GCSE Examiners' Report

Mathematics

GCSE

Summer 2024

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 unit.

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	WJEC 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.wjec.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 WJEC 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 subject, rather than for each unit that contributes towards the overall grade. Grade boundaries are published on results day.	For unitised specifications click here: Results, Grade Boundaries and PRS (wjec.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	WJEC 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.wjec.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 WJEC subject page.
Become an examiner with WJEC.	We are currently looking to recruit new examiners. 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 | WJEC

Contents

Executive Summary

The examination papers in GCSE Mathematics were generally of a similar standard to previous examination series. It is clear that many candidates in year 11 this year have been impacted by the pandemic, although there are signs that this has improved, compared with Summer 2023. There are gaps in candidates' knowledge and understanding, which cause problems with more demanding topics and skills. This is especially true of candidates entered at foundation tier and intermediate tier. Overall, candidates at higher tier performed better this summer than in recent series.

There are some areas of the subject content that are not well-understood year on year. These vary from tier to tier. They are usually the topics that are considered demanding at a particular tier, e.g. simultaneous equations, factorising and sample spaces at intermediate tier. More details of topics that are specific to units and/or tiers are listed in the individual unit reports.

There are skills that are also lacking across tiers, such as non-calculator methods, e.g. cancelling, working with fractions, and multiplying and dividing large numbers.

What is becoming more and more evident is how little time many candidates spent learning facts and rules in preparation for these examinations. At foundation tier, candidates do not know the names for polygons or words associated with circles. At intermediate tier, many candidates do not know the meaning of terms such as reciprocal, bisector, HCF, LCM, and had not learnt the various formulae for finding the area and volume of shapes. Even at higher tier, many candidates had not learnt the circle theorems or required formulae, e.g. average speed, the area of a sector. Very often, at all tiers, candidates have more success with questions for which the formulae are given in the question paper.

Many candidates do not use their calculators to their full potential on the calculator-allowed papers. Non-calculator methods are used when a calculator is available. There is a difference between showing your working and using non-calculator methods to carry out calculations. Candidates should remind themselves of this difference before taking these examinations.

There were many candidates who scored very low marks on the exam papers, especially at foundation tier. However, many candidates who were entered for higher tier, in particular, produced some excellent work in topics such as probability, quadratic equations and upper and lower bounds, for example. At intermediate tier, some good work was seen on probability topics, similar shapes and ratio.

Our digital resources website has many blended learning lessons and knowledge organisers, amongst other things: Mathematics - Educational Resources - WJEC
You can filter to help find what you want. Some examples of blended learning lessons and knowledge organisers are listed below, as they have been indicated as areas for improvement.

Areas for improvement	Classroom resources	Brief description of resource
Algebra: Expanding and Factorising	Mathematics - Educational Resources - WJEC factorising-expressions-intermediate.wjec.pdf	Algebra – knowledge organisers Knowledge organiser
	Expanding and factorising - Blended Learning	Blended learning lessons
Fractions	Mathematics - Educational Resources - WJEC four-operations-with-fractions.pdf	Number – knowledge organisers Knowledge organiser
	Fractions, percentages and decimals - Blended Learning	Blended learning lessons
Probability: Sample Spaces	Mathematics - Educational Resources - WJEC probability-sample-space-foundation-intermediate.wjec.pdf	Statistics – knowledge organisers Knowledge organiser
	Probability: Sample spaces - Blended Learning	Blended learning

MATHEMATICS

GCSE

Summer 2024

UNIT 1 FOUNDATION TIER

Overview of the unit

The demand of the questions was comparable to those tested in previous papers. The paper was a suitable and fair test for foundation tier candidates.

The questions that involved some steps of calculation were more challenging. These usually occurred later in the paper.

Candidates sometimes found it difficult to express themselves clearly in an answer which asked for an explanation.

The following questions were well-understood or well-answered:
- writing a number correct to the nearest hundred (Q. 1(b))
- using probability words when interpreting a bar chart (Q. 4(a))
- measuring the sides of a rectangle accurately to find its perimeter (Q. 5)
- continuing a linear sequence of numbers (Q. 6)
- solving simple equations (Q. 7(b)(i) and 7(b)(ii))

Some candidates found working with geometry difficult; these topics included definitions of geometrical terms, accurate drawing, angle properties of triangles. (Questions 2, 10, 15)
Areas for improvement include:
- learning the names of polygons
- learning definitions of words associated with circles
- fixing the location of a point defined by drawing accurately a given angle and the length of a line
- learning the angle properties of triangles

Some candidates found working with topics involving algebra difficult. (Questions 7a, 14)
Areas for improvement include:
- simplifying like terms
- finding numerical values of a sequence defined by its *n*th term

Some candidates found topics involving arithmetic difficult.
Areas for improvement include:
- writing the square or the square root of a number (Q. 9(a))
- rounding numbers correct to a given number of decimal places (Q. 9(b))
- multiplying two decimal numbers (Q. 12(a))
- subtracting two decimal numbers (Q. 12(b))
- expressing a number as a percentage of another number (Q. 17(a))
- sharing an amount in a given ratio (Q. 17(b))

Comments on individual questions

When a question or part-question is not listed, there are no areas to highlight.

Question 1(a)
Many candidates were unable to write the correct number of 0s in this answer. A frequent wrong answer was 56200 instead of 562000.

Question 3
The OCW question involved addition, multiplication and division of two or three digit numbers. Candidates needed to read the question carefully to ensure that they were including three bags containing 65 beads. Many added the number of beads for only one bag to the number in the fourth bag. If the wrong total of beads was found, then the answer for the number of beads per bag was not always a whole number. The answer needed to be written as a decimal correctly. Frequently, the remainder was wrongly written as the number following the decimal point.

For OC1, candidates needed to label their calculations, stating clearly what they were finding, e.g. total number of beads = 600.

For W1, candidates needed to write statements in correct mathematical form.

Some candidates wrote 3 × 65 = 195 + 405 = 600. This lost the W mark.

Question 4(b)
Many candidates did not realise that they needed to compare the number of Matilda's friends who liked rugby with the total number of friends. Very many thought that it was a likely chance as the bar for rugby was higher than the other two bars individually.

Question 5
There were candidates who confused perimeter and area. The area of the rectangle was wrongly found instead of the perimeter.

Question 7(a)
Many candidates did not associate the sign (+ or -) with the number following it. 9k was a frequent wrong answer.

Question 8
This question needed to be read carefully as only the numbers 1, 3, 5, 10, 15 were to be placed in the Venn diagram. Many candidates included other numbers. There was good knowledge of the definitions of multiples of 5 and factors of 15, though the numbers weren't always placed in the correct sections of the Venn diagram. If a number was repeated, no credit was given for either of them.

Question 9
In part (a), the value of 7^2 was 49 and the value of $\sqrt{81}$ was 9. No other answers were accepted.

In part (b), many candidates were unable to round the given numbers to the correct number of decimal places. Frequently, the decimal point was moved along the numbers, e.g. 65·4279 was wrongly written as 65 427·9.

Question 10
Very many candidates didn't realise that the line *BC* had to be drawn from the point *B*. It was often drawn from any point on *AB*.

Question 11
This question needed careful reading as the conditions specified in it had to be followed. For the mean of Ifan's four odd numbers to be 7, the total had to be 28. As the numbers were not all the same, then the only correct answer was 5, 7, 7, 9 for 3 marks. Partly correct answers were awarded part marks, e.g. 7, 7, 2, 12 was awarded 2 marks.

Question 14
Most candidates were unable to find the first three terms of the sequence. The three numbers needed to be added to give the final answer, but some candidates only listed 4, 9 and 14 rather than giving the total.

Question 16
Two parts of this question asked for explanations which candidates found difficult to give.

In part (a), it was necessary to connect the fact that groups of equal width in the table would reach only 19 points with the fact that 20 points could be achieved with 20 attempts at throwing a ball into the bucket.

Part (c)(i) asked for a probability which meant that a numerical answer was required. There were many candidates who wrongly wrote a probability word which is only appropriate in answer to the question, 'What is the chance … ?'.

Part (c)(ii) needed the explanation that the probability $\frac{11}{100}$ was not limited to a score of 19 points only but included points 18 and 20 too.

Question 18
This question was very challenging to most candidates as it was unstructured. The first step was to list all the possible combinations of the numbers given on the two spinners. From these, the three winning combinations needed to be identified. Many did not do this and consequently were unable to make further progress.

Having found the probability of winning the game, the number of winners from 100 games could be calculated. It was frequently difficult to identify what a number written in the answer was referring to; clearer labelling was needed.

Some candidates were able to find the expected profit, but marks were mostly gained from following through from previous wrong working.

Question 19
In part (a), very few candidates drew the line $x = -1$ and consequently very many candidates were awarded 0 marks, as whatever reflection they drew was in the wrong position. B1 was awarded if the shape had been reflected in the line $y = -1$, but this happened rarely.

In part (b), most candidates did not draw rays to help position the rectangle correctly. Consequently, most rectangles were drawn in the wrong place, but many did draw the correctly enlarged rectangle, for which 2 marks were awarded.

MATHEMATICS

GCSE

Summer 2024

UNIT 1 INTERMEDIATE TIER

Overview of the unit

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

Some questions proved more challenging than others, whilst some candidates lost marks because of incorrect numerical evaluations or giving unsupported incorrect answers. This is a common issue from series to series.

The following topic areas were generally well-understood or well-answered:
- finding angles in right-angled and isosceles triangles (Q. 4)
- interpreting grouped data (Q. 5)
- expressing one number as a percentage of another (Q. 6(a))
- sharing an amount in a ratio (Q. 6(b))
- completing the branches on a tree diagram (Q. 15(a))

Some candidates found working with fractions, decimals and percentages difficult. (Questions 1(a)(ii), 1(b), 10(c), 15(b))
Areas for improvement include:
- multiplying fractions
- multiplying decimals
- adding mixed numbers with different denominators

Some candidates found working with topics involving algebra difficult. (Questions 7(a), 7(b), 13, 18)

Areas for improvement include:
- avoiding presenting embedded answers in questions such as question 7(b)
- extracting common factors
- forming, manipulating and solving linear equations, including those involving expanding brackets
- forming, manipulating and solving simultaneous linear equations with whole number coefficients by algebraic methods set in context

A lack of knowledge or application of the facts, formulae and definitions that need to be learned was evident in some questions. (Questions 10(a), 12, 14, 17)

Areas for improvement include:
- understand what is meant by the terms reciprocal, angle bisector, perpendicular bisector, LCM and HCF
- learn the formulae for the relationship between average speed, distance and time

A number of arithmetical errors were made by candidates in some questions.

Areas for improvement include adding, subtracting, multiplying, and dividing whole numbers, decimals, fractions, and negative numbers

Comments on individual questions
When a question or part-question is not listed, there are no areas to highlight.

Question 1
Although generally well-understood, a number of arithmetical errors were seen by candidates in all parts of question 1.

In part (b), many candidates changed the fractions so that they had the same denominator, usually 28. In this case, candidates became stuck when trying to calculate 28 × 28.

Some candidates correctly found $\frac{2}{28}$ but then did not go on to simplify their answer.

Question 3
Candidates should be reminded to read and re-read questions carefully, as 4, 9 and 14 were frequently seen on the answer line as a final answer in this question. Some candidates substituted $n = 0$, $n = 1$ and $n = 2$ into $5n - 1$ and stated the first three terms as –1, 4 and 9. These candidates were awarded B1.

Question 7
Factorising simple expressions proved challenging for many candidates. $-21a$ and $6x^2$ were common incorrect answers in parts (a)(i) and (a)(ii).

Question 8
Many candidates found the lack of structure in the question challenging. Those candidates who clearly split the problem into three parts were successful.

Many candidates confused the number of winning scores with the number of winners e.g. stating that there were 3 winning scores (43, 44 and 45), so £5 × 3 = £15 was paid out in winnings. Follow through marks were available to find the profit made when the game was played 100 times, provided that their number of winners was not equal to 3 and less than 100.

Question 9
Many candidates found part (a) challenging, as they did not know where the line $x = -1$ was located. Candidates usually reflected the shape in the x- or y-axis.

In part (b), a number of candidates enlarged the shape by the correct scale factor of 2. However, placing the enlargement in the correct position on the grid using the centre of enlargement proved difficult. Those candidates who used 'rays' were usually successful.

Question 10
Not many correct answers were seen in part (a). A common incorrect answer seen was 0·4.

In part (b), many candidates were unable to make sensible approximations for 79·34, 40·1 and 0·48. A number of candidates approximated 0·48 as 0 or 1.

Adding mixed numbers with different denominators proved especially challenging to most candidates. Many just added the whole numbers, the numerators and denominators and gave $3\frac{16}{21}$ as a final incorrect answer. Another common error was changing $\frac{5}{7}$ to $\frac{10}{14}$, and also multiplying the whole number by 2 which resulted in a final answer of 5½. B2 was awarded here for one error. Many did not give their answers in their simplest form.

Question 11
Many candidates answered this question well. However, some candidates forgot to divide by 2, whether they were working with the method of calculating 'area of the triangle × 20', or the alternative method of calculating the volume of the cuboid and then halving.

This was the OCW question. Candidates should present their response in a structured way and use appropriate labels to be awarded the OC mark. All working should be shown, and the correct mathematical form was required for the W mark. Many did not label the first stage of working where appropriate. Common mathematical form errors included the incorrect use of the '=' sign and giving incorrect or no units for their final answer.

Question 12
Rarely were completely correct answers seen in all parts, with candidates drawing arcs by hand and not using a pair of compasses when trying to bisect the angle and constructing the perpendicular bisector. In some cases, it was clear that a protractor and ruler had been used with arcs added retrospectively. Candidates must show their 'initial arcs' to show where the point of the pair of compasses are placed before drawing intersecting arcs.

Question 13
Candidates were expected to form an equation to find the value of x. A B1 mark was awarded for sight of $7(x + 8)$ and $3(x + 1)$. Many candidates lost this mark for omitting the brackets. For those that did form an equation, a common error seen was incorrectly expanding the brackets. $7x + 8 + 3x + 1 = 89$ was frequently seen. More often than not, candidates did not form an equation, but used a trial and improvement method to find the value of x. 2 special case marks were awarded if $x = 3$ was clearly identified as a final answer if no correct equation was shown.

Question 14
Solutions would start off in a promising fashion, with the numbers given being broken down into their factors. However, this often did not lead to any conclusion (or sometimes lead to the wrong conclusion) and so the actual LCM of 10 and 18 and the HCF of 30 and 72 were never identified although all the preparatory work had been done.

Question 17
This question proved especially challenging to a number of candidates. Having the whole journey split into two steps and the inclusion of x caused numerous difficulties. Many different methods were seen to find the value of x. A final answer of $x = 48$ from working with 2 hours, was awarded 1 special case mark.

Question 18
Candidates needed to know the properties of a kite in order to set up the necessary equation(s) in this question.

The most common method was to state $2x + 3y = 13$ and $8x – 3y = 22$ and then go on to solve the simultaneous equations and use their solutions to find the perimeter of the isosceles triangle. Many did not realise that the y terms could be eliminated straight away by subtracting both equations. Many candidates continued to equate the x-coefficients, which usually resulted in errors. Occasionally, the correct solution of $y = 4$ was found using a trial-and-improvement method. Follow through marks were available if candidates used 'their equations' as long as they were of an equivalent difficulty.

Some candidates realised that $(2x + 3y) + (8x – 3y) = 13 + 22$ which let to $10x = 35$.

Many candidates find this topic extremely challenging.

MATHEMATICS

GCSE

Summer 2024

UNIT 1 HIGHER TIER

Overview of the unit

The paper appeared to provide a fair test of the full specification at this tier, with candidates' performances reflecting the increased demand when moving through the paper. Very few questions were not attempted; this was particularly pleasing in the later questions and indicated that the entries were generally appropriate for this tier.

The following topic areas were generally well-understood or well-answered:
- using estimations to ease a calculation (Q. 1(b))
- finding the volume of a triangular prism (Q. 2)
- completing and using a tree diagram (Q. 6)
- solving simultaneous equations (Q. 9)
- calculating probability (Q. 17)

Some candidates found working with fractions, decimals and percentages difficult. (Questions 1(c), 7(b))
Areas for improvement include:
- adding fractions and mixed numbers
- calculating using standard form

Some candidates found working with topics involving algebra difficult. (Questions 12, 14, 16(a), 16(b))
Areas for improvement include:
- understanding and using direct and inverse proportion
- recognising different quadratic expressions and knowing how to factorise them
- changing the subject of a formula involving roots

A lack of knowledge or application of the facts, formulae and definitions that need to be learned was evident in some questions. (Questions 1(a), 3, 5, 8, 10, 11, 13)

Areas for improvement include:
- understanding and using the terms reciprocal, angle bisector, perpendicular bisector, LCM and HCF
- understanding and using the formula for average speed
- calculating the area of a sector
- fully describing any transformation
- understanding, learning and using all of the circle theorems listed in the specification

A number of arithmetical errors were made by candidates in some questions. (Questions 1(b), 1(c), 7(b), 10, 15(a), 15(b), 15(c))

Areas for improvement include:
- multiplying and dividing whole numbers, decimals and fractions
- using correct place values when multiplying or dividing decimals
- working with multiples of π in exact calculations
- developing fluency in manipulating surds

Comments on individual questions

When a question or part-question is not listed, there are no areas to highlight.

Question 1
Part (a) was usually well done, but incorrect answers included ¼, 0.4, -0.25 and 0.44444…. Some candidates left the question blank, presumably because they did not know the meaning of the term 'reciprocal'.

Part (c) proved more difficult, with many not appreciating the need for a common denominator before adding fractions, or not expressing their final answer in lowest terms. Converting between mixed numbers and improper fractions was a frequent source of errors. Some candidates added denominators when adding their fractions.

Question 2
This was a successful question, with a high proportion gaining all of the marks, including the two for OCW. However, some candidates inappropriately used Pythagoras's theorem to find the hypotenuse of the triangle, sometimes even misinterpreting this as being the area of the cross-section. Weaker candidates gave an incorrect final answer of 1800 cm^3, from finding the volume of a cuboid (by simply multiplying all of the numbers on the diagram).

OCW marks were sometimes lost for a lack of appropriate labelling, for giving incorrect (or no) units, or for mis-using the 'equals' sign within the arithmetic.

Question 3
Occasional excellent constructions were seen by some candidates, with arcs appropriately shown as required. Other candidates, however, lost marks for not drawing the necessary lines, in some cases having drawn the arcs. A few candidates covered the page with a variety of arcs and were then unable to identify the relevant ones.

Question 4
The question required an equation to be formed, and this was often done successfully, although some used the given expressions to find perimeters rather than areas. Others attempted to multiply rather than add their expressions for area. Occasional inaccuracies were seen in the algebra, particularly in expanding the brackets. In a few cases, it was difficult to distinguish between the candidate's letter 'x' and their multiplication symbol.

Question 5
Many candidates were able to find a common multiple and a common factor, but they were not always the LCM and HCF (respectively). Some gave the LCM of 10 and 18 to be 2, without recognising the fact that the LCM should not be smaller than both 10 and 18. Factor trees or Venn diagrams were often seen, but not all candidates subsequently knew what to do with them.

Question 7
Part (b) was not as successful as part (a), with place value errors often seen. 2÷5 was sometimes given to be 2.5.

Question 8
Fully correct solutions were seen quite often here. After obtaining the correct distance of 90 miles, some candidates did not seem to realise that they had solved the problem and continued by writing 45 mph (for which they were not penalised).

Question 10
Many candidates found this question challenging. Of those who succeeded, there was no particular preference for starting with the major or minor sector. Some embarked on lengthy multiplications of 3.14, which were unnecessary and often inaccurate.

Question 11
Only a few gained all three marks here. Some did not recognise the enlargement at all; others gave the scale factor to be 3 (rather than –3).

Question 12
While there were some excellent solutions seen, this question often proved challenging. A lack of formality and clarity in the algebra was a widespread issue.

Question 13
Candidates needed to unambiguously identify their angles here, and this did not always happen. It was common to incorrectly assume triangle *ABD* or *BCD* to be isosceles.

Expressing the relevant circle theorems was a common difficulty, with some candidates giving vague descriptions that did not include the necessary terminology (namely 'cyclic quadrilateral' and 'alternate segment').

Question 14
Only a minority gained both marks here, with some not appreciating the need to have $2x$ within one bracket and x in the other.

Question 16
Errors in part (a) included only partially factorising the numerator or failing to recognise the difference of two squares in the denominator.

Part (b) was poorly answered. Of those who started by squaring both sides, many forgot to square the 3. Few candidates subsequently knew to collect terms to one side of the equation in order to factorise.

Question 17
This was often answered very well, although even the ablest candidates calculated two probabilities where it was more efficient to calculate only one (and then use reasoning to conclude that the other probability would not be the same).

Question 18
In part (a), many candidates knew to translate the curve to the right, but not always by the correct distance.

Some candidates were penalised in part (b) for vertically translating the curve instead of reflecting it in the x-axis.

MATHEMATICS

GCSE

Summer 2024

UNIT 2 FOUNDATION TIER

Overview of the unit

Overall, the paper was comparable with previous papers that have been sat and was a suitable and fair test for the candidates at foundation level.

Candidates found most of the early questions accessible, but many showed limited knowledge of the topics in the questions common with the intermediate tier.

As with previous series of this paper, there was evidence of candidates not using their calculators to carry out calculations despite this being a calculator-allowed paper. Although non-calculator methods can yield correct responses, they often increase the difficulty of questions and result in unnecessary errors. Candidates should be encouraged to use a calculator wherever possible on Unit 2 but must remember to show their working where appropriate.

The following topic areas were generally well-understood or well-answered:
- naming basic 2D shapes (Q. 3(a)(i))
- finding the next term in a sequence (Q. 5)
- multiples (Q. 8)
- solving basic linear equations (Q. 9(a))
- working with time (Q. 12(a))
- calculating the volume of a cuboid (Q. 13(b))

Some candidates found working with topics involving algebra difficult. (Questions 6, 9(b), 15)
Areas for improvement include:
- simplifying expressions
- solving two-step equations
- substituting values into a formula

Some candidates found working with topics involving geometry and measure difficult. (Questions 3, 11, 13(a))
Areas for improvement include:
- naming quadrilaterals and 3D shapes
- identifying the symmetrical properties of 2D shapes
- completing scale drawings
- measuring angles
- drawing 2-D representations of 3-D shapes on isometric paper

Other areas for improvement include:
- identifying square numbers (Q. 2(a))
- calculating the percentage of an amount with a calculator (Q. 10)
- calculating the area of a circle (Q. 17)

Comments on individual questions

When a question or part-question is not listed, there are no areas to highlight.

Question 1
Typically, candidates were most successful at completing the first two calculations, with errors often seen in the third and fourth calculations where conversion between pounds and pence was required. Incorrect responses of £576 and 1.21p were often seen.

Question 2(a)
Many candidates gave an incorrect answer of 190 to this part, obtained by finding the number halfway between 180 and 200.

Question 2(c)
Some candidates found the difference between the two numbers (130 m) but didn't go any further. Those who did go further often went on to halve the difference but neglected to add it to 280 m, or subtract it from 410 m, to get a correct response of 345 m.

Question 4(a)
55/66 was often identified as equivalent to 5/6 but many candidates struggled to find the second equivalent fraction (35/42).

Question 4(c)
Many candidates completed the calculation by simply writing the numbers in ascending order, with 35 × 67 the most common response.

Question 7(a)
Some candidates simply gave the correct answer to the calculation (46) without making any attempt to explain why Jemma's method is wrong. No marks were awarded to a response such as this on a calculator-allowed paper.

Question 7(c)
Some candidates stated that Rebecca's answer was correct, even though the question asked them to explain why her method was wrong. Others described how to calculate the median or mean from the list of numbers.

Question 7(d)
Nearly all candidates said that Stef should double 1/5 to get 1/10.

Question 8
Most candidates displayed good knowledge of multiples, though there was occasional confusion with factors. Some candidates included 72 (with 24 and 48) in their final answer, losing the final B1, as 72 is not in the range specified in the question.

This was the OC question. Candidates should present their response in a structured way and use appropriate labels for each step of their workings to be awarded the OC mark. Whilst most responses were clear to follow, some didn't use any labels and so were awarded OC0.

Question 11
Few candidates could draw the triangle to scale in part (a), with some picking up one of the two marks for drawing one of the sides to a correct length.

In part (b), most candidates gave a length as their answer instead of measuring the size of angle $A\hat{C}B$.

Question 13
Very few candidates were able to correctly use the isometric paper to draw the cuboid in part (a). Many horizontal lines were seen.

Some candidates were able to calculate the volume of the cuboid in part (b), but the units given were usually cm^2.

Question 14(a)
Many candidates engaged well with this question but an answer of 0.9 was often seen, typically without workings, so no marks were awarded.

Question 15
Very few candidates were awarded marks in this question, with many adding 2.3 and 9.8 to work with $12.1t$.

Question 17
Very few candidates had any awareness of the formula to calculate the area of the circle, with π rarely seen.
The few candidates who correctly calculated the area, typically gave their answer correct to the nearest whole number and were awarded all 3 marks.

Question 18
Some candidates were awarded 1 mark for correctly identifying the angle for *Distribution* as 162°, but few went any further.

MATHEMATICS

GCSE

Summer 2024

UNIT 2 INTERMEDIATE TIER

Overview of the unit

Overall, the questions were comparable with those asked on previous papers that have been sat, and the paper was a suitable and fair test for the candidates at the intermediate level. Some questions proved more challenging than others, whilst some candidates lost marks because of incorrect numerical evaluations or for giving unsupported incorrect answers. This is a common issue from series to series. Unit 2 is designed to assess the use of a calculator. Although non-calculator methods can yield correct responses, non-calculator methods can often increase the difficulty of the question and result in unnecessary errors. Candidates should be encouraged to use a calculator as much as possible on Unit 2 but must remember to show their working where appropriate.

The following topic areas were generally well-understood or well-answered:

- solving simple linear equations (Q. 1(a) and (b))
- finding a percentage of a quantity with a calculator (Q. 2(a))
- interpretation and construction of scale drawings (Q. 3)
- working with time (Q. 4(b) + Q. 8)
- converting between metric units (Q. 4(c))
- calculating the volume of a cuboid (Q. 5(a))
- knowledge that total probability = 1 (Q. 6)
- drawing and interpretating a quadratic equation (Q. 13)
- finding missing lengths in similar shapes (Q. 19(a))

Some candidates found working with topics involving algebra difficult. (Questions 7, 15, 17, 18)

Areas for improvement include:

- substituting values into a formulae and solving equations to find the value of a variable
- finding the gradient and the coordinates of the y-intercept from an equation of a straight line
- solving quadratic equations of the form $x^2 + ax + b = 0$ by factorisation
- forming and manipulating expressions

A lack of knowledge or application of the facts, formulae and definitions that need to be learned was evident in some questions. (Questions 3(b)(i), 4(a), 9, 14)

Areas for improvement include:

- understanding angle notation e.g. $A\hat{C}B$
- learning the formulae for finding the circumference of a circle
- learning the formulae for finding the volume of a cylinder
- converting between cm^3 and litres

Other areas for improvement include:

- drawing 2-D representations of 3-D shapes on isometric paper (Q. 5a)
- rounding numbers to a given number of significant figures (Q. 9)
- understanding and using Venn diagrams to solve problems (Q. 12)
- using Pythagoras's theorem and trigonometric ratios to find missing sides and angles in right-angled triangles (Q. 16)

Comments on individual questions

When a question or part-question is not listed, there are no areas to highlight.

Question 3

It was disappointing that very few correct answers were seen in part (b)(i). Many candidates did not understand the angle notation $A\hat{C}B$. Many gave the perimeter, 53 m, as an answer.

Question 5

Several candidates could not correctly use the isometric paper to draw the cuboid. The 3 directions had to be vertical and along two 'diagonals' (a Y shape). All lines had to go through the dots and have both ends at a dot. Many horizontal lines were seen and some candidates counted the dots, not the spaces between them, and drew a cuboid measuring 6cm by 4cm by 2cm.

Question 7

A correct embedded answer was given full marks. However, candidates often contradicted their embedded answer with a written final incorrect value for t. Those presenting a clear, logical, step by step solution as given in the mark scheme usually gained full marks. A common error was to see a correct first line of $51 \cdot 3 = 2 \cdot 3 + 9 \cdot 8t$ followed by $51 \cdot 3 = 12 \cdot 1t$.

Question 8

Most candidates were able the find the time difference of 16 hours. Numerous different methods were seen to find a third of the difference in hours and minutes. Some candidates worked in minutes and others worked in hours. Common errors were to give a final answer of 5·3 hours, 5·33 hours, 5 hours 30 minutes or 5 hours 33 minutes.

Follow through marks were available to correctly convert their 'third of the difference' into hours and minutes, provided their 'time difference' was not a multiple of 3 hours.

This was the OCW question. Candidates should present their response in a structured way and use appropriate labels for each step of their workings to be awarded the OC mark. Correct mathematical form and units were required for the W mark. Many did not use appropriate labels. Common errors included not showing any workings at all, using the '=' sign incorrectly or giving incorrect or no units for their final answer.

Question 9

Many candidates used an incorrect formula to find the circumference of the circle. These included $\pi \times 38$, $\pi \times 38^2$ or even calculations that did not include π at all. The majority of candidates who correctly found the circumference then gave their answer correct to 2 decimal places rather than correct to 2 significant figures. One mark was available to those candidates that correctly gave 'their circumference' to 2 significant figures, provided 'their circumference' > 100 and π had been used.

Question 10

Candidates should be reminded to read the answer carefully as the probability was asked to be given as a decimal. A fraction, sometimes simplified, or a percentage was commonly seen as a final answer.

Question 12
Usually, candidates gained one mark for completing the diagram using the 'just meal' + 'just drink' = 10 condition. Many did not engage with the condition that the total number of customers who bought a meal was twice the total number of customers who bought a drink.

Part (b) was answered well by candidates, usually following through the values from their diagram in part (a).

Question 14
Candidates usually split the method into four steps: calculating the volume of the cuboid, calculating the volume of the cylinder, finding the difference and converting into litres. Many did not know the formula to calculate the volume of a cylinder and, as in Question 9, many did not use π at all in their calculations.

Some candidates misinterpreted the question and gave the number of whole litres the container could hold. 74 litres was accepted as a final answer provided it had come from correct working.

Some candidates decided to convert the volume of the cylinder and cuboid into litres before the subtraction. The final B1 was awarded as long as all conversions were correct.

Question 16
It appeared that many candidates had not learnt how to use Pythagoras's theorem or trigonometry. Many candidates used the incorrect formula to find the length of *BD* by adding instead of subtracting. These candidates were able to pick up the final 3 marks for finding the value of y, by using 'their *BD*'. Candidates should be reminded to show all steps of their working, as many candidates lost marks because of this.

Question 17
Some candidates factorised correctly but then did not proceed to solve the equation. Many tried to solve by 'trial and improvement'. None of these candidates were successful as they did not realise that there were two solutions.

Question 18
This question proved especially challenging to the majority of candidates. Very few fully correct answers were seen. Candidates needed to show that $3a = b$ was true for all cases. Many used a pair of values (a and $3a$) to show that the mean = range. These candidates were awarded 1 special case mark.

Question 20
Many candidates successfully gave Berwyn's share to be £$0.6x$ in part (a).

Most candidates then omitted the x completely in part (b) and worked with 0·3 and 0·7 for Carys and Delyth. This is only showing that Carys + Aled = Delyth is true when x = £1, and not for all cases of x.

MATHEMATICS

GCSE

Summer 2024

UNIT 2 HIGHER TIER

Overview of the unit

Overall, the questions were comparable with those asked on previous papers. The paper was a suitable and fair test for the candidates at the higher level. As expected, candidates generally performed better over the first half of the paper and performed well on some of the standard Unit 2 higher tier topics. Candidate found some of the non-standard AO3 type multi-stage questions (which were primarily on geometry in this series) quite challenging.

The following topic areas were generally well-understood or well-answered:

- arithmetic work involving the use of calculators (Q. 1)
- drawing and interpreting quadratic graphs (Q. 2)
- volumes of cuboids and cylinders (Q. 4)
- converting cm^3 to litres (Q. 4)
- right-angled trigonometry (Q. 6)
- ratios of lengths of similar shapes (Q. 7)
- solving quadratic equations of the form $x^2 + ax + b = 0$ by factorisation (Q. 8)
- calculating the area of a triangle using $\frac{1}{2}ab\sin C$ (Q. 14)
- upper and lower bounds in numerical calculations (Q. 15)
- using the quadratic formula (Q. 19)

Some candidates found working with topics involving geometry difficult.

- 3D Pythagoras's theorem (Q. 12(a))
- volumes of pyramids, which can be found from the volume of a cone on the formula page (Q. 12(b))
- sketching trigonometric graphs and solving trigonometric equations (Q. 16)
- ratios of areas and volumes of similar solids (Q. 18)
- use of the cosine rule to calculate angles (Q. 20)

Areas for improvement include:

- avoiding loss of accuracy in answers due to premature approximation (especially in multi-stage geometry questions, 6, 12, 18 & 20)
- coordinate geometry (properties of $y = mx + c$ (Q. 5), equation of lines (Q. 13))
- solving quadratic equations with the quadratic formula not initially in the form $ax^2 + bx + c = 0$ (Q. 19)

It is important to highlight in this series that some candidates used their calculators in the incorrect angle mode (i.e. radians or gradians). This was more evident than in previous series.

Comments on individual questions

When a question or part-question is not listed, there are no areas to highlight.

Question 3a
Candidates were unsure how to interpret the third bullet point in the question. Many did not include the intersecting part of the Venn diagram. They chose values such that the number who bought a meal only was twice the number who bought a drink only.

Question 4
A significant number of candidates made errors in converting cm^3 to litres.

The OCW element response was more varied in this series. A notable number of candidates lost the OC element by not explaining the latter part of the solution.

Question 6
Accuracy marks were lost by some candidates who employed a more circuitous, alternative method because their intermediate rounding carried through to their final answer. Use of the sine rule for the second stage of the calculation was used by a number of candidates.

Question 8
Many candidates factorised the quadratic expression successfully. However, a significant number did not see the connection between the factorised form of a quadratic equation and its roots. Some candidates used the quadratic formula on the original equation to find the roots even if they factorised the quadratic expression correctly.

Question 9
Few candidates attempted to prove the result algebraically as the question asked. Most candidates who did gain credit, did so by exemplifying the result numerically.

Question 10b
Many candidates failed to include the variable x in their expressions and subsequent calculations, and therefore could not gain full marks.

Question 11
This question was poorly answered. Many candidates either quartered the 2 or quartered the power.

Question 13
A notable number of candidates could not distinguish between the lines $x = 2$ and $y = 2$.

Question 16a
The intention of having turning points at $x = 0°$ and $x = 360°$ was required to gain the B1 mark for an appropriate cosine curve. Many candidates' curves did not do this. Errors in axes labelling were also made. 2 and -2 on the y-axis was common errors seen.

Question 16b
Many candidates did not know to divide the equation by 2 first. They resorted to trial and error and found only one value.

Question 17
Many candidates were not aware that there were three permutations to consider for '6+6+5'. A common final answer was 1/216.

Question 18
Many candidates realised that they had to cube-root the ratio of the volumes, but then failed to square the result before multiplying with the base area.

Question 19
Errors were made in expanding the brackets and rearranging the equation to equal zero. Errors, in stating correctly, and in substituting into the quadratic formula were evident.

Question 20
It was clear that many candidates were not expecting to use the cosine rule twice in this question. Many candidates tried to use the sine rule for the second part of their solution. The ones who did attempt to rearrange the cosine rule, whether algebraically or initially substituting in their values, did so with varying degrees of success.

Supporting you

Useful contacts and links

Our friendly subject team is on hand to support you between 8.30am and 5.00pm, Monday to Friday.
Tel: 02922 404251
Email: mathematics@wjec.co.uk
Qualification webpage: GCSE Mathematics and GCSE Mathematics Numeracy (wjec.co.uk)

See other useful contacts here: Useful Contacts | WJEC

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.wjec.co.uk/home/professional-learning/

WJEC Qualifications

As Wales' largest awarding body, WJEC supports its education community by providing trusted bilingual qualifications, specialist support, and reliable assessment to schools and colleges across the country. This allows our learners to reach their full potential.

With more than 70 years' experience, we are also amongst the leading providers in both England and Northern Ireland.

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