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# **GCSE EXAMINERS' REPORTS**

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**MATHEMATICS – NUMERACY  
GCSE  
NOVEMBER 2023**

## Introduction

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

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

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

## Further support

Document	Description	Link
Professional Learning / CPD	WJEC offers an extensive annual programme of online and face-to-face Professional Learning events. Access interactive feedback, review example candidate responses, gain practical ideas for the classroom and put questions to our dedicated team by registering for one of our events here.	<a href="https://www.wjec.co.uk/home/professional-learning/">https://www.wjec.co.uk/home/professional-learning/</a>
Past papers	Access the bank of past papers for this qualification, including the most recent assessments. Please note that past papers are published to WJEC and WJEC Eduqas public websites between 1 <sup>st</sup> and 31 <sup>st</sup> December, the year after the examination has taken place.	<a href="http://www.wjecservices.co.uk">www.wjecservices.co.uk</a> or on the WJEC subject page
Grade boundary information	<p>Grade boundaries are the minimum number of marks needed to achieve each grade.</p> <p>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.</p> <p>For linear specifications, a single grade is awarded for the overall subject, rather than for each unit that contributes towards the overall grade. Grade boundaries are published on results day.</p>	For unitised specifications click here: <a href="#">Results, Grade Boundaries and PRS (wjec.co.uk)</a>

Exam Results Analysis	WJEC provides information to examination centres via the WJEC secure website. This is restricted to centre staff only. Access is granted to centre staff by the Examinations Officer at the centre.	<a href="http://www.wjecservices.co.uk">www.wjecservices.co.uk</a>
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.	<a href="https://resources.wjec.co.uk/">https://resources.wjec.co.uk/</a>
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.	<a href="http://www.wjecservices.co.uk">www.wjecservices.co.uk</a> or on the WJEC subject page.

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## Subject Officer's Executive Summary

The examination papers in GCSE Mathematics – Numeracy were generally of a similar standard to previous examination series. As is always the case, some questions were more demanding in some topics than in previous series, whereas others were less demanding. What was noticeable this is that it is clear that many candidates in year 11 this year have been severely impacted by the pandemic, and there are gaps in their knowledge and understanding, which then cause problems with more demanding topics and skills. This is especially true of candidates hoping to achieve the middle grades in the grade range (E to B). There are some areas of the subject content that are not well-understood year on year. This year was no exception. Topics such as bearings, map scales, converting metric and Imperial units, writing numbers as fractions or percentages of other numbers, and perimeter, area and volume have a great need for improvement. Other topics that are specific to units and/or tiers are listed in the individual unit reports.

Similarly, there are skills that are also lacking across tiers, such as non-calculator methods, e.g. cancelling, and multiplying and dividing large numbers and decimals.

What is also evident is how little time many candidates spent learning facts and rules in preparation for these examinations. These include metric to Imperial conversions, formulae for perimeter, area and volume of shapes.

There was also evidence of candidates not using the calculators to their full potential on the calculator-allowed papers. 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.

Some improvement was seen when calculating with time, especially at foundation tier. Knowledge and understanding of statistical charts and representations showed improvement this series too, including pie charts, pictograms, cumulative frequency diagrams and box-and-whisker diagrams.

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
<b>Angles (includes bearings)</b>	<a href="#">ko-angles-intermediate-wjec.pdf</a>	Knowledge organiser
	<a href="#">Angles - Blended Learning</a>	Blended learning
<b>Ratio and proportion (includes map scales)</b>	<a href="#">Ratio and Proportion - Blended Learning</a>	Blended learning
<b>Fractions</b>	<a href="#">four-operations-with-fractions.pdf</a>	Knowledge organiser
	<a href="#">Four operations with decimals, fractions and negative numbers - Blended Learning</a>	Blended learning

# MATHEMATICS - NUMERACY

## GCSE

November 2023

### UNIT 1 FOUNDATION TIER

#### Overview of the Unit

Many candidates attempted most questions. Performance was generally as expected from the candidates at Foundation Level. As candidates cannot use a calculator in this unit, errors in basic number work hindered some candidates. Candidates were more successful with the earlier questions than with the later questions in the paper, as is expected. However, some candidates did manage to gain a few marks in the later questions.

Key areas for improvement include the following:

- Writing one number as a percentage of another.
- Multiplying with a decimal value.
- Understanding the system for calculating income tax.
- Angles and bearings.
- Conversion of units.
- Understanding a map scale given as a ratio.

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

- Finding a basic fraction of a quantity.
- Interpreting and drawing pictograms.
- Interpreting a Venn diagram.

#### Comments on individual questions/sections

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

- Q.1** In Question 1(a)(i), a number of candidates did not use a 3m by 2m rectangle. In Question 1(a)(ii), a number of candidates did not take note of the correct units for area and gave 6m as their answer instead of 6m<sup>2</sup>. In Question 1(b)(ii), some candidates were not able to use the protractor correctly and did not check that the angle drawn looked like an acute angle rather than an obtuse one. In Question 1(b)(iii), some candidates measured the angle or used 360° instead of 180° in their calculation.
- Q.2** In Question 2(a), a few candidates could not find  $\frac{1}{4}$  of 4000000 and some candidates did not use the scale correctly, for example, for 4000000 they did not use the whole circle split into 4 but drew 4 separate quadrants instead.

- Q.3** In Question 3(b), a number of candidates subtracted the left and right eye for each year rather than subtracting the left eye values for both years and the same for the right. Some candidates added the values.  
In Question 3(c), many candidates did not subtract the 25% discount of £8 from the cost of the eye test or the 1/3 off the cost of the frames and worked with their £8 and their £28 to find the total costs. Some candidates thought that 1/3 was half and half again so £21 was often seen as the amount off the cost of the frames.
- Q.4** Most candidates could change 6/10 to 60% but 43/50 was often stated as 43% or 96%.
- Q.6** In Question 6(a), many candidates just stated the answer as 90.  
In Question 6(b), most candidates did not measure the angle for potatoes so had no strategy to answer the question.  
In Question 6(c), some candidates said the answer was 3/10 or divided by 7 or some gained one mark for the 7/10 value of 378.
- Q.7** In Question 7(a)(i), many candidates multiplied 48 by 200g and gave the answer as 9600g.  
For those that did work with 2400g, many could not change it to kg.  
In Question 7(a)(ii), some candidates gained 1 mark for stating 25:200:50 in the answer space, quite often with the units included. Very few simplified their ratio. Some candidates only stated the values of 25g, 200g and 50g on the working lines but did not include the ratio sign.  
In Question 7(b)(ii), several candidates were able to gain 1 mark for showing the calculation  $0.8 \times 70$  but most could not give the accurate answer to this and very few were then able to state the percentage as 25%. Many thought the percentage was 56% or their answer to  $0.8 \times 70$ .
- Q.8** In Question 8(a), many candidates did not understand that \$40 was 1/5 of the total so worked with the \$40 as the total which hindered the number of marks available to them.  
For those that did understand this, errors were made in multiplying 40 by 5.  
In Question 8(b), it was evident that most candidates do not understand how income tax works. Many candidates ignored that income tax was not payable on income below \$10 000 and attempted to calculate 22% of 30000. The understanding of how tax works is an area that needs improvement.
- Q.9** This question was not well answered. It is apparent that candidates at the foundation tier do not understand the concept of bearings in part (a).  
The map scale in Question 9(b)(ii) was not understood. Nearly all candidates did not realise that 1 : 25 000 means 1cm represents 25 000 cm. Many stated the answer as either 3 or 75000. This is an area that needs improvement.

# MATHEMATICS - NUMERACY

## GCSE

November 2023

### UNIT 1 INTERMEDIATE TIER

#### Overview of the Unit

Most candidates attempted all questions. In many aspects, performance was generally as expected, considering the fact that candidates at intermediate tier, in particular, are still affected by the impact the pandemic has had on their learning. Candidates were more successful with the earlier questions than with the later questions in the paper, as is expected.

Key areas for improvement include the following:

- Converting between metric units with the knowledge of standard conversions, for example 1 litre = 1000 cm<sup>3</sup>.
- Multiplying and dividing including larger numbers and decimals.
- Understanding the system for calculating income tax.
- Understanding a map scale given as a ratio.
- Calculating the area of a triangle and the volume of a triangular prism.

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

- Interpreting a Venn diagram.
- Interpreting a given fraction of a pie chart to find the number of people it represents.
- Interpreting box-and-whisker diagrams to find the median and the range.

#### Comments on individual questions/sections

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

**Q.1** In Question 1(a), a number of candidates did not simplify their fraction.

**Q.3** In Question 3(a)(ii), it was clear that a number of candidates incorrectly thought that 1 kg is 100 g not 1000 g. This is an area that needs improvement.  
In Question 3(a)(iii), a number of candidates incorrectly introduced fractions into their ratio, not understanding that, when simplifying, only integers should be in the simplified ratio.

In Question 3(b)(ii), there were many place value errors in evaluating  $0.8 \times 70$ , with 5.6 and 560 being common errors. This is an area that needs improvement.

**Q.4** In Question 4(b), many candidates do not understand the nature of income tax. Many candidates ignored that income tax was not payable on income below \$10 000, consequently \$6600 was a common incorrect answer. This is an area that needs improvement.

- Q.5** This question was not well answered. Many candidates did not give a bearing from Fishguard in Question 5(a), incorrectly starting from St Brides.
- The map scale in Question 5(b)(ii) was not understood. Most candidates did not realise that 1 : 25 000 means 1 cm represents 25 000 cm. This is an area that needs improvement.
- Q.6** Many candidates did not consider a right-angle triangle and work with Pythagoras' Theorem in Question 6(a)(i).  
In Question 6(a)(ii), very few candidates had secure knowledge of calculating a volume of a triangular prism. Many candidates did not consider the area of the cross-section. This is an area that needs improvement.
- Generally, in Question 6(b), the majority of candidates showed some understanding of the problem and tried various numbers of people to attempt to balance the total costs. A few candidates only considered the cost per person and did not include the venue cost.
- Q.7** In Question 7, the majority of candidates considered the ratio aspect initially, which lead to a partial answer of £3.96 if evaluated accurately. A common error made subsequently was to divide by 3 rather than 3.3. Very few candidates used alternative first stage methods.
- Q.8** In Question 8(a)(i), many candidates had some idea of a line of best fit, but many candidates showed a lack of detailed knowledge to be able to answer the question accurately. Few candidates wrote or used the point that should be derived from the means for both sets of data. Many candidates did not draw their line carefully illustrate the trend for the given points. However, many candidates did use their line to answer Question 8(a)(ii), but some candidates misread the vertical scale.
- In Questions 8(b) and 8(c), a number of candidates did not demonstrate any knowledge of bounds.
- Q.9** In Question 9(a)(i), many candidates evaluated the correct values to complete the table but did not plot points at the upper bounds.  
In Question 9(a)(iv), a number of candidates did not know how to express  $\frac{20}{160}$  as a percentage, they did not consider cancelling the fraction or multiplying by 100.
- In Question 9(b), many candidates calculated the costs and the profit, but made no attempt to calculate the percentage profit. Of those candidates who calculated only the costs, many of these candidates incorrectly expressed costs divided by receipts rather than receipts divided by costs.
- In Question 9(c), many candidates had no knowledge of reverse percentages. The majority of candidates showed an incorrect method by subtracting 20% of £8.40 from £8.40.
- Q.11** A common error in Question 11 was to incorrectly evaluate 26.4 by 2.4, by firstly cancelling the '.4' to write 26 divided by 2, with an incorrect scale factor then of 13, rather than 11.  
Many candidates attempted to evaluate the width of the poster but did not progress to calculating the perimeter of the poster.

# MATHEMATICS - NUMERACY

## GCSE

November 2023

### UNIT 1 HIGHER TIER

#### Overview of the Unit

Candidates appeared to have sufficient time to complete the paper. Candidates performed better over the first half of the paper. Accuracy marks were lost by a number of candidates in some of the later questions due to arithmetical errors in performing calculations with large numbers.

Key areas for improvement include the following:

- Dividing by a decimal number.
- How to draw line of best fit when mean values are given.
- Simplifying expressions for the area of a sector of a circle using a cancelling method.
- Adding surds.
- Calculating an estimate for the median of a histogram.
- The method for estimating the gradient of a curve.

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

- Using Pythagoras' theorem.
- Analysing a cumulative frequency diagram.
- Analysing a box-and whisker diagram.
- Calculating the lengths of similar shapes.
- How to calculate the area of a sector of a circle.

#### Comments on individual questions/sections

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

- Q.1** In Question 1(a)(i), many correct responses were seen, although some made arithmetical errors in calculating  $50^2$  and  $30^2$ , with 250 and 90 being the most common errors.  
A number of candidates did not know the correct approach to calculate the volume of the prism in Question 1(a)(ii).

In Question 1(b), some used the efficient way of forming an equation to arrive at the correct answer of 51 people. Most used trial and improvement, and in many instances, work was not well organised.

- Q.2** Most candidates showed at least part of the correct method needed, but accuracy marks were lost by many when attempting the divisions 4.4kg by 3.3 or £3.96 by 3.3.

**Q.3** Question 3(a)(i) was poorly answered with many candidates not giving the coordinates of the mean point in the answer space, and many also not giving a suitable line of best fit that illustrated the trend of the data at both ends of the data points. Far more success was seen in Question 3(a)(ii).

Questions 3(b) and 3(c) were answered well generally.

**Q.4** All parts of Question 4(a) were answered quite well. Some candidates did not complete the cumulative frequency diagram for Question 4(a)(i) which was slightly disappointing.

In Question 4(b), many of the candidates incorrectly thought they needed to use the £700 in their percentage calculation.

In Question 4(c), many correct responses were seen although as usual some thought that subtracting 20% of £8.40 was the required method.

**Q.5** This question was answered well on the whole, with Question 5(b) proving the more challenging part for candidates.

**Q.6** The OCW question on the paper was answered well, with many candidates gaining both OCW marks. Some candidates stopped after working out the width of the poster, however. Also, marks were lost by a number of candidates who failed to round their final answer to 1 significant figure.

**Q.7** Many correct responses were seen in Question 7(a).

It was disappointing to note that many candidates believed that only the data for the 'Rest of the world' was needed to be considered for the fraction of the whole world's railway track that was electrified in Question 7(b).

**Q.8** Marks were lost by a number of candidates who did not show the correct method of converting from pints to litres. Most candidates were able to gain marks in this question however, with many showing the car contained 42 pints of petrol after Hywel had put some petrol in at the garage.

**Q.9** Candidates in Question 9(a) used a variety of methods to arrive at their answer, although many only showed 1 correct step out of the 2 needed.

In Question 9(b), it was pleasing to see that a substantial number of candidates gave correct expressions for the area of each sector and showed the correct method to arrive at the answer. However, many were unable to simplify these expressions efficiently using cancelling methods. A number also incorrectly thought that only two 12cm by 3cm rectangles were included on the diagram.

Common errors seen in Question 9(c) were an initial step of showing  $\sqrt{45 + 5}$ , while others did not know how to go about adding the 2 surds.

**Q.10** Question 10(a) was answered well by many candidates, although quite a number just subtracted the readings from the frequency density axis.

In Question 10(b), it was clear that many candidates had an idea of which group contained the median, but few showed a correct method to find where it was in the group. Errors in reading the height of the bars and in performing multiplications and additions with numbers in the thousands was also evident.

**Q.11** In Question 11(a), a number of candidates failed to realise the height of the reservoir was decreasing during the first 20 days.

Most candidates used 5 trapezium calculations to begin Question 11(b). Inefficient methods to work with these calculations saw many lose accuracy. To arrive at the average depth of water in the reservoir, a number of candidates incorrectly divided their area by 5 instead of 200, while a comparative number failed to realise the need to perform a division at all.

Question 11(c) was poorly answered, with many non-attempts. For those who showed a correct initial step of drawing a tangent to the curve, some failed to give correct a value for their difference in  $x$  as they had not realised each small interval on the  $x$ -axis was worth 4 days.

# MATHEMATICS - NUMERACY

## GCSE

November 2023

### UNIT 2 FOUNDATION TIER

#### Overview of the Unit

Many candidates attempted most questions. Performance was generally as expected from the candidates at Foundation Level. Although candidates can use a calculator in this unit, several do not utilise this and try to calculate answers using non-calculator methods. Candidates were far more successful with the earlier questions than with the later questions in the paper that are common with the Intermediate tier.

Key areas for improvement include the following:

- Calculating the area of a trapezium.
- Angle properties.
- Finding the total amount when given the mean of a set of numbers.
- Conversion between units.
- Volume of a cuboid.

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

- Working with time.
- Using a worded formula.
- Rounding correct to the nearest 100.

#### Comments on individual questions/sections

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

**Q.2** In Question 2(b), some candidates only calculated the difference in costs for 1 day instead of 5 days with an answer of 74p often seen. A few candidates interpreted 'this week' as 7 days and not 5 days, even though Monday to Friday was stated several times in the question.

**Q.3** In Question 3(a), some candidates did not engage with the scale and stated their answer as 12 miles in (i) and 8 miles in (ii). In Question 3(a)(ii) some candidates did not give the answer as 4 miles but stated the values of 1.5 miles and 2.5 miles separately.

In Question 3(b), some candidates worked with partial perimeter, and a few worked with area. When calculating the number of laps, many candidates did not round up their answer and often rounded down. Very few used the method of  $5000 \div$  'their perimeter' but used trials to get as close to 5000m as possible.

- Q.5** For those candidates that found the total mass of the candles, several marks were gained for this question. Some did not add on the mass of the box or thought that the mass of the box needed to be added to each of the different sized candles. For those candidates that calculated the total mass as 5.18kg, the costs were misinterpreted as they did not consider 'mass up to and including' but rounded down to 5kg and a common incorrect answer of £16.85 was often seen. Several candidates attempted to work incorrectly with costs for each candle.
- Q.6** Several candidates did not calculate the number of units used, instead they incorrectly decided to use one of the meter readings or more commonly, the sum of the meter readings as their number of units of electricity. Some even changed the number of units from the 1<sup>st</sup> line to the 2<sup>nd</sup>. Many candidates could not calculate VAT at 5% with several either finding 20% or 50%.
- Q.7** In Question 7(a), most candidates found the mean of the 4 given values with a common incorrect answer of 41 or some even added the 4 values and then divided by 5. Those candidates that did get the answer of 46, did so using trial and error. Very few candidates used the fact that the total of the 5 days was  $42 \times 5$ . In Question 7(b), an error seen was to divide the total rainfall by the 5 days, rather than 7 days. Many candidates stated the same incorrect answer as they had in part (a) of 41mm.
- Q.8** In Question 8, most candidates did not have a correct method to calculate the volume and added the 3 dimensions rather than multiplying them. A common incorrect answer of 20 from  $\frac{1}{3}$  of 60 was often seen. For those candidates that did correctly calculate the volume of the box, some only gave the volume of the whole box or only found  $\frac{2}{3}$  of it rather than  $\frac{1}{3}$ .
- Q.9** In Question 9(a), the majority of candidates started by attempting to calculate the discounted price. Although many candidates did not have a correct method of finding 18% with some attempting to use non-calculator methods. Many of these candidates did not progress to work with the ratio and those that did often divided by 8 rather than 9. In Question 9(b), many candidates did not know how to calculate the area of a trapezium. Many only gained 1 mark for multiplying 'their area' by £2.50 to find the amount paid. This is an area that needs improvement.
- Q.10** In Question 10(a), very few candidates understood about angle properties formed in parallel lines. Some gained a mark for their answer to angle 'b' being the same as their angle 'a'. Many candidates did not use angles in a triangle to find angle 'c'. The use of basic angle properties is an area that needs improvement. In Question 10(b), very few candidates understood how to work with 12 inches  $\approx$  30cm. Instead of finding how many centimetres there are in 1 inch, many candidates incorrectly worked with 12 inches + 12 inches + 5 inches for their value of 29 inches. This is an area that needs improvement.
- Q.11** In Question 11(a), very few candidates knew the correct conversion of 5 miles = 8 miles or 1 mile = 1.6 km. In part (b), many candidates gave their answer as either 3.66, 36.6 or 366 metres per second; they did not know the number of metres in 1 km and did not engage with changing kms per minute into metres per second. This is an area that needs improvement.

# MATHEMATICS - NUMERACY

## GCSE

November 2023

### UNIT 2 INTERMEDIATE TIER

#### Overview of the Unit

Most candidates attempted all questions. In many aspects, performance was generally as expected, considering the fact that candidates at intermediate tier, in particular, are still affected by the impact the pandemic has had on their learning. Candidates were more successful with the earlier questions than with the later questions in the paper, as is expected.

Key areas for improvement include the following:

- Calculating the area of a trapezium.
- Calculating the circumference of a circle and hence the number of revolutions of a wheel.
- Calculating the radius of a circle and hence the volume of a cylinder.
- Interpreting frequency polygons.
- Using index notation and multipliers to calculate a repeated percentage appreciation or depreciation.

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

- Understanding the mean as a total shared equally.
- Calculating a discounted cost with a calculator method using percentage.
- Understanding how to use an exchange rate in order to purchase money.

#### Comments on individual questions/sections

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

**Q.1** In Question 1, there were very few place value errors and few candidates incorrectly deciding to subtract VAT, rather than add VAT. However, a number of candidates did not calculate the number of units used, instead incorrectly deciding to use a meter reading or the sum of the meter readings as their number of units of electricity.

**Q.2** In Question 2(a), many candidates showed a good understanding of the mean. A number of candidates used trial methods demonstrating clear understanding, other candidates found the total of the 4 days and the total for 5 days.

In Question 2(b), an error seen was to divide the total rainfall by the 5 days, rather than 7 days including the 2 days without rain.

**Q.3** In Question 3, a few candidates did not have a method to calculate the volume, but many candidates did correctly calculate the volume of the box. Some candidates incorrectly decided the ornament filled two thirds of the box rather than one third of the box.

The majority of candidates showed working and organised their work, but a number of candidates used incorrect units or did not give units for the volumes calculated.

**Q.4** In Question 4(a), the majority of candidates started by calculating the discounted price. Some of these candidates did not progress to work with the ratio.

In Question 4(b), many candidates did not know how to calculate the area of a trapezium, or use information given. This is an area that needs improvement.

**Q.5** In Question 5(b)(i), many candidates did not use pi in their working. This is an area that needs improvement. A number of candidates were awarded a mark for converting feet into inches or inches into feet.

In Question 5(c), many candidates did use their calculators correctly to enter the one and half hours and calculate the average speed. Although many candidates did incorrectly use 1.3 or 90 as one and half hours in their working.

**Q.6** Question 6 was not well answered. Very few candidates understand the nature of frequency polygons as a comparative representation of grouped data. This is an area that needs improvement.

**Q.7** In Question 7(e), a few candidates found the value of the \$50 note and the \$10 note in pounds and built up their answer to £350. This worked well in this question, as the exchange rate meant that the values were exactly £40 for \$50 and £8 for \$10. It was pleasing to see that candidates had a good understanding of the process of purchasing money.

**Q.8** It was pleasing to see, in Question 8(b), that most candidates understood the context and made some progress in attempting to answer this question.

Very few candidates have secure knowledge of the cross-section of a cylinder and its volume. As a consequence, Question 8(c)(ii) was not well answered. This is an area that needs improvement.

**Q.9** In Question 9, the majority of candidates only calculated the depreciated value after one year correctly. The use of multipliers to calculate repeated percentage appreciation or depreciation is an area for improvement.

# MATHEMATICS - NUMERACY

## GCSE

November 2023

### UNIT 2 HIGHER TIER

#### Overview of the Unit

Candidates appeared to have sufficient time to complete the paper. Candidates, in general, picked up marks throughout the paper, although some topics did prove challenging for some.

Key areas for improvement include the following:

- Comparing 2 sets of data shown in the form of frequency polygons.
- The relationship between the APR rate and the monthly percentage rate.
- Explaining the method of random sampling.

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

- Currency exchange calculations.
- Standard form representation.
- Right-angled trigonometry.
- Repeated percentage change calculations.
- Sharing in a ratio and using the formula for density.
- Using the cosine rule to calculate a length.

#### Comments on individual questions/sections

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

**Q.1** A number of candidates did not realise they needed to calculate the circumference of the wheel in this question, which meant they could only gain 1 mark.

**Q.2** The three parts of Question 2(a) required candidates to show an understanding of the grouped nature of the data, and how to compare two sets of data. It was clear that a substantial number of candidates struggled to understand what the frequency polygons were showing.

In Question 2(b), a number of candidates missed the fact that the frequency polygons crossed each other towards the end of the graph, and chose 2 incorrect data points to work with. Even though the stem of the question showed the groups, many used the mid-points of the plots (the lower bounds of the groups) for their products. The question was therefore not answered as well as a normal estimating the mean question where the data is given in a grouped frequency table.

**Q.3** In Question 3(a), most candidates gained marks, although some worked out the cost as a percentage of the budget, while others failed to give their answer correct to 2 decimal places.

Question 3(c) was answered well, with most candidates gaining full marks for their calculations. However, quite a number failed to give enough commentary on their work to warrant the Organisation and Communication mark.

**Q.4** In Question 4(a)(i), some did not know the correct conversion from pounds to kilograms resulting in no marks gained.

Question 4(b) was answered well, with a number of different methods used of showing that a fire in the forest had a high risk of spreading.

Question 4(c)(i) was answered well, with candidates showing a good understanding of trigonometry.

Question 4(c)(ii) was less well answered, with some failing to correctly rearrange the formula for the circumference of a circle, or not using a correct formula in the first place.

**Q.5** This question was answered well in general. The vast majority were able to correctly apply the first percentage decrease, with some candidates failing to apply a correct 2<sup>nd</sup> or 3<sup>rd</sup> percentage change.

**Q.6** Overall, Question 6(a) was answered well. Some used an incorrect method of finding the mass of each element in the second part of their workings, using division rather than multiplication.

Many fully correct responses were seen in Question 6(b), although as usual some only used the linear scale factor which gained no credit. Some also failed to realise the volume they needed to magnify was given at the top of the page, so their volume factor was applied to an incorrect value.

**Q.7** The vast majority of candidates substituted the correct values of L and n into the formula in Question 7(a), but far less success was seen with the value of r they used. Many thought the APR given in the table was the monthly percentage rate and so substituted 0.033 after converting the percentage rate to a decimal. The correct monthly payment was given in the question, so it was disappointing so many didn't realise their value for r was incorrect and try different options.

Less success was seen in Question 7(b). Many did not know what to do here, while a substantial number failed to realise that Option B included a £2000 deposit that contributed to the amount paid using this payment scheme.

**Q.8** In Question 8(a), many correct expressions for the arc length were seen, although a number failed to realise the need to add on the lengths of the two radii.

Question 8(b) was poorly answered. Correct expressions were seen for the surface area of both shapes, although some failed to divide by 2 for the hemisphere. Most used what they thought were the correct upper bounds for the surface area, although some used an upper bound for the coverage of a tin, which gained no credit for the last 2 marks. Some candidates also misinterpreted the question, giving the least number of tins that could coat all the parts. Special case marks were available for this type of work.

More success was seen in Question 8(c), although few candidates gave a good enough explanation of the method needed to select the parts to justify the 2 explanation marks available.

**Q.9** Question 9(a) was answered well, with the vast majority of candidates moving into part (b) of the question with a correct interior angle of the triangle at Neath.

A number of candidates correctly used the cosine rule to calculate the distance between Port Talbot and Swansea to begin part (b) of the question. Many also succeeded to correctly calculate either the interior angle of the triangle at Port Talbot or Swansea, although some did not rearrange their initial sine rule equation correctly. Calculating the bearing of the flight from Port Talbot to Swansea also proved difficult for many who failed to correctly use the rules of angles with parallel lines.

**Q.10** This question was not answered that well. Some thought they needed to find a quarter of 7.32m rather than half. Others thought the distance to the goal (10.97 m) and the height of the goal (2.44 m) were in the same plane and added these together before using Pythagoras' theorem.

## Supporting you

### Useful contacts and links

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

Tel: 02922 404251

Email: [mathematics@wjec.co.uk](mailto:mathematics@wjec.co.uk)

Qualification webpage: [GCSE Mathematics and GCSE Mathematics Numeracy \(wjec.co.uk\)](https://www.wjec.co.uk/gcse-mathematics)

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

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<sup>i</sup> *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.*