

GCSE Examiners' Report

MATHEMATICS

GCSE

November 2024

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Introduction

Our Principal Examiners' report provides valuable feedback on the recent assessment series. It has been written by our Principal Examiners and Principal Moderators after the completion of marking and moderation, and details how candidates have performed in each component.

This report opens with a 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 then looks in detail at each unit, pinpointing aspects that proved challenging to some candidates and suggesting some reasons as to why that might be.¹

The information found in this report provides valuable 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	Edugas offers an extensive 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.edugas.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 12 months after the examination.	Portal by WJEC or on the Edugas 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 component level. For linear specifications, a single grade is awarded for the 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 and PRS (edugas.co.uk)

¹ 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.

Exam Results Analysis	Eduqas provides information to examination centres via the WJEC Portal. This is restricted to centre staff only. Access is granted to centre staff by the Examinations Officer at the centre.	Portal by WJEC
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.edugas.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.	Portal by WJEC or on the Eduqas subject page.
Become an examiner with WJEC.	We are always looking to recruit new examiners or moderators. These opportunities can provide you with valuable insight into the assessment process, enhance your skill set, increase your understanding of your subject and inform your teaching.	Become an Examiner Eduqas

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Executive Summary

At foundation tier there was a huge increase in the number of candidates entered compared with last November. Many of these candidates were well prepared for the examination with targeted teaching from centres on certain topics to help candidates obtain a grade 4. However, some candidates had very little knowledge and some very low marks were seen. Candidates performed better at the mathematics set in a real life context, e.g. money, wages, repayments, timetables. Many different areas, apart from basic number work were brought into these questions including fractions, percentages and ratios. It was pleasing to see success with such a wide range of topics.

At this level algebra causes difficulty as does some of the more abstract geometry questions, e.g. bearings and angle calculations. It was disappointing to see so many candidates unable to read a scale that was not increasing by increments of 1 or 10.

The use of calculator is permitted for paper two, but many candidates use inefficient methods. To calculate percentages, partitioning e.g. $10\% + 1\% + 1\%$ was used rather than $0.12 \times \dots$ and some candidates employed trials when finding the square root.

At higher tier, the vast majority of candidates would have been better suited being entered for foundation tier. The algebraic skills that underpin many of the higher tier topics were lacking and basic skills e.g. laws of indices, recurring decimals were weak.

At both tiers it was very disappointing to see so many candidates not attempt the multiple choice questions.

Areas for improvement	Classroom resources	Brief description of resource
FT. Writing expressions	RESOURCE	BLENDED LEARNING
FT. Reading scales	BRIDGING UNIT: READING SCALES - BLENDED LEARNING	BLENDED LEARNING
HT. Completing the square	RESOURCE	BLENDED LEARNING

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FOUNDATION TIER COMPONENT ONE

Overview of the Component

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

Generally numerical skills were poor. Candidates knew the required operation but were unable to carry it out accurately.

Candidates performed better on questions set in real life situations, e.g. money and time rather than the more abstract questions on algebra or geometry.

Very few candidates used checking strategies, such as applying opposite operations, to check whether their answers were correct. This is something to be encouraged to increase the accuracy of candidate responses.

Comments on individual questions/sections

Q.1 (a) Subtraction	This was well answered by candidates.
Q.1 (b) Multiplication	This was well answered by candidates.
Q.1 (c) Calculation	Some candidates found this calculation challenging, with 25 (from $150 \div 6$) often seen as a final answer. Other candidates were awarded B1 for evaluating 0.5×30 correctly, but were unable to divide 15 by 6, often leading to final answers of 2.3 or 2 r 3.
Q.1 (d) Order of operations	Most candidates answered this part correctly.
Q.2 (a) Pictogram key	This was well answered by candidates.
Q.2 (b) Interpreting pictogram	This was well answered by candidates.
Q.2 (c) Completing pictogram	Some candidates found it challenging to draw $\frac{3}{4}$ of a sun, with some splitting $\frac{3}{4}$ into two separate diagrams, $\frac{1}{2}$ and $\frac{1}{4}$. They were awarded B0.

Q.3 Fractions and decimals	The first two conversions were well answered but candidates were less successful with the final two conversions, with $0.03 = \frac{3}{10}$ and $\frac{11}{50} = 0.11$ often seen.
Q.4 Formula in words	This was well answered by candidates.
Q.5 (a) Fractions	This was well answered by candidates.
Q.5 (b) Fraction to a percentage	Successful candidates typically used equivalent fractions to find a fraction with denominator 100 before obtaining a final answer of 28%.
Q.5 (c) Fraction of an amount	This was well answered by candidates.
Q.6 (a) Parallel + perpendicular	Only just over a third of candidates were able to draw a parallel line in (i). Very few candidates were able to draw a perpendicular line in (ii).
Q.6 (b) Plans + elevations	This was well answered by candidates. The most common incorrect answer was triangle-based pyramid.
Q.6 (c) Obtuse angle	This was answered correctly by less than half of candidates. Some felt that Nicola was correct, whilst others gave reasons which were insufficiently detailed or incorrect e.g. 'obtuse angles are below 190° '.
Q.7 (a) Train timetable	This was well answered by candidates.
Q.7 (b) Minutes late	Candidates found (b) more challenging than (a). The first step for candidates was to work out how long the train journey from Ashby to Elderville takes, but some made arithmetical errors at this stage. Others incorrectly worked with 4 days instead of 5 days.
Q.8 Lewis's shopping	This was well answered by candidates. Some arithmetical errors were seen and candidates often omitted one aspect of the problem, such as the 60p change.
Q.9 (a) Adrian's overtime	Candidates found this question challenging, with some simply multiplying 14 by 22 or 28 and then going no further. Many arithmetical errors were seen in this question, especially when multiplying 14 by $1\frac{1}{2}$.
Q.9 (b) Adrian's wage increase	Candidates also found this challenging, with some gaining 1 mark for finding the difference between Adrian's new pay and his original pay but going no further. Some arithmetical errors seen increasing £308 by 10%.
Q.10 (a) Solving equation	This was well answered by candidates. Most attempted a formal method to solve the equation, but some embedded answers were seen.

Q.10 (b) Simplifying	Many candidates only gained 1 mark in this question for incorrect answers of $12w$ or $7w^3$.
Q.10 (c) (i) Forming expressions	Candidates engaged well with this question, but many attempted to give equations rather than expressions.
Q.10 (c) (ii) Forming expressions	Candidates did less well with this part, with very few correct answers seen. Some candidates divided by 100, instead of multiplying by 100.
Q.11 (a) Average speed	This was answered correctly by more than half of candidates. The most common incorrect answer was 20.
Q.11 (b) Distance-time graph	This was well answered by candidates.
Q.11 (c) Distance-time graph	This was answered correctly by less than half of candidates. The most common incorrect answer was 15:30 to 17:00.
Q.11 (d) Distance-time graph	Very few correct answers were seen in (d).
Q.12 (a) Square root	This was answered correctly by less than half of candidates. Some candidates thought that Teddy was correct, with $400 \div 2 = 200$ or $200 + 200 = 400$ often seen as their reasoning.
Q.12 (b) Indices	Candidates who were able to calculate 5^3 typically went on to answer this correctly, but $5^3 = 15$ was often seen.
Q.12 (c) Factor and prime	This was answered correctly by more than half of candidates. Some candidates gave answers which were neither prime nor a factor of 16.
Q.12 (d) Using calculation	Just over a quarter of candidates answered this correctly. The most common incorrect answers were 132 or 1320.
Q.13 Survey design	This was well answered by candidates. Some candidates made reference to Year 7 not being suitable for the survey as they had only just started the school, or that all pupils in the school should be asked.
Q.14 (a) Fractions and percentages	Most candidates were able to convert $\frac{3}{20}$ to a percentage. The incorrect answer of 77% was frequently seen, obtained by incorrectly subtracting 33% from 100%.
Q.14 (b) Simple interest	Many candidates were able to calculate 5% of 80 to obtain 4, but most then divided 120 by 4, instead of 40 by 4.

Q.15 Bearings	Very few fully correct responses were seen to this question. Most marks were obtained for plotting point X 8 cm from Y. Candidates struggled drawing a bearing of 150 from Y and most were unable to read the bearing of X from Z for the final answer.
Q.16 (a) Ratio	Candidates who found that there were 36 marbles in the bag, typically went on to find out how many marbles Amy had.
Q.16 (b) Ratio	Many incorrect answers of 15 and 45 seen.
Q.17 Flour problem	Candidates found this multi-step problem very difficult, with many picking up just 1 or 2 marks. Most were able to find the weight of 30 large bags was 75 kg, but few were able to work out that 75kg was equivalent to 50 small bags.
Q.18 Isosceles triangle	This question was poorly answered. Candidates were required to show their workings as it is a 'show that' question, but many simply completed the diagram. It was common for candidates to demonstrate awareness that two angles in an isosceles triangles are equal, but some applied this incorrectly with $BAC = 50^\circ$ often seen. Reasoning was typically insufficient, with 'angles in a circle are 360° ' scoring E0.
Q.19 (a) Ratio counters	Candidates engaged well with this question. Candidates often scored 1 mark for a ratio which met one of the two required conditions.
Q.19 (b) Probability	Few fully correct responses were seen in this part. Many candidates were awarded 1 mark for calculating $1 - 0.46 = 0.54$ but then went no further.
Q.20 (a) Expand and simplify	The most common error in this question was multiplying -7 by -4 to get -28 , but some simplification errors were seen.
Q.20 (b) Form and solve equation	This part was poorly answered by candidates. Many attempted to find x using trials and were typically unsuccessful. Very few fully correct responses seen.
Q.21 Vectors	Very few fully correct responses seen. Some candidates obtained 1 mark for correctly adding vectors p and q .
Q.22 (a) Estimated mean	Few fully correct responses were seen in (a). Most marks were awarded to candidates who found the midpoints for each interval. Some went a little further and multiplied the midpoints by the frequencies but then divided the sum of the products by 4 instead of 50.
Q.22 (b) Estimated percentage	Very few fully correct responses were seen in (b). Most incorrect answers were unsupported, with 28% and 30% often seen.
Q.23 (a) Simplify ratio with units	Very few fully correct responses were seen. Most candidates simply divided both areas by 15 to get an answer of $1\text{cm}^2 : 20\text{mm}^2$.

Q.23 (b) (i) Fraction from a ratio	This was well answered by candidates.
Q.23 (b) (ii) Mass	Candidates engaged well with this question, but arithmetical errors often let them down.
Q.24 (a) (b) Tree diagram	Most candidates correctly completed the branches for badminton in (a) but that was typically it. Very few fully correct responses seen. Tennis branches were either identical to badminton's branches, or $9/50$ and $41/50$. Very few correct responses seen in (b).
Q.25 (a) Congruent triangles	Few fully correct responses seen in this question.
Q.25 (b) Exterior angle	It was very rare to see a correct response in (b). Some candidates clearly confused the properties of isosceles and equilateral triangles.
Q.25 (c) Similar triangles	It was very rare to see a correct response in (c). There was very little awareness of what mathematically similar meant.

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FOUNDATION TIER COMPONENT TWO

Overview of the Component

Candidates were able to use a calculator for this paper but sometimes chose to use non-calculator methods. For example, on question 15 some candidates used a partitioning method to calculate 12% of 485 instead of an efficient calculator method. Similar methods were observed on question 22(a) and 23(b). When this approach was used, there were often numerical errors.

There were several questions which required candidates to read a scale which did not go up in increments of 1 or 10. Candidates needed a strategy to calculate the value of the increments on the graph scale, but a large proportion were not able to do this.

There were various questions on this paper which involved calculations with money. These were answered well and the use of £ and p was correct most of the time. On questions where candidates were required to calculate a discount, they should have read the question carefully to give either the value of the discount or the reduced price depending on what was being asked for.

There were some algebra questions which required candidates to collect like terms. Candidates should remember the difference between adding variables and multiplying them.

The use of trials is not an efficient method for solving equations, candidates should use a formal method for solving equations, particularly simultaneous equations.

Comments on individual questions/sections

Q.1 Place value / four operations / inequality symbols	In part (a) candidates mostly had the correct answer. Some wrote the number in words instead of digits. Commas were sometimes misplaced. Part (b) was usually correct, where there was an error, it was in the first calculation.
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Q.2 Money calculations	Part (a)(i) was usually calculated correctly but in (a)(ii) some candidates calculated the new price of Ffion's order after a reduction of 10%, instead of stating the saving.
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Part (b) was well answered and mostly correct.

Part (c) was well attempted. Some candidates listed two additional items that illustrated that Catrin would not always save money using the voucher, whilst others wrote calculations to show this. The statement 'it depends on the items' was not awarded the mark unless a specific example was given.

Q.3 Area / perimeter	There were a pleasing number of correct rectangles followed by a correct perimeter.
Q.4 Conversion graph	Some candidates incorrectly read the scale for Argentine pesos and gave an answer of 6300 instead of 6600 in part (a). 5.8 was sometimes seen in part (b) from a misinterpretation of the horizontal scale.
Q.5 (a) Reflection	Only around half of candidates were able to reflect the shape correctly in the line. A lot of candidates added another triangle to the right-hand side of the shape to make it symmetrical in a vertical line through the middle of the shape.
Q.5 (b) Edges / faces / vertices	Only around half of the candidates were able to select the correct shape in each part.
Q.5 (c) Rotational symmetry	Around half the candidates selected the correct shape. The triangular shapes being the most common incorrect responses.
Q.5 (d) Calculating angles	Candidates were usually successful in gaining some of the marks on this question. Common incorrect responses came from using 360 degrees as the sum of the angles on a straight-line and 180 degrees as the sum of the angles in a quadrilateral. When a correct value of x was found, it was occasionally included in the calculation for the sum of the angles in the quadrilateral.
Q.6 (a) Reading a graph	This was well answered, most candidates could read the correct values off the graph and successfully calculate the total cost. Sometimes the individual costs were calculated and not added. Occasionally there were errors in reading the scale on the graph. 156 was sometimes used for the number of cold drinks.
Q.6 (b) Simplifying a ratio	Most candidates were able to select the correct two values off the graph, but not all could simplify the ratio fully. 35:25 was commonly seen as the final answer.
Q.6 (c) Finding a number as a percentage of another number	It was common to see 180/220 (number of colds drinks / number of hot drinks) instead of the number of cold drinks out of the total drinks sold during week 4. A small minority of candidates calculated the percentage of hot drinks sold instead of cold drinks.
Q.6 (d) Misleading graphs	In this question, candidates were required to recognise the contradiction between the bars and the scale, which leads to the advertisement being misleading. Most referred to there not being many numbers on the vertical scale.

Q.7 Reading a scale	In part (a) 1250ml was seen a pleasing number of times, however, occasionally only 250ml was given without addition to the original jugs volume. In part (b)(i) there were various errors which led to incorrect answers, including misinterpreting what had been poured out, and what was left in the jug. An incorrect use of the scale led to further errors. In (b)(ii) most candidates were able to divide 'their water poured' by five to gain a follow through mark.
Q.8 Number patterns	Part (a)(i) was often correct. In (a)(ii) the difference of eight was mostly spotted, but not all candidates were able to communicate that the pattern decreased by 8 each time. 'A difference of 8' was not awarded the mark. Some candidates attempted to find the nth term but did so incorrectly, $5n - 8$ was often seen. In part (b) a large proportion of candidates agreed with Hugo's statement. Of those that did give a correct answer, the most common statements included 'the pattern does not go up in 5's', 'the pattern goes up in 4's' or 'the 7th pattern should have 29 sticks.'
Q.9 Pie chart	This question proved challenging for candidates. Part (a) is where they were most successful, some candidates recognised that they were able to multiply the bills and expenses by four to get Sadia's overall income. Whilst others attempted to calculate the costs for each sector of the pie chart and sum them. This method often led to numerical errors and therefore an inaccurate answer. Candidates that recognised that 120° is a third of a pie chart usually gained the marks on this question. However, some attempted to calculate 30% instead. Very few candidates could compare the proportion of Pietro and Sadia's income in part (c). Most attempted to calculate 15% of Sadia's income.
Q.10 (a) Probability table	Candidates could usually complete the table correctly for pink and yellow but found the green and blue entries more challenging. Occasionally candidates used whole numbers in the correct proportion instead of probabilities. These were not awarded any marks.
Q.10 (b)	Very few candidates were able to form the correct expression. Some were able to form an expression for the length of one short necklace, but when attempting to form an expression for two short necklaces forgot to use brackets. $2 \times y - 11$ was sometimes seen. When a candidate did start off with a correct expression e.g. $y + y - 11 + y - 11$ they sometimes simplified it incorrectly by multiplying the y's instead of adding them, $y^3 - 22$ or $y^2 - 11$ were occasionally seen.
Q.11 (a) Median problem	It was rare to see a correct answer of 9 as the median. 15 (the sum of the middle two numbers) was sometimes seen and was awarded 1 mark.

Q.11 (b) Mean problem	Candidates often engaged with attempting to calculate the sum of the three and four numbers respectively. Marks were awarded for sight of 24 and 38 on occasion. Some candidates used trial and improvement to find three numbers with a mean of 8 and four numbers with a mean of 9.5, but unless three of the numbers were common in their trials this did not help them find the fourth card. It was rare to award full marks.
Q.12 Algebra	In part (a) less than half of the candidates were able to correctly simplify the expression. In part (b) a mark was usually awarded for the correct substitution of -4 into the equation but errors in solving usually followed. Some candidates rearranged incorrectly, an incorrect answer of $R = 4.1$ was frequently seen. Candidates were most successful in part (c), expanding brackets, the correct answer was given a pleasing number of times. But, factorising a single bracket in part (d) was often incorrect. Many candidates attempted to solve part (e) through trials instead of square rooting 58. This led to inaccurate answers of 7.6 or 7.61 which were not of an appropriate degree of accuracy to be awarded the mark in this case.
Q.13 Probability sample space	Candidates were able to complete some of the values in the table correctly in part (a), however, some calculated the division the wrong way around and had values of 0.5 instead of 2 and 0.8 instead of 1.25. When calculating the probability in (b)(i) some candidates included 2 when counting the values greater than 2. Part (b)(ii) was not well answered.
Q.14 (a) Highest common factor problem	Very few candidates could interpret this problem and apply an appropriate strategy to calculate the highest common factor of 90 and 144. Some attempted to start listing factors but only listed one or two for each number. Occasionally a factor tree was attempted. A proportion of candidates used a ratio to calculate the highest common factor, this sometimes led to the correct answer.
Q.14 (b) Proportion	Candidates performed well on this question. Some struggled to calculate the cost of the boiled sweets jar correctly but they could use 'their cost' to complete the rest of the question. A large proportion of candidates used £8.50 (1kg of boiled sweets) as the cost for the jar of boiled sweets.
Q.15 Repayment problem	It was pleasing to see how many candidates made good attempts at both parts of this question. They were most successful in calculating the monthly payment for option B. 12% was usually found correctly, although non-calculator partitioning methods sometimes led to accuracy errors. These candidates usually went on to subtract from £485 and find the monthly cost. There were more errors calculating option A, it was common to see candidates start by calculating $£485 \div 4$ without considering the deposit. Responses were usually well structured and easy to follow.

Q.16 Scatter diagram	Candidates performed quite well in all parts of this question. Most were able to give a valid reason in part (b). In some cases, the explanation was not clear enough to determine if they had made a correct comment about the relationship. Candidates should make sure they structure their response into a sentence and use appropriate language to describe the relationship.
Q.17 Pythagoras' theorem / area	Some candidates recognised that Pythagoras' theorem was required in this question. The formula was provided this series, so candidates were usually able to substitute in the correct numbers. However, a correct starting statement of $7.2^2 + 13.5^2$ was sometimes spoiled by answers of 20.7, 20.7^2 or 428.49. Others simply left their answer as 234.09 and did not square root. A large proportion of candidates did not engage with Pythagoras' theorem and found the missing length of the triangle through incorrect means. These were sometimes able to use 'their length' to complete the remainder of the question and find the area of the square. Very few candidates achieved full marks.
Q.18 Volume of a cylinder	It was rare to award marks in this question. Very few candidates used the correct formula to calculate the volume of a cylinder. Where the use of π was seen, it was sometimes embedded in an incorrect calculation such as $\frac{1}{2} \times \pi \times r^2 \times h$ or $2 \times \pi \times r^2 \times h$.
Q.19 Density / unit conversion / rounding	Candidates commonly divided the volume by the density instead of multiplying. When candidates did multiply the volume and density they did not always engage with the change of units. Answers of 13798.4 and 14000 were usually seen following a correct start. When candidates did engage with the change of units there were sometimes place value errors and the answer was not always rounded to 2 significant figures.
Q.20 (a) Indices	Some candidates were able to simplify the variables and had the correct indices but added the coefficients instead of multiplying them. $11x^5y^6$ was a common incorrect response. As was $28x^5y^5$, candidates did not always consider the y term in the second part of the equation. Expressions were not always fully simplified, an answer of $28 \times x^5 \times y^5$ was only awarded 1 out of 2 marks.
Q.20 (b) Solving an inequality	This question was not well answered. Equal signs were sometimes used instead of inequality signs. But very few could collect the n terms and numbers on either side of the inequality or equation.
Q.20 (c) Changing the subject of a formula	The most common response was $x = a \times b$.
Q.21 Standard form / metric conversion	Very rare to see a correct response.

- Q.22 (a)
Repeated
proportional
change
- Most candidates only gained 1 mark in this question for reducing 8000 by 30% (= 5600). Whilst they knew they had to reduce 8000 by 30% four times, very few could accurately calculate this. Non-calculator methods for calculating 30% were usually what was seen. Some candidates found 30% of 8000 and then multiplied this by four.
- Q.22 (b)
Assumption
- This assumption question was well attempted compared with similar questions in previous papers. There were a pleasing number of correct assumptions followed by a valid impact of the assumption. Some candidates just repeated the question.
- Q.23 (a)
Simultaneous
equations
- Very few candidates could set up and solve simultaneous equations. Unconventional notation was sometimes seen when forming an equation e.g. $6T + K7 = 185.75$. Correct answers were sometimes found using trials, these were not awarded any marks.
- Q.23 (b)
Reverse
percentage
- Most candidates calculated 35% of £24570 and subtracted it instead of equating 65% to £24570. 135% was also seen. Similarly to Q22(a), non-calculator partitioning methods for calculating percentages were frequently used.

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HIGHER TIER COMPONENT ONE

Overview of the Component

With the November series being post 16 only, there are few entries at higher tier. It was very obvious that the vast majority of these candidates either did not have the knowledge needed or were not prepared to tackle some of the more demanding questions at this tier and would have been better suited at foundation tier.

There were disappointingly a number of 'multiple choice' questions left blank.

Checking processes were again not always obvious to see, leading to many errors not being picked up. This aspect is possibly more vital with the lack of a calculator available. Numerical calculations were often made much more difficult by using incorrect values within subsequent working.

There are still many candidates showing many attempts at working within the same question with no clear indication of which solution is being presented.

Comments on individual questions/sections

- | | |
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| Q.1 (a)
Simplifying an expression | Many candidates did well with many factorising the final answer.
The main mistakes were with signs in the expansion of second bracket and collection of constant terms. |
| Q.1 (b)
Forming and solving an equation | Most candidates attempted this question but there were many errors. One common mistake was $189-29$ as opposed to $180+29$. A few tried to multiply the expressions and obtained a quadratic or even a cubic in 'x'.

When calculating the three angles after their 'incorrect x', many candidates did not get the final mark as their three angles did not total 180, a simple check to have made.

A very small number used the alternative method equating two angles. |
| Q.2 (a)
Vector geometry | Well attempted but not many with fully correct answers. $p + q$ was correctly evaluated by most candidates. |
| Q.2(b)
Vector geometry | More correct answers than (a) but many flipping the values in the vector. |

Q.3 (a) Grouped frequency table	Only a small number of accurate answers seen, of the very few that seemed to engage with this question, a number evaluated the midpoints but did nothing else (apart from occasionally adding them). A smaller number tried to find some products but did then not divide by 50, more often by 4 or 5 instead. There were also lots of numerical slips in products.
Q.3 (b) Grouped frequency table	Those that answered (a) well had more success with this. Most common mistake was an answer of 56% from 28/50 (total deliveries in the last two groups).
Q.4 (a) Product of prime factors	Typically well done – very few candidates picking up less than 2 marks. It was common to see the A1 mark lost due to a division error. Occasionally non-primes were included, or the final answer was not written in index form notation. Overall candidates are becoming more successful with this topic.
Q.4 (b) HCF and LCM	A different type of question for HCF and LCM with very few candidates picking up both marks. It is difficult to understand why some candidates are not attempting a multiple choice question.
Q.4 (c) Standard form	A number of candidates picked up marks on this question. Those that did engage seemed to get full marks. The rest of the candidates picked up 0 marks or did not attempt, with very little between these extremes.
Q.5 (a) Sequences	Nearly all candidates attempted this question with most candidates getting at least one mark.
Q.5 (b) Sequences	This topic was understood and correctly answered by many candidates.
Q.5 (c) (i) Sequences	Correctly answered by the majority of candidates, a number of slips with addition.
Q.5 (c) (ii) Sequences	Attempted by nearly all candidates, not many with full marks. Main slips in one of the two terms or another term other than the 7 th found.
Q.6 (a) Units within ratio	Of the few that did fully engage, many just ignored the fact the units were different, of those that did attempt to convert mm ² to cm ² , many divided by 10 rather than 100. Hence some of these picked up SC1 for 1:2.
Q.6 (b) (i) Ratio	Most candidates picked up this mark.
Q.6 (b) (ii) Ratio	Many candidates picked up full marks for this typical ratio question with some numerical slips seen.
Q.7 (a) Tree diagram	The first mark was picked up for the value on the first branch but then not many more as candidates didn't realise a division was needed for the second set of branches. Fractions on the branches compounded the difficulty.

Q.7 (b) Tree diagram	Most attempted this part but made it harder for themselves as candidates had 9/50 and 41/50 on the second set of branches from (a). Responses using addition as opposed to multiplication were often seen.
Q.8 (a) Congruent shapes	Most candidates picked up 0 marks on this question with a wide spread of incorrect choices seen. Again a small number of candidates did not even attempt this question.
Q.8 (b) Exterior angle and isosceles triangle	A very small number of candidates correctly evaluated the interior angle of 120 but very few realising that 2×30 would give an isosceles triangle.
Q.8 (c) Similar triangles	Very few candidates looked at proportions of sides, of those that did, a very small number got the correct solution using scale factor $\frac{3}{4}$ or $\frac{4}{3}$.
Q.9 Surface area of cylinder	Very disappointing responses to this question. Many candidates worked with the volume of a cylinder instead of surface area.
Q.10 (a) Box and Whisker Plot	Not many completely accurate box plots – very common occurrence to see the lower quartile value being placed as the median.
Q.10 (b) (i) Box and Whisker Plot	Lack of understanding by most candidates that the lower quartile separates the bottom 25% and top 75% so finding $\frac{3}{4}$ of 280 was seen on very few occasions.
Q.10 (b) (ii) Box and Whisker Plot	Most candidates attempted to answer this part however very few performed any calculations let alone those for range and IQ range as the required measures of spread.
Q.10 (c) Cumulative frequency graph	Very limited success – some candidates even talking of scatter graphs and lines of best fit.
Q.11 (a) Multipliers	Few candidates realised that the power of the first multiplier should be 8 (half-yearly for 4 years). It was common to say ' $\div$ ' wrongly used for the decrease in population.
Q.11 (b) Population graph	A number of candidates chose the correct graph. However disappointing yet again to see a multiple choice question not attempted by many.
Q.12 (a) Working with powers	Very few candidates knew what power $\frac{1}{3}$ meant.
Q.12 (b) Ratio and similar solids	Only a very small number of candidates knew the relationship between scale factors for area and volume of similar shapes.

Q.12 (c) Rearranging formula	Lots of attempts but very few picking up any marks. Algebraic manipulation was not a strength of the vast majority of candidates.
Q.13 (a) Expressions and area	Very few attempts were seen in terms of what was needed here. A number of candidates tried to solve and not show. Those that did make a success at the first part tended to also do well in part (b)
Q.13 (b) Factorisation of quadratic	More attempts made for (b) as opposed to (a). Quite a few candidates tried to solve using the quadratic formula, despite it being a non-calculator paper.
Q.14 (a) Water level change graph	Only a very small handful of candidates attempted to draw a tangent on the graph. Those that did, usually went on to be successful.
Q.14 (b) Water level change graph	Nearly every candidate picked up no marks from incorrect or no work.
Q.14 (c) Water level change graph	Slightly more success here than previous two parts however it was very common to see a line or curve drawn that ended when there was still water left.
Q.15 (a) Recurring decimal problem	It seemed Yes/No was chosen in equal numbers. Those candidates that correctly chose 'No' did not justify their selection with correct working. Most candidates did not understand the mathematical form for repeated digits after the decimal point. The better candidates also went on to say Option D was correct.
Q.15 (b) Recurring decimal as fraction	This question had similar problems to (a) with candidates not realising the two values that were required to eliminate the repeating decimal digits.
Q.15 (c) Standard form problem with powers	Power rules with brackets were correctly applied by very few candidates – many adding the 5 and 3 as opposed to multiplying. Quite a number of candidates missed the word 'Estimate' making the question so much harder for themselves.
Q.16 Area of triangle – trigonometry	$\frac{1}{2}ab\sin C$ was very rarely seen for the area of a triangle so no marks were picked up here, apart from a very few more able candidates.
Q.17 (a) Surd manipulation	Some candidates did roughly understand what was needed to rationalise denominator but unfortunately then did not know what to do with the two fractions.
Q.17 (b) Surd manipulation	Only a very small number of the more able candidates attempted this question. Of those that did, only a small number maintained the accuracy needed to pick up any marks.

Q.18 (a) Few candidates attempted this question with only the most able picking up
Inverse any marks.
function

Q.18 (b) Similar response to that in (a)
Composite
function

MATHEMATICS

GCSE

November 2024

HIGHER TIER COMPONENT TWO

Overview of the Component

Of the candidates that were entered most were able to engage with the earlier questions but were unable to engage constructively with more than these. These candidates would have been better suited being entered for foundation tier.

The use of a calculator is expected in this paper. Never the less, candidates are expected to show sufficient working to illustrate the method of solution they are employing.

Algebraic manipulation was a weakness and use of three letter angle notation was not often seen.

Comments on individual questions/sections

Q.1 Pythagoras' theorem, area and perimeter	Many candidates were able to use Pythagoras' theorem correctly, but far too many showed confusion between area and perimeter and were unable to complete the question correctly.
Q.2 Volume of a cylinder	Well answered by a minority. Despite the formulae for the area of a circle and the volume of a prism being provided, many candidates were unable to start correctly.
Q.3 Density / unit conversion / rounding	Candidates needed to be calculating mass = density $\times$ volume to be awarded any marks. Many did not engage with the change of units or did so incorrectly. Too many candidates missed the requirement to give the final answer correct to 2 significant figures.
Q.4 (a) Simplifying indices	There were some fully correct answers together with a number of correct answers that were not fully simplified such as $28 \times x^5 \times y^5$. Common incorrect answers were $28x^5y^5$, $11x^5y^6$ and $28x^5 \times 2y^5$.
Q.4 (b) Solving an inequality	This question was not well answered. Equal signs were often used instead of inequality signs. Candidates need to appreciate that exact answers are required. $n > 5.3$ is incorrect since $n > 5\frac{1}{3}$ or $\frac{16}{3}$. Those that obtained an inequality for their answer were often unable to complete (ii) by rounding their answer up to the next integer.
Q.4 (c) Changing the subject of a formula	About a half of the candidates were able to answer this correctly. A common incorrect response was $x = a \times b$

Q.4 (d) Inequalities on a number line	Half of the candidates answered this correctly. The notation for the end points was incorrect for some and others appeared unaware that there is standard notation for this.
Q.5 Standard form / metric conversion	A number of candidates ignored the instruction to circle the correct answer and there were a few that decided not to answer the question at all.
Q.6 (a) Repeated proportional change	When the question asks candidates to 'Show that John could be correct', it is disappointing to find candidates stating that John is incorrect. Many candidates only gained 1 mark in this question for reducing 8000 by 30% (= 5600). Some candidates found 30% of 8000 and then multiplied this by four.
Q.6 (b) Assumption	There were a pleasing number of correct assumptions followed by a valid impact of the assumption. Many missed the importance of <u>every</u> house using their voucher.
Q.7 Quadratic curve	(a) This was the best answered question on the examination paper. Even so, $2(-1)^2$ was often given as -2 leading to $y = -3$ when $x = -2$ (b) Many candidates knew the shape of a quadratic curve so were able to produce reasonable curves here. Those that realised the minimum was not at (1, -5) generally managed a better curve. (c) Candidates seemed unfamiliar with the requirement here. $2x^2 - 3x - 7 = 0$ implies $2x^2 - 3x - 4 = 3$ meaning that $y = 3$ is the line required.
Q.8 (a) Simultaneous equations	A minority of candidates were able to complete the question. Some gained one mark for obtaining the two equations. Often poor notation, i.e. $T6 + K7 = 185.75$, was used.
Q.8 (b) Reverse percentage	Several candidates gained one mark by stating that 65% was equal to £24570. A large proportion of these then proceeded to calculate $£24570 \times 1.35$.
Q.9 Capture/recapture	This question was more accessible than similar question on previous papers. A minority of candidates were able to complete this question correctly.
Q.10 Enlargement	Some candidates find the ray method of enlargement difficult. These candidates should be encouraged to draw a scale factor $\frac{1}{3}$ enlargement on the grid to demonstrate understanding of the enlargement.
Q.11 Trigonometry and bearings	Despite the formulae being provided, only a few candidates were able to demonstrate any understanding of right-angled trigonometry. Of those that did, many were then able to deal with the bearing.

Q.12 Circle theorems	Angles need to be labelled using 3 letter notation or correctly placed on the diagram to be awarded marks. Alternate segment theorem was required as a reason for the award of the final mark, a number of candidates gave the reason as the alternate angle theorem
Q.13 Bounds	Few candidates were able to appreciate that the greatest difference occurs when one value is at its maximum and the other at its minimum. Some candidates gained marks by showing understanding of the approach but many used incorrect values.
Q.14 Probability	Very few were able to deal with dependent events without the aid of a tree diagram. Candidates should be encouraged to draw or sketch a tree diagram first.
Q.15 Speed, distance time	The correct use of distance = speed $\times$ time was required to start the question. 1 hour 15 mins was often incorrectly seen as 1.15 hours. 75 minutes was also used but as the speed was in km per hour, this was penalised in the later marks.
Q.16 Vectors	The majority of candidates showed no understanding of vectors. Of those that did, many gave $-3\mathbf{q} + 4\mathbf{r}$ which is SR and not RS.
Q.17 Histograms	A few candidates showed understanding of histograms. In (b)(ii) candidates were expected to show an understanding that information is lost when data is grouped. The histogram assumes that, for the group driving at 25 to 35 mph, half of them drove at 30mph or less. In (c) too many candidates thought that their own knowledge of speed bumps was sufficient to answer the question. An interpretation of the histograms was required for a mark to be awarded.
Q.18 (a) Volume, cone and hemisphere	The formulae for the volume of a sphere and cone are given so candidates should all have been able to access the first mark by replacing r by $(x + 1)$ and dividing the volume of a sphere by two. Very few candidates were able to do so, many started manipulating the given equation and ignored the question completely.
Q.18 (b) Trial and improvement	Too many candidates appear unfamiliar with the formal process of solution by trial and improvement. Show that substituting 1.6 and 1.7 into $2x^3 + 11x^2 + 16x$ results in values either side of 65, then home into 2 decimal places using 1.64 and 1.65. The final step is to show that the solution is $x = 1.65$. The easiest method is to show that substituting $x = 1.645$ leads to an answer less than 65. Hence x is between 1.645 and 1.65 so must be 1.65 correct to 1 decimal place. Solving on the calculator and substituting 1.645... into the equation is awarded one mark only.

Q.19 Venn diagram	(a) Too many candidates failed to appreciate that the 15 was provided to help by showing that the 23 pupils that took part in rock climbing and coasteering includes the 8 who took part in all 3 activities. A number of candidates crossed out the 15 and replaced it with 23. Zero was expected in complement, we allowed it to be left blank, but some candidates wrote other values there including 143. (b) $\frac{22}{143}$ was the common incorrect answer. (c) $\frac{29}{143}$ was the common incorrect answer here with candidates not appreciating that the question only deals with the total number of pupils that participated in gorge walking and not the 143 pupils.
Q.20 Laws of indices	Candidates failed to appreciate that the question was a simple test of the laws of indices being effectively $2a^5 \div a^{-3} = 2a^8$. A few candidates answered the question correctly.
Q.21 Sector area, arc length, cosine rule	Most candidates were unable to start by equating the area of a sector to 12 cm^2 to calculate the radius of the circle. The few that did so were generally able to complete the question although some still confused area and perimeter.
Q.22 $y = \cos x$ and a translation	(a) One of the two marks was awarded for $\cos^{-1}(-0.731) = 136.97^\circ$ or 137°. The second mark was awarded for the other solution of $360^\circ - 136.97^\circ$. Less than half the candidates attempted the question. (b) Very poorly answered.
Q.23 Product rule for counting	Many candidates attempted the question but very few gained any marks. Marks were awarded for the correct calculations for the correct number of codes for either person: Bert $2 \times 3 \times 2 \times 3 \times 2 \times 1$ or 72 and Rehan $6!$ or 720.
Q.24 Direct and inverse proportion	Half of the candidates made no attempt at the question. Those that did often mixed direct and inverse proportion. Some candidates confused themselves by using the same constant in both proportionalities.
Q.25 Completing the square	The vast majority of candidates showed no understanding of the process of completing the square. This was compounded by the coefficient of x^2 not being equal to one. No marks were awarded for the graph unless completing the square was used initially.

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