GCSE EXAMINERS' REPORTS

GCSE (NEW)
MATHEMATICS

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MATHEMATICS

GCSE (NEW)

November 2022

UNIT 1 FOUNDATION

General Comments

The questions in this paper are comparable to those set in previous Unit 1 Foundation papers. The full content of the specification needed to be studied. However, Advanced Information Notice was given to schools so that they would know specifically which topics would be tested in the exam.

Setting out the subtraction calculation in the first question still causes difficulties for many. At this level, the larger number should be written above the smaller number. Frequently, the numbers are written the wrong way round and digits are subtracted irrespective of their position in the calculation.

Candidates still are unsure that the word *probability* in a question expects a numerical answer, and the word *chance* needs a descriptive word only.
The following questions later in the paper proved challenging: completing a diagram with given rotational symmetry; estimations; finding a specific term in a sequence given by its n^{th} term.

Comments on individual questions/sections

Q.1 (a) This question was done well though a common error was to write the answer as 6329 instead of the correct 63029. The number given in the question did not include any hundreds digits and candidates forgot to indicate this by writing 0 in their number.

(b) The number 2481, rounded to the nearest 10, should be 2480. However, common wrong answers included 2490, 2800 and 2491.

(c) This multiplication calculation was difficult for many, particularly for those who didn't seem to know one of the recognised methods. Some thought that 'multiply' meant 'divide'.

(d) A significant number of candidates still write the numbers in the question the wrong way round. So they tried to subtract 842 from 513, frequently subtracting the smaller digit from the larger wherever they were placed in the numbers.

(e) Very many candidates knew to divide 56 by either 2 or 4, fewer realised that dividing by 8 gave the required answer of 7.

Q.2 (a) Excellent response.

(b) Candidates found (b) more challenging than (a) as they needed to subtract 11 from 70 and a frequent wrong answer was 69, instead of the correct 59.

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Q.3 Showing that they've counted the squares (marks are enough) earns candidates 1 The final answer needed to be within the range 54 – 64 to gain the second mark.

Q.4 This was the OCW question. Many knew how to work out the cost of one large box but failed to write enough explanation to be awarded the 2 marks available for the OCW part of the answer. For OC1, the different stages of the calculation needed to be labelled so that it was easy to follow. For W1, all the working needed to be seen without any wrong mathematical form. Also, units (£) needed to be seen in the answer at least. Only 1 OCW mark could be awarded altogether if only part of the calculation was tackled.

Q.5 (a) Many candidates did not seem to know the definition of the word 'range', wrongly finding the mode or the mean of the given set of numbers.

(b) Here, the mode of the set of numbers was needed. However, many wrongly circled the middle number in the list in the answer space instead of looking at the original list of numbers given in the question. It was important to read the question very carefully to make sure that the correct set of numbers was considered.

Q.6 (a) Ordering the whole numbers given in the question was straightforward for most candidates. The most common error was not knowing that $-5 < -2$.

(b) This set of numbers, which included decimals, was more challenging for candidates particularly the number 3·8. The most straightforward way to deal with it was to fill in the second decimal place with 0. Then all four numbers have the same number of digits in the two decimal places and can be more easily compared. Candidates who did this were generally correct in their answers.

Q.7 This question asks for the **probability** that an apple is chosen. Many candidates still wrongly persist in giving a word, like 'likely'. Words should be given only if the **chance** of an event happening is required. As there are 11 apples in the bag which contains 17 pieces of fruit altogether, then the probability of choosing an apple is 11/17. However, as well as the correct answer, there was a random collection of incorrect fractions using the numbers given in the question. Some of these were greater than 1.

Q.8 The angle at a point is 360°. So $6y = 360° - 240°$. A lot of candidates wrongly went on to write $y = 120°$. They did not realise that they needed to divide 120° by 6 to find y.

Q.9 Candidates frequently didn't seem to read the words in the question very carefully. They were told that, 'The time taken to travel from Aber to Berw is **twice** the time taken to travel from Ceiro to Dinas.' So candidates found the time from Aber to Berw and then wrongly doubled it as they saw the word 'twice' without thinking exactly what the question wanted them to do. They needed to halve 1 hour 10 minutes (which gives 35 minutes) and add that answer to 16:30.

Q.10 (a) The answer to $11k = 99$ is found by dividing 99 by 11. So $k = 9$. Wrong answers included 99 – 11 = 88. Although correctly embedded answers are accepted, it would be clearer to write the value of k clearly at the end of the answer as $k = 9$.

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(b) Candidates seemed to find this easier than 10a, and many correctly found $p = 12$.

Q.11 Very many candidates did not understand that the instruction in the question, '… to make an accurate drawing of this triangle …' meant that they should use the measurements shown on the triangle. So the base should be drawn 8·4 cm long using a ruler, and the two given angles should be measured as 67° and 52° using a protractor. A significant number ignored the numbers given in the diagram but measured the length of the base and the angles in the sketch of the triangle, and then wrongly used those measurements.

Q.12 (a) The easiest first step to finding the multiple of 5·5 is to double it to make the whole number 11. Then, recognising 33 as a multiple of 11 gives 33 as the required answer. However, many candidates did not manage to do this.

(b) Candidates found finding the factor of 111 more difficult. Knowing the rule that if the sum of the digits in a number is a multiple of 3, then the number is a multiple of 3 is a handy way to answer this question. So dividing 111 by 3 gives 37 as the multiple of 3. As this is a non-calculator paper, it would have been arduous to divide 111 by each of the numbers in the given list.

Q.13 Very many found this question very difficult, some wrongly drawing reflections or placing the shapes randomly. The easiest way to answer this question was to use a piece of tracing paper to rotate the given shapes about the centre of the square.

Q.14 (a) The first prime number is 2 which is an even number. To be awarded the mark for this question, both the number 2 and either the word prime or even needed to be included. Many candidates seemed unsure of the definition of a prime number.

(b) A correct numerical example of an even cube number was needed to be included in this answer. Many were unable to identify one. Many thought that a cube number was a multiple of 3.

Q.15 Candidates found it more difficult to work out how many £10 and £5 notes Grace had, than Andrew as she had two £10 notes with three £5 notes. and he had just one £5 note with five £10 notes. A very frequent wrong answer was eight £10 notes and two £5 notes. But it was awarded 1 mark out of a possible 3 marks.

Q16 (a) To gain the first mark, the statement $7p = 63$ was needed. Then $p = 9$ gained the second mark. This last step was difficult for many candidates.

(b) Very many were awarded 1 mark but not 2 marks. They could either work out $6a - 2a = 4a$ or $-7b - 8b = -15b$ but they couldn't write the complete answer as $4a - 15b$. For 2 marks altogether, this complete expression was needed. B1 was awarded for $4a$ or $-15b$ or $4a + - 15b$.

Q.17 The answer to this question needed the eleven different combinations offered by the restaurant's menu. Those who worked systematically to find them were mostly successful.

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Q.18 This question demanded more understanding than usual of the theory behind working out the mean of a set of numbers. If there are five numbers with a mean of 7 then the total of the numbers must be 5 × 7 = 35. So, if another number is added such that the mean becomes 8·5, then the total of the six numbers is 6 × 8·5 = 51. Finding the difference between 51 and 35 gives the required answer. Many candidates still find this method very difficult.

Q.19 This was another question which needed careful reading. The larger share of a sum of money which has been divided in the ratio 1:8 is £16.80. This means that 8 parts are worth £16.80. Very many candidates thought that 9 parts (from 1 + 8) were worth £16:80 and so tried to divide this money by 9. This was not an easy calculation to do on a non-calculator paper and maybe could have suggested that the method was wrong.

Q.20 Marks for this question were awarded only for $\frac{20 \times 60}{400}$ or $\frac{20 \times 59}{400}$. Either of these would be awarded 1 mark. The second mark was awarded if the calculation was evaluated correctly. Very many tried to work out the original sum for which 0 marks were awarded.

Q.21 Both parts of this question were challenging for most candidates. They did not know that they needed to substitute the value of n into $3n - 13$.

Q.22 Very many were able to find the correct relative frequency of 40/300 and so gained 1 mark. But they were unable to cancel this fraction down correctly to write it in its simplest form of 2/15 and so lost the second mark.

Q.23 In this question, it was essential to know the difference between the meanings of the words area and perimeter. Candidates frequently confused them. The area of the rectangle (135 cm^2) needed to be calculated from the lengths of the two sides given in the diagram. From that, the area of the square was found by subtracting 135 cm^2 from 184 cm^2. This answer was 49 cm^2. To find the length of one side of the square, the square root of 49 needed to be found. Not all who'd found 49, were able to square root it. The perimeter of the square is 4x this square root. Very many candidates weren't able to follow every step of this problem to reach the correct solution.

Summary of key points

- Learn definitions of mode, mean, median, range securely.
- Know the difference between the perimeter and area of a shape.
- Be sure of methods for basic calculations like subtraction and multiplication.
- Always read the question carefully rather than guessing what it might be asking.
- Remember what is required in the OCW part of a question.

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MATHEMATICS

GCSE (NEW)

November 2022

UNIT 1 INTERMEDIATE

General Comments

This unit tested the content of the full specification, but an Advance Information Notice was released to centres prior to the series, giving details of the topics that would be assessed on Unit 1.

Overall, the questions were comparable with those asked on previous papers that have been sat, and the paper was a suitable and fair test for the candidates at the Intermediate level. Some questions proved more challenging than others, whilst some candidates lost marks because of incorrect numerical evaluations or giving unsupported incorrect answers.

Topics which many found difficult included, rotational symmetry, simplifying fractions, using non-calculator methods to solve numerical problems, and finding the length of a side of a square given the area and using inequalities.

Item level data is available to all centres by centre and for individual candidates with comparison of all candidates sitting these examinations. This report will focus on common errors and misconceptions to aid the interpretation of the data available.

Comments on individual questions/sections

Q.1 This question was not answered very well by candidates. Many candidates reflected the shapes instead of rotating. Some candidates gained B1 for one correct quadrant.

Q.2 In both parts (a) and (b), some candidates gave definitions of a prime number, a cube number, an odd and an even number. These responses were not awarded a mark as an explanation which included a numerical example was needed in both cases. In part (b), some candidates thought a cube number was the same as a square number.

Q.3 Both parts were generally well answered, with candidates identifying the multiple of 5·5 and the factor of 111 correctly.

Q.4 Some candidates gave the dimensions of a 4cm by 4cm-by-4cm cube as their cuboid, probably thinking that volume = 4 + 4 + 4 = 12cm^3.
Several candidates were unaware of how to correctly use the isometric paper. The 3 directions had to be vertical and along two ‘diagonals’ (a Y shape).
A horizontal line would be inaccurate and, simply put, ‘a line had to go through the dots and have both ends on a dot’.
Follow through marks were available to those that drew their cuboid correctly on the isometric grid.

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Q.5 This question was answered well.
Most candidates gave the correct number of notes for Andrew but gave the incorrect number of notes for Grace.
A common incorrect answer seen was 8 x £10 and 2 x £5.

Q.6 Part (a) was answered well.
Some had difficulty in evaluating 63 ÷ 7 and left their answer as 63/7 which gained 1 mark.
Candidates should be reminded that when a final answer or an answer on follow through leads to a whole number answer, it must be shown as a whole number. Otherwise a fraction is accepted.
An embedded answer e.g. 7 × 9 – 3 = 60 was accepted, but not if followed by a contradictory answer of $p \neq 9$.
Candidates should be discouraged from presenting an embedded answer.

In part (b),candidates tended to find at least one term correctly, usually 4a.
The most common incorrect answer was 4a – 1b.

Q.7 Very well answered. Many candidates used a systematic way of listing all the possible combinations.

Q.8 Some candidates gained part-marks for showing 6 × 8·5 or 5 × 7.
Many candidates did not then subtract their values.
Many found evaluating 6 × 8·5 challenging without a calculator.

Q.9 This question was generally well answered. It was pleasing that the majority did realise that £16.80 was the larger share and not the total amount of money.
This question also assessed candidates' organisation, communication, and accuracy of writing.
Responses should be structured with explanations that are clear and logical to the reader. Explanations should be given at the point in the solution when they are presented. A series of calculations followed at the bottom of the page with a detailed explanation is not what is expected to gain an OC mark. Candidates should also be discouraged to write a commentary, for example "First I will divide 16.80 by 8……."
Those who divide their page into two vertical halves headed 'Calculations' and 'Explanation', should ensure that the explanations on the right are in line with the calculations on the left-hand side.
Correct mathematical form was required for the W mark. This included giving units in their final answer, the correct use of "=" and correct notation e.g. 16·8 ÷ 8 and not 8 ÷ 16·8.

Q.10 When estimating in multiplication and division problems with whole numbers to obtain approximate answers, candidates should round the numbers involved correctly to one significant figure. They must show sufficient working to demonstrate how they have obtained their estimate.
Those candidates that estimated 407 as 400 did well on this question. However, sometimes candidates could not simplify their expression correctly, usually leading to place value errors.

Q.11 This question was generally well answered.
As expected, candidates dealt with 3 × 10 – 13 better than 3 × 4 – 13.

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Q.12
In part (a), many candidates gained only 1 mark for giving an unsimplified answer of $\frac{40}{300}$.
Many valid explanations were seen in part (b), usually referring to or implying to that the frequencies in the table were different.
In part (c), many candidates showed a correct method of $\frac{110}{300} \times 2400$ or equivalent, but then had difficulties in evaluating their expression.
Some lost a mark for expressing their answer as $\frac{880}{2400}$.

Q.13 Many candidates successfully found the area of the square.
Many then had difficulties in finding the square root of 49 to find the length of the side of the square. Many divided 49 by 4.
Candidates should be reminded to read the requirements of the question. The perimeter of the square was needed. Many stopped after finding the length of the side of the square to be 7 cm.

Q.14 In part (a), many candidates placed 105 and 20 in the correct positions on the Venn diagram. Most often the black hair total was 90 not 70 as given. Many thought the 70 was for black hair only.
In part (b), many candidates found a correct probability following through from their Venn diagram.

Q.15 This question was not well answered at all.
A number of candidates ignored the requirements to use a pair of compasses and used a protractor to draw the triangle.
Some were aware that construction arcs were needed and added random inappropriate arcs to their diagram.
Generally, if candidates achieved any marks from this question, it was from drawing 60° correctly and showing the appropriate arcs.

Q.16 A question that is normally well answered proved a challenge to many of the candidates as they could not find the first step of 1575 = 5 × 315.
Having a larger odd number of 1575, meant that the solution was abandoned at an early stage.

Q.17 The basic conventions of Algebra are still problematic for many candidates.
In part (a), candidates, responses such as $6 \times p^7 \times q^8$ were awarded 1 mark, for not giving their answer in a simplified form.
In part (b), expanding brackets when there is a negative sign involved and handling ‘like terms’ are poorly handled.
Whilst many gained 1 mark for expanding $7a\ (a + 5)$ correctly, the expansion of $-2(3a^2 + 6a - 7)$ often resulted in $-6a^2 + 12a - 14$.
Follow through marks were available for simplifying ‘their’ expressions correctly.

Q.18 Part (a)(i) was very poorly answered. Many candidates misinterpreted the scale; 2 was a common incorrect answer.
Follow through marks were available in part (a)(ii) for y = “their 4”x – 2
In part (b), marks were awarded for giving a valid explanation with a rearranged equation AND indicating that the gradient is 3 or equivalent.
Many candidates realised that the gradients needed to equal but did not refer to the equations or context of the question.

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Q.19 Very few gave the correct response to all five formulae.
Candidates should be reminded to use the terminology in the question as their answers.

Q.20 In both parts, a common method was to convert the numbers into decimal form.
Errors were made when trying to evaluate the answers.
Candidates should be reminded to read the requirements of the question. The answers were needed to be given in standard form.

Q.21 Those familiar with Pythagoras's Theorem and Trigonometry could identify the correct calculations in both parts, even though these are topics usually seen on Unit 2.

Q.22 Some candidates engaged with the isosceles triangle in the diagram and gained marks for finding the angle *POQ*. Few candidates then knew the relationships between angles *POQ* and *QRP*.
Very few candidates stated the angle properties used.

Q.23 The few candidates, who had given the correct inequality, were able to use it to find the least possible number of apples efficiently.
Others, who had no inequality to work with, treated the problem as a kind of numerical puzzle which they tried to solve by trial and improvement. Several of these candidates did arrive at the correct answer of 9 and were awarded 1 mark.
The disadvantage of not using an inequality is that no more part-marks or follow through marks can be given.

Summary of key points

- Remember to show all your workings. A lot of marks can be lost if unsupported incorrect answers are given.
- Practise evaluating simple arithmetical calculations on the non-calculator paper.
- When solving linear equations, show each step of the solution rather than giving an unsupported answer or an embedded answer.
- Be aware of exactly what is required to gain both the OC element and the W element in the question that assesses the quality of organisation, communication and accuracy in writing.
- Practise finding the gradient and writing the equation of a given line.
- Practise writing an inequality showing the information given in a question.

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MATHEMATICS

GCSE (NEW)

November 2022

UNIT 1 HIGHER TIER

General Comments

This Autumn series saw a return to coverage of the full syllabus (after content had previously been reduced due to the Covid pandemic). For this series, teachers and students had been provided with information in advance about which topics were to be assessed on each paper; this should have helped focus the candidates' revision. There were some excellent examination performances throughout the paper, reflecting the fact that entries were on the whole appropriate for this tier. As expected, overall performance was better in the first half of the paper than in the second, due to the increased demand towards the end of the paper.

Comments on individual questions/sections

Q.1 Part (a) was usually well-answered, although some misunderstood that the set of 70 people with black hair included the intersection with those who also wore glasses. Some candidates left sections of the Venn diagram empty; they were subsequently penalised in part (b) because the blank entries could not be followed through. In evaluating the probability, some gave an incorrect numerator because they misunderstood that the set of people who wore glasses included those who also had black hair.

Q.2 The majority of candidates attempted to complete the triangle but did not always do so by using appropriate construction methods (as evidenced either by showing no construction arcs at all, or by showing incorrect arcs - in some cases possibly drawn in retrospectively). The most successful construction was almost always the 60º angle. Of those who constructed the 45º angle, most chose to bisect a right angle. However, a large proportion drew their vertical line by eye, and not by construction. Some constructed the perpendicular bisector of *AC*, therefore producing their vertical line in an incorrect position.
A few able candidates succeeded in using alternative methods e.g. obtaining a right angle by using the angle in a semi-circle or avoiding the need for a right angle altogether by bisecting 60º then 30º in order to obtain 45º.

Q.3 A large proportion of candidates gained all three marks here, and they did not appear to struggle with the absence of 2 as a prime factor. Occasional errors were made in division, and a small number failed to write their answer in index form, sometimes presenting a list or sum.

Q.4 Part (a) was well-answered. Errors included leaving a × sign in the answer rather than fully simplifying, adding rather than multiplying coefficients, or incorrectly evaluating a power. A very few candidates mistook the '×' sign in the question to be a '+' and went on to factorise their corresponding expression.
Part (b) was often done well, although sign errors were very common when handling the second expression. Having obtained the final expression, a small minority were penalised for incorrect subsequent work such as trying to collect unlike terms or attempting to factorise.

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Q.5 In part (a)(i), mis-interpreting the scale on the y-axis was a common error in evaluating the gradient. A small number misunderstood the need to find the gradient as a number and chose to describe it e.g. stating it to be ‘positive’.
In part (a)(ii), the majority knew how to use their value for the gradient in an equation of the form $y = mx + c$, although it was notable that a few did not simplify $y = 4x + -2$ to become $y = 4x - 2$.
Part (b) was found to be challenging, with a significant number not even attempting this part. Candidates needed to re-arrange one (or both) of the straight-line equations in order to get corresponding terms in the same positions, so that the gradients could be compared. The most common approach taken was to make y the subject of $2y-6x=23$, but too many failed to divide the 23 by 2 in so doing. To gain the second mark, candidates needed to identify that the gradient of both lines was 3, and some were penalised for being too vague. Of those who chose to multiply through $y=3x-8$ by 2, some then ran into difficulty in interpreting the relevant coefficients, too often stating that that both lines had a gradient of 6.

Q.6 There was mixed success in this question. It was particularly well-answered by those who engaged fully with the expressions by writing down the dimensions of the terms. Marks were sometimes lost by using incorrect terminology e.g. perimeter, rather than using the terms which were clearly stated in the question.

Q.7 Both parts were usually well-answered, although occasional errors came from wrongly converting one of the given numbers from standard form. In part (a), some lost a mark for stating that their answer of 0.5×10^7 became 5×10^8. In part (b), even having correctly converted from standard form, it was disappointing to see errors in addition. In a few cases, there was inappropriate rounding of the answer, with 4·795 becoming 4·8, 4·80 or even 4·79.

Q.8 Despite these normally being topics on the ‘calculator-allowed’ paper, both parts were well-answered, particularly part (b). As is usually the case, those candidates who fully engaged with the question by using the space for working tended to be most successful. Incorrect choices were typically $\sqrt{25^2 + 10^2}$ and $\sin40^\circ=\frac{25}{y}$ for (a) and (b) respectively.

Q.9 Many excellent solutions were seen here, although some stopped having found 104˚, and a very few candidates were unable to start correctly. For the E mark, two written geometric reasons were required; some did not achieve this because they only wrote one relevant reason, and others were penalised for poor terminology e.g. ‘arrowhead theorem’. A few wrongly wrote the reverse of the required circle theorem, namely that ‘the angle at the circumference is twice the angle at the centre’; these candidates may or may not have correctly applied the theorem to the angle at the centre. Some mentioned the alternate segment theorem, despite it being irrelevant, or wrongly applied.
In a very few cases, extra lines were drawn, and alternative methods successfully used, such as: drawing a tangent at P and correctly applying the alternative segment theorem - extending PO to become a diameter, creating a right-angled triangle, then using angles in the same segment.

Q.10 The mathematical aspects of this OCW question proved challenging for many. Omitting ‘+7’ from the final total of Twm’s apples was a very common error in writing the inequality (although ‘follow through’ marks were still subsequently available). While some displayed secure algebra skills, re-arranging and solving the inequality was often done inaccurately, with many then missing the fact that they had to round up their final answer.

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A number of candidates chose to use trial and improvement to solve their inequality, with mixed success (often failing to express the method fully or using poor notation). Given that the question was essentially about constructing and solving an inequality, it was disappointing that some candidates worked only with equations, typically leading to incorrect rounding for the final answer.
For the OCW requirement, stronger candidates communicated well, often starting by explaining how to obtain their expressions for the numbers of apples, and also writing a suitable concluding statement at the end of their solution. Some, however, wrote lengthy retrospective essays, sometimes describing all their calculations in words. Others presented solutions with little or no clear structure. For the writing mark, candidates needed to engage with the inequality, using correct mathematical form and symbols (and not incorrectly switching between $<$, $>$, $\leq$, $\geq$ or $=$). Those opting for a trial and improvement method were penalised if they did not show all their working, and they often failed to show two appropriate trials.

Q.11 Most candidates showed a good understanding here. In part (a)(i) however, it was frustrating that many stopped after finding k=4, without specifying the required expression for y in terms of x. Also of concern was the significant number of candidates who thought that 3^3 was 9, and therefore calculated k to be 12. Even though 'follow through' marks were available in part (a)(ii) for some types of proportional relationships, the numbers involved often became too difficult.
In part (b), plenty of correct answers were seen, but some lost the mark for not being specific enough, writing e.g. 'e decreases' or 'e is divided' rather than the desired 'e is halved' or 'e is divided by 2'. Some candidates embarked on unnecessary algebra.

Q.12 Most candidates recognised that the transformation was an enlargement. Fewer, however, gave the correct (negative) scale factor and centre of enlargement, and it was common to omit the relevant terminology, even when −2 and (−3,1) were given. Unfortunately, many candidates described additional transformations such as 'rotation through 180°'.

Q.13 The response to this proof question was disappointing, with a significant number not even attempting it. While some good solutions were seen, too many failed to use appropriate notation to identify the equal sides (e.g. *BE*=*ED*) or angles (e.g. $A\hat{E}B=C\hat{E}D$). In particular, there was widespread reference to 'angle *E*'. Candidates needed to make use of the information directly given in the question (leading to the 'side angle side' case of congruence), rather than presenting other equal sides or angles. Some needed to realise that a concise solution did not require extended writing.

Q.14 Plenty gained all three marks here. Some common errors, however, included drawing the line with equation y=3 instead of x=3, or failing to observe the 'direction' of the inequalities. Whilst most candidates chose to shade the relevant region, there were other good solutions which involved 'shading out'.

Q.15 Both marks were usually awarded in part (a), although there were some errors in place value or in subtraction.
While there were plenty of correct answers in part (b), some candidates did not know that a power of 1/3 is equivalent to taking a cube root. Unfortunately, a final answer of 9 was frequently seen, usually because the minus was ignored in the power. Some candidates misunderstood the negative power and presented a negative answer.

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Q.16 The overall response to this question was poor. The absence of a diagram was perhaps a hindrance to some. Too many candidates were unable to construct a formula for the volume of the particular cylinder (which needed to include a height of '3r/2' rather than 'h'). Others misquoted the formula for the volume of a cone, despite it being printed within the paper. Of those who proceeded to form an equation, even the ablest candidates often stopped at h/3=3r/2, as they were unable to manipulate the fractions.

Q.17 Many fully correct answers were given here. Typical errors included stating $4\sqrt{5}$ for $\sqrt{20}$ or $3\sqrt{5}$ for $\left(\sqrt{5}\right)^3$. Unfortunately, an error often meant that the final answer could not be an integer multiple of $\sqrt{5}$ (which was a requirement in the question).

Q.18 Plenty of fully correct solutions were seen for this question, although there was some confusion regarding the replacement of the first selected card by two of the other colour. Many realised correctly that they needed to consider two different orderings of colours, in some cases helped by drawing a tree diagram. It was frustrating that some candidates made arithmetic errors or did not know when to multiply or add fractions. The alternative method, using 1-P(both same colour), was seen occasionally.

Q.19 There was a mixed degree of success here. Common incorrect answers included (−10,8), (−5,−3) and $f(-x)$ for part (a)(i), (a)(ii) and (b) respectively.

Q.20 Too few gained both marks in this question. Many of the answers offered were centred around incorrect symmetries e.g. 270±25. If they had one or both correct answers, candidates were unfortunately penalised if they also included incorrect values.

Q.21 Not many candidates were able to progress beyond clearing the fractions here. Errors in expanding and collecting terms meant that few produced the desired quadratic expression, with some ignoring the 'equality' altogether and adding the algebraic fractions. Of those who correctly expanded the brackets, many did not then recognise the need to form a quadratic equation in conventional form (equated to zero). Those who went further usually factorised and solved the equation correctly. The few candidates who chose to use the quadratic formula tended to be inaccurate.

Summary of key points

- Consider the requirements for OCW (organising, communicating and writing accurately) in mathematics
- Be able to use a ruler and pair of compasses for constructions
- Be able to fully state circle theorems, using appropriate vocabulary
- Include all the essential information in describing transformations
- Understand how to present a formal geometric proof
- Know when and how to add, subtract, multiply or divide fractions
- Understand how to use the properties of trigonometric graphs to solve equations
- Understand how to work with algebraic fractions in order to re-arrange an equation.

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MATHEMATICS

GCSE (NEW)

November 2022

UNIT 2 FOUNDATION

General Comments

Unlike examinations which were sat during the last academic year, this unit tested the content of the full specification of GCSE Mathematics, but an Advance Information Notice was released to centres prior to the series, giving details of the topics that would be assessed on Unit 2.

Overall, the questions were comparable with those asked on previous papers that have been sat, and the paper was a suitable and fair test for the candidates at this level.

Some questions proved more challenging than others, including some foundation tier only questions, whilst some candidates lost marks because of incorrect numerical evaluations or unsupported incorrect answers.

A calculator-allowed paper will contain questions which assess the use of the calculator methods to answer questions. Although non-calculator methods can yield correct responses, they often result in unnecessary numerical errors. Candidates should be encouraged to use a calculator when completing calculations, whilst remembering to record the method which they used in each questions' answer space.

Topics which many candidates found difficult included finding missing angles, translating shapes, solving equations, and drawing and measuring bearings.

Item level data is available to all centres by centre and for individual candidates with comparison of all candidates sitting these examinations. This report will focus on common errors and misconceptions to aid the interpretation of the data available.

Comments on individual questions/sections

Q.1 (a) Candidates were required to identify the incorrect calculation. This question was very well answered. Some candidates indicated their answer by ticking the correct calculations and putting a cross next to the incorrect calculation, rather than circling their response. Candidates who presented their answers like this were awarded the mark provided it was unambiguous to markers.

(b) Tested the candidates' knowledge of multiples. This was answered correctly by just over a quarter of candidates, with some clearly confusing factors and multiples. 2 and 19 were the most commonly selected incorrect answers.

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(c) Candidates were required to calculate how many computers could be bought with a given sum of money. The question was answered correctly by over a half of candidates, with some mistakenly giving a decimal answer, whilst others instead rounded their answer up to the nearest whole number.

Q.2 (a) Candidates were required to identify which of the five shapes was a kite. This was answered correctly by nearly all candidates.

(b) Where candidates were required to identify the acute angle, was answered correctly by just under three-quarters of candidates.

(c) Candidates were asked to identify the diagram which showed the chord of a circle. This was answered correctly by just over a quarter of candidates, with many identifying the radius or the tangent.

(d) Where candidates were asked to complete the diagram of the net of a cube, was answered correctly by approximately a half of candidates. Only two squares were required to be shaded, but some candidates shaded 5 or more.

Q.3 In this question, candidates were required to find the two missing digits in order to make the given calculation correct. It was well answered by candidates, with only a few unable to find the correct missing digits.

Q.4 In question 4, candidates were given a pair of coordinates which had been incorrectly written and had to explain what was wrong with them. There were three issues with the coordinates – they were reversed, brackets weren't included, and a semi-colon was used to separate the digits – but candidates offered often only focused on only one of these issues, so were awarded only one of the two marks available. A few candidates misunderstood the question and instead referred to the point being plotted in the wrong place.

Q.5 (a) Candidates were asked to simplify an expression by collecting like terms. This was answered correctly by approximately a half of candidates, with some adding the first two terms together but neglecting to subtract the final term, giving an answer as $5a - a$.

(b) In the first part of (b), candidates were required to continue the sequence of squares formed from dots. This was answered correctly by over three-quarters of candidates. Some candidates joined their dots and were still awarded the mark. However, some candidates incorrectly drew a 6 x 6 square with no dots and as the question asked them to continue the pattern, gained no marks.

In the second part of (b), candidates were asked to find how many dots would be in the 6^{th} diagram of the sequence. This was answered correctly over a half of candidates. Many candidates realised that each diagram had 4 more dots than the previous diagram, but some gave the number of dots for the 5^{th} diagram (24) instead of the 6^{th} diagram, whilst others realised that the 6^{th} diagram would be an 8×8 square but gave an answer of 32 – obtained by multiplying 8 by 4.

(c) Candidates were asked to substitute two positive values into an expression written in symbols. Some fully correct responses were seen, but these were sometimes spoilt by candidates who included w or y in their final answers.

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Some candidates were awarded 1 mark for correctly substituting one of the values correctly, whilst others correctly substituted both values correctly but neglected to add the values together.

Part (c) also assessed candidates' accuracy in writing. To be awarded the OC mark, candidates were expected to show both substitutions, with no errors in mathematical form. Some candidates showed no working whatsoever for this part.

Q.6 (a) Candidates were presented with information about responses to a survey on favourite pets and were asked to finish the bar chart to satisfy this information. Many candidates drew two bars that had a total of 9 but did not ensure that the bar for Rabbit had the highest frequency, with bars of height 5 and 4 commonly seen.

(b) Wasn't well answered, with some candidates being awarded 1 of the 2 marks for giving a fraction with the correct numerator (7) or denominator (22). Many candidates simply described the probability, with unlikely commonly seen.

Q.7 In this question, candidates needed to find the number between 14 and 20 that had an odd number of factors. Some candidates identified 16 as the number but did not give a correct list of its factors. Many candidates seemed to misunderstand the question and only considered the factors of odd numbers between 14 and 20, with factors of 15, 17 and 19 the common incorrect responses.

Q.8 Just under three-quarters candidates were able to correctly square 2.7 in (a), with others often multiplying 2.7 by 2.

Over a half of candidates were able to find the square root of 11.56 in (b), with some incorrectly dividing it by 2.

In part (c), most of the candidates who demonstrated awareness of how to calculate 60% of a number, first found 10% before multiplying it by 6. Some made numerical errors with this question, even though this is a calculator allowed paper.

Q.9 In this question, candidates were given $\frac{1}{5}$ of a number and asked to find the original value. While some candidates realised the need to multiply the given value by 5 or divide by $\frac{1}{5}$, many incorrectly divided the value by 5.

Q.10 In this question, candidates were asked to label a spinner in accordance with two given conditions. Most responses ensured that red and blue were equally likely to occur, but very few ensured that yellow was likely to occur.

Q.11 Some candidates were able to successfully enlarge the given shape by scale factor of 3 in part (a), but many found it challenging. Some enlarged by scale factor of two and were awarded 1 mark.

Less than a quarter of candidates were able to translate the shape in part (b). Some seemed to confuse the different types of transformation, with others reflecting the shape in two or four quadrants.

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Q.12 Question 12 was a multi-step problem which tested candidate knowledge and application of two basic angle rules – angles on a straight-line sum to 180 degrees and the interior angles in a quadrilateral sum to 360 degrees. Many candidates were able to find the first missing angle (68 degrees) in this question but were unable to go any further.

This question also assessed candidates on their organisation and communication. As this was a multi-step problem, it was important for candidates to present their responses clearly to the marker. However, as many candidates stopped at the first step of the calculation, they were unable to be considered for the OC mark.

Q.13 (a) Very few fully correct tables were seen. Some candidates were awarded 1 mark for giving values of red and blue counters that added to 90, with others awarded 1 mark for angles for red and yellow that added to 180 degrees. However, it was evident that many struggled to understand how the proportion of counters related to the angles in the pie chart and failed to fully engage with this question.

(b) Many candidates struggled to answer part (b), which required them to complete the pie chart using the angles calculated in part (a). Incorrect angles in part (a) were followed through into part (b), but it was clear that many candidates find it challenging to use a protractor accurately.

(c) In part (c), candidates often tried to describe the probability rather than writing it as a fraction. Some candidates wrote the probabilities of blue and red from their table but did not attempt to add them.

Q.14 Candidates were asked to find a number that satisfied the given three conditions and required understanding of factors and multiples. Some candidates were able to identify the correct answer (30). However, it was more common to award 1 mark for identifying a value which satisfied just two of the conditions.

Q.15 This question tested candidates' ability to correctly use a calculator and required them to round their answer to one decimal places. While there were some fully correct responses seen, other candidates were able to carry out the calculation correctly but then were unable to round their answer appropriately – either incorrectly rounding their answer down to 34.2 or offering their solution to two decimal places.

Q.16 (a) Some candidates attempted to add the values given in the table but then did not go on to subtract the total from 1.

(b) A minority of candidates continued to work with Ysgol Bryn which was used in part (a), rather than Ysgol Dewi.

Q.17 (a) Very few fully correct responses were seen, with candidates clearly finding it difficult to draw bearings. However, some candidates were awarded 1 mark for drawing point *C* the correct distance away from *B*.

(b) Part (b) was poorly answered by candidates, who seemed to find it more challenging to measure a bearing than to draw one. One mark was available for candidates who measured the distance correctly, but many candidates lost this mark due to poor accuracy.

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Q.18 (a) Many of the candidates who attempted part (a) seemed confident in expressing one value as a percentage of another, although some left their answer as a decimal rather than a percentage. Some candidates calculated 21.76% of 32.

(b) Very few correct answers were seen in (b), where candidates were required to solve an equation with unknown term on both sides of the equation. Typically, candidates were not able to collect the terms correctly at the first stage, making two errors so they could not be considered for follow through marks.

Summary of key points

Remember to show all your workings. Whilst this is a calculator-allowed paper, a lot of marks can be lost if unsupported incorrect answers are given.

Be aware of exactly what is required to gain the OC and W marks in questions that assesses the quality of organisation, communication and accuracy in writing.

It is evident that candles need more practise of some lower-grade topics, including:

- collecting like terms
- substitution
- nets
- factors and multiples
- measuring and drawing angles
- calculating the percentage of an amount.

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MATHEMATICS

GCSE (NEW)

November 2022

UNIT 2 INTERMEDIATE

General Comments

This unit tested the content of the full specification, but an Advance Information Notice was released to centres prior to the series, giving details of the topics that would be assessed on Unit 2.

Overall, the questions were comparable with those asked on previous papers that have been sat, and the paper was a suitable and fair test for the candidates at the Intermediate level. Some questions proved more challenging than others, whilst some candidates lost marks because of incorrect numerical evaluations or giving unsupported incorrect answers.

A calculator paper is designed to assess the use of the calculator. Although non-calculator methods can yield correct responses, they often increase the difficulty of the question and result in unnecessary errors. Candidates should be encouraged to use a calculator as much as possible on Unit 2 but must remember to show their working where appropriate.

Topics which many found difficult included converting metric units such as cm^2 to m^2, working with bearings, finding the volume of a cylinder, working with bounds, and expanding brackets that involve negative terms.

Item level data is available to all centres by centre and for individual candidates with comparison of all candidates sitting these examinations. This report will focus on common errors and misconceptions to aid the interpretation of the data available.

Comments on individual questions/sections

Q.1 Both parts of this question were well answered.

Q.2 A significant number of candidates evaluated 7 × –9.2 and 6 × 4·7 correctly and gained 1 mark, for one or even both values. Many had an incorrect final answer incorrect due to the misuse of negatives.

Q.3 Most candidates correctly found angle *EBC* to be 68° and continued to use the angle properties of a quadrilateral and angles on a straight line to find the value of x.
It is important that candidates show their method as part marks can be gained, even if there is a numerical error in their calculation.
Although many of the candidates gained full marks for this question, a number lost OCW marks. Candidates needed to communicate which angle they were working with, and inappropriate mathematical form or lack of units was often seen.

Q.4 All parts of this question were well answered.
In part (a) if 45 blue counters were not stated, a follow through mark was available for 90 – 25 – ‘their stated 45’.

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A method mark was awarded for showing a correct method to find the Red or Yellow angle. Again, many candidates did gain the final mark for a follow through if their Red + Yellow angles = 180°.
The pie chart construction question was well answered, and many candidates labelled their sectors correctly.
In part (c), may gave a correct probability, with some not gaining any marks as they showed the probability of red and blue separately, but not adding them.

Q.5 Parts (a) and (c) were very well answered, with a number of correct answers seen. Candidates find converting m^2 to cm^2 and vice versa challenging. 6700 was, as expected, the most common incorrect answer seen.

Q.6 A well answered question.
Many correct answers were seen.
Those gaining one mark picked a number satisfying 2 of the conditions.
Numbers written on the answer line took precedence, however if the answer was not written there, it needed to be clearly identified for the marks to be awarded.

Q.7 Most of the candidates demonstrated that they could make accurate and efficient use of a calculator. Some marks were lost as the final answer was not given to the required number of decimal places or an incorrect first decimal place was shown.

Q.8 Many an example was seen which demonstrated the advantage of 'showing all your working' e.g. seeing '0·08 + 0·2 + 0·28 = 0·38' (having used 0·2 as 0·02) followed by '1 − 0·38 = 0·62'.
This incorrect answer of 0·62 would gain a method mark as the error is in the arithmetic. However, an unsupported incorrect answer of 0·62 would gain no marks.

Part (b) was answered reasonably well, although an answer of 35/125 was seen often.

Q.9 In part (a), 1 mark was more commonly gained for a point C 35km (7cm) away from B. Sometime this was point was placed on the line AB.
Bearings continue to prove challenging to candidates, especially using bearings that are greater than 180°.
Part (b) was a strict follow through from their AC × 5km from their diagram in part (a).
Very few candidates got the bearings mark. When an angle was given, it very frequently was not given as 3 figures.

Q.10 Some misunderstood the question in part (a) and attempted to find 32% of 21·76, rather than express 21·76 as a percentage of 32.

In part (b), common errors seen were seen in the first step of solving the equation. Follow through marks were available if candidates continued to solve their equations correctly before two errors had been made.

Q.11 This question had two parts – finding the volume of the cylinder and then finding the density of the metal.
Many candidates finding working with cylinders difficult; 2·3 × 5 was a common incorrect method.
Follow through marks were available for a correct method of finding the density using 'their derived or stated volume'.

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Q.12 The marking scheme allowed:
1 mark (B1) for any correct substitution and evaluation.
1 mark (B1) for two correct evaluations using x in the range $1{\cdot}15 \le x \le 1{\cdot}35$, but crucially one answer has to be less than 0 and one answer has to be greater than 0.
1 method mark (M1), that has to be seen, for two correct evaluations using x in the range $1{\cdot}15 \le x \le 1{\cdot}25$, but again crucially, one answer has to be less than 0 and one answer has to be greater than 0. If this is not shown, then no further marks were permitted. 1 mark (A1) for a final correct answer BUT only if the previous M1 mark awarded.

Some candidates substituted $x = 1{\cdot}2$ and $x = 1{\cdot}3$ into the expression and then simply looked at which evaluation was the closest to 0.
This does not gain a method mark (M1) nor the final mark (A1) even if 1·2 given as an answer.
Others not only lost the final A1 mark but wasted valuable time by giving an answer to a greater degree of accuracy than was asked for.

Q.13 This question involved several steps.
It was pleasing to see that some candidates realised that Pythagoras's Theorem was needed to find the length BC, however many incorrect added instead of subtracted. No marks were awarded in this case.
Those candidates that gained 1 mark for $\pi \times 9^2$, then usually gained the last mark on follow through for finding the area of the shaded area.
Many candidates thought that the area was found by evaluating $\frac{18 \times 10}{2}$.

Q.14 In part (a), many candidates gained 1 mark for showing an intention of working with width × length.
Most successful candidates factorised the area and compared 3ay with 12y. Answers that were embedded were mostly correct.
A number of candidates gave an unsupported answer of 4, which gained full marks.

In part (b)(i), answers such as "the value can't be negative" were not credited. To gain the mark, references had to be made that a negative side or length was impossible.

In part (c), the first three marks were awarded for finding the sum of both lengths. Many attempted this, but, again, the lack of brackets resulted in errors.
The final mark was awarded for finding the length of one side. A follow through was available here, as long as their expression was of equivalent difficulty; that is, in the form $ax + b$, with a & $b \neq 0$.

Q.15 Some accessible marks for those who were familiar with using trigonometric relationships in right-angled triangles. It appeared, however, that many candidates had not covered this part of the specification.
A few candidates adopted a 'round the houses' multi-step approach which, although correct, was not necessary. This approach has more potential of possible arithmetical errors arising, and marks are not awarded for a partial method.
Many candidates incorrectly wrote $YZ = 7 \times \cos 41(°)$, but could pick up 1 mark if $\cos 41 = \frac{7}{YZ}$ was shown as the first step.

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Q.16 Many candidates find questions dealing with bounds to be challenging.
In many cases, the upper and lower bounds of the given times were not shown as accurate. Many candidates could not appreciate the greatest difference was found by 'upper bound of 25·5 – lower bound of 12·4'.

Q.17 Hardly any part marks were awarded in this question. It was either the full 2 marks or no marks at all. Candidates, on the whole, find it difficult to comprehend the concept of 'reverse percentage'. Instead of equating 64 to 160% of the original number, most candidates found 160% of 64, or found 60% of 64 and then added it onto 64.

Q.18 This question was answered very well, with almost all candidates being able to correctly complete the tree diagram. A few careless arithmetical mistakes were seen (usually converting 2/5 into a decimal for the first branch), but rarely from a lack of understanding.

Having completed the tree diagram correctly, the follow up question in part (b) was not answered quite as well as part (a).
Some candidates only calculated the probability of either P(red and red) or P(blue and blue). but then did not go on to add them to get a final answer.

Q.19 Several different methods were used by candidates to solve the simultaneous equations. If these methods were valid and algebraic (as the question specified) then marks could be awarded.
The most common method was to eliminate one variable by trying to equate either the x or y coefficients. Some only multiplied the terms in x, only the terms in y, or only the terms on the left-hand side. 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 to eliminate one variable. In some cases, the requirement to subtract a negative value ('minus a minus') did lead to arithmetical errors. The question required the candidates to solve the simultaneous equations using an algebraic method. As this was on a calculator paper, no marks were awarded to those who used a form of 'trial and improvement' method to find the value of x and the value of y.

Summary of key points

- Remember to show all your workings. A lot of marks can be lost if unsupported incorrect answers are given.
- Be aware of exactly what is required to gain both the OC element and the W element in the question that assesses the quality of organisation, communication and accuracy in writing.
- Practise expanding brackets that involve negative terms such as $-2\,(4x - 10)$.
- Practise solving problems using bearings.
- Practise expressing the upper and lower bounds of numbers expressed to a given degree of accuracy, and then calculating the upper and lower bounds in the addition and subtraction of numbers expressed to a given degree of accuracy.
- Understand what is required to justify the accuracy of a solution when finding a solution to a cubic equation using a 'trial and improvement' method.

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MATHEMATICS

GCSE (NEW)

November 2022

UNIT 2 HIGHER TIER

General Comments

This unit tested the content of the full specification, but an Advance Information Notice was released to centres prior to the series, giving details of the topics that would be assessed on Unit 2.

Overall, the questions were comparable with those asked on previous papers, and the paper was a suitable and fair test for the candidates at the Higher level. The common questions to the Intermediate tier were answered well and the majority of candidates attempted the Higher tier second half of the paper with a pleasing degree of success on some questions.

Candidates should be encouraged to be as accurate as possible when using a calculator, especially when there are multiple steps to a calculation. They must appreciate the importance of retaining the whole value of an answer on the calculator to be passed to the later parts of the solution to get the most accurate final answer. Some candidates unfortunately lost final accuracy marks due to premature approximations within their solutions. However, it was encouraging to see most candidates write out their solutions to questions, even though a calculator could be used.

Topics which many candidates had difficulty with were:

- Simplifying expressions involving indices
- The relationship between the linear and area scale factors of similar shapes
- Metric conversions between length, area and volume
- Irrational numbers
- Factorising (difference of two squares)
- Sketching quadratic graphs from interpretation of the algebraic form
- Combinations and probability.

Item level data is available to all centres by centre and for individual candidates with comparison of all candidates sitting these examinations. This report will focus on common errors and misconceptions to aid the interpretation of the data available.

Comments on individual questions/sections

Q.1 Well answered. Many candidates knew how to work out the volume of the cylinder and also apply it to the density formula. Common mistakes were assuming the area of the base of the cylinder was the volume and using the density formula incorrectly by dividing the volume by the mass.

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Q.2 The majority of candidates were familiar with using trial and improvement and scored well on this question. A few still did not carry out the necessary check required in order to find whether the answer was 1·2 or 1·3 (by looking at 1·25 and in this question in particular, even 1·23 or 1·24) – these candidates only gained two marks. Some candidates also failed to give the answer to 1 decimal place.

Q.3 (a) The majority of candidates understood that a resultant negative number would be a problem, but some failed to say explicitly that a negative number could not represent a length. This was necessary to gain the mark.

(b) A fair number of candidates gained full marks for $3x + 8$. A common mistake was incorrectly simplifying $14x - 4 - 2(4x - 10)$ to $14x - 4 - 8x - 20$. If this was simplified correctly to $6x - 24$ and then halved to $3x - 12$, three marks could be awarded. This incorrect solution was often seen. However, a number of candidates could not go beyond setting up an equation correctly linking the given widths and missing lengths to the perimeter. Some tried to solve an equation for x. Furthermore, some solutions used x to represent the missing length which therefore caused confusion and errors when simplifying the expression.

Q.4 This was the OCW multi-step question on Pythagoras' theorem and calculating the areas of a triangle and a circle to ultimately work out the area of a shaded region. Many candidates did not realise that the length of *AB* was required to work out the area of the triangle. Therefore, erroneously, a number of candidates worked out the area of the triangle with the solution ½×10×18 = 90, which is incorrect as the two perpendicular sides are required. Working out the area of the circle was successfully done by most candidates. The majority of candidates could also attempt the shaded region part of the calculation.
As regards to the OCW marks, candidates are still making errors within their mathematical form, such as BC = $18^2 - 10^2 = \sqrt{224} = 14.97$. Writing $\sqrt{ANS}$ = 14.97cm, for example, should also be avoided, especially having previously written the difference of the two squares to equal 224. The explanation and structure of most candidates' solutions were done well. All explanations were relevant and in line with the pertaining mathematics. It was pleasing to note that paragraphs of explanation at the beginning or end of the solution was rarely seen.

Q.5 The question was generally well answered, although some candidates were unable to correctly rearrange the equation to make *YZ* the subject after initially gaining M1 for correctly setting up a trigonometric equation. However, many of these higher tier candidates decided not to use the expected right-angled triangle cosine ratio but use a two-step method instead. For example, some evaluated either the angle *XYZ*, to be 49° or the side *XY* to be 6·09 cm by using the tangent ratio, and then employed the sine rule.

Q.6 Although many candidates gained full marks, the most common mistake candidates made was assuming the greatest difference was by calculating 25·55–12.45, that is using the upper bound of both values. Some candidates who did appreciate which greatest and least bounds to use in the calculation, did not realise that the upper bound could be 25·55, so instead used 25·54. An M1 was available in this case.

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Q.7 Encouragingly, this question on reverse percentages was well answered by most candidates gaining both marks. Otherwise, candidates usually attempted to add 60% to the 64, rather than realise that the 64 represented 160% of the original value, and therefore gained no marks.

Q.8 (a) Very well answered by most of candidates. The awarding of full marks was mainly seen.

(b) Also well answered. The significant number of candidates who did not gain full marks knew to calculate P(B,B) and P(R,R) by multiplication of the probabilities along the tree diagram of part (a). However, they did not proceed to add them together which was the trigger for the M1 mark.

Q.9 Well answered by the higher tier candidates. Most candidates could appreciate how to solve the equations algebraically, with the elimination method undoubtedly the most common method employed (the substitution method was also seen occasionally). However, unless an acceptable method was shown to eliminate one of the variables then no marks were awarded. An appropriate subtraction (or addition) was deemed to have been attempted if the unequal variable or the constant terms had been dealt with correctly. However, if an unsupported correct answer was offered, no marks were awarded, as there was an instruction in the question for candidates to show all their working. This has become necessary as some calculators will now solve simultaneous equations.
It must also be stated that a 'trial and improvement' method is not acceptable when solving simultaneous equations.

Q.10 (a) Many candidates made a good attempt at expanding the two brackets and if a quadratic expression resulted, they proceeded to simplify their quadratic correctly. It is interesting to note that although most candidates began the expansion by multiplying $2h$ and $5h$ to correctly give $10h^2$, many candidates then incorrectly wrote down the final term to be $-21t$ instead of $-21t^2$, which in this case came from the product of $3t$ and $-7t$.

(b) Poorly answered by candidates. Many candidates gave the final index as 6 from $8-2$, not realising that division would mean a subtraction of the indices seen. The correct answer should have been $8-{}^{-}2=10$. Some candidates who gave the correct answer of $7(d+5)^{10}$ unfortunately presented further erroneous work, sometimes cancelling out the bracket completely to 7^{10} or attempting to expand the bracket to $7d^{10}+5^{10}$.

Q.11 Well answered. The vast majority of candidates were able to calculate either the curved surface area of the cone or the curved surface area of the semicircle or both. However, some candidates having calculated both curved surface areas also added the area of the common circular surface. These candidates were limited to 1 mark from the possible 3 marks. It was only those candidates who calculated only the two necessary curved surfaces gained both method marks and therefore they inevitably gained the final accuracy A1 mark as well.

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Q.12 Fairly well answered. However, many candidates still do not use the quadratic formula correctly, usually because they do not handle the b term correctly if it is a negative number, either in the $-b$ part of the formula or within the discriminant. In this question the b^2 term calculated incorrectly (i.e. incorrectly calculating $(-7)^2$ to be -49) still gave a positive discriminant. Therefore, the candidate could not rely on the calculator to produce an error to determine whether the answers were correct or not.

Q.13 This was a relatively straightforward question on areas of similar shapes based on their linear scale factor of enlargements worked out from their perimeters. However, it was not answered particularly well. Many candidates still do not realise that the linear scale factor should be squared before multiplying it with the area of the smaller shape. In this question, many candidates did consider the linear ratio of the perimeters, 719/241, but then incorrectly believed this to be the area scale factor. The second part of the question was a strict conversion of the candidate's answer to the area in cm^2 to m^2. Most candidates who attempted this part divided by 100, instead of 10000.

Q.14 (a) The correct answer of 68° was seen frequently, but many candidates also quoted 32° (angles on the straight line at the tangent), as well as 80°. Moreover, 68° was incorrectly assigned to the wrong angle (usually angle *ABC*) and therefore no marks were awarded. The 'alternate segment theorem' was also incorrectly stated by many candidates, 'alternate angle theorem' being a common incorrect answer.

(b) Candidates performed better in this part of the question, with candidates often gaining full marks for either a correct answer or a correct answer on FT.

Q.15 Surprisingly, more incorrect answers were seen here than was expected. A significant number of candidates incorrectly believed that a recurring decimal is irrational. Also, many candidates simply gave a terminating decimal answer between 9 and 10, for example, 9·5.

Q.16 Few candidates gained full marks on this question. Many candidates gained a mark for factorising the common factors, kp. However, the majority of these candidates could not continue and factorise $k^2 - p^2$ using the difference of two squares.

Q.17 Poorly answered. The graph for $y = (x + 3)(x + 7)$ was the most common incorrect answer seen.

Q.18 (a) Fairly well answered, however there were two incorrect responses often seen. Some candidates failed to realise that there were two O's and therefore used 1/7, rather than 2/7 within the solution. Also, there were a number of solutions from candidates who did not realise the cards were drawn without replacement.

(**b**) The main pitfall in this question was that many candidates failed to realise that there were 3 different combinations for each of the cases of two O's or two N's. A common partially correct answer, credited with 1 mark, was the addition of one combination of two O's and of two N's.

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Q.19 Although this was a substantial higher tier 'subject of the formula' question, it was answered quite well by a fair number of candidates. Many realised that there was factorising of the common factor c^2 involved and then subsequently division and square rooting. However, most candidates did not continue correctly past the expansion of the brackets and then isolating the c^2 term.

Q.20 This was a testing final question on the paper based on combining three higher tier geometrical methods. Most candidates attempted the question and answered it quite successfully. The solution required candidates to initially employ the cosine rule in order to calculate the radius of the circle. Although many attempted this part successfully, a notable number of candidates incorrectly believed the triangle *ABC* to be a right-angled triangle. Candidates then had to use the sine rule or rearranged cosine rule to calculate the sector angle. Again, some candidates were not able to gain the marks here as they again believed the triangle *ABC* to be right-angled. However, with two previous method marks gained for calculating the radius and sector angle, the final two marks were available on FT for calculating the shaded sector area. Many candidates knew how to calculate the area of a sector. Some candidates unfortunately lost a mark due to premature approximation, usually rounding part answers to integers. Candidates should always give their answers to a few decimal places, especially when there are multiple stages.

Summary of key points

- Practise expanding brackets that involve negative terms such as $-2\,(4x-10)$.
- Know when to use right angle trigonometric ratios and when to use the Sine rule, the Cosine rule or the formula A = ½abSinC.
- Understanding the relationship between the linear and area scale factors of similar shapes and how to use them.
- Appreciate that the technique of factorising quadratics using the difference of two squares method can be used when both squared terms are variables themselves, e.g. $k^2 - p^2$.
- Rearranging formulae when the subject appears in more than 1 term (higher tier subject of the formula).

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WJEC
245 Western Avenue
Cardiff CF5 2YX
Tel No 029 2026 5000
Fax 029 2057 5994
E-mail: exams@wjec.co.uk
website: www.wjec.co.uk

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