GCSE EXAMINERS' REPORTS

GCSE (NEW)
MATHEMATICS – NUMERACY

Summer 2022

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MATHEMATICS NUMERACY

GCSE (NEW)

Summer 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 the frequency diagram and pie chart questions demanding as they involved other aspects of mathematics in order to answer the questions.

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 Both parts in this question were quite well answered. Candidates lost marks with the usual error of writing the y-coordinate first and the x-coordinate second. Some candidates did not include either one or both negative signs in part (b) and some candidates wrote their coordinates with the x and y included, for example (3x, 1y)

Q.2 In part (a), errors often occurred with the multiplying of 14 and 4 for the tomatoes. Some candidates thought that they needed to multiply each ingredient by 3 rather than by 4. Part (b) was well answered but the most common error was saying the shape was a sphere rather than a cylinder. In part (c), the most common error was made in counting the number of hours that the hall was needed. Candidates did multiply their number of hours by 10 and follow through marks were available for them in adding their hall costs to the other costs. Many candidates struggled with dividing 760 by 8 with many using 800 divided by 8 even though their costs were less than 800. As this was the non-calculator paper, workings were shown, and some labels were given by many of the candidates.

Q.3 This question was not well answered since candidates did not take note of the word ‘estimate’ even though it was in bold. Many candidates just attempted to calculate the actual costs of the party bags. Part (b) followed on from their estimate given in part (a). Those that were able to gain the mark in part (b) gave clear reasons why their estimate was an overestimate.

Q.4 In part (a)(i), many candidates did not consider that the service was 2 hours in length and had to happen between 09:00 and 12:30. So, common incorrect answers were given as Wednesday 11am rather than Wednesday 10:00 – 12:00. Some candidates only considered the earliest day being Tuesday at 14:00 or the earliest time being Friday at 09:00. In (ii), most candidates did not consider the number of hours above 15 hours that were worked to gain the bonus. The main error was to multiply 15 by 8. In part (b), one of the common errors was to add the 4.5 and 6. Several candidates only calculated 7 multiplied by 4.5 and did not add on the 6. Many candidates did not know that 1000 ml = 1 litre so many of the answers in part (c) were either 45 or 450. Many candidates knew what to do in part (d), however, they did not measure the height of the campervan correctly with many measuring this as 5cm (ignoring the height of the wheels). A few measured the length rather than the height.

Q.5 Most of this question was well answered especially part (a). In part (b), the most common incorrect answer was to write 7 metres and 3 cm as 7.3m rather than 7.03m. In part (c), some candidates did not understand that the meaning of the word 'difference' is to subtract and instead gave a descriptive answer. Part (d) showed that many candidates struggle with ordering decimal values.

Q.6 In part (a), £3.60 and £3.40 were common incorrect answers.
In part (b), there were numerous errors in dealing with time, including incorrectly thinking there are 80 or 100 minutes in an hour. A few candidates ignored the pricing details for after the first 2 hours and considered charging £3 for each further 2 hours. A number of candidates did not move on from finding that after the initial £3 charge there was an extra £2.80 to consider in lots of 40p, which related to lots of 20 minutes of time.

Q.7 Some candidates were able to identify the modal group in part (a).
Part (b) was poorly answered. The most common error in was to think '3 bars out of 5 bars', leading to an incorrect fraction of 3/5. Candidates did not even add the frequencies to find the total number of energy bars.

Part (c) was also poorly answered. Most candidates did not engage with what was required. Several candidates who did give the correct answer of 10% gained their answer by subtracting the class intervals.

Q.8 Part (a) was not well answered. Most candidates had difficulty with calculating the number of small bags and the number of large bags, having not worked with every degree on the pie chart representing 2 bags. However, several candidates did indicate the correct angle for the number of small bags on the pie chart. Those candidates who did work with a number of small and large bags made many errors in multiplying by 80p or £1.80, including dealing with place value.

In part (b), most candidates attempting to find the better value did not work with like for like comparisons. Most looked at the cost of 1200g or 800g of peas purchased in a small bag compared with the 1000g large bag.

Q.9 Several parts of this question were quite well answered. In part (b) there were errors in reading the scale; in part (c) most candidates did not use the graph to find the wingspan for an 8.5g bird in centimetres first before attempting to convert to inches. Those that did use the 20cm for the wingspan did not use the method of finding 10cm in inches first to help find 20cm in inches. In part (d), many candidates gave a description of the graph rather than stating the type of correlation. In part (e), several candidate's estimates were outside the range of acceptable answers.

Q.10 Several candidates using the method of looking at 10% of 420 and adding parts to make 35% made errors in deciding what to add to find 35%. Errors included finding only 25% from 84 + 21, instead of 35% from 42 × 3 + 21. A few candidates made errors finding 5% of 42; from the 10% value of 42 they divided by 10 instead of halving. Many candidates did not subtract their 35% of 420 from 420 to find the 65% of 420 required.

Summary of key points

- Candidates often do not consider the size of an answer from their calculations, so do not notice place value errors.
- A number of candidates have poor skills of multiplication and division.
- A number of candidates have poor skills when working with decimals, especially place value and ordering.
- Candidates need to take note of words that are in bold, especially the word '**estimate**'.
- Candidates need to know that to find 5% they halve their 10% value rather than dividing their 10% value by 10.
- Candidates often make errors in reading scales on graphs, not considering the scale before attempting to read values from the graph.
- A number of candidates do not have techniques for adding on or subtracting times that involve hours and minutes.

MATHEMATICS NUMERACY

GCSE (NEW)

Summer 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 In part (a), £3.60 and £3.40 were common incorrect answers.
In part (b), there were numerous errors in dealing with time, including incorrectly thinking that there are 80 or 100 minutes in an hour. A few candidates ignored the pricing details for after the first 2 hours and considered charging £3 for each further 2 hours. A number of candidates did not move on from finding that after the initial £3 charge there was an extra £2.80 to consider in lots of 40p, which related to lots of 20 minutes of time.

Q.2 Although this question was fairly well answered, many candidates worked accurately to find the total rainfall for 10 days and gave the total rainfall for 11 days but did not then divide by 11 to find the mean rainfall over these 11 days.

This question assessed organisation, communication, and writing. Unfortunately, a number of candidates did not label stages of their work or insert units, but the vast majority did show working.

Q.3 Sadly, a number of candidates believe that 1 kg is equal to 100g, rather than 1000g. These candidates consequently did not access any of the marks as this was fundamental and the error simplified follow through working. Other candidates were able to find that 200g cost 60p and were able to give the correct change. A number of candidates incorrectly wrote 60p as 0.60p.

Q.4 A number of candidates were able to identify the modal group in part (a).
In part (b), a number of candidates did not read the vertical scale for frequency accurately and consistently, with the height of the first frequency bar sometimes being given as 2. A common error in part (b) was to think ‘3 bars out of 5 bars’, leading to an incorrect fraction of 3/5.

In part (c), a number of candidates did not engage with what was required.

Q.5 In part (a), many candidates had difficulty with calculating the number of small bags and the number of large bags, having not worked with every degree on the pie chart representing 2 bags. However, many candidates did indicate the correct angle for the number of small bags on the pie chart. In working with a number multiplied by 80p or £1.80, there were many errors including place value in money. This question was generally not well answered.

In part (b), many candidates attempting to find the better value worked with like for like comparisons, such as finding the cost of 1kg of peas when purchased in a small bag. A number of candidates did not compare like with like, looking at the cost of 1200g of peas purchased in a small bag compared with the 1000g large bag.

Q.6 Many candidates did not work accurately in calculating angles and many were not aware of properties of angles for parallel lines.

Q.7 Many parts of this question were well answered. However, there were errors in part (b) in reading the scale and in part (e) a number of candidate estimates were outside the range of acceptable answers.

Q.8 In part (a), a number of candidates using a method of looking at 10% of 420 and adding parts to 35% made errors in deciding what to add to find 35%. Errors included finding only 25% from 84 + 21, instead of 35% from 42 × 3 + 21. A few candidates made errors finding 5% of 42, from 10% is 42 they divided by 10 instead of halving. Many candidates did not subtract their 35% of 420 from 420 to find the 65% of 420 required.

In part (b), a number of candidates did not associate the 420 people who travelled by bus with the appropriate part of the ratio, incorrectly deciding to divide by 37 rather than by 20. Of the candidates dividing 420 by 20, many did this accurately; if there were errors they were generally place value errors.

Q.9 In part (a), many candidates found multiples of the given numbers by listing. Some candidates then did not work from this to find the correct number of boxes. 5 x 25 was often given as 150, instead of 6 x 25 = 150.

Part (b) was not well answered, with many candidates not engaging with bounds.

Q.10 A number of candidates wrote 510 million in full to start before attempting to write it in standard form. There were errors with the number of zeros written, impacting on place value. A number of candidates had insecure knowledge of writing numbers in standard form.

Q.11 Many candidates found both parts of this question difficult.

In part (a), many candidates did not give a uniform scale. Of those who did and found some points, the cost for producing 0 bottles was often given incorrectly as £0 instead of £10. This was not well answered. Many candidates showed no understanding of graphs to represent costs.

In part (b), the majority of candidates were unaware that there are approximately 1.75 pints in 1 litre. Part (b) was not well answered.

Q.12 Many candidates engaged well with this question, using the scale factor to multiply. However, a number of candidates did not find the width of the smaller sticker first and then multiply by 4 to find the width for the larger sticker. A common error was to calculate 168 divided by 42 from incorrect logic or using 42 cm^2 as the perimeter of the small sticker.

Q.13 A number of candidates had little knowledge of cumulative frequency and box-and-whisker plots. A number of candidates gave guesses, demonstrating no or little knowledge. So, indicating common errors is difficult.

In part (c), of the candidates with knowledge of box-and-whisker plots, a number of these candidates also drew in an extra line. This extra line is the information regarding the interquartile range from the table, which was given in order for candidates to calculate the upper quartile.

In part (b)(ii) a number of candidates found 25% of the 60 guppies, rather than 75% as the question required. However, the majority of candidates were unable to engage with this question through lack of knowledge.

In part (c) it was clear that very few candidates realised that 9.9kg should have been treated as 110% with the requirement to find 100%.

Summary of key points

- Candidates often do not consider the size of an answer from their calculations, so do not notice place value errors.
- Some candidates do not know that 1kg = 1000g.
- The majority of candidates do not know the conversion 1.75 pints is approximately one litre.
- Candidates often make errors in reading scales on graphs, not considering the scale before attempting to read values from the graph.
- A number of candidates do not have techniques of adding on or subtracting times which involve hours and minutes.

MATHEMATICS - NUMERACY

GCSE (NEW)

Summer 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 some appeared to have gaps in their knowledge at the higher end of the paper, especially forming and solving equations.
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 based on a ratio was answered quite well. Those who adopted a correct method generally went on to gain full marks in the question, showing good basic arithmetical skills. A common error was to divide 420 by 37 to begin with, thinking that the total number of people was 420 rather than it just being those that travelled by bus.

(b) This compound appreciation question was also answered well. Some added the first year's price increase twice rather than compounding the percentage price increase. Some candidates who used a decimal multiplier made arithmetical errors.

Q.2 (a) This question based on lowest common multiple was answered well. Some correctly calculated that the LCM was 150, but then put the entries into the table in an incorrect order. Others though arrived at an LCM of 300, meaning their numbers of packets were double what they should be.

(b) This question on bounds was answered well on the whole. The most common incorrect upper bound for the width of a washer was 2.5 mm, but other values from 2.05 mm up to 2.49 mm were seen. Those who used the correct upper bound of 2.25 mm generally went on to gain full marks.

Q.3 (a) Most candidates were able to give suitable scales on both axes for their plots, but many were unable to give a correct graph for the cost of producing between 0 and 100 bottles. A number did not realise the fixed charge was payable even if 0 bottles were produced, and many disappointingly thought the fixed charge was a charge per bottle, and therefore ended up with costs that were 10 times too much.

(b) Not many candidates were successful in converting the 1750 pints into litres as they did not know the correct conversion. Also, those who thought the fixed charge in part (a) was 'per bottle', made the same mistake in (b) and multiplied the answer to their conversion by £10 rather than adding £10.

Q.4 This question on similar shapes was answered well. Those who made errors tended to multiply the area of the smaller sticker by the scale factor rather than the area factor, bypassing the width of the smaller sticker. This was the OCW question on this paper, and it was pleasing to generally see suitable labels been given to workings, few misuses of the equals sign, and suitable units being given to their answers.

Q.5 (a) Both parts of this question on cumulative frequency were answered well. In (i) a number gave a median of 50 which is half of the biggest value given on the horizontal axis. In (ii), 30 was often seen, giving the number of ray fish up to 72 cm in length.

(b) In (i), most candidates gave the correct format of a box-and-whisker diagram, and most were able to plot the minimum, lower quartile and median appropriately. Some were unable to use the inter-quartile range and range appropriately however to arrive at the upper quartile and maximum. In (ii), many correct answers were seen. Some possibly misread the question and gave ¼ of 60 rather than ¾ of 60. Others however did not understand the meaning of the lower quartile in relation to the number of guppies in the aquarium.

(c) Less success was seen in this reverse percentage question. Errors came from those who calculated 10% of 9.9 and either added it on or subtracted it from the mass of the carp in April.

Q.6 This question on writing a number in standard form was answered well, but a number of incorrect answers of 5.1×10^7 were seen, even from those who correctly wrote 510 million as an ordinary number initially. Possibly these candidates thought the power of 10 needed was the number of zeros in the ordinary number.

Q.7 This question assessed the knowledge of volume/capacity formulae and writing one number as a percentage of another. Nearly all candidates knew how to calculate the volume/capacity of a cuboid, but the majority did not know how to calculate the volume/capacity of a pyramid. Some used (½ ×) or (1 ×) in their formula rather than (1/3 ×), while others thought that the area of the four triangular surfaces were required in the calculation. Giving the capacity of the modified enclosure as a percentage of the capacity of the original was a fresh start in this question in effect. Many candidates started writing percentages of their original capacity, working up to the capacity of their modified enclosure e.g. if a correct original capacity of 140 cm^3 was calculated, we would see for example 10% = 14, 50% = 70 etc. The more efficient method was to realise that the volume of the wooden cuboid was simply 5% of the original capacity leading to an answer of 95% and many did go down this route.

Q.8 (a) The majority of candidates answered this question on finding frequencies from a histogram well, showing a good understanding of the method required.

(b) In (i) fewer correct answers were seen than in (a), possibly showing some did not realise the median length was the length where half the trees were shorter than it and half were taller.

In (ii), many candidates were able to successfully give the lower quartile, but far less success was seen with the upper quartile. The calculation to find this length was slightly more difficult due to the numbers involved.

Q.9 (a) The majority of candidates were able to form a correct equation for the volume of a sphere to start this question. Some though were unable to rearrange it successfully, while others did not realise that pi could be cancelled on both sides. For those who arrived successfully at r being the cube root of 96, many did not give a correct simplification of the surd.

(b) This question on surface area was also not answered that well. Most used the formula for the surface area of a sphere correctly, but many did not give a correct expression for the curved surface area of the cylinder. Some also showed a misunderstanding of the concept here and included the area of the internal circles where the three shapes that make up the capsule meet.

Q.10 (a) The majority of the tangents seen were drawn from t = 6 seconds onwards, with these candidates not realising that the graph was steepest at around t = 5.8 seconds. Candidates were still able to get the majority of the marks if they started this way. Those that gave tangents in the main knew how to arrive at an acceleration using it, but a number of them gave one incorrect difference in their calculation, usually from not working with one of the scales correctly.

(b) Far more success was seen in this question. Some errors came from those who showed a misunderstanding of what the recurring decimal actually looked like. Others wrote a number of different powers of 10 of the recurring decimal, and then subtracted inappropriate ones which would still result in a recurring decimal e.g. subtracting 100x and 10x. It was disappointing that some made errors with e.g. 1000x – 10x giving 900x rather than 990x.

(c) This trapezium rule question was answered quite well. Some errors were seen in reading the scale on the speed axis. Individual calculations for the trapeziums were generally seen. Some chose to use the formula for a triangle for the first strip, and those that gave an incorrect formula cost themselves dearly in some instances as good work on the other strips came to nothing.

(d) This question on forming and solving an equation was not answered well at all, with the majority of candidates not even attempting to give expressions in terms of v. It was disappointing that many candidates who answered part (c) correctly were unable to gain marks in this part, which was in essence an extension to part (c), and involved the same mathematics.

Summary of key points

- With similar shapes, candidates need to be aware that scale factors only apply to the lengths of the sides of shapes. The scale factor squared, or area factor, applies to the areas of shapes.
- A more secure understanding is needed of how to write a number in standard form. The power of 10 is not always the number of zeros in the number.
- Candidates need to know that the volume of a pyramid is given by the formula 1/3 × base area × perpendicular height.
- Candidates need more practice in forming and solving complex linear equations.

MATHEMATICS - NUMERACY

GCSE (NEW)

Summer 2022

FOUNDATION UNIT 2

General Comments

The paper differentiated well, with different styles of questions and a graduation in the level of difficulty. Most candidates found the question involving the circumference of a circle and the area of trapezium demanding as this involved knowledge of formulae.

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 show full calculations as they were able to use a calculator.

Comments on individual questions/sections

Q.1 Part (a) was fairly well answered; although common incorrect responses were to calculate 13.80 divided by 5.

Part (b) proved more difficult for some candidates and many candidates left their answer as £4.50 and did not divide by 2.

Q.2 Although part (a) was generally well answered, some candidates gave a description of the difference between a 2-star freezer and a 4-star freezer. Candidates do not always understand the meaning of the word ‘difference’ in mathematical based questions.

Part (b) was well answered, although a common incorrect answer was 3-star.

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In part (c), many candidates stated no and could give an appropriate reason linked to the 4-star being able to freeze food for longer than 3 months; however, some just referred to both the freezers having the same temperature and indicated yes. Some candidates were unable to calculate the number of months between June and December with some stating it was 4 months.

Q.3 Part (a) was well answered and in part (b) many candidates gave an appropriate reason why there was not an equal chance of gaining each prize. In part (c), many candidates could calculate the total cost of all of the prizes, and many could work out 10% of their total costs; however, several candidates did not subtract their 10% to find the discounted price. Some candidates only worked with one of each prize and found the discounted price of this. This did gain them some marks. Some candidates decided to work with 10% of each price first but then did not know what to do next. As this was the OCW question, many candidates were able to label some of their workings or values but as candidates were able to use a calculator, several candidates did not show clear methods for their workings throughout the question and only wrote down their values/answers.

Q.4 Several candidates did not show evidence of counting squares and obtained an answer for their number of squares which was outside of the given range. This meant that several marks were lost. Candidates were able to gain marks if they then multiplied their number of squares by 0.5 and multiplied by 290 to find the cost. Some candidates did not engage with the use of the scale.

Q.5 Some candidates were able to convert all the values into either percentages or decimals; however, many thought that 0.03 was 30% and 0.2 was 2%. Some thought that ¼ was either 14% or even 15% and some thought that 5% was meant to be 50%. Several candidates did not show how they had decided on the order and just wrote the names of the oceans in the table. For some this was correct but for others it wasn't.

Q.6 In this question, many candidates confused area with perimeter and vice versa. In part (a), many candidates attempted to calculate the length of edging as 25 × 30 instead of 20 × 30 (without the gaps). Several candidates ignored the 4cm gap on each side and some candidates only worked with one side being 154cm. Few candidates took note of giving their answer in metres. In part (b), many candidates calculated the perimeter rather than the area. Some only added 1.3 and 0.4. For those that did multiply 1.3 by 0.4 to get the area of 0.52, they did not state the correct units for area.

Q.7 Parts (a) and (b) were quite well answered. A common incorrect answer for (a) was 2km as candidates misread the horizontal scale for the time at 17:00. In part (b), common incorrect answers were 17 ½ hours or 7 ¼ hours. Part (c) proved more difficult, and a common incorrect answer was 3km rather than 5km; this implied that candidates knew how to identify a part of the graph that can represent a stop, however, misreading the time scale for what is an hour proved more difficult

Q.8 Part (a) was quite well answered. However, many candidates used a non-calculator method to calculate 35% of £2400, which often led to errors in not summing the appropriate parts or working with 50% instead of 5%. Some candidates also attempted to find 35% of 860 or just subtracted 860 from 2400 or subtracted 35 from 860 or 2400. It was clear that many candidates do not know an appropriate method of finding a percentage of a quantity with a calculator.

Part (b)was not well answered. A number of candidates did not write a ratio and of those who did many did not simplify the ratio. A few candidates tried to simplify the ratio to include decimal parts.

Q.9 Common errors here included: adding the meter readings instead of finding the difference; working with either of the meter readings as their number of units; costing units and not realising that multiplying by 21 would give an answer in pence; working with VAT as 50% rather than 5%; and subtracting the VAT rather than adding it on to find the final amount to pay. Some candidates did not engage with the notion that the given cost for the standing charge was for one month and they had to calculate three months. A few candidates changed the number of units used on the second line compared to what they had written on the first. However, several candidates gave a completely correct answer.

Q.10 In part (a) it was clear that most candidates had no strategy or knowledge of circles, with pi not seen in any calculation. A minority of candidates who were able to answer this question often lost out on the final accuracy mark, due to premature approximation. A number of candidates thought the question had something to do with angles and used 360 or 380 instead of the circumference of the circle. Some candidates just stated that the 4th side of the flowerbed was 140cm.

In part (b), of the few candidates who considered area, those who calculated the area of the trapezium as a whole, rather than working with a rectangle and a triangle, had more success. A common error was to sum the three lengths of the sides given and use this as an area. However, a number of candidates were then able to continue with what they thought was an area in an attempt to find the number of bags of fertiliser needed. An error seen with calculating the number of bags needed was to divide by 0.9 squared rather than 0.9 as some candidates misinterpreted that m^2 was the unit of measurement and not an indication to square 0.9. Many candidates did not engage with the idea that complete bags of fertiliser needed to be considered.

Q.11 In part (a), common incorrect responses were 'every 12 minutes' and 'every 2.5 minutes'.

Part (b) was quite well answered, with the majority of candidates using the scale correctly.

Part (c) was not well answered, with many candidates misreading the scale and others leaving their answer as 'between 100°C and 110°C' rather than stating the range as 11°C. A common error was to not consider the highest and lowest of the temperatures shown on the graph leading to incorrect responses of 'between 100°C and 109°C' or 9°C.

Part (d)(i) demonstrated that many candidates could not work with scales on the two graphs, especially when plotting temperatures of 109°C and 105°C.

There were quite a few good attempts at reasoning why the graph was misleading in part (b)(ii), however some candidates just said that the plots were not accurate which was not accepted.

Summary of key points

- Candidates need to consider graph scales carefully, working out what each increase in a small square represents.
- Candidates demonstrated little knowledge of circumference of a circle and area of a trapezium.
- Candidates need to show evidence of counting squares when working with the area of irregular shapes.
- Candidates need to show full methods even though they are allowed a calculator.
- Candidates need to ensure they attempt multiple choice questions and not leave them unanswered.

MATHEMATICS - NUMERACY

GCSE (NEW)

Summer 2022

INTERMEDIATE UNIT 2

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.

Comments on individual questions/sections

Q.1 Parts (a), (b) and (c) were generally well answered, with the majority of candidates giving a correct response, particularly in part (a). However, part (d) demonstrated that many candidates did not know how to interpret a travel graph to give distance, with the distance from home labelled on the vertical axis. Many candidates just gave readings from the scale, rather than look at difference of distance.

Q.2 Part (a) was well answered. However, a number of candidates used a non-calculator method to calculate 35% of £2400, which sometimes led to errors in not summing the appropriate parts. A few candidates did not organise their work with a written conclusion or included units so were only awarded OCW1 rather than the 2 marks available. A number of candidates decided to split the answer space into two columns, with working on the left and prose on the right, this is not a natural way of working nor is it good practice. Often the comments stated how to calculate rather than what was being calculated, mathematical symbols tell us how to calculate. Also, the lines of prose were out of step with working.

Part (b)(i) was not as well answered, a number of candidates did not write a ratio and of those who did many did not simplify the ratio. A few candidates tried to simplify the ratio to include decimal parts, which is not correct.

In part (b)(ii) a number of candidates prematurely approximated in working, but luckily their answers fell into the accepted range. It is not good practice to prematurely approximate mid calculation.

Q.3 Common errors here included adding the meter readings instead of finding the difference, working with either of the meter readings as their number of units, costing units not realising that multiplying by 21 would give an answer in pence, working with VAT as 50% rather than 5% and subtracting the VAT rather than adding it on to find the final amount to pay. Some candidates added the charge for electricity, the standing charge, the total charges and the VAT to find the 'Amount to pay'. However, many candidates gave a completely correct answer.

Q.4 In part (a) it was clear that many candidates had no strategy or knowledge of circles, with pi not seen in any calculation. Other candidates were able to answer this question correctly, although a few lost out of the final accuracy mark an error, due to premature approximation. A number of candidates thought the question had something to do with angles or Pythagoras' Theorem.

In part (b), of the candidates considering area, those who calculated the area of the trapezium as a whole, rather than working with a rectangle and a triangle, had more success. Working with each part of the area and then considering the number of bags of fertiliser needed was not a good strategy. A common error was to sum the three lengths of the sides given and use this as an area. However, a number of candidates were then able to continue with what they thought was an area in an attempt to find the number of bags of fertiliser needed. An error seen was instead of dividing by 0.9, candidates read that a bag of fertiliser was enough to treat 0.9 m^2, but seemed unfamiliar that m^2 is a unit of area, and they squared the 0.9 before doing any calculation. A number of candidates did not engage with the idea that complete bags of fertiliser needed to be considered.

Q.5 In part (a) common incorrect responses were 'every 12 minutes' and 'every 2.5 minutes'.

Part (b) was well answered, with the majority of candidates using the scale correctly.

Part (c) was not as well answered, with some candidates misreading the scale and others leaving their answer as 'between 100°C and 110°C' rather than stating the range as 11°C. A common error was to not consider the highest and lowest of the temperatures shown on the graph leading to incorrect responses of 'between 100°C and 109°C' or 9°C.

Part (d)(i) demonstrated that a number of candidates could not work with scales on the two graphs, especially when plotting temperatures of 109°C and 105°C.

There were many good attempts at reasoning why the graph was misleading in Part (b)(ii), however some candidates just said that the plots were not accurate or biased, which was not accepted.

Q.6 Part (a)(i) was not particularly well answered, with $80 \leq x < 100$, as the middle group in the table, being selected the group in which the median lies.

In part (a)(ii), a number of candidates were able to find the mid points of the groups and continue with finding the product of these with the frequencies. Some then did not sum these products, instead deciding to sum the mid points. A common error was to divide by 5 rather than by 52 and a number of candidates added the frequency column and divided this by 5 as their answer.

In part (b), there were a number of ways to calculate the amount Janita should budget. Many candidates made a good attempt at answering this question, generally either finding the increased costs, the original cost of travel or the amount of fuel needed next month. A number of candidates did not complete their work by finding the amount Janita should budget, but they did make good progress towards this final amount.

Q.7 Part (a) was not well answered. Many, many candidates do not engage with the idea of bearings with no idea of where to look from and incorrect turning anticlockwise from North.

In part (b), the issue for many candidates is working with time when calculating average speed. 1 hour 27 minutes was not often written correctly as 1.45 hours or 87/60, instead candidates errors included using 1.27 or 87 in calculations.

In part (c) many candidates were able to calculate 108576 yen, and a number of candidates did engage with the available notes realising that only 108000 yen could be purchased. However, some candidates did not actually state 108000 yen, instead listing the notes that could be purchased, which was accepted. An error a few candidates made was rounding up from 108576 yen, not engaging with the idea that only £800 was available for the purchase of this currency. The difficulty candidates generally have is finding how much it will cost in pounds to buy the 108000 yen.

In part (d) a number of candidates only found 25% of the population rather than the 75% required. Of these candidates, a number of did make progress to work with ratio correctly. Candidates starting by finding the percentage of the population represented by the ratio generally made better progress than those candidates starting by considering the ratio parts.

Q.8 Clearly a number of candidates had no knowledge of trigonometry. Of the candidates with knowledge of trigonometry, many candidates were able to select the sine ratio and work accurately.

Q.9 This question was poorly answered, with very few candidates engaging with the volume of a cylinder or even the area of the cross section. A number of candidates wrote $\pi \times 36^2$ but evaluated $(\pi \times 36)^2$. Very few candidates converted 80 litres to 80000 cm^3.

Q.10 This question requiring reverse percentage thinking was not well answered. A few candidates were able to work backwards to find 12000 dollars, but only very few continued to add on 5000 dollars to find Khalida's income.

Summary of key points

- Candidates should be discouraged from including inappropriate premature approximation or rounding during multi-stage problems, as it can impact on accuracy of answers.

- Candidates need to consider graph scales carefully, working out what each increase in a small square represents.

- Candidates demonstrated little knowledge of area and circumference of a circle, particularly in the 3D context of a cylinder.

- Candidates seem unfamiliar with how to enter times given in hours and minutes as hours in a calculator.

- Candidates engage well with real-life problems involving money, percentage, foreign currency.

MATHEMATICS - NUMERACY

GCSE (NEW)

Summer 2022

HIGHER TIER UNIT 2

General Comments

Candidates appeared to have had sufficient time to attempt all the questions, and the paper differentiated well. Some candidates had their calculator in radians or gradians mode for the exam, which would have caused errors in 3 of the questions, but special consideration was applied to these candidates. 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) Both parts of this question that assessed data analysis were answered quite well, although less success was seen in (i) where candidates needed to find the group that contained the median weekly number of miles. Many correct answers were seen in (ii), but some made errors with their mid-points. Others incorrectly divided their total by the number of groups rather than by the total of the frequencies. Some of the candidates who failed to gain any marks multiplied the frequencies by the widths of the groups, possibly getting mixed up with calculations involving histograms.

(b) This question based on fuel consumption was answered well. Some lost marks due to failing to use correct methods to apply a percentage increase, whilst some rounded their answers to one or more of their intermediate calculations, resulting in errors in their final answer.

Q.2 (a) The vast majority knew that to calculate the average speed of Anzu's journey they needed to calculate the distance travelled divided by the time taken. Most also knew that they needed to convert the time of 1 hour 27 minutes into hours and knew how to do it. Some however thought this time was 1.27 hours, whilst some believed they could use 87 minutes in their calculation, not realising the link between the units of speed required (km/h) and the units that needed to be used in the calculation.

(b) This question that assessed currency conversions was answered well. As the number of yen to the pound was so large, it helped those who would otherwise be unsure whether the conversion from pounds to yen required multiplication or division. It seemed therefore that most candidates performed a correct first step in converting the £800 into yen. A number of candidates wanted to give the number of each type of note that the shop could then provide rather than focussing on the amount of yen Tilly could buy. This did not cause problems though and most correctly then calculated the cost to Tilly of this amount of yen in pounds. Some only converted the difference between 108576 yen and 108000 yen, whilst some incorrectly rounded their answer to the nearest penny.

(c) Again, this question was answered well in the main. Most were able to gain some marks by sharing an amount in the correct ratio. The majority of correct answers came from those who first calculated how many people were aged between 0 and 64, and then finding 9/50 of this amount. A few candidates used an imaginative method whereby they used the fact that the number of over 65s was 1/3 the number of 0 to 64s, from the percentages given in the question, and then used this to give the number of parts the over 65s would be in the ratio of the whole population. However, the number of parts came to be $16^{2}/_{3}$, and those who rounded this value introduced error into their final answer.

Q.3 This question that assessed right-angled trigonometry was answered well also. Most chose the correct trigonometric ratio and were able to give the correct angles for both cases. This was the OCW question on this paper. It was a little disappointing that a number of candidates did not label their calculations suitably, and some did not give a suitable conclusion showing that the angle of lean had more than doubled. These were the main two reasons why some candidates lost the organisation and communication mark. Most candidates showed all their workings, but some forgot to state the units of their answers. Due to the fact few workings were needed in this question, the lack of units was the main reason some candidates lost the accuracy of writing mark.

Q.4 Less success was seen in this question that assessed the volume of a cylinder. Some did not know the correct formula, whilst others did not realise the need to convert the number of litres into cm^3. Those who used 80 in their calculations generally rearranged their equation incorrectly with their division the wrong way around, as this was the only way their answer was of a size that made sense to them.

Q.5 This was not the usual type of question based on income tax, which usually asks candidates to calculate the amount of tax someone would have to pay. It required candidates to work in reverse, giving them the amount of tax and asking them to calculate what someone's pay must have been to result in this amount of tax. This did result in a slightly lower facility factor, although many candidates were able to successfully show a correct method and arrive at the correct answer. Some though did not realise the need for a final step of adding 5000 dollars.

Q.6 This question assessed the topic of upper and lower bounds and was not answered very well. Several candidates misinterpreted this question, as they attempted to calculate the minimum number of boards that could span the distance to be fenced. Special case marks were available to these candidates provided they considered the overlap and worked with suitable bounds. The overlap of the boards did increase the difficulty of this question, as candidates needed to realise that nearly all the boards had an effective width of 77.5 cm in the worst-case scenario, whilst the last board put in place would effectively span 97.5 cm. Some candidates used both upper bounds or both lower bounds in their calculations which was inappropriate, whilst others did not know how to deal with the overlap correctly.

Q.7 More success was seen in this question. Most candidates attempted to calculate the length DB first using the isosceles triangle that formed the uniform cross-section. Some chose to use the sine rule, whereas others used the symmetry of this triangle and used right-angled trigonometry. The second step involved using Pythagoras to calculate the length AB and most were able to perform this step accurately. Some lost marks by failing to use this to calculate the total length of the tear strip. Others misinterpreted the diagram and incorrectly gave different lengths for DC and DB.

Q.8 It was pleasing to see that many of the candidates used the correct multiplier in their work and gave a correct number of months for the balance of Jay's account to reach £1000. Some, however, miscalculated the correct date from this number of months. Some candidates did not perform efficient calculations using the multiplier 1.0048 whilst others worked in steps of, for example a year, multiplying the balance after each year by a power of 1.0048. There were a number of candidates however who used an incorrect multiplier of 1.048, and some who did not know an efficient method of performing a percentage increase.

Q.9 (a) Candidates needed to show that they knew the relationship between the area factor that was given in the question, and the scale factor. Those that did, generally went on to gain full marks in this question.

(b) Some candidates who gave correct answers in (a) did not read this part correctly and just gave the volume of the large can by multiplying the volume of the small can by the volume factor of 1.5^3. Some candidates decided they needed to calculate the radius of the small can, multiply it by the scale factor to give the radius of the large can, and then go on to find the base area. Many who went this way introduced error into their work by rounding one or more of their intermediate values.

Q.10 (a) This question on arc length was not answered well. Some used the radius rather than the diameter in their formula. Candidates who did this could only gain a special case mark if their work was otherwise fully correct, and they rounded their answer appropriately. Quite a number arrived at the correct sector angle for an arc length of 65m, but failed to realise they needed to halve this to find the value of x.

(b) This part of the question that assessed the use of the sine and cosine rules was quite well answered. It was pleasing to see that many candidates came up with a correct strategy to find the length of the single shot, as it could not be calculated in a single step. Some candidates chose to split the length of the single shot into 2 parts by creating 2 right-angled triangles. This method required 3 steps, but a number of correct responses were seen using this method.

Summary of key points

- Candidates need to make sure their calculators are in degrees mode at the start of the exam.

- When a question involves a number of steps, candidates need to strive to carry forward accurate values through their steps so that their final answer is not compromised. Practise of how to efficiently use a calculator is needed to ensure this.

- Candidates need to realise the need to convert a volume given in litres into cm^3 when the dimensions of a shape are given in centimetres.

- Candidates need to realise which bounds are appropriate to use in a question that assesses this topic, as determined by the language used in the question.

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