GCSE EXAMINERS' REPORTS

GCSE (NEW)
MATHEMATICS

SUMMER 2018

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MATHEMATICS

GCSE (NEW)

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UNIT 1 FOUNDATION

Candidates responded to this exam in a similar way to those of the previous series. Later questions in the paper were found to be more difficult and were more frequently not attempted.
Many candidates were challenged by questions which involved drawing and measuring (Q1and Q9). Some did not use the appropriate equipment and so were not able to answer these questions with any degree of success. Using a protractor seemed to be a particular problem for many. A significant number also had difficulty with symmetry questions: drawing lines of symmetry (Q3) and particularly the questions involving rotational symmetry (Q18). Many do not seem sure how to set out the answers to linear equations clearly.
The equivalences between metric and Imperial units (Q11) were not securely known.

1. (a) Answered well.

(b) Many found it difficult to draw a circle with a radius of 6 cm. A significant number did not attempt the question. Of those who did try to draw a circle, some confused radius and diameter. Others tried to draw a circle free-hand, often much smaller than the required answer.

(c) The angle which needed to be measured was obtuse and therefore had to be bigger than a right angle, a fact not recognised by very many candidates. Frequently, the wrong side of the protractor was used, giving the supplementary acute angle. Other angles were not measured within the necessary accuracy of $\pm 2°$. This question was not well answered.

2. Candidates answer these questions which test their knowledge of the words used in probability very well.

3. Very many did not see that the pentagon has five lines of symmetry. A very frequent wrong answer showed only the vertical line of symmetry.
Some drew a line of symmetry on each of the two arrows rather than the one diagonal line of symmetry for the whole shape.

4. (a) (i) Very many did not seem to know the meaning of the word perimeter, incorrectly giving the area of the rectangle as their answer.

(ii) This was answered more confidently. However, many lost 1 mark by not writing down the units of area.

(b) This was a question based on knowledge of the different pairs of factors of 18 and its application to the area of a rectangle. It was expected that a rectangle with dimensions 6 cm by 3 cm would be drawn, as the original rectangle was 9 cm by 2 cm. However, many didn't realise this. Some drew polygons which did have an area of 18 cm^2 but which weren't rectangles.

5. (a) Both parts were generally answered well though many answers were numbers which appeared to have been picked at random and just written in the answer boxes.

(b) Candidates found it more difficult to answer the second of the two parts of this question. It involved division by 100, rather than multiplication by 10, and not all could identify the correct subsequent place values.

(c) This question asked for the mean of five numbers. However, some found the median of the given numbers instead. Although no marks were gained for this, it was concerning to see that the given numbers weren't written in numerical order but just the central number in the list given in the question was chosen.

6. This was the OCW question and candidates needed to engage with at least three of the steps of the computer program before they could be awarded either of the OCW marks.
Many multiplied the INPUT number (15) correctly by 3 to get the answer 45. However, they didn't read the instruction in Step 3 to calculate 2/3 of the **INPUT** number. They worked out 2/3 of their answer to Step 2. This was a very frequent error.
In a question of this type, where there is little need for words, then to gain the OC mark, some clear labelling of the order of the steps was required; e.g. Step1, Step 2, … ; or use of words like percentage. Just rewriting the question wasn't sufficient to be awarded the mark.
To gain the W mark, all sums had to be written out mathematically correctly, together with their answers. Answers didn't need to be correct for the W mark to be awarded, as wrong answers would have already been penalised.

7. Many were able to solve these linear equations correctly, particularly Q7 (b): $x + 9 = 28$.
However, marks were lost if answers weren't shown clearly. Ideally, the answer should be given as $x = 19$. However, $19 + 9 = 28$ gains the mark, but $19 + 9$ does not. If an answered is embedded, then it must be fully embedded in the whole of the original equation.
In (c), a common wrong answer to $14 – x = 8$ was $x = 22$.

8. A significant number of candidates seemed to have trouble with understanding the rules described in this question. Some multiplied the numbers given in each box together, rather than adding the terms in two adjacent boxes to find the term in the box above. To find the missing term in the bottom row, 4x had to be subtracted from 9x, whereas the other two missing terms had to be found by adding relevant terms. This change of operation caused problems.

9. Many candidates found it difficult to draw the required angle, ∠BAP, and to locate it correctly at A. P was frequently wrongly marked along the line AB. If this distance AP was measured correctly, then 1 mark was awarded out of the 2 marks available for this question.

10. (a) Very many were unable to identify the two prime numbers with a sum of 32 from the given list. A very common wrong answer was 12 and 20, obeying only one of the given conditions as neither is a prime number.

(b) Many more candidates were able to find the multiple of both 4 and 6, though some wrote down a number which was not on the list, e.g. 24.

(c) This question was difficult for very many candidates as they did not readily know the factors of 51. Work needed to be done to see which number divided exactly into 51, but without a calculator, this didn't seem to happen.

11. The Specification for both Mathematics and Numeracy states that '*Candidates will be expected to know the following approximate equivalences:*
8km ≈ 5 miles, 1kg ≈ 2·2 lb, 1 litre ≈ 1·75 pints.' Like the Intermediate Tier candidates, it was clear that many Foundation Tier candidates were not familiar with these approximate equivalences.
All parts of the question were challenging to the candidates.

(a) 8 miles was a frequent wrong answer.

(b) Familiarity with the standard bag of sugar which was 2 lb but which is now 1 kg should have made this a much easier question to answer than was apparent.

(c) Correct answers were rare for this part. All given answers except the correct one were circled, apparently randomly. There was little evidence of any numerical work like 4 x 1·75 being done.

12. (a) Many found it difficult to work out - 2 – 3 to find - 5.

(b) As the coordinates of the two end points were given, and the candidates were told that it was a straight line, then there was sufficient information in the question to draw the correct line. However, many did not do so. There was no follow through from part

(a) There was some difficulty in plotting the points, confusing x and y values.

(c) This part was challenging to very many candidates as they had not drawn the correct line in (b) and so didn't have a suitable line as the diagonal of a square. There was a penalty for inappropriately giving a final answer as 15/50 or 15:35 instead of 15.

13. (a) Explanation questions can be very difficult for Foundation Tier candidates. Many didn't understand that they had to explain why the statement was **in**correct.
A simple statement such as, '*The probability should be above 0·5'*, would have been sufficient. No marks were awarded for simply contradicting the statement e.g. '*Less than half are blue'*.

(b) Despite the question asking for 'the probability', many candidates still give words like 'unlikely' as an answer. Probability words should be given as answers for questions asking for 'the chance' of an event happening. These questions come at the very beginning of the exam paper. So not many correct answers of P(not blue ball) = 1 - 0·3 = 0·7 were seen.

(c) The number of blue balls should have been found by working out 0·3 x 50. However, many candidates combined numbers randomly, e.g. 50 – 30 = 20, or 50 ÷ 2 = 25. Correct answers were rarely seen.

14. Despite '*Drawing 2-D representations of 3-D shapes, including the use of isometric paper'*, being included in the Specification, most candidates did not know how to use isometric paper correctly.
Lines had to follow the lines of the dots, vertically in one dimension and along the two diagonals in the other two directions. The lines had to begin and end on a dot, and go through dots. If these conditions weren't satisfied, then no marks could be awarded. Of those who knew how to draw a cuboid, most drew one line horizontally which almost inevitably meant that 0 marks were awarded as the above conditions weren't satisfied.

15. In both parts (i) and (ii), many didn't realise that all that was required was a simple substitution. Many didn't attempt the question at all.

16. Of those who attempted this question, most gained 1 or 2 marks of the available 3 marks. They chose a whole number within the given range but which did not obey all the bullet points. Occasionally, the correct answer of 50 was given.

17. This question was demanding for Foundation Tier candidates as it was a multi-step problem. First, the length of the side of the square needed to be found by dividing 28 cm by 4. Some did find this length. However, it was more difficult to use the length of EC as the base of the triangle with known area. The formula for the area of a right-angled triangle could then be used to find its height.

18. (a) Despite attempting this question, most candidates were unable to draw the correct reflection. The given shape should have been reflected in the horizontal line, y = 1. However, there were many incorrect attempts to reflect the shape in the vertical line x = 1 or the y-axis.
Wrongly, very many drew three more shapes, rotating the given shape about the origin.
This question seemed to be beyond almost all the candidates as they could not draw the line y = 1 correctly.

(b) The question asked for the full description of a single transformation. Any descriptions indicating more than one transformation, were penalised -1 mark.
Four components were required: clockwise, rotation, 90°, about the origin.
Alternatively, an anti-clockwise rotation of 270° was acceptable. The word 'turn' was not accepted as an alternative to 'rotation'.
The component 'about the origin' was almost always left out.

MATHEMATICS

GCSE (NEW)

Summer 2018

UNIT 1 INTERMEDIATE

The paper was similar in standard to the previous Unit 1 Intermediate papers set, and contained many questions on topics that were tested in the Specimen Assessment Materials (SAMs).
Candidates found the questions towards the end of the paper slightly more challenging than those of previous papers.
Candidates performed poorly on some standard topics, e.g. basic number work (Q10), basic conventions of algebra (Q12), metric and Imperial equivalences (Q2) and transformations (Q9).
Construction work (Q17), using only a ruler and a pair of compasses, is still poorly executed.
Question 18 asked for a proof. Few candidates understood that this meant that they had to present facts that led to the required conclusion.
There was evidence that some candidates were not familiar with the whole of the Intermediate specification content.

Question	Comment
1	(a) Not all of the candidates heeded the fact that there were **two** conditions to be met. Many gave 15 and 17 as their answer having only considered that the total (32) was correct, but ignoring the fact that 15 is not a prime number. (b) Very well answered, but some forgot that the answer had to be selected from the given list of numbers. An answer of 24 on its own was not acceptable. (c) Most candidates gave the correct answer of 17.
2	The Specification for both Mathematics and Numeracy states, '*Candidates will be expected to know the following approximate equivalences:* *8km ≈ 5 miles, 1kg ≈ 2·2 lb, 1 litre ≈ 1·75 pints.'* It was clear that many candidates were not familiar with these approximate equivalences. As multiple choice questions, all three parts simply required a recollection of the above. Part (c) proved even more problematic as candidates who knew that 1 litre was approximately 1¾ pints were unable to calculate 4 × 1¾. If a question relied on knowledge of the above to answer a subsequent problem, then even more marks would be lost.
3	(a) Most candidates found the three correct missing values for *y*. These had to be shown in part (a) and not left to the marker to assume the values from a correctly drawn line in part (b). (b) An 'extended' correct line was not penalised, but the line had to be drawn for values of *x* from −4 to 6. As the candidates were told in the question that it was a straight line and the two end coordinates were given, there were no marks for using their incorrect coordinates found in part (a). (c) Candidates were expected to realise that the line drawn was a diagonal (not a side). Some had obviously recognised where the four corners were situated but then reversed their *x* and *y* coordinates in their answer.

4	(a) A 'generous' acceptance of their explanation meant that most gained the mark. A simple statement such as, '*The probability should be above 0·5'*, would have been sufficient. No marks were awarded for simply contradicting the statement e.g. '*Less than half are blue'*. (b) Well answered. (c) There was a penalty for inappropriately giving a final answer as 15/50 or 15 : 35 instead of 15.
5	(a) '*Drawing 2-D representations of 3-D shapes, including the use of isometric paper*', is noted in the Specification. Several candidates were unaware of how to correctly use the isometric paper. The 3 directions had to be vertical and along two 'diagonals'. A horizontal line would be inaccurate and, simply put, 'a line had to go through the dots and have both ends on a dot'. (b) Well answered although a few lost a mark for not showing the correct units.
6	(a) Often on multiple choice questions the correct answer becomes very obvious when use is made of the working space. Here those who noted t_6 to be 17 and $t_{7\ to}$ be 20 were easily able to choose the correct relationship. (b) In both parts (i) and (ii), some didn't realise that all that was required was a simple substitution. Having so often been asked to give an expression for the n^{th} term they gave incorrect final answers such as n + 9 or n – 5, rather than just 9 and −5.
7	If the number was outside the range noted in the first bullet point or was not a whole number, then no marks were gained. If the full three marks for an answer of 50 were not gained, candidates were awarded two marks for satisfying two of the 2^{nd}, 3^{rd} and 4^{th} bullet points. One mark was awarded for satisfying one of these bullet points. Nearly all of the candidates gained at least one mark.
8	Candidates should be made aware of what is taken into consideration when awarding the OC and W mark. Responses should be structured with explanations that are clear and logical to the reader at the point in the solution when they are presented (not a series of calculations followed at the bottom of the page with a detailed explanation). For the OC mark (organising and communicating) we are looking for an explanation for each step of the work e.g. 'Each side of the square = 28/4 = 7cm' rather than simply having 7 cm written in isolation on the page. The area formula for a right-angled triangle should be noted as such rather than, again in isolation, say, 7×?/2 = 35. For the W mark (accuracy in writing) it includes accuracy in mathematical writing. Correct mathematical form is required. Units, where appropriate, should be shown. We do not want to see, for example, 'DE = 10' with no units given. Poor mathematical form such as '7×DE/2 = 35 = 70 = 70/7 = 10cm' would not gain a W1 mark. A number of candidates had an answer of DE = 5 cm having used an incorrect formula for the area of the triangle. This in itself did not prevent them gaining OCW marks.

9	(a) More incorrect answers than correct ones. There was a mark for those who reflected in the line $x = 1$ rather than the line $y = 1$. Many, however, chose to reflect in the y-axis, for which there were no marks awarded. (b) The question asked for the full description of a <u>single</u> transformation. Those descriptions indicating more than one step (the ‘and then’) were penalised −1 mark. All four components were required (<u>clockwise</u> <u>rotation</u> of <u>90°</u> <u>about the origin</u>). Obviously an ‘anticlockwise rotation of 270°’ would be equivalent. Allowances were made as regards the description of ‘the origin’ but the word ‘turn’ was not accepted for ‘rotation’. The component most often left out was ‘<u>about the origin</u>’.
10	Yet again on a multiple choice question, many candidates did not take advantage of the working space available. (a) Showing and evaluating 600/50 would have easily led to the correct answer. (b) The most common incorrect answer was $\times 0{\cdot}04^7$. (c) There was little evidence of an understanding and ‘feel’ for number magnitude. Thinking ‘¼ goes into 1 four times’ would have given a strong indication of which of the values on offer was the one to go for.
11	(a) The most common error was to write 18 in the ‘*Bread of Heaven’* only section. (b) The probability had to be written as a fraction. Incorrect notation such as ’19 in 30’ was penalised −1 mark. The numerator of their fraction could be a follow through from their diagram. There was also a generous follow through from their diagram allowed for the denominator of the fraction. This, despite the total of 30 people been given in the question.
12	The basic conventions of Algebra are still problematic for many candidates. Expanding brackets when there is a negative sign involved, handling ‘like terms’, and dealing with fractions in an equation, are poorly handled. (a) The expansion of $-3(x^2 - 2x + 7)$ often resulted with $-3x^2 - 6x + 21$. Follow through marks were available for simplifying ‘their’ expression. However their x-terms of $-2x$ and $-6x$ were often incorrectly simplified as $-4x$. (b) Those whose first step was to deal correctly with the fractional side of the equation, showing that $22 - f = 18$, usually went on to gain full marks. An embedded answer of $\frac{22-4}{3} = 6$ was allowed. This method of displaying an answer is not however, to be encouraged. Many who did write an embedded answer then lost marks for a contradictory answer of f = 6 or f = 18 being written as a final answer.
13	(a) An extremely disappointing response to a very standard question. Not only did most start with an incorrect method of 1/6 + 1/6 which meant no marks were available in any case, but displayed further poor arithmetic by equating the above to 2/12. (b) (i) Most correctly showed the probability for Caernarfon as ¼. The probabilities of ⅛ for Newtown and Ebbw Vale were not seen as often. (ii) Unfortunately a correct method of ½ + ⅛ often resulted in the wrong answer of $^2/_{10}$.

14	(a) Rather than deal with the indices directly most took the laborious route of trying to evaluate 0·0002 × 7800000000. A correct value, but not in standard form, (e.g. 15·6 x 10^5 or 1560000) was awarded 1 mark. (b) Again not well answered, with surprisingly few answers even showing the digits 1 and 3. A correct value, but not in standard form, (e.g. 13 x 10^4 or 130000) was awarded 1 mark.
15	Those candidates who were familiar with the topic usually gained full marks. A few lost a mark as they only partially factorised the expression. Most candidates, however, were unable to meaningfully engage with the question.
16	Only a few candidates used the fact that the opposite angles of a cyclic quadrilateral sum to 180° in order to show that angle ADC = 109°. Some mistakenly used the 'angle at the centre being twice the angle at the circumference' theorem, and decided that angle ADC was 142°. These candidates were allowed follow through marks. Others assumed the special case of BD being a diameter of the circle. These candidates were allowed marks for fully correct work.
17	Whatever skill is asked in a construction question it is not well performed. Lots of candidates simply <u>drew</u> a perpendicular bisector with no construction arcs. Some had intersecting construction arcs on one side only of line AB. The angle of 60° was often clearly drawn using a protractor (the more enterprising tried to camouflage this with random arcs). As the requirement was to show a region, then a single point 6 cm away from A was not sufficient. An arc of suitable length, radius 6 cm with centre A had to be drawn. It was easy for markers to identify when an acceptable method had been properly carried out.
18	Not well answered. Many of the candidates did not appreciate that they had to <u>prove</u> that *AX* = *BX*. This meant showing, through calculations, and using what was given in the question (*BX* = *BC*) that angle *ABX* = 40° and hence, *AX* = *BX* On this occasion an alternative mark scheme allowed candidates to <u>assume</u> *AX* = *BX* and then through calculations show that angle *BXC* = 80° and hence, what was given in the question (*BX* = *BC*) was true. Often it was unclear which approach candidates had used, as the values of the angles were just shown on the diagram. All the mark schemes would however yield the same total mark whichever method was applied. The marks available, for giving reasons for each step and making a logical statement at the end, were rarely earned.

MATHEMATICS

GCSE (NEW)

Summer 2018

UNIT 1 HIGHER

Once again, pupils' performances reflected the increased demand of later questions in the paper. The fact that, overall, relatively few questions were not attempted demonstrated that candidates had been appropriately entered for this tier.

Question	Comment
1	This question was very well-answered by most (particularly part *(b)*), though part *(c)* did cause some difficulty. As is always the case with multiple-choice questions, those candidates who engaged with the question, e.g. by writing down their numerical steps, tended to be the most successful.
2	A significant number gained full marks here. Of those who did not, in part *(a)*, many interpreted the given number of 18 to be the number who could <u>only</u> sing *Bread of Heaven*, without considering the intersection. This meant that the total within their diagram was more than 30, despite the fact that the question clearly specified that there were 30 people altogether. In part *(b)*, some gave an answer of 7/30 because they omitted to include the number in the intersection as part of their numerator. Correct notation was almost always used for expressing the probability (as a fraction on this occasion).
3	There were plenty of fluent algebra skills demonstrated here. In part *(a)*, almost all candidates correctly expanded the first brackets, but too many sign errors were made in removing the second pair. Most went on to collect terms correctly, though some then went on to inappropriately (and incorrectly) factorise or to solve a non-existent equation. In a minority of cases, candidates were penalised for trying to add or subtract x-terms with non-matching powers, sometimes ending up with a single term. In part *(b)*, the majority undertook a correct first step of multiplying 6 by 3. Sign errors were common, however. Some candidates showed a complete lack of understanding of the necessary order of operations.
4	*(a)* The correct answer of 1/36 was usually given here. Too many candidates, however, whilst knowing that they needed to calculate 1/6 × 1/6, did not then know how to evaluate it correctly, commonly giving a final answer of 1/12 or 2/12. Others incorrectly thought that the calculation should be 1/6 + 1/6 (possibly misunderstanding the meaning of 'and' in the context of probability). *(b)* The majority completed the table correctly in part (i), often going on to correctly answer part (ii). Some, however, were unable to correctly evaluate ½ + 1/8 in part (ii); a final answer of 2/10 was surprisingly common. A small minority of candidates were penalised for using inappropriate notation e.g. writing a decimal as the numerator of a fraction.
5	Most candidates were able to evaluate both answers in this question, though some were unable to correctly express their numbers in standard form (sometimes simply 'counting zeros' rather than considering changes in place value).

6	Most knew how to factorise this binomial expression. Some lost 1 mark for having only extracted one of the two relevant factors. Candidates should be encouraged to check their factorisation by multiplying and verifying that they obtain the original expression.
7	Many excellent solutions were seen for this question on circle theorems. These often included relevant statements of a circle theorem or angle fact; this should be encouraged as good practice (despite the fact that it was not explicitly required on this occasion). Weaker candidates, however, did not recognise the cyclic quadrilateral or understand its relevance to the question. Common wrong answers for angle *ADC* included 142° (misusing 'angles in the centre') or 90° (misusing 'angle in a semicircle'), as well as 26° or 71°. Some candidates assumed (without justification) that angles *BAD* and *BCD* were both right angles, and were therefore working with a particular specific case.
8	This was a challenging question, combining a variety of construction techniques with an understanding of locus, and there were many excellent solutions. Plenty of candidates constructed the required perpendicular bisector, and usually showed their construction arcs. (It is worth noting that benefit of doubt was not given in the absence of credible arcs.) Similarly, many knew how to construct an angle of 60° (though an absence of arcs sometimes indicated the inappropriate use of a protractor). Most knew to draw an arc with radius 6 cm centred at A. Not all were able to identify the correct region in relation to their constructions though.
9	The quality of responses to this question was extremely varied. The strongest candidates understood the need for structure, clarity and rigour within a geometric proof. Some, however, started (rather than finished) with the statement '*AX* = *BX*' and proved conversely (and often successfully) that *BX* = *BC*. Weaker candidates sometimes both started and finished with the statement '*AX* = *BC*', and as such succeeded only in describing a single isosceles triangle. Despite the usual statement that the diagram was 'not drawn to scale', common errors included the assumption that line *BX* bisected angle *ABC*, or that angle *BXC* (or *BXA*) was a right angle. For the OCW requirement of the question, plenty of candidates performed well, presenting well-structured solutions. Others needed to engage more with the need to 'communicate' by quoting angle facts more fully. (Some also needed to realise the need to quote an angle fact only when undertaking a related calculation, rather than presenting a list of angle facts at the very beginning or end of their solution.) Incorrect spelling of the word 'isosceles' was a frequent issue. For the 'writing' aspect, many candidates were penalised for use of poor notation, particularly in relation to naming angles or lines, and there was some misuse of the 'equals' sign.
10	The enlargement was usually undertaken correctly. Common errors included incorrect use of the centre, or enlarging with a scale factor of +2 (rather than the required -2). Weaker candidates enlarged with a scale factor of +½.
11	Plenty of candidates gained full marks here. A minority seemed to mis-read 'direct proportion', proceeding instead as if it were inverse proportion (which made the subsequent calculations much harder). Part *(a)* clearly required the candidate to 'find an expression for *y* in terms of *x*', but unfortunately it was common for the final expression not to be given explicitly. Part *(b)* was usually well done, with only occasional numerical errors.
12	The majority understood how to identify at least one pair of congruent triangles and were able to state the associated condition of congruency. However, it should be emphasised that stating a reason such as '2 equal sides and 1 equal angle' is insufficient; it must be made clear that the angle is 'included' or 'between the 2 sides' (as is implied by simply stating 'SAS'). It was a concern that a significant minority thought that triangles B and H were congruent due to having 3 equal angles.

13	The overall response to this question was rather poor. In part *(a)*, it was necessary to derive the given quadratic equation. Only a few candidates were successful, with most not realising the need to replace 'h' with 4. In part *(b)*, it was necessary to solve the quadratic equation; of those who were successful, most opted to factorise, and usually did so correctly. (Use of the quadratic formula was seen occasionally, but tended to be inaccurate.) It was, however, disappointing that a large proportion of candidates did not appear to know how to begin to approach the equation on this occasion. Only a very small number expressed appropriate understanding of the context in part *(c)*, with some wrongly suggesting that they should discard one of their answers (perhaps because that is usually the case in similar questions). Many simply did not attempt this part of the question.
14	This multiple choice question was often well-answered, though 27/2 and -2500 were common incorrect answers for $9^{3/2}$ and $10\,000^{-1/4}$ respectively.
15	*(a)* This was often well done, though there were some place value errors in multiplying the recurring decimal by a power of 10. Another (less common) error was to treat the given decimal as if it were entirely recurring, namely 0·245245245…. *(b)* Many fully correct answers were given, though there were some errors in handling the surds e.g. stating that 5 × 3√7 should become 3√35. In particular, multiplying 3√7 by √7 caused difficulty.
16	*(a)* A minority of candidates produced excellent exponential graphs, however the overall response to this question was very poor. It was a concern that too few could evaluate 2^{-2} or 2^{-1}, and it was particularly disappointing that 2^0 was frequently given to be 0. Candidates' coordinates often produced graphs of a straight line (y = 2x) or of a parabola ($y = x^2$). Those who attempted to draw the graph without writing down any calculations of coordinates tended to be unsuccessful. It is worth noting that, when provided with a grid, candidates should be encouraged to choose a scale which makes best use of the available space. For parts *(b)* and *(c)*, it was necessary to take readings from the graph. The quality of responses was mixed, with some candidates misreading their own scale, and others reversing the two answers.
7	*(a)* This part of the question was often well-answered, which is encouraging given its level of challenge. Common errors included confusion between adding and multiplying fractions, or failing to account for the non-replacement of each selected ticket. *(b)* This (more difficult) part was significantly less successful. The very ablest candidates did calculate the correct probability, mainly using an efficient method; some achieved the answer through various alternative valid methods (although these methods were prone to errors as they were more long-winded). It is worth pointing out that cancelling fractions before multiplying them will result in numerical calculations with smaller (therefore easier) numbers.
18	*(a)* Only a small number of candidates knew how to use the symmetry of the cosine graph in this part of the question, resulting in a disappointing number of correct pairs of answers. *(b)* Given that the cosine curve was printed on the opposite page (in part *(a)*), it was surprising that many candidates gave the wrong shape of graph (often a sine curve). Plenty of correct graphs were sketched in both parts of the question, though some candidates omitted to label the y-axis adequately. Common errors in part (i) were drawing y = cos x + 2 or y = cos(2x), and in part (ii) drawing y = cos x + 1.

MATHEMATICS

GCSE (NEW)

Summer 2018

UNIT 2 FOUNDATION

The paper was similar in standard to the previous Unit 2 Foundation papers set and contained many questions on topics that were tested in previous examination series and the Specimen Assessment Materials (SAMs).
Candidates found most of the questions on the earlier part of the paper accessible, though found the common questions with the Intermediate tier very challenging.
As in previous series, there was evidence that some candidates were not familiar with the whole of the Foundation specification content.

Question	Comment
1	This question was well answered by candidates. It was clear that some candidates worked the calculations out using non-calculator methods, despite this being a calculator-allowed paper. A few candidates found the change of units involved in this question confusing and hence omitted decimal points in their answers.
2	(a) This was well answered, with nearly ¾ of candidates getting this question correct. Those who were incorrect typically rounded to the nearest hundred or thousand instead of the nearest ten. (b) This question was answered correctly by over a half of candidates. The most common incorrect answer was ‘nine thousand’, with candidates subtracting 1000 instead of 1.
3	Candidates should be made aware of what is taken into consideration when awarding the OC and W mark. Responses should be structured with explanations that are clear and logical to the reader at the point in the solution when they are presented (not a series of calculations followed at the bottom of the page with a detailed explanation). For the OC mark (organising and communicating) we are looking for an explanation for each step of the work. Candidates typically engaged well with this question, though many attempted repeated additions rather than the most obvious method of division. Those who used this method often made arithmetical errors which lost them the accuracy mark. Some candidates multiplied the two numbers given in the question (2.80 and 35), demonstrating little understanding of what they were being asked to do.
4	This was a multiple-choice Geometry question, assessing candidates knowledge of 2-D shapes, types of angles and nets. (a) This was answered correctly by over half of candidates. Nearly all incorrect candidates selected the parallelogram instead of the trapezium. (b) This was answered marginally better than (a). There was no incorrect answer which seemed to be chosen more often than the others. (c) This was answered correctly by nearly two-thirds of candidates. There was no incorrect answer which seemed to be chosen more often than the others.
5	This is the third examination series in which there has been a Venn diagram question, but candidates are still finding them extremely difficult. A mark was available for correctly placing 3 (or 4) of the 5 values, though very few candidates achieved this. Fully correct answers were extremely rare. It’s unclear as to whether candidates struggled to engage with the square and even numbers aspect of this question, or just were unable to place their answers correctly in the Venn diagram.
6	(a) Part (i) was answered correctly by over 80% of candidates. Those candidates who weren’t awarded the mark typically gave an answer of ‘5’ rather than ‘add 5’ or

	equivalent. Part (ii) was surprisingly answered less well, with just over a half of candidates getting the correct answer. Some wrote that the sequence was increasing by different amounts each time, failing to recognise that the terms were being multiplied by 2. (b) This question was answered correctly by over half of candidates. Those who were incorrect, nearly always gave an incorrect answer of 0.10.
7	This question was answered well by candidates, with part (b) answered better than part (a). The most common incorrect responses were 5.2 for (a), obtained by multiplying 2.6 by 2 instead of squaring it, and 10.58 for (b), obtained by halving 21.16 instead of finding its square root.
8	More than half of candidates recognised there are 180° in a straight-line in (a), with less being able to apply this knowledge to find the missing angle in (b).
9	Candidates found this question very challenging, with few fully correct answers of 2.8 seen. Most candidates tried to answer this question through trial and error rather than using reverse operations, with answers such as $3 \times 5 + 3 = 17$ commonly seen.
10	Candidates found this question challenging, though (b) was answered more successfully than (a). Many candidates in (a) multiplied 134 by the denominator of the fraction, before dividing by the numerator. In (b), candidates often simply multiplied 275 by 30. Some candidates attempted to answer (b) using the typically non-calculator partitioning method, despite this being a calculator-allowed paper and more efficient methods being available.
11	Candidates found this question very challenging, with very few awarded full marks. Most were able to engage with the mode aspect of the question, providing an answer with two or more 7s. Some were able to engage with the range being 5, though very few with the median being 6.
12	(a) An embedded answer of 28/4 = 7 was allowed. This method of displaying an answer is not however to be encouraged. Some candidates who did write an embedded answer then lost the mark for a contradictory answer of $x = 7$. (b) Reasonably well answered. Some candidates lost a mark for not showing their final answer as a single expression, whilst others made sign errors. (c) Again, as with part (a), a clearly correct embedded answer was given full marks. Many candidates simply gained SC1 on this question for sight of 20 – obtained by substituting p=4 into 5p. Those who presented a clear, logical, step by step solution as given in the mark scheme usually gained full marks, and it was also possible to award part marks when an arithmetical slip was seen to occur.
13	It was the correct intention of the positioning of the dots that was marked in parts (a) & (b). (a) Well answered with the majority of the positioning of the dots also showing reflective symmetry. (b) Not as well answered as part (a) with the common error being the placement of three dots in a straight line. (c) Just over a third of candidates chose the correct shape. There was however no obvious incorrect choice made by those who failed to gain this mark.
14	(a) Candidates found this question challenging, with many giving less than the 11 required combinations. Those candidates who had some logical pattern to their list (either listing in blocks of 'Summer' then 'Winter' or blocks of 'Cottage' then 'Hotel') typically avoided repeats or omissions of combinations. (b) Many marked the point at exactly the 0·25 position. This was not allowed a mark as it was already a generous tolerance to allow a position such that $0 < P < 0{\cdot}25$.
15	Some candidates understood the need to convert the fractions to a common format, though many just selected one of the fractions with no workings. The most common incorrect answer was ¼; this was very popular with candidates.Some candidates very frustratingly left the ¼ unchanged. Those who did this were penalised 1 mark.

16	Both of these multiple-choice questions were answered poorly by candidates, with (a) answered slightly more successfully than (b). Although recorded as testing knowledge of the properties of angles as noted in the Specifications. Geometry content, in reality all candidates had to do was look at the diagrams, especially in (a). The size of each angle in the diagrams gave a strong indication as to which equation should have been circled.
17	Candidates find it very difficult to deal with questions involving time periods. Most candidates who gained marks gained them for knowledge of the method required to find the mean of four values. The accuracy of dealing correctly with addition of time and converting from minutes to hours was poor. The usual common error was treating the four time periods as decimals with the total time shown as; 5·20 + 2·44 + 6·18 + 4·34 = 18·16 (sometimes converted as 18hrs 16mins).
18	Some candidates were able to calculate the volume of one (or both) of the cuboids but very few engaged with the second aspect of the question - there was very little understanding of how to write one amount as a percentage of another.
19	Yet again some embedded answers that would have gained full marks were penalised for a contradictory final answer e.g. 4×4 – 7 = 27/3 so x = 9. The question was foremost a test of applying their knowledge of the properties of an equilateral triangle rather than a test of solving a linear equation. Some candidates were awarded the SC1 mark for recognising the length of each side of the triangle was 9 cm, while a fully correct solution was extremely rare.
20	(a) Answered correctly by less than half of candidates. Those who demonstrated understanding that the sum of all probabilities must add to 1 were typically awarded full marks. Some clearly thought the answer would be a multiple of 0.12 in common with the other values given in the table. (b) The question tested whether candidates could interpret the probabilities given in the table into meaningful and simple information, i.e. that there were three times as many discs showing Caernarfon Castle as there were showing Harlech Castle. Most candidates did not appreciate this and simply multiplied the 522 by 0·12 (or sometimes by both 0·36 and 0·12).

MATHEMATICS

GCSE (NEW)

Summer 2018

UNIT 2 INTERMEDIATE

The paper was similar in standard to the previous Unit 2 Intermediate papers set, and contained many questions on topics that were tested in the Specimen Assessment Materials (SAMs).
Candidates found most of the questions on the earlier part of the paper very accessible.
Handling questions involving time remains problematic for some candidates.
The questions dealing with a reciprocal value (Q11b), a 'reverse' bearing (Q12c) and forming and solving simultaneous equations (Q18) were not well answered.
The specific requirements asked for in question 14 were not clearly understood.
There was evidence that some candidates were not familiar with the whole of the Intermediate specification content.

Question	Comment
1	(a) An embedded answer of 28/4 = 7 was allowed. This method of displaying an answer is not however to be encouraged. Many who did write an embedded answer then lost the mark for a contradictory answer of $x = 7$. (b) Well answered. Some lost a mark for not showing their final answer as a single expression. The 4f on one answer line and the (+)3g on another line would not gain full marks. (c) Again a clearly correct embedded answer was given full marks. Here however, even more so than in part (a), candidates often contradicted their embedded answer with a written final incorrect value for q. Those presenting a clear, logical, step by step solution as given in the mark scheme usually gained full marks, and it was also possible to award part marks when an arithmetical slip was seen to occur.
2	It was the correct intention of the positioning of the dots that was marked in parts (a) and (b). (a) Well answered with the majority of the positioning of the dots also showing reflective symmetry. A few also correctly had dots at positions, best described, as '*alternate angles*' placement. (b) Not as well answered as part (a) with the common error being the placement of three dots in a straight line. (c) Around a half of the candidates chose the correct shape. There was however no obvious incorrect choice made by those who failed to gain this mark.
3	(a) Most gave all the other 11 different combination to the one given. Those who had some logical pattern to their list (either listing in blocks of 'Summer' then 'Winter' or blocks of 'Cottage' then 'Hotel') avoided repeats or omissions of combinations. (b) Many marked the point at exactly the 0·25 position. This was not allowed a mark as it was already a generous tolerance to allow a position such that $0 < P < 0{\cdot}25$.
4	Pleasing to note that the candidates understood the need to convert the fractions to a common format. Most candidates opted for a common format using decimals (sometimes then unnecessarily converted to percentages). A common error was to leave the ¼ unchanged. Those who did this were penalised 1 mark.

5	The question was meant to test whether the candidates not only knew how to calculate the area and perimeter of a rectangle, but also knew which was which. Hence the instruction to use the answer space to clearly identify which is the area and which is the perimeter. Only a few candidates mistook one for the other. Far more lost a mark for omitting to give the units for their answers.
6	Apart from part (a), a disappointing response to this multiple choice question. Although recorded as testing knowledge of the properties of angles as noted in the Specification's Geometry content, in reality all candidates had to do was look at the diagrams! The size of each angle in the diagrams gave a strong indication as to which equation should have been circled.
7	Candidates find it difficult to deal with questions involving time periods. Most gained their marks gained for knowledge of the method required to find the mean of four values. The accuracy of dealing correctly with addition of time and converting from minutes to hours was poor. The usual common errors were seen on many scripts. The four time periods were treated as decimals with the total time shown as 5·20 + 2·44 + 6·18 + 4·34 = 18·16 (sometimes converted as 18h 16m). Those who worked in minutes got a little further with 320 + 164 + 378 + 274 = 1136m 1136 ÷ 4 = 284m (all well and good so far) but then 284 ÷ 60 = 4·73 = 5h 13m.
8	Candidates should be made aware of what is taken into consideration when awarding the OC and W mark. Responses should be structured with explanations that are clear and logical to the reader at the point in the solution when they are presented (not a series of calculations followed at the bottom of the page with a detailed explanation). For the OC mark (organising and communicating) we are looking for an explanation for each step of the work. e.g. 'Volume of A = 5 × 5 × 5 = 125 cm^3' rather than simply '5 × 5 × 5 = 125 cm^3'. For the W mark (accuracy in writing) it includes accuracy in mathematical writing. Correct mathematical form is required. Units, where appropriate, should be shown. We do not want to see, for example, 'Volume of A = 5 × 5 = 25 × 5 = 125'. The actual question was well answered.
9	Yet again some embedded answers that would have gained full marks were penalised for a contradictory final answer e.g. 4×4 – 7 = 27/3 so x = 9. The question was foremost a test of applying their knowledge of the properties of an equilateral triangle rather than a test of solving a linear equation. Some candidates did not gain marks as they had an incorrect method of equating $4x – 7$ with 27.
10	(a) Very well answered. (b) The question tested whether candidates could interpret the probabilities given in the table into meaningful and simple information, i.e. that there were three times as many discs showing Caernarfon Castle as there were showing Harlech Castle. Many candidates did not appreciate this and simply multiplied the 522 by 0·12 (or sometimes by both 0·36 and 0·12).

11	(a) Candidates always find it easier to give answers correct to so many decimal points than correct to so many significant figures. The most common answer seen was 8·267, which gained only 1 mark for being the correct answer to 3 decimal points. (b) Very few gained any marks on this question as the majority of the candidates did not know that the reciprocal of 47 is 1 ÷ 47. Questions involving reciprocals have been poorly answered on previous examination papers.
12	Three different multiple choice questions demanding an understanding of angle values. (a) There was little evidence of candidates testing whether the given values were factors of 360. The most common incorrect answer was 10°. Possibly as it was the only value that was not a multiple of 6. (b) More candidates gained the mark for part (b) than the other two parts. It was significant that there was more evidence of candidates using the answer lines as working space for this multiple choice question. (c) In contrast, there was hardly any examples seen where the candidates had drawn a sketch to help them with this question. The most common incorrect answer by far was 260°. Candidates obviously thinking that the answer was to be found from 100 + 260 =360.
13	Those candidates familiar with this type of question usually gain all four marks. Many lost the final mark as they did not give their answer correct to 1 decimal place. Having gained the crucial third mark for carrying out the check at x = 4·35 they continued to test at x = 4·34 then at x = 4·33 and gave 4·33 as their final answer instead of 4·3. Some did not carry out the necessary check required (e.g. looking at 4·35) to establish that the answer was 4·3 and not 4·4, and therefore only gained two marks.
14	Both parts of Q14 involved not only some basic number work but also a need to unpick the actual requirement asked for in the question. (a) There was a mark for clearly identifying 15 as being the HCF of 30 and 75. Simply listing all their factors was not sufficient. Having identified 15 as the HCF, a common error was to give the final answer as 3·87… (=√15) rather that 225 (= 15^2). (b) Some tried to use the $33^1/_3$% first and calculated 32·768 × 3. Others found the square root of 32·768 rather than its cube root. Another common error was, having correctly found the cube root to be 3·2 (1 mark), then gave as their answer 1·066…(=3·2÷3) rather than 9·6 (=3·2×3).
15	An improved response to a Pythagoras' Theorem question than seen on previous papers at this level. However if this had been an OCW question then many would have failed on both the OC and W marks. Typical presentation errors were; $1{\cdot}41^2 + 0{\cdot}89^2$ shown in isolation without being equated to QR^2. QR = 2·7802 rather than QR^2 = 2·7802 or QR^2 = 1·667… rather than QR = 1·667… Units often not given.

16	(a) Well answered. Some reversed the probabilities for one of the pair of 'Walk / Train' branches. (b) This part was less challenging than some of the follow up questions to a tree diagram that have been asked on previous papers. It was disappointing therefore that so many candidates failed to apply the correct method of 0·42 × 0·35. By far, the incorrect answer of 0·42 + 0·35 = 0·77 was presented.
17	Those who knew that in similar shapes, corresponding dimensions are in the same ratio, scored well on this question. Many candidates at the Intermediate level did not use the above fact and hence did not gain any marks for this question. For all three parts candidates in general scored full marks or zero marks. The most popular solution seen in part (c), by those who gained both marks, was to demonstrate that the statement was false because 3·9 × 1·5 was equal to 5·85 and not 6·5.
18	Few marks are gained at the Intermediate level for solving two simultaneous linear equations even when the equations are given. In this question there was the added requirement to form the two equations from the information provided about the rectangle and the kite. Marks were awarded for showing the correct equations. Unfortunately few candidates wrote any equations as part of their solution, and so there was no opportunity to gain any follow through marks for solving their equations correctly.
19	A very accessible six marks for those who were familiar with using trigonometric relationships in a right-angled triangle. It appeared, however, that many candidates had not covered this part of the specification. Some candidates had difficulty in 'disentangling' the two right-angled triangles shown in the diagram.

MATHEMATICS

GCSE (NEW)

Summer 2018

UNIT 2 HIGHER

This paper was similar in difficulty to previous papers set. The intermediate tier first half of the paper was mainly answered well by candidates. The latter higher tier half did pose more demanding questions to reflect the A/A* grades and the majority of candidates did attempt them, albeit with varying degrees of success. However, there was a feeling that some candidates had possibly been entered for the higher tier examination without having completed the higher tier syllabus, possibly due to the fact that they were previously entered for the intermediate tier.

Areas of the syllabus that require attention include:

- Problem solving using simultaneous equations,
- Correct manipulation and solving of simultaneous equations,
- Understand the purpose of factorising quadratic expressions,
- Calculating the volumes of 3D shapes, in particular a pyramid,
- Upper and lower bounds,
- Correctly setting up quadratic equations to solve them using the quadratic formula,
- Change of subject within a formula, including roots and powers,
- Use of the Sine rule and the Cosine rule.

Question	Comment
1	(a) This question was well answered with only a comparatively small number not being able to do the calculation correctly on their calculator. A few candidates forgot to round the answer to 3 significant figures as the question asked. (b) A significant number of candidates still do not know the definition of reciprocal, with some attempting to find the square root, and others squaring 47. Even when candidates knew the meaning of reciprocal to be 1/n, a small number of candidates forgot to round to 4 decimal places. Although a 'recurring' dot was often seen above the '0' in the tenths column (1/47 is a recurring decimal), candidates were not penalised this time for including the dot.
2	(a) Approximately half the candidates answered this correctly. Most choices were made without showing any calculations. This may be expected as candidates were expected to use a calculator. (b) A higher proportion of candidates got the correct answer to this part, often showing 1530 ÷ 360 = 4.25, and interpreting the 0.25 to be the final 90° turn clockwise from North. The second most popular answer seemed to be 'none of these'. (c) This part of the question was poorly answered. A significant number of candidates were not able to visualise the bearing of B from A to be a difference of 180° to the given bearing.

3	The majority of candidates were familiar with this type of question, and scored well in it. Some still did not carry out the necessary check required in order to find whether the answer was 4·3 or 4·4 (e.g. looking at 4·35) – these candidates only gained two marks. However, it was evident that a greater proportion of candidates than previous sittings did know to test $x = 4.35$. This was the OCW question of this paper and the majority of the candidates knew how to set out the solution in a clear, well-structured way. Incorrect mathematical form was seldom seen.
4	(a) The vast majority of candidates did employ a correct method to calculate the HCF, and of those, most correctly calculated it to be 15. Only a small number of candidates incorrectly found the LCM. A good majority of those who found the HCF of 15, and also those who found an incorrect HCF, went on to square it in order to find the number. (b) This part was less well answered than part (a). The vast majority of candidates were able to find the cube root to be 3·2, but then failed to realise that all they needed to do afterwards was to multiply by 3 to find the number. 9·6 was not seen often.
5	This straightforward question on Pythagoras was answered very well, with only a handful of candidates not recalling the formula, or subtracting rather than adding the two square values. It is worthwhile noting that, if a degree of accuracy is not asked for, then as the values given in this question were both written to 2 decimal places, it would be appropriate to also give the answer correct to 2 decimal places. However, this degree of accuracy was in fact given by the majority of candidates.
6	(a) This was the best answered question on the paper. However, a notable minority of candidates still think that all branches on a particular level (in this case the four branches for 'transport') should add up to 1. (b) This was also well answered. A small, but significant minority chose to add, rather than multiply the relevant probabilities. Also, some candidates unnecessarily rounded their answer to 0·15 when the full answer was exactly 0·147.
7	The question as a whole was well answered; parts (a) and (b) especially so. Occasionally in part (b), the candidate did not divide by the linear scale factor evaluated in a part (a). Although writing an equation with two equal ratios rearranged to find the missing lengths is the method given in the mark scheme, the majority of candidates nowadays tend to initially work out the linear scale factor, usually for the enlargement (but occasionally for the reduction). In part (c), the candidates who had answered parts (a) and (b) using the scale factor seemed to explain much more clearly why the statement was false simply by stating, for example, that 3·9 x 1·5 = 5·85, which is not 6·5. The candidates who considered the ratios also answered the question well, but wrote in greater detail.
8	Candidates had some difficulty in setting up the two correct equations. Even when a correct equation was given, errors were then made when simplifying or rearranging these two equations. When two equations, correct or otherwise, were offered, the majority of candidates knew that they had to solve these equations simultaneously. However, a significant number of candidates still do not know the techniques required to solve simultaneous equations. For example, some were multiplying only the terms in x, only the terms in y, or only the terms on the left hand side, in order to have equal coefficients. Furthermore, if candidates did achieve two correct equations with equal coefficients for either the terms in x or y, a significant number of candidates did not know whether to add or subtract in order to eliminate one variable.

9	This was fairly well answered by candidates, although the intersecting triangles seemed to hinder a number of candidates in part (b). (a) The main error seen was the ratio of the opposite side to the adjacent side written the wrong way before the correct inverse tangent function was used. Some candidates failed to see the single trigonometrical step, instead using first Pythagoras and trigonometry to evaluate angle x which, although correct, occasionally introduced errors in premature approximation. (b) The main error to highlight is that a number of candidates used the incorrect trigonometrical function, usually cosine, to evaluate DE. Many candidates realised that 22° had to be added to their evaluated angle from part (a), but this obvious simple addition was incorrectly calculated by enough candidates to warrant commenting on. Candidates must take care when using a calculator.
10	The fact that the term in m^2 had a coefficient of 4 should have been a pointer to candidates that this was a question on the difference of two squares. However, it was disappointingly answered.
11	The majority of candidates did not know the formula for the volume of a pyramid. Although the formula for the volume of a cone is given on the formulae page, from which they could deduce that the volume of a pyramid should be 'V = 1/3 x base area x height', many candidates did not find 1/3 of their product, and many offering ½ or no fraction whatsoever. As regards to the change of units, this was done just as poorly. Some candidates attempted to divide their final answer by 100, rather than 100^3, whilst others attempted to change units before substituting into their formula, with the same lack of success, as they divided 13200 by 100 rather than 100^2.
12	This question showed that many candidates do not fully understand the purpose of factorising polynomials – the fact that these equations were already factorised made them quickly solvable. The evidence for this was that if candidates did show their working, a number of them expanded the brackets which they realised was the wrong route to take. There was no further evidence that the quadratic formula was employed. It is worth noting that this multiple choice question was an example where some relevant working may have helped the candidate.
13	This question was answered poorly. From the attempts seen, it appears that candidates have a poor knowledge of two aspects. Firstly, in order to find the least value of d, the lowest numerator should be found by subtracting 'lowest – greatest', and then dividing by the greatest denominator. Secondly, whenever an upper bound is required it is at the limit (mid-point of two values) e.g. the upper bound of 1·9, correct to 2 significant figures, is 1·95 rather than 1·94.
14	This question was generally well answered, but a number of candidates did calculate the length of the unseen minor arc AB (for 1 mark). Other incorrect answers seen were for either finding the area of the sector, or for finding the distance AOB (= 6·2cm), i.e. in both cases not knowing the meaning of the term 'arc'.
15	Few correct answers were seen. Many candidates who did attempt the question knew to multiply the numerator with the 'other' denominator, but then did not know to combine the two algebraic fractions, in this case, by subtraction. Further to this, a common error was the incorrect expansion of the second bracket, in this case the expansion of $2(11x - 13) - 7(3x - 5)$ resulting in the incorrect -35 fourth term. Some candidates thought the resultant denominator was the subtraction of the individual denominators. However, if the candidates did know it was the product, many proceeded with the common misconception of expanding the double brackets, and unfortunately a mark was lost if the expansion was incorrect.
16	The candidates who attempted this question fell into two categories – those who knew that they needed to find the square root at some stage, and these candidates usually did quite well gaining 2, 3 or 4 marks. Other candidates did a lot of writing, but as they were calculating values such as 0·1369 x 200, did not gain any marks.

17	This was marked in two stages – firstly setting up the quadratic equation, and then solving it. Candidates made a good attempt at expanding the brackets to form a quadratic expression, the occasional mistake being an error with the signs. Although a fair number of candidates realised that the quadratic formula was required in this question, many of them failed to realise that the equation had to be equated to zero which, in this case, meant taking the 7 from the right hand side. Failure to equate the equation to zero resulted in no further marks available for solving it. A significant number of candidates lost marks for not employing the formula correctly. The common error was incorrectly inputting the negative value of b into the b^2 part of the discriminant resulting in an incorrect negative value when obviously it should be positive.
18	The change of subject at the higher grades will always have the subject (c in this case) at least twice within the formula. It was clear that the presence of a c term already isolated in the initial equation confused some candidates, believing that the formula was already rearranged. Many candidates did not know to square both sides of the equation, and although a FT was available for one slip, most candidates who failed to square tended to gain no marks. If candidates did square initially they often did go on to gain the second mark as well, but then very few candidates were able to go on to complete all steps correctly for the full 4 marks.
19	(a) In order to calculate the length *AE*, candidates did not need to consider the circle, and a good number of candidates were able to gain the correct answer of 5·84 cm. (b) Here, candidates who realised that they could find the size of angle *CED* from using 'the angle in the alternate segment' and firstly calculating the size of angle *CAE* did very well. Unfortunately, the majority of candidates failed to realise this. Marks were given for finding either angle *CAE* or angle *CEA* in triangle *ACE*, either by using the Sine rule or the Cosine rule, but even so, this part of the question was poorly answered.

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