GCSE EXAMINERS' REPORTS

GCSE (NEW)
MATHEMATICS

NOVEMBER 2021

Grade boundary information for this subject is available on the WJEC public website at:
https://www.wjecservices.co.uk/MarkToUMS/default.aspx?l=en

Online Results Analysis

WJEC provides information to examination centres via the WJEC secure website. This is restricted to centre staff only. Access is granted to centre staff by the Examinations Officer at the centre.

Annual Statistical Report

The annual Statistical Report (issued in the second half of the Autumn Term) gives overall outcomes of all examinations administered by WJEC.

MATHEMATICS

GCSE (NEW)

November 2021

FOUNDATION UNIT 1

General Comments

General Comments

The number of candidates entered was lower than for previous November series, except in 2020. As a result of the Covid pandemic, the examination tested a reduced content of the normal specification.
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 Foundation level.
Some questions proved more challenging than others, particularly towards the end of the paper. There seemed to be particular difficulty in working out the answer to division calculations where the answer wasn't an integer. This is just one example of problems with number work.
Topics which proved challenging included all fraction work as well as indices.
There were a number of questions where it was particularly important to read the instructions carefully. Marks may have been lost unnecessarily by candidates not doing this.
There were occasional problems reading some of the handwriting presented.

Comments on individual questions/sections

Question 1a
The most challenging part of this question seemed to be deciding how to spell the words ninety, forty and eight correctly. A few candidates wrongly thought that millions were part of the answer and others did not realise that the 0 indicated that there were actually ninety-five thousand not nine thousand five hundred. Frequently, the word 'and' was missing.

Question 1b
A significant number of candidates did not seem to know that finding the sum of two numbers meant that they should be added together.

Question 1c
This was generally well answered though some divided 250 by 5 rather than multiplying the numbers together.

Question 1d
A considerable number of candidates did not attempt this question at all. Of those who did, very many halved 624 instead of dividing it by 3, maybe because that was easier to work out. Many didn't set out a division calculation in the traditional way. Doing this may have helped them answer the question correctly. The correct answer was 208 but many were unable to deal with the central digit in the answer, 0, just leaving a space.

Question 1e
To gain any marks at all in this question, at least 4 correct factors had to be identified with no incorrect factors. To be awarded full marks, all 6 factors of 18 needed to be written down with no incorrect answers. Many were able to find all the factors. The most common one to be left out was 18.

Question 2a
Both parts of Question 2 were standard measuring questions, but they proved difficult for many candidates.
There was some confusion as to which side of the triangle needed to be measured. The side *AB* was specified. Many wrongly measured the length of the base of the triangle, *AC.* Several answers were given in cm instead of mm which were the specified units in the question. It is important to read the question carefully, rather than just guessing what answer is required.

Question 2b
There were a number of random wrong angles given for this answer. Also, some measured the length of one of the arms of the angle even though an angle was required.

Question 3a
The answer to this question had to be both a square number **and** an even number. From the given list, only 16 fitted these criteria but many candidates chose a number which was either a square number (9) or even (2, 12) but not both as required.

Question 3b
The answer to writing 75% as a fraction in its lowest terms was ¾. No mark was awarded to writing the answer as 0·75 or as 75/100.

Question 3c
This question was answered well.

Question 4
The shape to be reflected was made up of two straight lines and a curve. Very many reflected the longer straight line correctly but had difficulty with recognising the curve and then reflecting it. The reflected lines had to pass through the correct intersection points of the grid lines.

Question 5a
Very many candidates thought that 1 kg = 100 g so there were lots of wrong answers of 430 g as well as other random wrong answers. Consequently, they lost both marks. Most who knew that 1 kg = 1000 g were able to multiply 4·3 by 1000 correctly.

Question 5b
To gain the first mark, candidates needed to state that they were working out 3 × 100 ÷ 6. The second mark was awarded for calculating this correctly as 50 cm. However, several calculated only part of this giving 300 cm or 0·5 m as their answer. Each of these was awarded SC1.

Question 6
Candidates found marking the position of B easier to do than that of A. They realised that as there were no green balls, then B should be marked at 0 on the probability scale. The point A should have been marked at 0·7. As the scale was 10 cm long, then A should have been marked 7 cm from the left hand end, as accurately as possible. Many candidates marked A anywhere in the right-hand half of the scale as they indicated that they thought it was ‘likely’ that a yellow ball was chosen. However, questions which include the word ‘probability’ must

use numerical values. It is only if the word ‘chance’ is used then answers involving words like ‘unlikely’, ‘impossible’ are allowed.

Question 7
Candidates generally responded well to this question where $x = 6$ had to be matched to an equation for which it was the solution. There were two equations for which this was true. The most popular wrong answer was $x - 9 = 3$.

Question 8
Though some thought that the angle in a full turn is 180°, many candidates knew that the eight sectors fitted together to complete an angle of 360° and realised that they needed to work out 360 ÷ 8. However, they were unable to do the necessary arithmetic or didn’t know of the method to use. Consequently, many lost the third mark.

Question 9
Some still confuse perimeter with area. It wasn’t necessary to draw a diagram to show the length and width of the rectangle, but it would have helped those who found it difficult to respond to the question.
It was necessary to work out 15 + 15 + 7 + 7 = 44 cm. Then the length of the side of the square was found by working out 44 ÷ 4 = 11 cm. Alternatively, the calculation could be shortened to (15 + 7) ÷ 2 = 11 cm.
The final two marks were OCW marks. To be awarded the Organisation and Communication mark, candidates needed to label their work by making statements like,
‘Perimeter = 15 + 15 + 7 + 7 …’ .
They also needed to write a conclusion explaining their answer.
To be awarded the Accuracy of Working mark, then all working needed to be shown. An answer alone was not sufficient.
There shouldn’t have been any ‘trailing’ calculations, e.g., 15 + 15 = 30 + 7 = 37 + 7 = …
The answer must have included appropriate units, cm in this question.

Question 10a
Candidates needed to use the fact that the sum of the three angles of a triangle is 180°. Many used this; alternatively, others subtracted 37° from 90°. Candidates found this question more straightforward than 10b.

Question 10b
To find a, 129° needed to be subtracted from 180°. Then $b = 360° - (82° + 153° + a)$, using their value for a. Working through these two steps proved difficult for many. Several added together all the angles they could see, including the exterior angle. They were unable to proceed as their total was greater than 360° though many didn’t seem to know that the sum of the angles of a quadrilateral is 360°. There was a lot of random arithmetic, including halving a number they’d somehow found and writing a and b both equal to this.

Question 11a
Very many wrongly thought that $\frac{1}{3}$ of $\frac{1}{3}$ is equal to $\frac{2}{6}$. It was difficult to know whether the candidates thought that ‘of’ means add and consequently wrongly added the fractions using their own wrong method for that.

Question 11b
Candidates found working out 0·02 × 0·8 easier to do than multiplying fractions.

Question 11c
Common wrong answers were 0·15 or $1{\cdot}5^{10}$.

Question 12a
Several candidates who were able to multiply the two fractions together left the answer as 2/20, consequently not giving the answer in its simplest form and so they lost the mark allocated to this question.

Question 12b
Calculating powers of numbers was difficult for many; they did not appear to be familiar with the rules of indices.
3^3 was frequently wrongly written as $3 \times 3 = 9$ and 7^2 as $2 \times 7 = 14$.
Many who worked out that they needed to calculate $27 \div 4$ were unable to do this correctly. They would write the answer as 6 remainder 3, frequently as 6·3, but did not continue the division to 6·75.

Question 13
This question was well answered. However, a significant number wrongly added the three given dimensions of the cuboid.

Question 14
It was necessary to find $\sqrt{81}$ and 7^2. This was difficult for many candidates. The first mark was awarded for finding both 9 and 49.
Then $n = 49 - 9$.
Many found writing out the mathematical statement from the sentences in the question to include n too difficult to do and consequently worked with the numbers alone. Even then, it was still a challenging question for the majority.

Question 15
There seemed to be a poor grasp of what needed to be done in this question as there were three separate steps.
The first step in answering this question was to identify the letters which allowed points to be awarded. Many candidates were able to do this, but few could progress further to complete the question correctly. Many were unable to work out that the number of winning cards was $2/6 \times 24 = 8$.
From there, they needed to work out the total number of points ($8 \times 10 = 80$). The final mark was awarded for 80 and the conclusion, No. The conclusion alone was not sufficient for the mark; it had to be supported by the number of points.

Question 16
It was hoped that candidates could write down the formal statement using alternate angles, $4x + 5 = 57$. However, this was rarely seen. Very many wrongly wrote that $4x + 5 = 9x$ and couldn't proceed from there.
Some did subtract 5 from 57 and subsequently divided that answer of 52 by 4. So, the idea of alternate angles being equal was used, but informally.

Question 17
It was very rare to see all three conditions satisfied by the four numbers given as answers in the boxes. The most common correct condition satisfied was the mean being 5, easily checked by the total of the numbers being 20.
The range of 6 was the next most commonly correct condition satisfied.
Finding the median to be 4 was made harder by there being an even number of boxes. So, there were frequently one or two correct conditions but only occasionally three.

Question 18
The final question of the paper proved to be very challenging for most candidates. Even for those who remembered that speed = distance /time, changing 2 hours 30 minutes to hours only was difficult. So, many wrongly wrote 2·3 hours.
Those who noticed that 100 could be split into 40 + 40 + 20 and 2 hours and 30 minutes into 1 hour + 1 hour + ½ hour found the speed to be 40 mph quite easily.

Summary of key points

- Take care with handwriting; tiny or illegible writing was significantly a greater problem this time.
- Take care with basic numerical calculations, setting out the numbers in an organised, appropriate way.
- Be careful to use both a ruler and a protractor correctly, thinking first what the approximate answer should be to help guide you.
- Read the instructions in the questions slowly and carefully. Make sure you understand what the question is requiring you to do rather than hazarding a guess.
- All fraction work needs careful attention.

MATHEMATICS

GCSE (NEW)

November 2021

INTERMEDIATE UNIT 1

General Comments

The number of candidates entered was significantly lower than for any previous November series, except in 2020. The situation and consequences arising from the Covid pandemic meant that the examination tested a reduced content of the normal specification.
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 evaluation.
Topics which many found difficult included, questions involving manipulation of fractions, surface area of a cuboid, finding the Lowest Common Multiple of two numbers, finding the coordinates of the midpoint of a straight line joining two given points, expressing a number in standard form and forming and solving simultaneous equations.

Comments on individual questions/sections

Question 1(a)
Most of the candidates correctly found x to be 53°.
It is important that candidates show their method as part marks can be gained even if there is a numerical error in their calculation.
E.g., When seen, an answer of 90 – 37 = 63 would have gained the method mark. However, an unsupported answer of 63 would not have gained any marks.

Question 1(b)
Well answered, but again, showing the method used to calculate the final answer is recommended.

Question 2(a)
A multiple-choice question where the incorrect values of 2/6 and 2/9 were the ones chosen most often by those not opting for the correct answer of 1/9.

Question 2(b)
A multiple-choice question where the incorrect value of 0·16 was often chosen as the answer to 0·02 × 0·8. This type of error was also seen for question 16(b).

Question 2(c)
A multiple-choice question for which the choice of an incorrect conversion of a percentage into a decimal was evenly distributed amongst the distractors on offer.

Question 3(a)
Many candidates added the two fractions, perhaps having often encountered an addition question when looking at past papers. Candidates should take care when looking at what exactly is being asked for in a question. It is also important to read the question carefully, as several candidates did not give the answer in its simplest form.

Question 3(b)
Having written 3^3 as 27 and 2^2 as 4, a worryingly number of candidates failed to evaluate $27 \div 4$ correctly. Amongst the incorrect evaluations, the answer of 6·3 was often seen.

Question 4(a)
Very well answered by nearly all of the candidates.

Question 4(b)
Hardly any correct answers were seen. The concept of 'surface area' was lost, with many not even attempting to calculate the area of one of the surfaces.

Question 5
Those candidates who correctly gave the square root of 81 as being 9, and knew that 7 squared is 49, were able to link the information given in the question to correctly establish that the value of n was 40. Follow through marks were awarded to those who thought that 7^2 was equal to 14 and subsequently evaluated n to be 5.

Question 6
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. A solution that starts off with $2/6 \times 24 = 8$ with no explanation of 'why 2/6' or 'what is the 8' does not explain to the reader what is being calculated at each stage.
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 in order to gain an OC mark. 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 is required for the W mark.
We do not want to see, for example, 'Points = $2/6 \times 24 = 8 \times 10 = 80$'.

When a question asks for a conclusion as in, 'Do you expect Leah to score a total of 100 points?', then it is not sufficient to simply end with a numerical answer. A decision has to be noted even if only a brief 'Yes' or 'No' dependent on the calculation arrived at.

Question 7
A correct use of relationships of angles within parallel lines had to be made when forming an initial equation to be solved.
Most focused on the alternate angles shown in the diagram and used $4x + 5 = 57$, whilst a few used corresponding angles to set up the equation $4x + 5 + 123 = 180$. The question did not specifically ask for an equation to be shown, so a correct answer of $x = 13$ would gain all three marks.

Question 8
When all three marks were not awarded then in general the mark usually gained was for numbers with a range of 6. A mark for numbers with a mean of 5 was the next most often gained. Writing numbers with a median of 4 proved to be more difficult for several candidates.

Question 9(a)
Instead of expressing 54 as a percentage of 300 many of the candidates calculated 54% of 300.

Question 9(b)
Despite the question clearly asking for the average speed to be given in miles per hour several candidates converted the 2 hours 30 minutes into 150 minutes.

Question 10
The main problem for many was, not so much the sharing of a number in the ratio of 2 : 3 but, in evaluating what that number should be. An incorrect answer often seen was $a = 50$ and $b = 75$.

Question 11(a)
Not many correct answers were seen for the Lowest Common Multiple of 60 and 72. There seemed to be more emphasis given to the word 'lowest' than the word 'multiple', with many candidates opting for an answer of 2 as this was the smallest of the common prime factors displayed for each of the two numbers.
The most successful method at the Intermediate tier was to simply list the multiples of each of the two numbers and seeing that 360 was the first (lowest) common multiple reached.

Question 11(b)
A question that is normally well answered proved a challenge to many of the candidates as they could not continue after the first step of $882 = 2 \times 441$. The number 441, having neither a 2 nor a 5 as a factor and being far too large to spot that 3 was a possibility, meant that the solution was abandoned at an early stage.

Question 12.
Calculating the correct value for y when substituting $x = -1$ into the quadratic proved difficult for some of the candidates. A common error was to evaluate $7 - (-1)^2$ as $7 + 1 = 8$.
Most plotted their points accurately. There has been an improvement in the drawing of a smooth curve although some candidates lost a mark as not enough care had been taken in making sure the curve went through all of their plotted points within the permitted tolerance.

Question 13
A diagram was not given, and probably explains why nearly all candidates failed to appreciate that the diameter of 8 cm is part of the total perimeter of the semicircle.

Question 14(a)
Some candidates thought that rearranging the formula $p = 3k + 2$ simply meant swapping the p with the k and offered $k = 3p + 2$ as their answer.

Question 14(b)
Not well answered at all as most candidates were unable to find the coordinates of the midpoint.

Question 15(a)
The common incorrect answer was $5{\cdot}8 \times 10^3$.

Question 15(b)
At the Intermediate level calculations involving using the rules of indices are not well answered, let alone giving the answer in standard form. Some offered long complicated (and incorrect) evaluations which, not only gained no marks but, would have eaten up valuable examination time.
Question 16(a)
A question involving completing a tree diagram is usually well answered. This was the case again on this paper with most candidates gaining all three marks.

Question 16(b)
Some candidates are still not sure on how to deal with independent events.
An incorrect answer of 0·45 + 0·2 = 0·65 was seen on many occasions.
Sadly, even when the correct method was understood a mark was subsequently lost for an incorrect multiplication of 0·45 × 0·2 leading to 0·9 rather than 0·09.

Question 17
The question required the candidates to form two simultaneous equations to be solved using an algebraic method. Only a 'special case' single mark would be awarded to those who used a form of 'trial and improvement' method to find the value of x and the value of y.
The common error in writing the first equation was to write $2x + 3y = 19$ rather than $4x + 3y = 19$. Follow through marks were available for those who correctly solved 'their' two equations. In some cases, the requirement to subtract a negative value ('minus a minus') did lead to arithmetical errors.

Summary of key points

- Take care when undertaking simple arithmetical calculations on the non-calculator paper.
- Visualise the surface area of a cuboid and how to calculate that total area.
- Understand what is meant by Lowest Common Multiple (and Highest Common Factor).
- Finding the coordinates of the midpoint of a line segment *AB*, given the points *A* and *B*.
- Use the exam time wisely. A one- or two-mark question should not involve lengthy and complicated calculations.

MATHEMATICS

GCSE (NEW)

November 2021

HIGHER UNIT 1

General Comments

The number of candidates entered was rather lower than for most previous November series, except in 2020. Due to the Covid pandemic, the adapted examination tested a reduced content of the usual specification; nevertheless, the paper was a fair test at this tier. As is usually the case, candidates' performances reflected the increased demand as they progressed through the paper. Only a very few questions were not attempted, indicating that the entries were appropriate for this tier.
Topics which many found difficult:
manipulation of fractions (both numerical and algebraic)
finding a lowest common multiple
finding the perimeter of a semicircle
finding the coordinates of the midpoint of a straight line joining two given points
understanding and using a scale factor for similar areas
volume of a hemisphere
expressing volumes in terms of π.

Comments on individual questions/sections

Question 1
This was usually well-answered. Occasional misunderstandings included dividing 180° (or 360°) in the ratio 2:3, taking 25° as '1 share' or assuming the triangle to be isosceles.
For the OCW requirement, most candidates understood the necessity of labelling their steps e.g. 'sum of angles in a triangle' or '1 part ='. For the OC mark, the explanation of a step should accompany the relevant calculation. In particular, a few wrote all their numerical calculations, arrived at a final answer, and then wrote retrospectively about their work. Given that this was a question about angles, it was a pity that a small number did not use a degree symbol at all within their solution (and therefore lost the W mark).

Question 2(a)
A variety of successful methods were seen in obtaining the Lowest Common Multiple of 60 and 72. The most straightforward was to list the multiples of each of the two numbers and identify 360 as the LCM. A more sophisticated approach was to use products of prime factors - though this too often led to a final answer of 12 (the Highest Common Factor) or 2 (the lowest prime factor).

Question 2(b)
A correct product of prime factors was often seen. However, after a first step of $882 = 2 \times 441$, arithmetic errors were common (since neither 2 nor 5 could be used as a further factor); this usually meant that no marks could be given.

Question 3
Substituting $x = -1$ into the quadratic expression was mostly successful. Some evaluated $7 - (-1)^2$ as $7 + 1 = 8$. Most plotted their points accurately and drew a smooth curve (although a small number of candidates drew a polygon rather than a curve, by joining points with straight lines).

Question 4
While there were plenty of fully correct solutions seen, it was disappointing that many candidates did not eventually include the diameter of the circle as part of the perimeter. A surprising number used a formula for the area rather than for the circumference of a circle. Another common error was giving the circumference (or even area) of a whole circle, without halving.

Question 5(a)
The majority gained both marks here, with others losing a mark due to a sign error. Only a very few used the wrong order of operations in expressing their answer.

Question 5(b)
Very few candidates realised the need to find the midpoint of the straight line joining the points with coordinates (3,15) and (7,19). Of those who succeeded in so doing, some used a formal algebraic method, while others drew an appropriate diagram. Having found a midpoint, even fewer candidates understood how to show that it would lie on the line with the given equation of $y = 3x + 2$.
(Many showed that neither (3,15) nor (7,19) would lie on the line, without any attempt to find the coordinates of the midpoint. This gained no marks.)

Question 6(a)
The majority gave the correct number in standard form. If incorrect, it was usually given as $5{\cdot}8 \times 10^3$ or $5{\cdot}8 \times 10^{-4}$.

Question 6(b)
The majority answered this well, although there were some careless place-value errors, notably in giving the denominator of 2×10^3 incorrectly as 200.

Question 7(a)
Most candidates gained the three marks for completing the tree diagram. (A small number of candidates lost the accuracy mark for making an error in subtracting 0·55 from 1.)

Question 7(b)
Most showed the appropriate calculation of $0{\cdot}45 \times 0{\cdot}2$, though it was common for this to lead to 0·9 rather than 0·09.

Question 8
A good number of fully correct solutions were seen. However, forming the two simultaneous equations did prove challenging for some. The first equation was too often given as $2x + 3y = 19$ rather than $4x + 3y = 19$. Some wrote down the perimeter of the square as $6x – y + 6x – y + 12 + 12$ but did not equate their expression to 48. The question specified the need for an algebraic method, and only a ‘special case’ single mark was awarded to those who used a form of ‘trial and improvement’ method to find the value of x and the value of y. If the equations were not correctly formed, follow through marks were available for those who correctly solved ‘their’ two equations. Sign errors were sometimes made in solving the equations, as well as numerical errors in multiplying.

Question 9
Although most identified the enlargement, relatively few gave the correct scale factor of –½ (often giving –2 or ½). A surprising number appeared to identify the centre of enlargement but did not gain the mark because they wrote the coordinates wrongly as (0,1) rather than (1,0). A lack of appropriate terminology (enlargement, scale factor, centre of enlargement) was prevalent. Some candidates failed to observe the requirement to describe a single transformation, with many stating various combinations of reflections and rotations with their enlargements.

Question 10
Plenty of secure algebra was seen in this question. Predictably, however, a sign error in the fourth term of the numerator was the most common mistake. Unfortunately, some weaker candidates were unable to make a start.
Even though it was unnecessary, some candidates chose to expand the brackets in the denominator; in some cases, they did so incorrectly and therefore lost the final mark. (This would have been avoided had they left the denominator in its factorised form.)

Question 11
The overall response here was disappointing. Most candidates used 7/5 or 1·4 as a scale factor for area, hence gained no marks. Of those who did attempt to square 1·4, not all could do so accurately. It was sometimes frustrating that the second mark was lost due to the lack of a clearly stated conclusion (e.g., ‘Mari is not correct’).

Question 12
Fluent algebra skills were again shown here, with many gaining all three marks. However, some only gained the first mark, as they were unable to proceed (by factorising) beyond the initial step of rearranging the equation.

Question 13
While the majority of successful candidates solved the quadratic equation by factorising, a few gained full marks by using the quadratic formula. After factorising, there were sometimes sign errors in obtaining the answers for the final mark.

Question 14(a)
Many gave the correct answer of 1/8. Common incorrect answers were 8, –8 or –6.

Question 14(b)
Most candidates started by converting 0·0222… to 2/90. A significant number were then unable to correctly add 1/3, seemingly not recognising the need to obtain a common denominator.
A different successful approach was to start by adding 0·333… to 0·0222…, then convert the new recurring decimal to a fraction. Candidates occasionally produced 0·353535… rather than 0·3555…., in which case there were follow through marks available.
Errors in place value were sometimes seen when multiplying a recurring decimal by 10 or 100.

Question 15
It was rare to see a full solution for this question, with many candidates unable to make a meaningful start. Candidates needed to equate the total volume of 63π to the sum of the volumes of the cylinder and hemisphere. The volume of the hemisphere proved particularly challenging, and it would have helped many candidates had they realised that half of 4/3 is 2/3. Some used the formula for surface area instead of volume for the hemisphere. A minority undertook lengthy and unnecessary calculations involving multiplying or dividing by 3·14.

Question 16(a)(b)(c)
For this multiple-choice question on surds, those candidates who used the working space tended to be the most successful. Many candidates selected all three correct answers, although 4 was a common incorrect choice for part (b).

Question 17
Many candidates showed secure understanding of the symmetry of the trigonometric graph by giving both correct solutions to the equation. If neither of the correct solutions was seen, a 'special case' mark was available for clear use of 180°–n and 180°+n. (This mark was not awarded without working being shown, as the answers could have come from 270°– n and 270° + n. This is a case which illustrates the importance of showing working to gain part marks for a question.)

Question 18(a)
This was well-answered by most, though some candidates did not know how to multiply their fractions correctly.

Question 18(b)
A good proportion gained all three marks here, which was pleasing at this late stage of the paper. Of those who succeeded, almost all used the efficient method of subtracting P(3,3,3) from 1. The alternative method, accounting for all possible outcomes other than (3,3,3), rarely led to success due to the large number of calculations involved, including the need to consider all permutations.

Summary of key points

- Understand how to add or subtract fractions.
- Understand how to obtain the Lowest Common Multiple (and Highest Common Factor).
- Know how to find the coordinates of the midpoint of a straight line joining two points.
- Avoid unnecessary algebraic or numerical calculations as they can lead to the loss of marks if done incorrectly.
- Understand and use scale factors in one, two or three dimensions.
- Work with exact volumes in terms of π.

MATHEMATICS

GCSE (NEW)

November 2021

FOUNDATION UNIT 2

General Comments

The number of candidates entered was lower than for any previous November series, except in 2020. The situation and consequences arising from the Covid pandemic meant that the examination tested a reduced content of the normal specification.
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 Foundation level.
Topics which many found difficult included, questions involving the properties of quadrilaterals, formation of expressions, solving linear equations and conversion between imperial and metric units.

Comments on individual questions/sections

Question 1(a)
Most candidates answered this part correctly. Those who gave incorrect answers typically used non-calculator methods despite this being a calculator-allowed paper.

Question 1(b)
This part was answered correctly by over half of candidates. 8226 was the most common incorrect answer, obtained by adding the two values in the calculation.

Question 1(c)
This part was well answered, with over three-quarters of candidates getting the correct of 186.

Question 1(d)
Candidates found 1(d) to be the most difficult part of question 1, with only half of candidates getting the correct answer of 45.

Question 2(a)
This part was answered less well than anticipated, with some candidates confusing what is meant by certain and likely. These candidates typically wrote 5 on only three cards, rather than the four required for a correct answer.

Question 2(b)
Candidates answered this part more successfully that 2(a), suggesting that they have a greater understanding of what is meant by an even chance than something that is certain.

Question 2(c)
Over three-quarters of candidates answered this part correctly, writing exactly one 2 and any other three numbers.

Question 3(a)
Over half of candidates were able to write the given number in figures. The most common incorrect answer was 4065, which came from candidates omitting a zero.

Question 3(b)
This part required candidates to round to the nearest hundred and was well answered. Some candidates incorrectly rounded to the nearest thousand or gave an answer of 5478.

Question 4(a)
This part was poorly answered, with less than a quarter of candidates correctly selecting rhombus as their answer. Nearly all candidates who answered this part incorrectly selected square as their answer.

Question 4(b)
Approximately half of candidates correctly selected equilateral triangle as their answer for this part.

Question 5
Candidates engaged well with this question, though few fully correct answers were seen. The two centre values, 85 and 42, were the values which candidates were able to find. Candidates found the top right value (41) the most difficult value to work out.

Question 6(a)
Over three-quarters of candidates were able to find the next term in the given linear sequence.

Question 6(b)
Candidates were slightly less successful in this part, where they had to identify the rule, rather than give the next term in the sequence. Some incorrect answers of ‘add 13’ were seen.

Question 6(c)
This part was poorly answered by candidates, with less than a quarter writing the correct expression. Many candidates wrote numerical answers to this part, often taking x to be 10.

Question 7(a)
Some candidates were able to calculate the mean of the four numbers correctly, but sometimes those who knew the correct method made calculation errors, despite them having the use of the calculator. Many candidates simply calculated the total of the four numbers.

Question 7(b)
Most of the candidates who answered this part correctly added 1 onto each of the numbers in the list and recalculated the mean, rather than simply adding 1 onto their answer in 7(a). Some candidates incorrectly added 4 onto their answer for 7(a).

Question 8(a)
This part was well answered, with approximately 70% of candidates correctly squaring 4.8. The common incorrect answer was 9.6, obtained by multiplying 4.8 by 2.

Question 8(b)
This part was answered less successfully than 8(a), with candidates halving 62.41, rather than calculating its square root.

Question 8(c)
Some candidates multiplied 325 by 4 in this part, whilst others divided by 4. It was common to see the use of non-calculator methods, such as partitioning, to calculate the given percentage, despite this being a calculator-allowed paper. These candidates often made numerical errors or incorrectly followed their method.

Question 9
In this question, candidates were assessed on the quality of their organisation and communication. Some candidates presented their response in a structured way and laid out their working in a way that is clear and logical, whilst others just wrote an unaccompanied answer.

There were three conditions given in the question to help candidates find the missing number. Most candidates gave answers which satisfied one or two of the conditions, but not all three, with 45 and 72 often seen.

Question 10
In this question, candidates were asked to find the coordinates of the midpoint of the line. Some incorrect answers were the correct coordinates reversed, but a significant number struggled with the concept of midpoint.

Question 11(a)
In this part, candidates were assessed on their accuracy in writing. Very few candidates showed all their working and used correct mathematical form.

An embedded answer, such as $7\times2 - 3 = 11$, would be awarded both marks if it was not later contradicted. This was the most common way that candidates were awarded both marks for this question, with very few candidates able to correctly follow a more traditional algebraic method to solve the equation.

Question 11(b)
Some fully correct answers were seen to this part, but many candidates who engaged with this question were awarded only 1 of the 2 marks. If the correct answer of 10 was not awarded, then a mark was available for showing either $17{\cdot}4$ or $-7{\cdot}4$.
Writing $17{\cdot}4 + 7{\cdot}4 = 24{\cdot}8$ would gain one mark, but an unsupported answer of $24{\cdot}8$ was not awarded any marks. This emphasises the importance of candidates showing their workings.

Question 12
Candidates found this question challenging, with very few fully correct answers seen. Some candidates who engaged well with this question gave unrounded answers, missing out on the final mark. M1 was often the only mark awarded for multiplying 200 or 440 by a value between 320 and 330. No marks were awarded for candidates who multiplied 200 by 440 – this was often seen.

Question 13(a) and 13(b)
Many candidates found it difficult to interpret the group sizes shown in the two tables, with less than a quarter of candidates getting 13(a) correct and even fewer getting 13(b) correct.

Question 14(a)
Both marks were rarely awarded in this part. Candidates often gave the date as the 22nd March having simply added the 2 days of 'battery life' to the 20th March, forgetting about the additional 10 hours.

Question 14(b)
Over one quarter of candidates did not attempt this question.
One of the approximate equivalences that candidates are expected to know, as noted in the specification for GCSE Mathematics, is that 8 km ≈ 5 miles. Very few candidates were aware of this equivalence – those who were, typically went on to get both marks.

Question 15
This was not very well answered. It was common for candidates to confuse area with perimeter or to try to measure the length of PQ with a ruler. Very few candidates realised that calculating the square root of the area of a square would give the lengths of the sides of that square.

Question 16(a)
This part wasn't well answered. Some candidates demonstrated that they could use of a calculator effectively but lost the second mark as their final answer was not given to the required number of decimal places or an incorrect third decimal place was shown.

Question 16(b)
This was the least attempted question on the paper, with nearly 30% of candidates not attempting this part and few correct answers seen. Some candidates were awarded 1 mark for 17.5% of 1600, whilst others were awarded 2 marks for giving an unrounded final answer.

Question 17
It was rare to see a fully correct answer to this question. Some candidates were awarded 2 marks for finding the missing probability in the table, but very few knew how they could go on to calculate the expected profit.

Summary of key points

- Calculators should be used to carry out calculations on a calculator-allowed paper, as non-calculator workings were often seen.
- Be aware of the properties of triangles and quadrilaterals.
- Use calculator methods to calculate the percentage of an amount, as non-calculator methods were often incomplete or led to numerical errors.
- Solve linear equations by the traditional algebraic method, rather than give 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.
- Be familiar with the approximate equivalences between the metric and imperial units as noted in the GCSE Mathematics specification.

MATHEMATICS

GCSE (NEW)

November 2021

INTERMEDIATE UNIT 2

General Comments

The number of candidates entered was significantly lower than for any previous November series, except in 2020. The situation and consequences arising from the Covid pandemic meant that the examination tested a reduced content of the normal specification.
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.
Topics which many found difficult included, questions involving grouping of discrete data into class intervals, conversion between imperial and metric units, formation of expressions, formation and manipulation of simple linear inequalities, and factorising quadratic expressions of the form $x^2 + ax + b$.

Comments on individual questions/sections

Question 1(a)
Most of the candidates correctly found x to be 2.
An embedded answer shown as 7×2 – 3 = 11 would be awarded both marks. Unfortunately, some candidates will show the above and then contradict themselves by writing $x = 11$ or $x = 14$ and be deducted a mark. Embedded answers should not be encouraged.

Question 1(b)
Well answered, but showing the method used to calculate the final answer is recommended. If the correct answer of 10 was not given then a mark was available for showing either 17·4 or −7·4. So, writing 17·4 + 7·4 = 24·8 would gain one mark. An unsupported answer of 24·8 however would not gain any mark. It's always wise to show each step of a solution.

Question 2(a)
A multiple-choice question where several of those who chose the correct fraction had used the answer lines to list the value of each of the fractions displayed.

Question 2(b)
A multiple-choice question where again many of the successful candidates had made use of the answer lines to test if the numbers offered were a factor of 92.

Question 2(c)
A multiple-choice question which was well answered showing a good understanding of the term 'multiple'.

Question 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.

A solution that starts off with 440 × 200 × 325 = 28 600 000 with no explanation of why the calculation is being considered or where the 325 came from does not explain to the reader what is being done at each stage of their response.
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. 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 is required for the W mark.
We do not want to see, for example, 'Clips = 440 × 325 = 143 000 × 200 = 28 600 000'.
It is also important to distinguish whether a number refers to 'boxes' or 'clips'.
The actual question was well answered although some gave their answer to the nearest million (29 000 000) rather than to the nearest ten million (30 000 000).

Question 4(a) and 4(b)
Many candidates found it difficult to interpret the group sizes shown in the two tables.
There were conflicting answers seen between the numbers written on the answer line (which took precedence) and the numbers the candidate had written in the blank spaces on the new table. Those who wrote, e.g., 8·3, as an answer should realise that whilst 8·3 is indeed a number that it is not possible to have anything but whole numbers in this instance.

Question 5(a)
Well answered although quite a number of candidates gave the date as the 22nd having simply added the 2 days of 'battery life' to the 20th March, and forgot about the additional 10 hours.

Question 5(b)
One of the approximate equivalences that candidates are expected to know, as noted in the Mathematics specification, is that 8 km ≈ 5 miles. Many are familiar with the equivalent approximation of 1 mile ≈ 1·6 km. For this examination, stating that 3 miles is approximately 5 kilometres is not accepted. The final mark for this question was only awarded to candidates who showed that 15 miles was approximately 24 kilometres or that 25 kilometres was approximately 15·625 miles, AND gave a verdict (be it 'yes' or 'no') on Helen's claim.

Question 6
Common errors were, (i) to confuse area with perimeter and (ii) a failure to realise that the square root of the area of a square would give the lengths of the sides of that square.

Question 7(a)
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 third decimal place was shown.

Question 7(b)
Not as well answered as part (a). An error that was evident on several occasions was to somehow treat the 17½% given in the question as (17 × ½)%.
The correct answer for this part of the evaluation, 17½% of 1600 = 280, thus became, (17 × ½)%. of 1600 = 8½% of 1600 = 136.

Question 8
Although many of the candidates gained full marks for this question, a number of them were fortunate that it was not designated as an OCW question. Presentation was poor, as values relating to 'probabilities', 'number of winners' and 'money' were all used in inappropriate mathematical form. This led to some candidates failing to obtain all the available marks due to simple calculation errors.

Question 9(a)
Only fairly well answered. Some carelessly gave the first term as 1·3 instead of −1·3.

Question 9(b)
Again, only around half of the candidates gave the correct answer. The common error was to give the value of the first whole number (14) in the sequence rather than the term (10^{th}).

Question 10
Many candidates do like their solutions to have a numerical answer and much prefer equations to expressions. So, in a case such as this we saw several potential correct answers not fulfilled as 4(3a – 7) + 2(5a + 4) became 4(3a – 7) = 2(5a + 4) or 4(3a – 7) + 2(5a + 4) = 180.
For those who stuck with an expression several started off by either considering only two sides, 2(3a – 7) + (5a + 4) or sometimes only three sides, 2(3a – 7) + 2(5a + 4). In these cases, follow through marks were available for correct removal of brackets and correct collection of like terms.

Question 11
Most candidates were able to find the number of part-time staff who were from North Wales. One common error in trying to find the number of full-time staff from North Wales was to ignore the 144° on the pie chart and assume that it looked about ⅓ of the 150 total for full-time staff. A few candidates were unable to engage with what was required to answer the question and tried to evaluate 90/96 + 144/150.

Question 12
The mark scheme allowed,
1 mark (B1) for any correct substitution and evaluation.
1 mark (B1) for two correct evaluations using x in the range 2·25 ≤ x ≤ 2·45, but crucially one answer has to be less than 20 and one answer has to be greater than 20.
1 method mark (M1), that has to be seen, for two correct evaluations using x in the range 2·25 ≤ x ≤ 2·35, but again crucially, one answer has to be less than 20 and one answer has to be greater than 20. 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 = 2·3 and x = 2·4 into the expression and then simply looked at which evaluation was the closest to 20. This does not gain a method mark (M1) nor the final mark (A1) even if 2·3 is given as an answer.
Some lost the final A1 mark by giving an answer to a greater degree of accuracy than was asked for.

Question 13
Many attempted to find the value of x by trial and improvement rather than by forming a linear equation. Having found x to be 21 they were able to show by substitution that none of the angles were 90°.
The alternative method of assuming that each angle in turn was equal to 90° and proceeding to show that the sum of the angles was then not 180° was not seen at the Intermediate level.

Question 14
Well answered by those familiar with using trigonometric relationships in right-angled triangles. In most cases this question either gained full marks or zero mark for the candidate.

Question 15(a)(i)
Most of the candidates expanded the bracket correctly. The common errors were to give the first term as $3x^k$ or, having obtained the correct expansion of $x^3 + 7x$ continue to give a final answer of $7x^4$.

Question 15(a)(ii)
When expanding the two brackets several of the candidates remembered the acronym FOIL (they wrote it in large letters on the page) but were unable to implement the procedure correctly. The most common error was in writing the number term as −20 instead of +20.

Question 15(b)(i)
Very few of the candidates wrote any kind of inequality let alone a correct inequality.

Question 15(b)(ii)
The few candidates who had given the correct inequality in (i) were able to use it to find the answer to part (ii) efficiently.
Others, who had no inequality in part (i) 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 6 and were awarded all three marks.
The disadvantage of not using an inequality is that no part marks or follow through marks can be given for part (ii), it's 3 marks or nothing.

Question 16(a)
A multiple-choice question where the answers offered were spread evenly among the five choices on display.

Question 16(b)
The common errors were, (i) not giving the exact final answer of 248·832, but to round or truncate the number, (ii) approximate each value found at each step to a whole number so that the final answer was inaccurate, (iii) go one step further than required in thinking that 'Diagram 6' would be $100 \times 1{\cdot}2^6$ rather than $100 \times 1{\cdot}2^5$.

Question 17
Some factorised correctly but then did not proceed to solve the equation.
Many tried to solve by 'trial and improvement'. None were successful as they did not realise that there were two solutions. Using the quadratic formula (not on the Intermediate specification) would only lead to the final B1 mark.

Summary of key points

- Solve linear equations by showing each step of the solution rather than give 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.
- Get an understanding of what information can be taken, and the interpretation of data shown, from a grouped frequency table.
- Be familiar with the approximate equivalences between the metric and imperial units as noted in the GCSE Mathematics specification.
- Distinguish the difference between an expression and an equation and how each one should be dealt with when answering a question.
- Practise writing an inequality showing the information given in a question.

MATHEMATICS

GCSE (NEW)

November 2021

HIGHER UNIT 2

General Comments

The number of candidates entered was lower than for previous November series, except in 2020. The examination was based on reduced content from the normal specification due to the impact of the Coronavirus pandemic. Holistically, the paper had a good coverage of the topics in the syllabus with varying levels of difficulty, allowing candidates to show an appropriate level of mathematical understanding. However, there was still a sense that some candidates were entered for this tier without covering the whole of this adapted syllabus. Some of the questions were quite testing and required the candidate to have sufficient knowledge of the relevant topics to access them.

Comments on individual questions/sections

Question 1
Most candidates gained at least 1 mark for this question. However, three errors were frequently seen in their responses if full marks were not awarded:
(1) The failure to add all four sides (expressions) together for the perimeter. A number of candidates added the two expressions for the sides but then did not double that expression afterwards.
(2) Once an expression was found for the perimeter, some candidates proceeded to create an equation from their expression which lost them the final mark.
(3) Mistakenly multiplying the two sides together to calculate the area.

Question 2
The majority of candidates could work out that there were 24 part-time workers and 60 full-time workers in North Wales. However, some candidates failed to gain the final A1 mark, because they did not consider the numbers of workers as 24 + 60 = 84, from the total workforce of 246. If the number of workers were presented as fractions (i.e., 24/96 and 60/150), many made the incorrect assumption of adding them together.
Other candidates did not realise the need to firstly calculate the number of part-time and full-time workers at the company and simply added the probabilities (written as fractions), be it $\frac{90}{360} + \frac{144}{360} = \frac{234}{360}$ or $\frac{1}{4} + \frac{2}{5} = \frac{13}{20}$. They gained no marks at all.

Question 3
The trial and improvement question was answered well with a significant number gaining all four marks. Most candidates made the final check of $x = 2{\cdot}35$ to confirm the root to be $x = 2{\cdot}3$ and hence gain the final M1A1 marks. As the evaluated value for $x = 2{\cdot}35$ gave an answer of 20·0, correct to 1decimal place, some candidates unfortunately concluded that the root was $x = 2{\cdot}35$.

Question 4
The question was generally answered well by candidates who set up an equation showing the sum of the three angles (expressions) equalling 180° and then finding the *x* value. However, some candidates did employ an alternative method to show the answer. They started with the false hypothesis that one of the angles was 90°, and then proceeded to show that the hypothesis was incorrect. For a full solution, they should have shown that each of the three angles could not be 90°. Candidates who did follow this alternative approach usually only gained 3 marks, because they only assumed and disproved one of the given angles not being a right angle.

Question 5
This question was answered well. A few candidates took the circuitous route of using the sine rule and then Pythagoras, but still correctly found the correct length for side AB. Occasionally candidates used the incorrect trigonometric ratio, but this was seldom seen.

Question 6(a)(i)
Very well answered.

Question 6(a)(ii)
Well answered. A common error was the constant term incorrectly given as –20 instead of +20. However, with only one incorrect term given, candidates could still gain the final B1 mark by correctly collecting like terms. The majority of candidates did this successfully from their expanded expression.

Question 6(b)(i)
A significant number of candidates failed to realise that this question involved forming an inequality. Many candidates could write down an expression of 5n – 27, but they did not proceed any further. There were examples of candidates writing inequalities using three expressions (for Monday, Tuesday and Wednesday) e.g. n < 5n > 5n – 27. This last example failed to get any marks. Of the candidates that were able to write an inequality, many did write it correctly but some wrote it down in the wrong direction, e.g. n < 5n – 27, which gained B1.

Question 6(b)(ii)
Although many candidates failed to gain marks for forming an inequality in 6(b)(i), they did interpret the question correctly and a final answer of n = 6 was often seen, be it from correct work, incorrect work, or even as an unsupported answer.
Of the candidates who had an inequality in 6(b)(i), most were able to solve it. A common error was getting as far as –4n > –27, and then not inverting the sign when dividing by a negative value, in this case –4. n > –27/–4 was seen, instead of the correct n< -27/-4.
A number of candidates reverted to solving an equation from their inequality in 6(b)(i) by replacing the inequality with '='. These marks were lost unless the inequality was corrected in the final line of working.

Question 7(a)
Generally, candidates were able to identify 1·04 as the multiplier, but unfortunately a significant number chose '× 1·04' rather than '÷ 1·04'.

Question 7(b)
The majority of candidates accessed this question and knew that it involved using the multiplier method which involved multiplying 144 by the equivalent of 1·2 three times. Some candidates added 20% in stages instead. In either case, the common error was to round the intermediate or final answer. Without the sight of 248·832, one B mark was lost.

Question 8
This question was answered well on the whole and the majority of candidates knew the factorisation resulted in two brackets. Occasionally candidates did make a slip in the signs within the brackets, but the digits 2 and 6 were seen in most responses. Furthermore, the majority of candidates gave the correct inverted signs for their two solutions from their double bracket factorisation.
There were instances of candidates attempting to solve the quadratic using the quadratic formula.

Question 9
This was the OCW question.
A significant number of candidates used the formula for the area of a sector and lost all the marks for the mathematics. Of the candidates who did correctly work out the arc length, many failed to add the two radii to get the final perimeter of the sector.
On the whole OCW marks were often awarded in this question. Mathematical form was well presented, but there were still a number of candidates who did not give the final answer with units.

Question 10(a)(i)
Most candidates could correctly link inverse proportionality to an expression involving a reciprocal. Many candidates could correctly work out $k = 468$ but then did not write down the final expression in part (i). However, if the expression was seen in part (ii), usually whilst attempting to find the missing values for the table, the final mark was awarded.

Question 10(a)(ii)
The majority of candidates who gave the correct expression in part (i) correctly gave the correct value for $y = 120$. Unfortunately, many candidates then gave an incorrect value of $x = 6$ instead of $x = 36$ because they forgot to square the 6, resulting in the second B0.

Question 10(b)
The incorrect choice 'c is multiplied by 2' was mainly seen for this question.

Question 11
A significant number of candidates could not appreciate the fact that the largest value for the denominator (the e term) gives the least value for the calculation. However, the correct value of 63·5 to be used in d^2 was usually seen.

Question 12
Good solutions were offered by many candidates in this question.
Of the remaining candidates who attempted this question, the majority could see that the cosine rule and/or sine rule would need to be used. Many candidates gained some marks for using the rules correctly even if they only used one of them.
The most common errors to note were failing to take the root of the value to obtain the length of the side EG when using the cosine rule, and incorrectly rearranging the sine rule if the sine rule was initially presented with the length of the sides as the numerator.

Question 13
A significant number could factorise the numerator but many failed to see the denominator as a difference of two squares, and therefore did not continue any further with their solution. However, a candidate who did have common brackets in both the numerators and denominators usually proceeded with their solution and cancelled them. If a B1 was previously awarded, a further B1 mark could be awarded for this simplification.

Question 14(a)
Of the candidates who quoted the area of a triangle as A = ½ absinC, many substituted the values in correctly to gain the first B1. Following on from a successful B1, many candidates then correctly expanded and simplified (x–1)(2x+3), the respective sides of AC and BC. Convincingly rearranging the equation was where candidates lost the final B mark. Many candidates could not see that dividing through by ½ and sin30 would result in 24 which, when collected on the left-hand side, would result in the final –27. Some candidates tried to manipulate the equation by saying that sin30 = 30 to fortuitously obtain the –27 in the stated equation.

Question 14(b)
The majority of candidates who attempted this question knew that the quadratic formula should be employed. However, although the quadratic formula is given in the formula page, many candidates were still substituting the values into it incorrectly, with one slip in substitution allowing only the M1 mark to be awarded. Most candidates gave their answers to 2 decimal places, with a few rounding their solutions to 1 decimal place.

Question 14(c)
This part was generally well answered if the candidate had one positive and one negative value in their solution to part (b) with candidates knowing that lengths needed to be positive. It was evident that candidates who failed to obtain one positive and one negative value struggled to answer this question and left it un-attempted. Some candidates stated, generically, that x must be positive, which is a correct statement in this case, as one length is (x-1). However, had the lengths been given by different expressions, it may well have been that x could have been positive, but still incorrect.

Question 15(a)
Generally well answered, with the most common incorrect answer being $y = f(x - 3)$.

Question 15(b)
Generally well answered, with the most common incorrect answer being $y = f(-x)$.

Question 15(c)
Generally well answered, with the most common incorrect answer being $y = f(x + 10)$.

Summary of key points

- Distinguish the difference between an expression and an equation and how each one should be dealt with when answering a question.
- How to form inequalities correctly from a worded problem.
- Only rounding answers if absolutely necessary. For example, an answer which is given to 3 decimal places on a calculator should be written down as such.
- Using upper and lower bounds in order to find the maximum or minimum values
- Rearranging equations involving fractions (e.g. evaluating the constant of proportionality in inverse proportion questions, or using the sine rule).
- Correctly using the quadratic formula.

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