frac{3}{10} + \frac{5}{10} + \frac{2}{7}$, or using tree diagrams. Those who realised they had to use $\frac{4}{14}$ as the equivalent to $\frac{2}{7}$ usually went on to get the correct answer.

Question 4

Amongst the few that did not get full marks were those who produced a drawing of a 5 cm by 2 cm rectangle or a 5 cm by 5 cm square (without a dividing line). No marks were awarded for a front elevation or a 3-D diagram.

Question 5

Most candidates understood what they needed to do and marks were most frequently lost due to a lack of care and attention to detail. Monetary answers had to be shown with the correct currency units, and written correctly (e.g. £26.5 is not enough). There were also errors in undertaking subtraction, even neglecting to do it after a currency conversion.

Question 6

A common method that appeared to assist candidates was use of a 2-way table. Others chose to deal with the men and women separately, which again assisted in ordering the information sufficient that it usually led to a correct answer. Some spoiled their good work by giving a final answer of 7 which only represented the number of men who studied French. Weaker candidates often combined a variety of groups (men, women, adults) which could not help to solve the problem.

Question 7

The most common (and successful) approach was to divide the price by the number of plants and compare the resulting figures. The danger was to round answers sufficiently that they ended up being too similar! Many who divided the number of plants by the price interpreted the smaller value as the best (rather than the bigger). Another approach which was usually successful was choosing a common amount of plants and finding the total cost for each tray (e.g. 10, 50, 60, 100, etc.). Candidates need to understand that a comparison needs to be made using all three items, with comparable figures as evidence.

Question 8

In part (a) most candidates recognised that the coefficient of n was 7, but failed to identify the correct number term, with +3 or −3 as the most common incorrect term used. Some weaker candidates gave $n + 7$ as their answer. In part (b) quite a few wrote out the full sequence or demonstrated that the 22nd term worked, which was quite adequate. An algebraic approach using $7n – 4 = 150$ usually worked well. Some described the method they would use such as ‘adding on 7s’ which received some credit. Vague responses included those that made some reference to dividing 150 by 7 or using 150 in some other way.

Question 9

Most found an acute angle of a rhombus by considering the angles around the point at the centre of the diagram. Some went no further but gained 2 marks credit to this point, having stated this angle as 65°. A few spoiled their working by using 180° as the sum of the angles of a quadrilateral. Some worked out $\frac{360}{9}$ but in many cases the labelling and their explanations suggested that they thought that they were finding an exterior angle of a quadrilateral. It is particularly important for candidates to realise that the instruction “you must show your working” must be adhered to in order to gain full marks.

Question 10

Although many candidates jumped to a conclusion, in order to get full marks their reasoning had to be clear and complete, and it was here that marks were most frequently lost. Many did not convert to a percentage and left 62/80 as 0.775.

The % sign was often missing and just "77.5" stated. Some showed $\frac{62}{80} \times 100$ but left their answer as 77%. Many candidates attempted to calculate the marks required at the boundaries of the given table and while a lot were successful, a lot only worked out one boundary. A common error was to misinterpret the figures and calculate 62% of 80 (giving 49.6).

Question 11

Parts (a) and (b) were usually answered correctly. The common error in (a) was to multiply the indices, whilst in part (b) it was to add them.

In part (c) many struggled with the negative index for a, with many stating it as a^4.

Question 12

Predictably the main error was in calculating the area rather than the circumference. And of those who were finding the circumference a significant number did so using 140 as the radius. Many candidates transferred accurate answers into grossly rounded answers for writing into the exam paper, which sometimes lost them a mark.

Question 13

Most made a first step of doing a distance/time calculation often getting as far as 1.15… or an equivalent calculation, but then not knowing how to proceed.

There were many correct answers from candidates who had a good understanding of what the question was asking and who could work confidently with compound measures and time. Failure to include correct units with their numerical answer was penalised. Errors were also caused by premature rounding, leaving final answers outside tolerance. A common error was to write 26 minutes as 0.26

Question 14

Part (a) was well answered, the most common error being in stating 4 or 21 as the answer, rather than the class interval.

Part (b) was a good discriminator with many getting the correct answer. Some used the lower or upper end of the class interval. Weaker candidates used the class interval width, 50 ÷ 5 (= 10) or 90 ÷ 5 (= 18). It was disappointing to see addition or multiplication errors in some work.

In part (c) many good attempts were spoiled by careless error. This could be a failure to use the scale to plot the points correctly, failure to plot at the midpoint, drawing free hand or curves, or joining first to last point. Some only drew the bar chart hey were perhaps hoping to use to draw the polygon.

Question 15

A well answered question. The main error was in premature rounding. Only a few spoilt their Pythagoras by subtracting, failure to take a square root, doubling rather than squaring, or by attempting to use trigonometrically methods.

Question 16

In part (a) there were many correct responses and the vast majority of candidates scored at least 1 mark for the intent to remove the brackets, which was often correctly done. The main error was in not processing both sides of the equation in the same way, perhaps with negative sign errors.

In part (b) there were some correct solutions, but many were unable to resolve the fractions in order to move towards a correct solution. Weaker candidates simplified the left hand side to $3h + 6$ from which they could not proceed. Some found a common denominator, usually 6, but the numerator on the left hand side often contained errors, usually $3(h + 7) + 2(2h - 1)$. A significant number of responses did not contain brackets. Generally it was found that most candidates did not clear the fractions as a first step, but worked with fractions until the very end of their solution. Again processing problems resulted in unforced errors.

Question 17

Many correct answers to this question. The only common error in completing the table was use of 15 instead of −15. Plotting was good, though an opportunity to correct errors in the table were lost due to the failure to anticipate the correct shape of the graph. There were many errors in joining the points, with many using straight line segments or curves which missed joining the points.

Question 18

This was the first question on the paper that was poorly attempted. The preferred route taken by candidates was to find either *AB* or *AC*, which was nearly always correctly done. Most of these candidates then went on to substitute their values into $\frac{1}{2}ab \sin C$ with just a few using the wrong value for the included angle. A few candidates, having found the slant height, used it as the perpendicular height of the triangle when calculating the area using $\frac{1}{2}b \times h$, resulting in the loss of marks. It was rare to see the triangle split into two right angled triangles and tan 54° used to find the height, though those who chose this route usually did it well.

Question 19

This was a well answered question. The only common error in either part was incorrectly placing the decimal point.

Question 20

The most common mistake was calculating 20% of 464 (= 92.8) and then having variations of 464 ± 92.8 Of those who correctly recognised that 464 was 80% on original price many incorrectly gave 580 as the final answer, even though many had correctly already calculated 116 as the reduction.

Question 21

In part (a) the answer had to be completely correct to get the single mark. Incorrect answers often included decimals and/or had 2 on the outside of the brackets. Others made the error of writing $(2x-3)^2$. Part (b) was not well answered since most candidates could not isolate terms in *m* from the other terms. Of those who could, most could not then take out *m* as a factor. There were many who failed to attempt this part.

Question 22

In part (a) most used the formula for the area of a trapezium and gained the first mark for this; the second mark was more difficult to achieve as the processes used were either incomplete or unconvincing. In part (b) a surprising number of candidates made no attempt to use the quadratic formula to find the value of *x*. Of those who did, most were able to substitute the correct values into the formula and many were able to complete the process leading to the correct answer. A few candidates lost the accuracy mark by suggesting a negative value was acceptable for the value of *x*. In some cases answers to the two parts were mixed up or poorly organised. Resorting to trial and improvement did not always help.

Question 23

A well answered question. The most common errors seen were either calculations involving 246, taking the total number of Year 8 students 120, or the use of 531. Candidates need to think about whether their final answer makes sense; for example, answers greater than120 clearly make no sense given the context. Some lost the final mark since they failed to give the answer as a whole number of students.

Question 24

Most candidates took the first step of finding the volume of the large tin; it was encouraging that most were able to remember the volume for a cylinder correctly. Further, most were also able to substitute the correct values. A minority unfortunately spoilt their solution by not using division to find the height of the new tin. Some candidates chose to use similar figures as an alternative process, but this was less successful due to the fact they were unable to scale these up.

Question 25

There were many different approaches to this question, but equally many who chose not to attempt it. A significant number substituted (–1, 2) and (2, 8) in turn into the equation of line *A*, hoping to find the point of intersection. Some tried to draw sketches of the lines, but usually these were not sufficiently accurate, and needed to be supported with additional working. Few candidates were able to work out the gradient of the line *B* correctly. Some appeared to that the lines would only intersect if they were perpendicular. The best solutions came from using the equation of line *B* as $y = 2x + 4$ and equating the *y*-intercept on both lines. Some compared the gradient with equal success.

Question 26

Many candidates started off by using the cosine rule with the angle 136° or basic trigonometry, but alone this would not have led to a complete solution. It was rare to find the cosine rule being used correctly as a first stage. In some cases a start using the sine rule was not developed, as a significant number of candidates did not know what to do with it once they had substituted the numbers. Those who did so successfully usually went on to use cosine or sine rule again to complete the solution. Premature rounding spoilt many solutions.

Question 27

The majority of candidates did not consider the areas of the rectangles in the histogram but only used the bar heights in their calculations. Those who showed an attempt to calculate the areas of the bars gained some credit, but some then lost a mark because they were unable to sum their areas correctly.

Question 28

Most candidates did not have the mathematical rigour to find the complete solution to this question. In the best attempts candidates could spot which sides and angles were equal but were either not able to associate them using correct mathematical language or were not able to give acceptable reasons. Some candidates did not focus on the triangles that were congruent and simply attempted to find any equal sides or angles (such as the triangles made using the radius) whether they related to the congruent triangles or not. Only a handful could find the necessary associations, give the reasons for congruency, and give the full reasons using correct language.

GCSE Linear Mathematics 1MA0
November 2013

1MA0			A*	A	B	C	D	E	F	G
1F	Foundation tier	Paper 1F				74	61	49	37	25
2F	Foundation tier	Paper 2F				77	63	49	36	23
1H	Higher tier	Paper 1H	85	70	51	33	16	7		
2H	Higher tier	Paper 2H	84	69	49	30	15	7		

(Marks for papers 1F, 2F, 3H and 4H are each out of 100.)

1MA0		A*	A	B	C	D	E	F	G
1MA0F	Foundation tier				151	125	99	73	47
1MA0H	Higher tier	169	139	101	63	31	15		

(Marks for 1MA0F and 1MA0H are each out of 200.)

Grade boundaries are set by examiners for the whole qualification 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 139 and 63 at 101. By the same token the grade boundaries on each of the higher tier papers are strictly 51.5 and 49.5 but are rounded down for the purposes of the table above.

Boundaries for A* are determined statistically – thus the boundaries given for the papers 1H and 2H won't necessarily add the the total used for grading. For more information, see the JCQ Notice to Centres – Setting A* in GCSE.