



GCSE EXAMINERS' REPORTS

**GCSE (NEW)
MATHEMATICS – NUMERACY**

NOVEMBER 2022

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MATHEMATICS – NUMERACY

GCSE (NEW)

November 2022

FOUNDATION TIER UNIT 1

General Comments

The paper differentiated well, with different styles of questions and a graduation in the level of difficulty. Several candidates found working with time and area demanding; however, many candidates engaged with the later questions on the paper quite successfully.

Errors in basic numerical calculations hindered many candidates.

Several candidates did not take the opportunity to demonstrate their skills in organisation, communication, and writing. A number of candidates did not label calculations or give a final statement.

Item level data is available to all centres by centre and for individual candidates with comparison of all candidates sitting these examinations. This report will focus on common errors and misconceptions to aid the interpretation of the data available rather than focus on whether each question was well answered or not.

Comments on individual questions/sections

Q.1 Most candidates did not engage with the question 'By approximating the cost of each item...' It appeared that they either misread or did not understand. In Welsh the word 'brasamcan' / 'brasamcanu' was used, pupils previously engaged better when 'amcangyfrifwch' / 'amcangyfrifo' was used. Most candidates just calculated the total cost of the items as they were given. This did mean that those who added accurately gained a mark, but many made numerical errors as it was a non-calculator paper. Candidates who did round using the values £200, £40, £30 and £20 generally gained full marks.

Q.2 In part (a), some candidates incorrectly wrote their answer as one hundred thousand and ninety-five thousand. Some candidates even though the number 195 000 was one million and ninety-five and some thought it was one thousand nine hundred and five.

In (b), the most common incorrect answer was Conwy Castle as it was the 'lowest value' in the list. Some candidates did not engage with the smallest percentage change.

In parts (c) and (d), most candidates identified the values that they needed to use. More candidates were able to add 2 numbers rather than subtract. Many basic errors were made with both calculations. For the subtraction in (d), many set up the column method with the smallest value on top and some candidates thought that the difference meant to add the 2 values.

In (e), many candidates were able to recognise that half a million is 500 000 with many being able to say that 455 428 was close to 500 000 when rounded. Some candidates just repeated the statement of the question saying that 455 428 was about half a million.

In part (f), most candidates were able to gain 1 mark for attempting to count the area, although, some merely counted the squares in the whole grid rather than the squares of the logo. Some candidates did not multiply by 4 and some did not interpret their answer correctly.

- Q.3 Very few candidates gained full marks. Many thought that 27 was a prime number and very few understood what a square number is. Most candidates gained 1 or 2 marks for the final 2 digits being either 21 or 35. Those candidates that did use 21 instead of 35 had not engaged with the fact that the digits should be different.
- Q.4 Parts (a) and (b) were quite well answered; however, many candidates misinterpreted what the customer said in part (c). Most candidates did not consider the rule from the design number to the corresponding number of pieces of metal; they only considered the rule for the continuation of the number of pieces of metal from one design to the next. Therefore, the common incorrect response was 'to add 1 on each time'.
In (d) many candidates only subtracted 55° from 180° and did not engage with the 90° . For those that did use the correct method, basic errors of subtracting 145° from 180° were made with a common incorrect response of 45° .
In part (e), most candidates used the £30 as the cost of the materials and a common incorrect answer of £74 was often seen. Those that did subtract 14 from 30 as the first step of their calculation often gave their answer as 16 and did not divide this by 2. Embedded answers of $2 \times 8 + 14 = 30$ were seen in workings but several then gave the answer of 16 on the answer line.
- Q.5 Candidates were much better at calculating 25% of 800 than $\frac{3}{10}$ of 800. Overall, candidates understood what needed to be done but lack of accuracy inhibited some. Follow through marks were available to find the number of weeks required to save enough money. Most candidates at this level counted on in 80s rather than using a traditional dividing technique. There were some candidates who did some of the first steps and then just calculated 800 divided by 80 for the number of weeks it took to save. Presentation and communication of their methods and workings (OCW) appeared to be worse than in other series of examinations. Many candidates gained 0 or 1 marks for OCW.
- Q.6 In part (a), the correct response of 20:40 did not appear often. The most common incorrect answer was 20:50 where they added 20 minutes onto 20:30.
In part (b), it was very rare to see the correct answer of 10:10. Marks were awarded regularly for multiples of 12, sight of 9:48 etc. The most common incorrect answer was 10:37 where they added 22 minutes onto 10:15. Some candidates made an initial step of subtracting 22 minutes from 10:15 but didn't know what to do next.
- Q.7 Some candidates who engaged with area were able to gain some of the first 3 marks. Again, errors were made with basic multiplication. Very few understood how to work with the costs with some giving the final answer as £12. There were a few candidates who used the alternative method of finding the number of small pictures that would cover the area of the large picture. Of these candidates most gained the first 3 marks but could not then go on to find the costs.
Part (b) was better answered than part (a). Many candidates were able to gain 1 mark for finding the perimeter or finding the costs of half the perimeter.

- Q.8 Very few candidates were able to compare costs and/or volume of the 3 cartons. Many were only able to compare either small with large or medium with large. Very few then went on to compare the small with the medium. It was rare to see candidates using the method of finding the costs for 10ml, 100ml etc of each sized carton to see what the best buy was.
- Q.9 In (a)(i), many candidates did not use the correct method. Most started with adding 175 and 55 and then some tried to divide by 8. Candidates who did use the correct method often made errors with their subtraction and/or their division. In (a)(ii), quite a few candidates gained the first method mark for $17.5 + 17.5$ but most didn't go beyond giving the answer to this calculation which was often incorrectly seen as 34. For those that did go beyond this, some tried to subtract their VAT rather than adding it onto 175. In part (b)(i), the most common incorrect answer was to tick no and state 'there's no leaf with a height of 6cm'. Very few candidates gave the answer that there was no correlation, but some said that the points were scattered. Part (ii) was well answered, although, a common incorrect answer was 17.5. Part (iii) was answered quite well with many candidates gaining 1 or 2 marks. For those that gained 1 mark it was usually due to them having a correct answer to a subtraction using either 17.5 or 13. For this late in the paper, it was pleasing to see that candidates engaged with (iv) and gained some if not full marks for 80%. For those that gained 1 mark it was usually for 8/10 or 90% seen.
- Q.10 There were several candidates who were able to gain the first mark for knowing that they needed to multiply 200×0.23 and/or 200×1.60 . Accuracy often let candidates down; the answer to 200×0.23 was often seen as 23. Follow through marks were available to some for knowing what they needed to do next, although, some calculated the cost to make the jam but failed to then give the profit.

Summary of key points

- Candidates need to ensure that they read questions carefully and highlight key points of the question, especially when the questions ask them to approximate or estimate.
- Candidates need to know the difference between area and perimeter of rectangles so that they can engage with problem solving questions.
- Candidates struggle with finding a fraction and percentage of a quantity. Often this is due to poor division and multiplication skills.

MATHEMATICS – NUMERACY

GCSE (NEW)

November 2022

INTERMEDIATE TIER UNIT 1

General Comments

The paper differentiated well, with different styles of questions and a graduation in the level of difficulty.

Item level data is available to all centres by centre and for individual candidates with comparison of all candidates sitting these examinations. This report will focus on common errors and misconceptions to aid the interpretation of the data available rather than focus on whether each question was well answered or not.

A number of candidates did not take the opportunity to demonstrate their skills in organisation, communication and writing. In particular, a number of candidates did not label calculations or give a final statement.

Comments on individual questions/sections

Q.1 Most candidates engaged with the idea of using area in part (a). A few candidates incorrectly considered the perimeters of the pictures. Often both areas were evaluated correctly with errors occurring in the next stage in answering this question, however there were some errors in calculating 40×15 . Most candidates showed working and labelled some of their calculations. Units were often given correctly, and a final statement made. The unlabelled more difficult section to read was working for calculating the cost.

In part (b), some candidates incorrectly thought of area, but only very few candidates used the larger picture. Generally, candidates were able to understand what was required. Some candidates worked out the cost of each edge of the frame, with some forgetting to find the total cost. However, many candidates found the perimeter first. A few candidates worked only with the semi-perimeter.

Q.2 Part (a) was not well answered, with a number of candidates finding a simple time problem difficult to engage with. 20:50 was a common incorrect response. Although a number of candidates were able to work out the correct time in part (b), some candidates only stated the time of the tram to catch, not the arrival time of this tram at Rowe Place. A number of candidates did not engage with the problem, simply adding 22 minutes to the time given in the question (10:15), hence writing 10:37 as their incorrect response. However, many candidates did engage with some aspects, by showing the tram times from 8am or working from the 10 a.m. tram but giving a time that arrived too late at 10:22.

Q.3 In part (a) many candidates considered the same number of ml of milk looking at the cost for each carton size. Some candidates did not make like for like comparisons. However, a number of candidates did work correctly making pairs of comparisons, such as 400 ml for 40p for the medium carton compared with 500 ml for the same amount of money in the small carton. Where errors occurred, it was generally with division or giving the incorrect units leading to an incorrect conclusion. Candidates did not consider the order of their division and the consequence was that they made an incorrect 'best buy' decision.

In part (b), many correct responses were seen. However, a number of candidates made errors in dividing 30 by 12.

Q.4 In part (a) a number of candidates did not work with the area of a triangle, instead candidates added lengths or multiplied three lengths together. It was important to work with the area of each triangle. A number of candidates working with the area of a triangle incorrectly used 13 cm as the height of the larger triangle.

Many candidates in part (b)(i) showed a complete correct method in stages but made errors in calculation of $175 - 55$ or in division by 8. A few candidates failed to subtract the £55 before dividing by 8.

In part (b)(ii) a number of candidates found the VAT correctly, but then either did nothing with this amount or they subtracted it from £175, rather than adding it to £175.

A popular incorrect response in part (c)(i) was to say that there was no plot for a height of 6 cm.

Part (c)(ii) was well answered.

In part (c)(iii), common errors included not subtracting accurately and reading heights incorrectly from the graph.

In part (iv) although many candidates did count accurately, a few candidates did not express the 8 out of 10 as a fraction or attempt to calculate the percentage. A few candidates included 23, so had an answer of 90%.

Q.5 A number of candidates engaged with the information regarding the apple and pear trees in the north orchard in part (a). A few candidates incorrectly then doubled 20 apple trees, rather than the 15 pear trees. The second stage caused candidates greater difficulty in interpretation, although a number of candidates did give a correct response.

In part (b) a number of candidates attempted to find a sixth of 5280 lbs but failed to convert this to kg although a number of candidates did write '1 kg = 2.2 pounds' on the page. In the second stage some candidates attempted to divide by 5 but omitted the need to double.

Many candidates engaged well with the problem in part (c)(i), with their only errors being in the arithmetic. However, a few candidates thought that the ingredients for 1 jar of jam cost £94, added the 23p for the cost of the jar, deducing incorrectly that each jar of jam cost £94.23 to produce.

Many candidates engaged with the diagrams in part (c)(ii), with correct working and an answer of 18 cm. Where errors occurred, it was through incorrect logic, looking at differences in lengths, such as $48 - 8 = 40$, so $40 + 3 = 43$.

- Q.6 In part (a) a number of candidates were able to work with the bearing of 010° from Aberporth, but worked incorrectly with 280° from Aberystwyth, the common error being to indicate a bearing of 260° instead. Only a few candidates indicated a region using the correct radius. Also, a number of candidates did not engage with finding where the whale was spotted at all.

In part (b) many candidates attempted 2.5×12 but did not continue. However, a number of answers of 600 were seen and many correct answers of 6 metres.

In part (c)(i) a few candidates did not estimate and did not write values in a fraction or attempt division. Of the candidates using estimation, some candidates did not consider carefully how many digits to give in their estimation. $10/20$ giving 50% is not a good estimate in this context. When estimating it is important also to consider the context and the manageability of possible calculations, being reason why we estimate.

In part (c)(ii) a few candidates did find 10% of 19 billion correctly, some wrote this in standard form or in full but did not subtract this from 19 billion. There were errors in working with large numbers and some candidates did not have skills of using standard form to write large numbers.

- Q.7 In part (a) a number of candidates did show they could find the median and indicate the shortest and longest lengths of the yachts. A number of candidates did not draw the box-and-whisker diagram using the correct format, with missing lines, lines through the box or no lines.

In part (b)(i) a number of candidates calculated 25% of 68 yachts, rather than 75% of 68 yachts.

In part (b)(ii) some candidates did not show understanding of how to find the interquartile range.

Part (b)(iii) was well answered by those with an understanding of the information they had been presented with, in that the length of the longest yacht in the Clwyd marina was not given and couldn't be read from the graph. Other candidates made a guess, and some candidates thought the longest yacht in the Clwyd marina was 25 metres in length.

- Q.8 This question was not well answered, although some candidates did engage well with part (b)(i).

Very, very few candidates engaged with the question in part (a), although, some did write πr^2 but progressed no further.

In part (b)(i) $\frac{1}{4}$ of 500 was often seen and calculated correctly, with a number of candidates then not progressing any further to consider this as 'per second' to calculate 'per minute' by multiplying by 60.

In part (b)(ii) a number of candidates gave incorrect answers such as 200 (double the 100% given in the question) or 50 (double the 25 cm^2 given in the question).

Summary of key points

- Candidates often make calculation errors when working with time or dividing.
- When working through a multi-step problem, it is important to write and consider units, as not knowing the unit can impact on understanding when engaging with the next step.
- Candidates do not engage well with bearings, seemingly not understanding where a bearing is measured from and the clockwise turn.
- When estimating, candidates should consider the context and difficulty of the calculation required. Approximately all values correct to 1 significant figure will not necessarily give a useful estimate of a calculation when considering the context.

GCSE MATHEMATICS – NUMERACY

GCSE (NEW)

November 2022

HIGHER TIER UNIT 1

General Comments

Candidates appeared to have had sufficient time to attempt all the questions, and the paper differentiated well. Candidates generally performed well on most of the questions at the lower end of the paper, but arithmetic errors were seen throughout the paper, even on some quite basic calculations.

This report will focus on common errors and misconceptions to aid the interpretation of the item level data available to all centres.

Comments on individual questions/sections

- Q.1 (a) This question on working with ratios was well answered. Candidates generally showed a good understanding of how to work with the ratios in both orchards, and how to work with the different type of calculations involved. Some brought forward the wrong value from the first orchard, due to pear trees appearing on different sides of the ratio in the two orchards. Others used the same type of calculation in the 2nd orchard as in the first, which was incorrect as they weren't given the total number of trees in the 2nd orchard. This was the OCW question in this paper. Generally, work was well laid out and easy to follow. Workings were clearly shown with very few candidates misusing the equal sign. There were instances where candidates were giving the explanation of their work after their calculations which is not good practice. Also, one or two candidates wrote what seemed like an essay detailing each calculation, which is not good mathematical communication.
- (b) This question assessed fractions of an amounts, converting between kg and pounds, and working with proportions. It was answered reasonably well, with most gaining marks for calculating $\frac{1}{6}$ of 5280 and working with the proportion correctly. Quite a number of arithmetical errors were seen with those who tried to convert from pounds into kg. The division by 2.2 proved difficult. Those who converted the number of kilograms in the proportion into pounds had better success, as 5×2.2 was a simpler calculation. A number of candidates did not know the correct conversion, however.
- (c) This question was answered very well. Nearly all candidates knew the correct method of similar shapes. The only errors seen were arithmetic ones, in calculating $48/8 \times 6$.
- Q.2 (a) Those who knew how to draw a bearing generally were able to find the location of the whale. Those who made errors with the bearings tended to make their error with the bearing of 280 degrees . Nearly all candidates drew a circle of the correct size to show the search region. Some incorrectly drew a circle of diameter 20km rather than a circle of radius 20km, and some did not draw their circle centred at the location of the whale.

- (b) The majority of candidates used the correct method here, although many did not explicitly show the division by 100 to convert from cm to m. Many correct answers were seen, but those who made errors did so when multiplying 240 by 2.5. It was disappointing to note that of those candidates who made errors here, a number did not realise that the answer was not going to be that far away from 480 (240×2).
- (c) In part (i) of this question, the majority of candidates knew that a correct method to convert the proportion into a percentage, although many did not approximate the numbers involved to make the calculation easier. In part (ii), in order to give the answer to the calculation in standard form, it was necessary for candidates to show they knew the full size of 19 billion in figures. Many did not, and therefore their standard form answer was incorrect. Most were able to show the calculation $19 - 1.9$ to get the significant figures of the answer, although an incorrect answer to this calculation of 18.1 was seen a number of times.
- Q.3 (a) The vast majority of candidates drew the correct format of a box-and-whisker diagram, and many correct responses were seen. Some did not give the correct quartiles. More success was seen with the end points and the median.
- (b) Those who showed an understanding of the information given to them at the start of the question tended to gain marks in all 3 parts of this question. In part (i), some only gave the value for $\frac{1}{4}$ of 68 rather than $\frac{3}{4}$. Arithmetic errors were also seen from some in calculating $\frac{3}{4}$ of 68. Only the lower quartile was specifically mentioned in the information given at the start of the question, and some candidates were unable to use the information correctly to give the correct interquartile range for Clwyd Marina in part (ii). More success was seen in part (iii), with most candidates stating that the length of the longest boat in Clwyd Marina was not given, and hence chose the correct option of 'Can't tell'. Some misinterpreted the data, thinking that length was referring to length of time. Some also thought the last question was asking which marina had the greatest average length.
- Q.4 (a) A number of candidates correctly stated that $\pi \times \text{radius}^2 = 25$, but many were then unable to rearrange it correctly to give the correct expression. The answer 5π was seen a lot. Many did not realise their expression should include square root. Some candidates were including the height of the cylinder in their expressions.
- (b) In part (i), many correct answers were seen, although some did not read the question carefully, and failed to see the need to $\times 60$ to give the rate per minute. In part (ii), it seemed as though some candidates did not know that the word capacity used in the question referred to the volume of the bags. Many worked with the cross-sectional area of 25 cm^2 rather than the volume of 500 cm^3 .
- Q.5 (a) The majority of candidates knew how to arrive at frequencies from the histogram, although some did not see the need to add them to find the total number of pebbles in the sample, which was needed to create a percentage. Arithmetical errors were again seen in the calculating the products, and in summing, and errors were also seen in reading the vertical scale correctly.

Those who gained marks in arriving at the total number of pebbles generally showed the correct method for arriving at the percentage of pebbles that had a mass of less than 70g, although again arithmetical errors were seen, especially with those that didn't arrive at the correct total number of pebbles of 250.

- (b) Part (i) of this question was answered reasonably well. Candidates needed to realise the area of the 2nd bar was double that of the 1st bar, equating to 80 and 40 pebbles, and hence allowing the scale on the axis to be found. In part (ii), the middle option of the five (45g) was an incorrect response that was seen more than the others.
- Q.6 Candidates had to work with bounds in this question to be awarded any marks, and even if they misinterpreted the question, trying to calculate the minimum number of packs of flooring that could cover the area, half of the marks were still available. It was disappointing to note that a number of candidates failed to realise that they needed to use bounds, and that also a number did not use the correct formula for the area of a triangle. For those candidates who used bounds, most used appropriate values, although some failed to give an accurate answer for 8.1×4.5 . Some also did not realise that the height of the triangle would be 1m when consistent bounds were used, as it came from the calculation $5.5 - 4.5$. Most who arrived at an answer for the area of the floor, using bounds and appropriate formulae, added on 10% and calculated the number of packs of flooring accurately.
- Q.7 Candidates who used the formula for the area of a circle in their calculations were not given any credit in this question. Those who used a diameter of 4.5 cm rather than 9 cm were able to gain special case marks if they went on to use the correct method to arrive at the total length of the metal sheet. Many candidates used the correct expressions for the two different arc lengths, but a significant number failed to realise that two of the shorter arc lengths and four of the longer ones were needed. Another common error was incorrectly adding the lengths of the straight sides (33 cm) to their arc lengths in terms of π to give an answer with a single term.
- Q.8 The vast majority of candidates attempted to calculate the area of each strip and then to sum their answers. Those who attempted to use the trapezium rule tended to make errors in their formula. Some candidates incorrectly used a triangle for their first area. Credit could still be given if they went on to treat the other areas as trapeziums correctly. However no credit was given to those who also used a triangle for the last area. A number failed to realise the need to multiply by 1.2 once they had found their total area. Some candidates made this question more difficult arithmetically by summing the volumes of each strip rather than finding the total area and then multiplying by 1.2 to find the volume. Arithmetical errors with halving and multiplying by 3 were seen, especially with those candidates whose work was less organised and who took several steps to get to the area of each strip.
- Q.9 (a) This question was answered well. The number of shops and the number of hours were both directly proportional to the number of ice creams sold, which made this question more accessible. Some candidates did make the error of treating one as being inversely proportional, however. A number of candidates started with realising that 50 ice creams were sold in 1 shop in 1 hour. A common error was to perform a correct first step e.g. 500 ice creams sold in 5 hours (in 2 shops), but then to only multiply this number by 3 without also dividing by 2.

- (b) The correct strategy in this question involved firstly equating the volumes of the half cone to the volume of the half hemisphere, in order to calculate the height of the half cone. Most candidates gave a correct expression for the volume of a full sphere, but many only halved this rather than quartering it. More success was seen with the expression for the volume of the half cone. Some equated the volume of a hemisphere to that of a full cone, and full credit was awarded to this type of response. The second stage then involved the use of Pythagoras's theorem to arrive at the value of x as a surd, which then needed to be simplified. More success was seen in this last part of the question, and many knew the correct method of simplifying a surd, although arithmetic errors were seen, especially with those candidates whose previous incorrect work had given them a value for x which was much larger than it should have been.

Q.10 Very few candidates gave the correct formula. Some only raised 0.83 to the power of 4, rather than n , possibly because the diagram showed 4 bounces of the ball. Some candidates wanted to work out the height of the ball after each bounce, showing they did not know what was required.

Summary of key points

- Candidates need to be more proficient at multiplying and dividing with decimal numbers and should be able to tell whether the size of their answers are sensible.
- Candidates need to be able to rearrange simple formulae, as this skill is needed to solve reverse problems.
- Candidates need to know the area formulae for basic 2-D shapes.

MATHEMATICS – NUMERACY

GCSE (NEW)

November 2022

FOUNDATION TIER UNIT 2

General Comments

The paper differentiated well, with different styles of questions and a graduation in the level of difficulty. Many candidates found working with time and proportion demanding.

Several candidates did not take the opportunity to demonstrate their skills in organisation, communication, and writing. A number of candidates labelled calculations but did not show full methods as they were allowed to use a calculator.

Item level data is available to all centres by centre and for individual candidates with comparison of all candidates sitting these examinations. This report will focus on common errors and misconceptions to aid the interpretation of the data available rather than focus on whether each question was well answered or not.

Comments on individual questions/sections

Q.1 Most candidates were able to gain 4 or more marks in part (a). Many candidates did not label the vertical axis, and some placed the numbers for their scale in the boxes rather than on the lines. Where workings for the frequency of each mountain were not shown, the frequency had to be taken from the bar chart. Some candidates lost marks if their diagrams were not accurate, especially those that did not use a scale of 1 square to represent 1 or 2 on the vertical axis.

Part (b) was well answered, and most candidates were able to articulate in their own way that the modal choice was not Pen Y Fan as it didn't have the largest frequency. In part (d)(i), the most common error was to calculate 800 divided by 3.3 and in (d)(ii) many knew that they had to add on the time but often gave their answer as 2:15(pm) rather than using the 24-hour clock. In (d)(iii), Pupils could identify the day with the lowest temperature but had difficulty in calculating the range because it went from a negative value to a positive one; the most common incorrect answer was 2. For those candidates that knew how to work out the median, most were able to gain both marks for the correct answer; however, some tried to calculate the mean rather than the median.

Q.2 Most candidates were able to gain at least 3 marks; however, some lost marks due to mixing up the units of pence and pounds. Some candidates forgot to add on the £230 for the drinks and decorations and some only added the costs for one item of each and did not engage with any multiplication. Those that did manage to find the total costs did not subtract £250 at the end to find the amount of money that was still needed. This question allowed candidates to provide simple labels for OCW; however, due to it being a calculator paper, less methods were shown.

In part (b), many candidates did not use the base line of 14cm that was given to them and decided to draw their triangle anyway and used a completely different length base line. Accurate measuring of angles let some candidates down with 45° often used rather than 40° .

In part (c), candidates did not correctly read the conditions of how the tables should be arranged with many not placing 2 people on the long side and 1 person on the short. Several candidates also attempted to put long sides and short sides together.

- Q.3 In part (a), candidates at the foundation tier struggled with changing 2.2 million to figures **and** trying to find 2%. Some did not use a calculator method and attempted to find 1% twice. Some candidates were able to gain one mark for writing 2.2 million in figures and some gained 1 mark for showing a method to find 2% of 2.2 (million). In (b)(i), the most common incorrect answers were 65/360 or 135/360.

Most candidates did not know a correct method that would lead to the correct answer. Some were able to gain one mark for measuring the angle for gold in the pie chart.

- Q.4 In part (a), those candidates that knew how to calculate a percentage of an amount gained marks for the method and often the mark for 920. Some candidates did not read the question correctly and found 23% of 800 rather than 4000. Some did not subtract 800 and 920 to find the difference in VAT.

In part (b), many candidates chose to multiply 3600 by 1.11. Some showed both multiplying by 1.11 and dividing by 1.11 but decided to give the neater answer from multiplying. Those that did use the correct method often did not give their answer to the nearest penny so lost the accuracy mark.

- Q.5 In part (a), many candidates failed to subtract the two given meter readings but gained a mark for multiplying 'their units used' by 7.2. Using incorrect units resulted in some candidates losing marks. Many were able to gain follow through marks for calculating 'their VAT' correctly.

Part (b) was poorly answered. Most candidates added the 3 values given in the question and divided by 3. Some candidates understood that the mean of 7 days was 13.2 and attempted to find 7 values that would add up to between 92 and 93. Part (c) was also poorly answered. Candidates did not know the angle facts formed in parallel lines. Some candidates managed to gain a follow through mark for angle c.

- Q.6 Part (a) was quite well answered with most candidates able to explain that the graph only went to 80 minutes. Part (b) was also well answered with the common incorrect answer of 12 given as candidates read from the wrong graph. Part (c) was not answered as well with many giving the answer as either 34 or 26. Part (d) was not answered poorly. The word proportion was not understood and most just found the difference in the number of males and females using the gym between 40 and 60 minutes.

- Q.7 For the last question on the paper, many candidates attempted the question with many gaining at least one mark for realising the time difference was 5 hours; however, this was often not added onto 17:40 and 9 hours 15 minutes. Some candidates struggled with adding on time and some confused a.m. and p.m.

Summary of key points

- Candidates need to know the calculator method for finding percentages of an amount rather than relying on non-calculator methods.
- Use of time and calculating with time needs to be addressed.
- Candidates struggle with working with pie charts and proportion.

MATHEMATICS – NUMERACY

GCSE (NEW)

November 2022

INTERMEDIATE TIER UNIT 2

General Comments

The paper differentiated well, with different styles of questions and a graduation in the level of difficulty.

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A number of candidates did not take the opportunity to demonstrate their skills in organisation, communication and writing. In particular, a number of candidates did not label calculations or give a final statement.

Comments on individual questions/sections

Q.1 In part (a), many candidates were able to interpret 2.2 million in figures, but unfortunately a number of candidates used a decimal point as a spacer without considering the number they then had written, meaning their working led to an incorrect response of 44 (by writing 44.000). If a spacer is to be inserted, which is not necessary, but may aid grouping the zero digits, it is wise to use a comma or leave a small gap. 44,000 or 44 000 both read as forty-four thousand, whereas 44.000 is forty-four.

In part (b)(i) many candidates did select the correct response, with 135/360 being the most common incorrect choice.

In part (b)(ii) a number of candidates wrote 20/360, probably looking at the format of the possible responses in (i), but did not progress further, not using the fact that the pie chart represents 1800 medals.

Q.2 In part (a) many candidates did find the correct number of units of gas used. Some errors were made with place value of money, particularly if interpreting 7.2p in pounds. A number of candidates subtracted the VAT, rather than adding it to find the total cost. In general, many candidates did label the working shown but some candidates did not. Some candidates did not include units in their answers.

In part (b), a common incorrect response was to find the total of the three temperatures given in the question and divide by 3, a misinterpretation of the 13.2°C given in the question, the average temperature for the first 7 days.

In part (c), angle b was often incorrect, as candidates incorrectly thought of b and 82° as corresponding angles, when the lines are not parallel. However, these candidates were awarded a follow through mark for their c , if appropriate.

- Q.3 There were many correct responses in part (a), with many candidates realising the graphs went as far as 1 hour 20 minutes only, so Freddie was not telling the truth.

Parts (b) and (c) were generally well answered.

Many candidates gave the incorrect answer of '6' from finding the number of men and women in the 40 to 60-minute groups. They had not considered that the frequency diagrams did not both illustrate information for different numbers of men and women.

- Q.4 Some candidates did not work with the 5-hour time difference; some candidates did find the time difference but subtracted 5 hours rather than add it. Candidates need to take care in writing time in analogue or 24-hour formats, and realise that, for example 2:55 does not tell us whether it is morning or afternoon.

Although a number of candidates did calculate the time as 1.5 hours in part (b)(i), a number of these candidates did not interpret this correctly, writing that 1.5 hours is 1 hour 5 minutes.

A number of candidates in part (b)(ii) did not use the total for the two parts of the journey in order to calculate the overall average speed, this was a common error.

- Q.5 In part (a), a number of candidates did not engage with tax already paid and wanted to subtract this from Viktor's total income. Many candidates did not understand how to work with the number line of the tax band.

In part (b) many candidates were able to convert the currency into pounds and some of these candidates did highlight that the answer should be given to the nearest penny, but then did not give their answer the nearest penny.

- Q.6 In part (a), many candidates demonstrated knowledge of applying Pythagoras' Theorem, although, other candidates did not seem to realise that this knowledge was needed to answer this question. A number of candidates calculated the distance correctly but did not continue to find the difference.

There were few clear correct reasons given in part (b)(i), but other candidates did not interpret the inequalities in the grouped frequency table and thought that 200 metres was in the group $200 < \text{distance (metres)} \leq 1000$.

Part (b)(ii) was answered correctly by a number of candidates. Other candidates made errors in finding the mid points of the groups. A common error was to add the mid points and divide by 4 or divide by the sum of the frequencies.

In part (c), a number of candidates did not seem to have knowledge or understanding of systematic sampling. Of the candidates finding 20, from $140 \div 7$, a number of these candidates entered 20, 40, and so on, instead of $2 + 20 = 22$ followed by 42, 62 and so on.

Q.7 In part (a) a number of candidates worked out for each year individually. These candidates made more calculation errors than candidates using index notation. A few candidates calculated a total of 11 years instead of for 10 years, through either miscounting individual years or misinterpreting the question.

In part (b) a number of candidates did not work with the concept of reverse percentage, instead incorrectly reducing £750 by 25%.

In part (c) there were many candidates who demonstrated little or no knowledge of trigonometry. For other candidates the issue was in rearranging the relevant trigonometric formula to find half the width of the garage. The majority of candidates did find the missing height of the triangle, 80 cm.

In part (d) a number of candidates did not engage with the concept of bounds. Other candidates carefully wrote out upper and lower bounds for both of the lengths. Having written the bounds, candidates did not always select the appropriate ones to use to answer the question or write out a suitable calculation to find the required length.

Q.8 The idea of increasing an amount by 682% was not understood by many candidates in part (a). Common errors included $\times 0.682$, $\times 6.82$ and $\times 1.682$.

A common error in part (b) was to divide by 432^2 rather than 432, perhaps having been confused by the unit km^2 . A number of candidates did correctly decide to divide but did not give the answer correct to 2 significant figures. The instruction: 'Give your answer correct to 2 significant figures' was often highlighted by the candidates; but then not done or the answer rounded to 2 decimal places used instead.

Answers in part (c) demonstrated that many candidates are unsure how many cm^3 there are in 1 m^3 . Some candidates did not know or use the fact that $1 \text{ kg} = 1000 \text{ g}$ either.

Summary of key points

- Candidates should be discouraged from using decimal points as spacers in large numbers. If needed, a small space can be left, or if felt necessary, a comma could be used to aid the grouping of digits in large numbers.
- Candidates need to ensure that answers are given to the degree of accuracy requested in the question.
- The understanding of increasing by or decreasing by a percentage is not a secure skill for many candidates, especially when working with repeated percentage, percentage change or with a percentage that is greater than 100%.
- Candidates need to read inequalities carefully. They should then be able to decide if a number is included in a particular group or not by looking at the inequalities used to define the group.

GCSE MATHEMATICS – NUMERACY

GCSE (NEW)

November 2022

HIGHER TIER UNIT 2

General Comments

Candidates appeared to have had sufficient time to attempt all the questions, and the paper differentiated well. This report will focus on common errors and misconceptions to aid the interpretation of the item level data available to all centres.

Comments on individual questions/sections

- Q.1 Those candidates who knew how to deal with the 3 tax rates generally went on to answer this question well. Some arrived at the correct answer by calculating the net income in each band first, then going on to give the amount of tax payable in each band. It was clear though that a number of candidates did not know how to calculate income tax, which would have been an uncomfortable start to the paper. This was the OCW question for this paper. Some good presentation was seen, but some failed to label their work sufficiently, and a number of candidates incorrectly thought that writing their percentage calculations using the percentage symbol was appropriate e.g. $22\% \times 15000$.
- Q.2 (a) This question based on Pythagoras's theorem was answered well. The vast majority of candidates realised the need to use the theorem, and these generally went on to use it correctly to arrive at the distance from College to Delyth's house. Apart from those who made arithmetical errors, they also went on to correctly give how much further she had to walk when she passed Ronnie's house on her way to college.
- (b) Part (i) of this question was not answered well. A number of candidates thought that 200m was in the second group, and so they thought you couldn't tell whether Ronnie had travelled further than the median. There were some candidates who gave the correct decision of 'No', but with the incorrect reason that they thought the median was half-way between the lowest number in the table (100) and the highest number (7000). Part (ii) of the question was on the topic of estimating the mean from a grouped frequency table. Far more success was seen on the question, although some failed to correctly find the mid-points of all the groups.
- (c) Most candidates correctly performed the initial calculation of 140 divided by 7 to give 20, meaning every 20th student should have been sampled. However, some failed to add 20 onto the position of the 1st randomly chosen student to be sampled.
- Q.3 (a) The majority of candidates knew the method required for this repeated percentage change question, but it was disappointing to see the number of candidates who did not know how to efficiently perform the calculation using powers of the multiplier 0.86.

Some candidates performing year-by-year calculations rounded their answers too much, meaning their final answer was outside the acceptable range. Some candidates also applied the percentage change for 1 too many years, which cost them a mark.

- (b) This reverse percentage question saw the usual misconceptions in candidates' responses. The most common error was to calculate 75% of 750, although a few candidates also incorrectly calculated 125% of 750.
 - (c) This question assessed right-angled trigonometry, and it was well answered generally. Some used inefficient methods, and some failed to rearrange their initial trigonometric equation correctly. Those who chose the incorrect trig ratio were only able to gain a mark for calculating the vertical height of the roof of Matteo's garage.
 - (d) This question on using upper and lower bounds was answered quite well. Incorrect answers were generally from those who used the greatest possible length of the garage with the greatest possible length of Matteo's car. Some candidates failed to include the 70 cm in their calculations.
- Q.4
- (a) The vast majority of candidates knew how to efficiently increase a number by 20%, but most used an incorrect multiplier while trying to increase the initial population by 682%. This meant that a score of 1 mark out of 3 was by far the most common score for candidates in this question.
 - (b) Most candidates were able to calculate the accurate population density, but a number of them were unable to round the answer correctly to 2 significant figures. There were those who made an error in the method however, with some performing the calculation in the wrong order, and some thinking that the units of area in km^2 meant they needed to square 432 as part of their calculation.
 - (c) This question assessing the conversion of a metric compound unit was poorly answered. Most of these incorrect answers came from failing to see the need to divide by 100^3 as part of the calculation.
- Q.5
- This question assessed trigonometry and the areas of sectors and triangles. Responses were mixed. Some very good work was seen, although again some candidates used inefficient methods to arrive at the size of the sector angle x . The second part of the question involved summing the area of the sector and the triangle. It was pleasing to see that most knew the correct formula for the area of the sector. Quite a few candidates failed to see the need to calculate the area of the triangle, however.
- Q.6
- (a) Many candidates failed to use the formula correctly, mainly because they used an incorrect value for the monthly interest rate as a decimal. Some arrived at incorrect answers for their calculations as they did not include the correct number of brackets. For those that arrived at the correct number of months, a significant number failed to convert this into the correct date as they didn't realise that the first interest payment would happen at the end of August.

- (b) Candidates generally performed better on this question. Some candidates used an incorrect number of compounding periods, possibly as a result of the work they did in part (a). Some candidates though appeared to be unaware of the formula used to calculate AER.
- (c) This question was not that well answered, considering the calculation required was relatively simple. Candidates were unable to calculate the correct number of £300 instalments Seren would be making in the time period given.
- Q.7 (a) Most candidates realised they needed to use Pythagoras' theorem to find the height of the pyramid, but many were unable to do this correctly. Of the candidates that found the height correctly, most were able to go on to find the volume of the pyramid, although some candidates used $\frac{1}{2}$ in their formula rather than $\frac{1}{3}$.
- (b) Part (i) of this question was not answered well. Similar to a question on the Unit 1 paper, the majority of candidates struggled to correctly rearrange the formula or solve their equation, depending on what their first step was. Disappointingly, a number of candidates who did apply the correct first two steps of rearrangement failed to see the need for brackets around $1 + \tan 58$. Part (ii) of the question assessed the area of similar shapes. More success was seen here, although as usual many candidates incorrectly thought they could multiply the area of the smaller souvenir by the scale factor and not the scale factor squared.
- Q.8 (a) Many fully correct answers were given, which was pleasing to see. After correctly using the cosine rule, most were able to convert a decimal number of hours into a number of hours and minutes. Errors saw some that thought they could use right-angled trigonometry to arrive at the distance between the 2 ships, and others who failed to correctly calculate the initial distance travelled by each ship before 11:00.
- (b) Most candidates who made progress on part (a) also made some progress on part (b), either by using the sine rule or the cosine rule to find one of the two missing angles in the triangle. However, only a minority were able to complete it by correctly calculating the bearing by using the other angles provided.

Summary of key points

- Typing $22\% \times 15000$ into a calculator does give the correct answer to 22% of 15000, but it is not deemed to be good mathematical notation.
- Candidates need to be aware of the efficient method for repeated percentage changes.
- When a value is being increased by 682%, it means the new amount will be 782% of the original value, and therefore the multiplier should be 7.82.
- Candidates need to be proficient at rearranging formulae, including ones that involve terms that are being squared or square rooted.



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