



GCSE EXAMINERS' REPORTS

MATHEMATICS
GCSE

SUMMER 2023

Introduction

Our Principal examiners' reports offer valuable feedback on the recent assessment series. They are written by our Principal Examiners and Principal Moderators after the completion of marking and moderation, and detail how candidates have performed.

This report offers an overall summary of candidates' performance, including the assessment objectives/skills/topics/themes being tested, and highlights the characteristics of successful performance and where performance could be improved. It goes on to look in detail at each question/section of each component, pinpointing aspects that proved challenging to some candidates and suggesting some reasons as to why that might be.ⁱ

The information found in this report can provide invaluable insight for practitioners to support their teaching and learning activity. We would also encourage practitioners to share this document – in its entirety or in part – with their learners to help with exam preparation, to understand how to avoid pitfalls and to add to their revision toolbox.

Further support

Document	Description	Link
Professional Learning / CPD	Eduqas offers an extensive annual programme of online and face-to-face Professional Learning events. Access interactive feedback, review example candidate responses, gain practical ideas for the classroom and put questions to our dedicated team by registering for one of our events here.	https://www.eduqas.co.uk/home/professional-learning/
Past papers	Access the bank of past papers for this qualification, including the most recent assessments. Please note that we do not make past papers available on the public website until 6 months after the examination.	www.wjecservices.co.uk or on the Eduqas subject page
Grade boundary information	Grade boundaries are the minimum number of marks needed to achieve each grade. For unitised specifications grade boundaries are expressed on a Uniform Mark Scale (UMS). UMS grade boundaries remain the same every year as the range of UMS mark percentages allocated to a particular grade does not change. UMS grade boundaries are published at overall subject and unit level. For linear specifications, a single grade is awarded for the overall subject, rather than for each component that contributes towards the overall grade. Grade boundaries are published on results day.	For unitised specifications click here: Results and Grade Boundaries (eduqas.co.uk)

Exam 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.	www.wjecservices.co.uk
Classroom Resources	Access our extensive range of FREE classroom resources, including blended learning materials, exam walk-throughs and knowledge organisers to support teaching and learning.	https://resources.eduqas.co.uk/
Bank of Professional Learning materials	Access our bank of Professional Learning materials from previous events from our secure website and additional pre-recorded materials available in the public domain.	www.wjecservices.co.uk or on the Eduqas subject page.
Become an examiner with WJEC / Eduqas.	We are always looking to recruit new examiners or moderators. These opportunities can provide you with invaluable insight into the assessment process, enhance your skill set, increase your understanding of your subject and inform your teaching.	Exam Marking jobs Examiner & Moderator Vacancies From Eduqas

	Page
Executive summary	4
Foundation tier: component one	5
Foundation tier: component two	10
Higher tier: component one	16
Higher tier: component two	20
Supporting you – useful contacts and links	25

Subject Officer's Executive Summary

At both tiers there was sufficient challenge at the top end and accessible at the start.

At foundation tier, accuracy with numerical calculations requires improvement. Algebraic methods were seldom seen with trials often employed as a method, this should not be encouraged. Probability and statistics were highlighted as strengths.

At higher tier, poorly organised responses often made it difficult to find work worthy of credit.

For both tiers, when a calculator was available it was not always used and accuracy marks were frequently lost when the correct method was seen.

Areas for improvement	Classroom resources	Brief description of resource
Efficient use of a calculator, not employing non-calculator methods on a calculator paper.	FRACTION AND PERCENTAGE OF AN AMOUNT	Blended learning
When attempting a multi-step problem, it is important to set out the solution in a clear and logical way. All workings should be shown, and any relevant labels or units given.	PAST EXAM PAPERS AND QUESTION BANK	
Writing algebraic expressions	WRITING EXPRESSIONS	Blended learning
Manipulating surds	RECURRING DECIMALS AND SURDS.	Blended learning
Constructing the perpendicular bisector.	CONSTRUCTIONS, LOCI, 2-D REPRESENTATIONS AND CO-ORDINATES	Blended learning
Circle theorems	CIRCLE THEOREMS	Blended learning

MATHEMATICS

GCSE

Summer 2023

Foundation tier: component one

Overview of the Component

In this paper candidates are assessed on their ability to use and apply standard techniques. They must reason, interpret and communicate mathematically as well as solve problems in mathematical and other contexts.

To do well in this examination, candidates needed to interpret each question carefully and make sure they used all the given information, particularly key words, and phrases, in their solution. They should have shown all their methods. The candidates who used efficient methods and presented their work in a neat and logical way were generally more successful.

Many candidates were able to access a good proportion of the paper. However, a significant number of candidates struggled to access the questions that are common with the higher tier paper.

All candidates seemed to have sufficient time to answer those questions that were within their capabilities.

Comments on individual questions/sections

- Q.1 (a)(i) Most candidates were able to accurately divide by 10.
- (a)(ii) Most candidates were able multiply by 1000.
- (a)(iii) Most candidates were able to accurately complete this subtraction which resulted in a negative answer.
- (b) Most candidates were able to calculate the missing value to complete a sum.
- (c) Candidates were asked to identify a prime number, a multiple of 12 and a square number from a list of numbers. Most candidates were able to identify the multiple of 12, but many were unable to identify the prime number and the square number.
- (d) Many candidates were able to write the decimal as a fraction, but some neglected to write the fraction in its simplest form.

- Q.2 (a) This was well answered, with most candidates able to identify the expression which best described the chance of each of the events occurring.
- (b) Candidates found it considerably more challenging to represent the probability of each event occurring on a probability scale.
- Q.3 (a) Candidates were asked to give the coordinates of a point. This was well answered by candidates, although some reversed coordinates were seen.
- (b) Candidates were asked to mark the position of the midpoint between two points, and many candidates were able to do this correctly.
- (c) Candidates were required to measure the length on a grid, then use a scale to find the length of a path, writing their answer in metres. This was well answered, though some candidates incorrectly measured the length 7 cm or 9 cm, instead of 8 cm.
- Q.4 (a)(i) Candidates were required to complete a table listing the different permutations. This was well answered.
- (a)(ii) Candidates were asked to use their table to find the probability of an event occurring; this was answered well by most candidates.
- (b)(i) Many candidates found it challenging to find the difference between two times.
- (b)(ii) Calculating an average speed. The best strategy here was to multiply by four rather than use the formula, $\text{speed} = \text{distance} \div \text{time}$.
- (b)(iii) Many incorrect answers of 5 km were seen in this part, with candidates forgetting to subtract 1 from 10, before dividing it by 2.
- Q.5 (a) Candidates were required to write a decimal between 61% and 62%, however many gave an answer of 61.5.
- (b) Most candidates showed understanding that you needed to write both fractions with a common denominator in order to compare them, but few were able to do this accurately.
- Q.6 (a) Candidates needed to write an expression for the total number of nails, but many found this very challenging. Some candidates were awarded 1 mark for writing an expression for the number of nails in the large tub ($3n$).
- (b) Some candidates were able to calculate the weight of the nails in grams but were unable to write this in kilograms, with final answers of 9kg and 90kg often seen.
- Q.7 (a) Some candidates were able to draw a rectangle which satisfied both conditions, but most drew rectangles which satisfied only one of the two conditions.

- (b)(i) Candidates were asked for the diameter of a circle when given its radius. Most candidates were able to do this correctly, although some halved the radius instead of doubling it.
- (b)(ii) Most candidates were able to write the ratio of the radius and the diameter in simplest form, but some were unable to simplify their ratios.
- Q.8 (a) This was well answered by candidates. Most incorrect answers were obtained by candidates who calculated 5^2 to be 10.
- (b)(i)(ii) Candidates were given two calculations and needed to put one pair of brackets into each calculation to make them correct. Most candidates were able to do this correctly.
- Q.9 (a) This was well answered by candidates, with most realising they needed to divide the wage by the number of hours worked and many were able to do this accurately.
- (b) This was answered less well, with some candidates multiplying Walter's wage by 12, instead of engaging with Anna's wage.
- (c) To calculate 2% of £18, many candidates simply multiplied 18 by 2 or 0.2.
- Q.10 (a) This was well answered by candidates.
- (b) Candidates were required to draw a straight-line graph, plotting the coordinates from the table they had completed. This was answered less successfully than part (a). Some candidates correctly plotted their points but did not join them with a straight line.
- Q.11 (a) About a half of candidates were able to increase an amount by 20%. Some simply increased by £20, instead of 20%.
- (b) This was not well answered by candidates. Some candidates were able to calculate the amount paid by monthly but unable to calculate the deposit. Many divided by 4, instead of 3.
- Q.12 (a) Less than half of candidates could explain why David was correct, with many seemingly happy with the supermarket's pricing.
- (b) Few candidates could solve the best-buy problem. Some attempted to calculate the unit price but most made numerical errors.
- Q.13 (a)(i) Less than half of candidates were able to correctly subtract a number with 2 decimal places away from a number with 1 decimal place. Some candidates made place value errors as they didn't line their digits up correctly before completing the subtraction.
- (a)(ii) A similar number of candidates were able to correctly multiply two numbers with one decimal place. Many incorrect answers of 2.4 or 0.024 were seen.

- (a)(iii) Candidates who showed awareness of the need for a common denominator, often went on to get a correct answer in this part. However, many simply subtracted the numerators and denominators to get an answer of $\frac{6}{6}$.
- (b) Some correct answers were seen in this part, but more often 1 mark was awarded to candidates with an answer out by a power of 10 (15.65 or 1565).
- Q.14 (a) Many candidates realised they needed to divide the total by the number of weeks or unit price, but most were unable to do this accurately.
- (b) Some candidates were able to accurately multiply 246 by 54 but many gave that as their final answer rather than calculating how much more Neil received.
- Q.15 Most candidates recognised that Marcie's plan wasn't reasonable, but were unable to give suitable reasons why, with some just writing it was biased but not elaborating.
- Q.16 This was not well answered by candidates, many of whom found it very difficult to engage with the first step of this question, finding the total number of slabs.
- Q.17 Very few correct answers were seen for this question, with incorrect answers of 220° frequently seen, obtained by subtracting 140° from 360° .
- Q.18 (a) Less than a half of candidates were able to give a fraction using the ratio.
- (b) This was answered less well, with many answers of 20 20 20 seen.
- Q.19 (a) This was not well answered by candidates. Some wrote out some of the terms from the sequence but didn't state the difference between consecutive terms as the question asked.
- (b)(i) Candidates were required to solve an inequality. Some candidates solved it like an equation but didn't replace the = with < when completed.
- (b)(ii) Although inequalities from (i) were followed through, few marks were awarded here.
- Q.20 Few fully correct responses were seen, with some candidates able to do one of the currency conversions, but not the other. Many multiplied 60 by 1.20, instead of dividing it by 1.20.
- Q.21 This was not well answered by candidates, with many not engaging with algebra at all, so were unable to answer this question.
- Q.22 (a) This was not well answered by candidates, with some attempting to solve the pair of simultaneous equations by elimination or substitution, instead of using the diagram.

- (b)(i) This was well answered by candidates.
- (b)(ii) Some candidates were able to correctly find the coordinates of the turning point, but many incorrect y coordinates of -8 were seen.
- (b)(iii) Few candidates were able to use the curve to solve an equation.
- Q.23 Most candidates knew they needed to use a method to find the percentage of an amount, using the surface area of the Earth and the percentage of the Earth that is ocean, but many candidates didn't round these values or calculate accurately using standard form. Few fully correct answers were seen.
- Q.24 This was not well answered by candidates, with many answers of $\frac{2}{8}$ or $\frac{4}{16}$ (obtained by incorrectly adding $\frac{2}{8}$ and $\frac{2}{8}$) seen.
- Q.25 This was not well answered by candidates. Some were able to form equations for each of the families, but few were able to solve the pair of simultaneous equations by elimination or substitution.

MATHEMATICS

GCSE

Summer 2023

Foundation tier: component two

Overview of the Component

In this paper candidates are assessed on their ability to use and apply standard techniques. They must reason, interpret and communicate mathematically as well as solve problems in mathematical and other contexts.

Many candidates were able to access a good proportion of the questions. However, a significant number of candidates struggled to access the questions that are common with the higher tier paper.

Candidates were able to use a calculator for this paper but sometimes chose to use non-calculator methods. For example, on question 6(a) some candidates used a partitioning method to find 22% of 250 instead of an efficient calculator method. Similar methods were observed on question 14(a)(ii). When this approach was used, there were often numerical errors.

It was common to see place value errors when working with decimal values. In question 14(a)(i), $0.2 + 0.35$ was often given an incorrect answer of 0.37 and in 14(a)(iii) $0.1 \div 2$ was often answered incorrectly as 0.5.

There were various questions on this paper which involved calculations with money. Some candidates struggled to interpret their answers correctly. For example, on question 1(b) some candidates who arrived at the correct answer of 0.69 then incorrectly interpreted this as 0.69p instead of 69p or £0.69.

All candidates seemed to have sufficient time to answer those questions that were within their capabilities.

Comments on individual questions/sections

- Q.1 (a) Most candidates were successful in selecting the correct items from the table and were able to order them correctly. The most common error was using incorrect units to display the costs. 86p was often written as 0.86p.
- (b) A correct strategy for calculating the difference in cost was seen most of the time and 0.69 was usually arrived at. The most common error was misinterpreting the answer as 0.69p.
- (c)(i)(ii) Most candidates chose efficient calculations here ($8 \times 95\text{p}$ and $12.95 \div 1.85$) and arrived at the correct answers. However, some used repeated additions of 95p and £1.85. These occasionally led to errors.

- Q.2 (a) Most candidates were able to shade some of the additional squares required to complete the shape. A fully correct response was seen a pleasing number of times. A symmetrical shape with two additional squares shaded was also a common response.
- (b) This question was well answered, the correct shape was indicated most of the time.
- (c) Many candidates were able to correctly count the number of edges and vertices. However, they did not always know which one was which, reversed answers were often seen.
- (d) Most candidates were able to correctly identify the kite. The hexagon was not identified correctly as often as the kite, but candidates had more success with this shape than the trapezium and rhombus. The parallelogram was often mistaken for a rhombus.
- Q.3 (a) The correct answer was indicated in most cases.
- (b) The correct answer was indicated in most cases.
- (c) A good proportion of candidates gave a correct response in this question. Where a fully correct response was not seen, there was often creditable work. Listing the factors of 18 was often seen on the answer lines.
- Q.4 (a)(i) Most candidates were able to correctly complete the pictogram.
- (a)(ii) A correct strategy was often seen here. Some candidates listed the totals for each day whilst others counted the number of complete shapes and added part-shapes on at the end. There was often an error in interpreting the three-quarters shape for Tuesday, so the final answer was not always accurate.
- (b) The candidates who were successful in this question gave explanations such as:
- 'The pictogram uses multiples of three and 17 is not a multiple of three.'
- 'The pictogram uses multiples of three and 17 is not divisible by three.'
- A statement which explained that each segment represented three was not enough to gain the mark without further explanation that it is not possible to show 17. Some candidates did not engage with multiples of three and only considered multiples of 12.
- Q.5 (a)(i)(ii) This question was well-answered particularly by candidates that made use of their calculators. Those that attempted the calculations without a calculator often made numerical errors.
- (b) Candidates performed well on this question. The mass of the box was correct in most cases and the mass of the ball was correct a pleasing number of times. A common error when calculating the mass of the box was to divide 5.5 by 2 without subtracting the mass of the box.

- Q.6 (a) Candidates that used an efficient calculator method here were usually successful. The correct answer was often seen. Partitioning methods were sometimes seen and these often led to incorrect answers.
- (b) Candidates who interpreted the question correctly and calculated two fifths of the original number of coins were often successful in arriving at 100 coins. Some then went on to calculate the total value of the coins.
- Some candidates' mis-interpreted the question and subtracted the number of £1 coins from 250 and then calculated two fifths of the remaining coins.
- (c) Most candidates made good attempts at calculating the total value of the coins. However, there were often place value errors. It was common for a candidate to find the remaining number of coins. In calculating the total value of each set of coins they used of a mixture of pounds and pence often leading to incorrect overall answers.
- Q.7 (a) It was pleasing to see candidates were able to accurately measure the length of the car where this was attempted. Most were also able to use the scale appropriately to arrive at the correct answer using an efficient calculation. A small number of candidates attempted repeated addition of $\frac{1}{2}$ or 50 to arrive at the answer. Incorrect units were sometimes given.
- (b) This question proved challenging for candidates, and it was often un-attempted.
- Q.8 (a) Many candidates ordered the six numbers and were able to identify that 17 and 21 were the middle two. Only some were able to correctly give the median value. Some candidates calculated the mean of the six numbers instead.
- (b) The most common strategy seen here was a series of mean calculations using different combinations of five numbers. This sometimes led to the correct five numbers chosen. One combination of five numbers gave a mean of 21.4 and these were often selected incorrectly as the answer.
- Q.9 Where candidates had labelled 60° angles on the equilateral triangle, they usually calculated the size of angle x correctly. Some struggled to make a start on this question and were only able to label the right-angles.
- Q.10 (a) Candidates who drew lines on the graph to show their comparisons were usually successful in drawing the correct conclusion. Occasionally candidates' mis-read the scale on the horizontal axis and gave an answer of 15.5 instead of 17.5 when converting 28km into miles.
- (b) This question proved challenging, and the answers given were often guesses. Candidates who were successful used the graph to correctly to read off various conversions from miles to km that would make up 36 miles.

- Q.11 (a) The brackets were often expanded correctly, it was common to award marks for $4x + 24$. However, some candidates went on to multiply $3x$ by 4 as well. An incorrect answer of $16x + 24$ was often seen. Some candidates did not multiply the 6 in the bracket by 4 when expanding, leading to an incorrect answer of $7x + 6$. Candidates were able to successfully collect 'their' like terms in most cases.
- (b) This was well answered, the correct answer was often seen.
- (c) Most candidates successfully substituted the numbers into the formula and the correct answer was seen many times. However, not all were able to complete the steps needed to calculate the answer. The brackets caused difficulty for some. It was common to see $3 \times 24 + 2 = 74$ and $74 \div 8 = 9.25$.
- Q.12 (a) This question proved challenging; it was common to see an answer resulting from $\sqrt{5 \times 3 \cdot 8 + 2 \cdot 1^2}$. This was sometimes rounded correctly to 4.84, but 4.83 was also a common response.
- (b) The most common responses observed in this part was 0.1 or 1.
- Q.13 (a)(b) This was well answered, many candidates were able to plot all five points correctly on the scatter diagram and identify the incorrect plot.
- (c) Pupils who referred to the relationship between hours of exercise and resting heart rate were the most successful in this part of the question. Where the word 'resting' was left out of the explanation it often led to factually incorrect statements such as 'more exercise gives you lower beats per minute'.
- Q.14 (a)(i) Many candidates gave a correct response of 0.55 or 55%. However, some made place value errors and gave an answer of 0.37.
- (a)(ii) Candidates found this question challenging. But where the appropriate method was selected this usually resulted in the correct answer.
- (a)(iii) Many candidates made a good start with this question and found the sum of the probabilities given in the table; some then went on to find the remaining probability 0.15. At this stage some candidates divided by 2 instead of 3. An answer of 0.075 for both the car and train were often seen. Others misinterpreted the place value and gave answers of 0.1 and 0.5 after correctly finding 0.15.
- (b)(i) The correct answer of 62 was seen a pleasing number of times. When this was not seen it was usually an incorrect answer of 42 (from adding the three values in the Venn diagram).
- (b)(ii) Where a candidate attempted to write their answer as a probability, they often forgot to combine both parts of the Music circle. $\frac{17}{104}$ was usually the response given.

- Q.15 There were a variety of strategies seen by candidates in this question. Those that started off by calculating the height of each box rim to be 5.6cm were usually the most successful in arriving at the correct answer. Where candidates used division to calculate the number of additional boxes placed on top of the existing box (or boxes) they sometimes forgot to add on the original box (or boxes).
- Some candidates used repeated additions of 5.6 (1 box rim) or 16.8 (3 box rims) onto either 35.2 or 52 until they arrived at 85.6. Where this method was used there was often a misunderstanding of how many boxes this represented. For example, $52 + 16.8 + 16.8 = 85.6$ was often interpreted as $4 + 1 + 1 = 6$ boxes instead of $4 + 3 + 3 = 10$ boxes.
- Q.16 A fully correct response was rare on this question.
- Q.17 (a) Some candidates were able to draw a translation of the shape, it was occasionally correct for either the vertical or horizontal translation. Attempts to draw the shape in the correct position sometimes missed out on marks as the shape was not drawn accurately.
- (b) This was not answered well. Rotated shapes were sometimes drawn with a vertex at (0,0) instead of being rotated about (0,0).
- Q.18 (a) This question was answered well in comparison to similar questions in previous series. The correct answer was seen a pleasing number of times. Some candidates did not know how to calculate the area of the base of the filling cabinet and so were unsuccessful in this part.
- (b) This question was well attempted, however, candidates found it challenging to rearrange the formula and the incorrect operation was often chosen to calculate the answer.
- Q.19 (a)(i) Some candidates were able to identify the years where there was a decrease in the households that owned a desktop computer.
- (a)(ii) Most candidates incorrectly agreed with the statement accompanied by a supporting comment such as 'the line goes through 70%'.
- (b)(i) Candidates who attempted to plot the points usually achieved the mark.
- (b)(ii) This question was not well answered, a correct answer was rare.
- (b)(iii) Candidates who were successful in this question commented on internet connection continuing to increase and desktop computer ownership starting to decrease. It was not sufficient to just comment on one of these. Some candidates talked about the advancement of technology in general but did not relate it back to the information about Eduvale on the graph.

- Q.20 (a) This question proved challenging for foundation tier candidates. It was common to see candidates calculate the area of the square, but very few engaged with the area of the circle. Where there was engagement with the area of the circle, the diameter was sometimes used instead of the radius.
- (b) Candidates struggled to interpret this question. Some multiplied the three values given in the question together, whereas others used the area of a triangle and trapezium formulas. The correct answer was rare.
- Q.21 (a) This question was a challenge for foundation tier candidates. Many attempted to add like terms (ignoring the equal sign) instead of solving the equation. This led to an expression as an answer instead of a solution for x .
- (b) Very few candidates were able to form an equation to find the number of bananas. Most simply used trials to find the number of bananas.
- (c) Most candidates at this tier did not know how to factorise a quadratic expression.
- Q.22 Very few candidates had any knowledge of trigonometry. This question was rarely attempted.
- Q.23 Some candidates were able to calculate the amount of money in account A after 5 years, but that is generally where the solution stopped. It was common to see the total amount of interest gained using account B but it was rare to see a correct percentage increase for either account. Few candidates were able to state a valid assumption with an associated effect.

MATHEMATICS

GCSE

Summer 2023

Higher tier: component one

Overview of the Component

In this paper candidates are assessed on their ability to use and apply standard techniques. They must reason, interpret and communicate mathematically as well as solve problems in mathematical and other contexts.

To do well in this examination, candidates needed to interpret each question carefully and make sure they used all the given information, particularly key words, and phrases, in their solution. They should have shown all their methods. The candidates who used efficient methods and presented their work in a neat and logical way were generally more successful.

Many candidates were able to access a good proportion of the paper. However, a significant number of candidates struggled to access the questions in the final third of the paper.

All candidates seemed to have sufficient time to answer those questions that were within their capabilities.

Comments on individual questions/sections

- Q.1 (a) This was well answered by candidates.
- (b) Some incorrect answers of 20 20 20 were seen but most candidates were able to answer it correctly.
- Q.2 Very few correct answers to this question. Incorrect answers of 220° were frequently seen, obtained by subtracting 140° from 360° .
- Q.3 (a) This was well answered by candidates. However, some correctly wrote out terms the terms of sequence but didn't state the difference between consecutive terms.
- (b)(i)(ii) This was generally well answered. However, some candidates solved it as an equation but didn't replace the = with < when completed.
- Q.4 This was generally well answered, but some candidates were only able to correctly do one of the currency conversions, but not the other. Some candidates multiplied 60 by 1.20, instead of dividing it by 1.20.
- Q.5 Most of the candidates who found the value of x, were then able to go onto find the value of y. Some candidates attempted to answer this question without engaging with algebra at all.

- Q.6 (a) Candidates needed to use Pythagoras's Theorem to find out how far Sam had cycled. Some candidates gave an incorrect answer of 4 cm, obtained by subtracting 16 cm from 20 cm.
- (b) Some candidates were awarded 1 mark for sight of 20/25 but were unable to use this to find the correct time of 48 minutes.
- Q.7 (a) Some candidates attempted to answer this question by algebraic methods, such as elimination or substitution, instead of interpreting the diagram.
- (b)(i) This was well answered by candidates.
- (b)(ii) Most candidates were able to correctly find the coordinates of the turning point, but some incorrect y coordinates of -8 were seen.
- (b)(iii) Most candidates were able to correctly use the diagram to solve the equation.
- Q.8 Most candidates knew they needed to use a method to find the percentage of an amount, using the surface area of the Earth and the percentage of the Earth that is ocean given in the question, but many candidates didn't round these values or calculate accurately using standard form. Some fully correct answers were seen.
- Q.9 This was answered correctly by approximately a half of candidates, with many answers of $\frac{2}{8}$ or $\frac{4}{16}$ (obtained by incorrectly adding $\frac{2}{8}$ and $\frac{2}{8}$) seen.
- Q.10 (a) Many answers of 175 cm were seen in this question, obtained by finding the mean of 170cm and 180cm.
- (b) Some candidates were able to identify the outlier in the data and explain that this would have a big impact of their mean, but others found it challenging to come up with a suitable reason.
- Q.11 This was well answered by candidates. Most were able to form equations for each of the families, and then go onto solve the pair of simultaneous equations by elimination or substitution.
- Q.12 (a) This was well answered by candidates.
- (b) Candidates were asked to find the value of the x coordinate of a point, when given the y coordinate, the coordinates of another point and the gradient of the line. This was not well answered.
- Q.13 (a)(i) Most candidates were able to find the next term in a Fibonacci-type sequence.
- (a)(ii) Candidates needed to find the next term in a sequence where the ratio between the terms was a surd. This wasn't well answered by candidates, most of whom struggled to correctly find the ratio.

- (b) Some candidates were able to find the n th term of the given sequence, others showed awareness that the sequence is a quadratic sequence but gave the n th term simply as n^2 .
- Q.14 (a) Some candidates demonstrated understanding of how to enlarge by a scale factor of $1/3$, but incorrectly placed their shape on the grid.
- (b) Triangle R is obtained by first reflecting Triangle P in the line $y = x$ and then reflecting in the line $y = -x$. Few correct descriptions of a single transformation were seen. Many candidates simply reflected Triangle P in the x -axis and then the y -axis before describing the transformation, so were awarded B0.
- Q.15 This question required candidates to complete 3 calculations to find the original depth, but many candidates only accurately carried out one of these steps. Few fully correct answers of 10 cm were seen.
- Q.16 (a) This was very well answered by candidates.
- (b) Candidates found this a lot more challenging than part (a), with candidates often engaging with the index of -1 or $1/3$, but not both.
- (c) Finding numbers to equate the two values was beyond many candidates.
- Q.17 (a) Some candidates were able to give one correct criticism of the cumulative frequency graph, but few gave both.
- (b)(i) Most candidates who showed awareness of the need to calculate frequency density were able to correctly draw the histogram, but some numerical errors were seen.
- (b)(ii) Many candidates were able to find the 30 gardens in May, but some were unable to find the 21 gardens in April.
- Q.18 (a) Candidates needed to use circle theorems to find the size of angle OPR. Some candidates were able to find PRS, but few were able to find the size of OPR.
- (b) Candidates found this proof very challenging, with few fully complete proofs seen.
- Q.19 (a) Most candidates who understood inverse proportion, were able to go onto find the correct formula.
- (b)(i) Most candidates who derived the formula in (a) were able to find the value of y when $x = 8$.

- (b)(ii) Candidates found it a lot more challenging to find the value of x when $y = 1200$.
- Q.20 Most candidates had a good attempt at writing the recurring decimal as a fraction and demonstrated some understanding of a method which would lead to a correct answer, but some made numerical errors. A few candidates simply gave an answer of $321/100$, neglecting the recurring element of the question.
- Q.21 Some candidates were able to correctly calculate the width of the rectangle, but many made numerical errors when calculating with surds and were unable to find the area.
- Q.22 Most candidates showed a basic awareness of vectors, but many struggled with the ratio element of the question. Few fully correct answers were seen.
- Q.23 Candidates who demonstrated understanding of velocity-time graphs, typically went on to get all 4 marks. However, some candidates didn't write their final answer in minutes and were awarded 3 marks.
- Q.24 (a) Some candidates were able to do the first step to solve their equation, but few were able to get their answers in the required form.
- (b) Few candidates were able to manipulate their equation in order to write it in the form $ax^2 + bc + c = 0$, so were unable to solve the equation.
- Q.25 (a) 25% of candidates did not attempt this question. Many candidates did draw a Venn diagram, but few were able to draw it correctly. Very few correct answers for $P(B)$ were seen.
- (b) Over 40% of candidates did not attempt this question. Very few correct responses were seen.

MATHEMATICS

GCSE

Summer 2023

Higher tier: component two

Overview of the Component

Candidate layout and presentation – In many cases, especially the longer questions, poorly organised presentation, made it difficult to find work worthy of marks.

Use of calculator - Lots of slips where candidates had written the method with correct values in calculations then obviously didn't use calculator and so lost crucial accuracy marks. This was especially shown in the probability tree diagram Q9 where it was very common to see place value errors.

E (Explanation) marks – Q2 (line graph – technology), Q6 (interest rates) and Q13 (reverse compounded %) the more able candidates were using quite advanced vocabulary which was good to see but unfortunately many candidates either seemed to not understand what was being asked or communicated their answers in a very clumsy way.

Comments on individual questions/sections

- Q.1 (a) Nearly all candidates answered this question correctly gaining both marks for correctly dividing the force by the calculated area of the rectangle.
- 1(b) Nearly all candidates gained full marks on this question.
- Q.2 (a)(i) Nearly all candidates correctly chose the 2 year period with the biggest decrease i.e. 2014-2016.
- (a)(ii) This question was not particularly well answered with just as many candidates choosing the incorrect answer of 'Yes' as 'No'. The candidates who said 'Yes' seemed to misunderstand the fact that there was no actual data for the year 2009 by usually stating the graph goes through 70 in 2009.
- (b) This was very well answered by candidates.
- (i)(ii)
- (b)(iii) Candidates mainly lost marks due to not mentioning the decrease in desktop computer sales, by saying 'both increased'. Another common misconception was that candidates thought that more people in the county meant an increase not realising the question related to 'proportion'.

- Q.3 (a) Most candidates wrote a suitable question including 'per month' There were many instances of missing 'top and/or' bottom end boxes and overlaps/gaps.
- (b)(i) The vast majority of candidates answered this question correctly and left in fractional form. A few, decided to successfully convert to equivalent decimals or percentages.
- (b)(ii) This question was again well answered, however there were slightly more errors made with this part as opposed to (a).
- Q.4 (a) Many candidates achieved full marks on this question.
- (b) This question was not well answered by many candidates. It was disappointing to see so many using the '8' when finding the area of the parallelogram.
- Q.5 (a) This was well answered by the vast majority of candidates.
- (b) Only a small minority of candidates engaged algebraically with this question. For the few that did, many made mistakes with the algebraic manipulation. It was common to see the mixing of pounds and pence within the same equation.
- (c) This was well answered by the majority of candidates.
- Q.6 (a)(b) Nearly all candidates partially engaged with this question. They usually started by successfully calculated the interest gained for each account but fewer candidates found the percentage interest (22.7%/122.7% and 19%/119% respectively).
Most candidates gained the first E mark. However, the preferred explanation indicating that '*an increase in the interest rate of Account A would mean A could earn even more interest whereas a decrease in the interest rate of Account A may mean Account B is the better option*', was rarely seen.
- Q.7 The first construction representing an arc of 55m from A was accurately drawn by most candidates. However, the perpendicular bisector proved more challenging with many not presenting the correct method of constructing the necessary intersecting arcs.
The final mark, for shading the appropriate area was usually well answered.
- Q.8 Many candidates answered this question well either using the angle of 87° or 3° and the correct use of 'tangent'.
A number of candidates who decided to use the sine rule, did so successfully.

- Q.9 (a) The majority of candidates completed the tree diagram correctly. Some candidates did not seem to like the fact that the probabilities had two decimal places, and despite having the use of a calculator, lost either or sometimes both the marks available.
- (b)(i) Most candidates answered this fully correctly, however a number of candidates got the method mark for showing the correct product needed but then unfortunately, despite having the use of a calculator available, didn't seem to use it and lost the accuracy mark. Quite a number of candidates decided to add the probabilities instead of multiplying.
- (b)(ii) A few candidates correctly calculated the two products but instead of adding these, decided to multiply.
- Q.10 Very few candidates fully engaged with this question. Most candidates were able to gain the first M1 from ' $5xy(x + y) = 172.8$ '. However, in order to gain more marks, candidates had to form an equation in one variable by using ' $y = 4x$ '. Sadly this was only seen in a very few cases, and even less cases leading to a fully correct solution.
- Q.11 Many candidates that attempted this question achieved full marks – using either the main or alternative methods. A few candidates, of the ones deciding to collect the '*y term*' on the left hand side, got into difficulties with the use of incorrect signs.
- Q.12 Nearly all candidates engaged with this question and many attained full marks.
The most common errors made were from finding the two quartiles or slips in reading the scales from the box plot.
A few candidates incorrectly used intervals for the quartiles and interquartile range.
- Q.13 (a) Most candidates tried to explain that 15% was to be found of an amount that already had been reduced by 20% and so less than 35% altogether. A few of the more able candidates actually calculated that it was a 32% discount.
- (b) Very few candidates achieved any marks for this question with most of the ones attempting it not using a method that involved ' $\div$ by 0.85 and then 0.8' or equivalent. Many decided to multiply £306 000 by 1.15 followed by multiplying by 1.2.
- Q.14 (a) The majority of candidates struggled with the understanding of bounds.
- (b) The allowed 'FT' from part (a), together with the use of the easier lower bound from 82 000 000, enabled candidates to achieve full marks. Quite a few 'calculator' errors were seen.

- Q.15 (a) Many candidates did not attempt this question. For those that did, very few candidates achieved full marks. By far the most popular answer was ' $x \leq 6$ '. A few candidates factorised and then solved with solutions ' $x=6$ or $x=-6$ ' with the inequality sign being ignored completely.
- (b) The vast majority of candidates that did engage with this part drew the full parabola extending beyond -6 and 6. Some candidates drew the part of the parabola for positive values of x only.
- Q.16 Many candidates engaged well with this question, being able to find the combined area of the sector and triangle. However, a lot of candidates decided they needed to find one of the missing sides and so ploughed on with unnecessarily using the cosine rule, or in some instances even Pythagoras.
- Q.17 (a) This question was probably the 'least understood' in terms of the requirement, of the whole paper. The vast majority of candidates left the whole question blank but of those that did make an attempt, rather than equate the two equations and rearrange, decided to go down the route of 'substituting values' into the cubic needing to be found.
- (b) Despite the relatively straightforward task of obtaining the x -values of the three points of intersection of the two graphs, very few candidates obtained full marks.
Some candidates occasionally found two of the points but then lost the mark as they did not give the answers correct to 1 decimal place.
- Q.18 (a) This question was generally answered well although the most common error was where candidates thought that the inverse of cubing was to find the reciprocal.
- (b) Most candidates attempted this question but very few ended up with the correct expression as their final answer. Many slips were made along the way, including: $1 \times 1 = 2$.
- Q.19 (a) Many candidates gained full marks in this question using the sine rule accurately.
- (b) As with part (a) the cosine rule was handled effectively with correct answers by many candidates. There were a few that did not square root, so only gained one mark out of 3.
- Q.20 (a) The correct answer was given by many candidates. Some evaluated 7^7 as opposed to $7!$. 49 was a common wrong answer.
- (b) A correct answer for this part was seen less often than (a). However, a number of candidates did pick up FT marks from their (a) by dividing by 7.

- (c) The correct answer was not seen as often as in part (b). A number of candidates did pick up FT marks from their answers to the previous parts.
- Q.21 This question was probably the most poorly answered of the paper. If the candidate had not engaged with similar triangles, the only available mark was for the correct method to find the volume of the whole cone. The last part for finding the time, ($\div 1000$ and $\times 10$) was also poorly answered with very few attempting a complete method for this.
- Q.22 (a) The success candidates had with this question was varied. Many had '+3' however there were also many candidates that missed the '+' sign or chose '5' as it was the first term. Some candidates decided to give an nth term solution.
- (b)(i) This question was generally well answered although marks were not awarded if there were any missing steps (especially $\div$ by 'x' and ' $\sqrt{}$ ' done in one go). Some candidates did work backwards although this was not as common.
- (b)(ii) This question was poorly answered with very few candidates achieving full marks. Quite a few candidates obtained both method marks but didn't actually write down the x-value solution correct to 1 decimal place.
- Q.23 This question gave rise to more variation of working than any other question in the paper. It was disappointing to see so many candidates either not reading or disregarding 'using 4 vertical strips of equal width'. Responses included, anything from 3 to 6 strips, often of varying widths. It was rare to see candidates solely using the 'area of a trapezium formula'. Mainly rectangles and triangles were used although not always compounded to give the identical trapezia, hence loss of accuracy. Some candidates used horizontal strips and a few of these even used π in their working, thinking the top part of graph was a semicircle. In addition to not doing what was instructed in the question, there were many computational errors arising from, as mentioned in previous questions, lack / poor use of the calculator.

Supporting you

Useful contacts and links

Our friendly subject team are on hand to support you between 8.30am and 5.30pm, Monday to Friday.

Tel: 029 2240 4251

Email: mathematics@edugas.co.uk

Qualification webpage: https://www.edugas.co.uk/qualifications/mathematics-gcse/#tab_keydocuments

See other useful contacts here: [Useful Contacts | Edugas](#)

CPD Training / Professional Learning

Access our popular, free online CPD/PL courses to receive exam feedback and put questions to our subject team, and attend one of our face-to-face events, focused on enhancing teaching and learning, providing practical classroom ideas and developing understanding of marking and assessment.

Please find details for all our courses here: <https://www.edugas.co.uk/home/professional-learning/>

Regional Rep Team

Our regional team covers all areas of England and can provide face-to-face and online advice at a time which is convenient to you.

Get in contact today and discover how our team can support you and your students. [Regional Support Team | Edugas](#)

Edugas Qualifications

We are one the largest providers of qualifications for schools, academies, sixth form and further education colleges across England, offering valued qualifications to suit a range of abilities. Each and every one of our qualifications is carefully designed to engage students and to equip them for the next stage of their lives.

We support our education communities by providing trusted qualifications and specialist support, to allow our students the opportunity to reach their full potential.



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

ⁱ Please note that where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.