GCSE EXAMINERS' REPORTS

GCSE
MATHEMATICS - NUMERACY

NOVEMBER 2021

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MATHEMATICS - NUMERACY

GCSE (NEW)

November 2021

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 longer style questions demanding as anticipated but many gained some of the marks available.

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 Many candidates were able to state that the triangle with 3 equal lengths is an equilateral one in part (a) but many also thought it is an isosceles triangle.

In part (b), many candidates did not understand what an obtuse angle is. Many confused the definitions of an acute and obtuse angle. Some even thought the angle was 90°.

In (c), many candidates were able to count the area but then some candidates multiplied their value by 2 thinking that this what is meant by cm^2. Some candidates who gave an answer within the range for the area did not fully answer the question and did not state that Maisie was correct.

Q.2 Parts (a) and (b) were well answered by many candidates. Most were able to give the correct answer in (a)(i) and (ii) but the most common incorrect answer in (ii) was South Africa.

In (b), the reason that several candidates were not able to gain full marks was because they did not know how to represent New Zealand and Wales using the key that was given. There were some candidates who just listed the values that were given in the table at the start of the question.

Most candidates struggled with what 3 hundredths is as a decimal value in part (c) so were not able to gain even 1 mark. Many thought that 3 hundredths was 300, 30 or 0.3.

In (d)(i), most candidates knew that they had to subtract the times of 1^{st} and 2^{nd} place but many thought that the 5.45, for example, was 5 minutes and 45 seconds and so worked on a base of 60. Common incorrect answers were 2.06 and 1.54. In (ii), many candidates knew what was meant by 'modal' and gave the correct answer of 0.68, although some gave their answer as 0.73.

Q.3 Many candidates gained at least 1 mark in (a). It was evident that several candidates do not have knowledge of what these amounts look like. Many thought that 200kg was the weight of a large bar of chocolate!

In (b), the most common error was the misinterpretation of when the delivery charge should be added to the bill. A large number of candidates added the £2 delivery fee that would be given to a bill of £84 first and then worked out 25% discount of £86. Some candidates did not know that to find 25% they only need to divide by 4 or half and half again. Several candidates used the method of finding 10% twice and 5% which led to many incorrect calculations for 25%. OCW was assessed in this part of the question, with several candidates showing working, giving units and labelling their calculations. Other candidates did not label their working or show full methods, consequently these were not awarded OCW2.

In (c), it was evident that most candidates do not know or could not use the fact that 1kg is approximately 2.2lbs.

Q.4 This question was well answered with many candidates gaining 3 or 4 marks if they did not gain full marks. Errors were often made with calculating 4 lots of £8.40 and also subtracting their £30 from their £33.60. Some candidates attempted to find the cost of one cupcake in each bakery; this was usually done successfully for Carol's Cakes but not for Icing Top Cakes. Many then struggled to multiply these costs by 12. A minority of candidates just multiplied the given costs of £5 and £8.40 by 12.

Q.5 This question was quite well answered, in particular parts (b) and (c). In (b), although many candidates selected '5:30 p.m.', the common error was to select '5:30 a.m.'. In (a), the common error was to select '15.5 km'.

Q.6 Many candidates were able to interpret the graph to answer at least one or two parts of this question correctly.

In part (a), many candidates misread the vertical scale, showing '151'mm and hence an answer of '51'mm instead of 155mm and an answer of 55mm; they did not consider the vertical scale first.

In (b), several candidates were able to interpret the fact that the tank took the same time to fill on both days.

The common incorrect answer for (c) was 08:35 not 08:36.

In part (d), a number of candidates only referred to the difference in depth at 08:40, which did not answer the question and some candidates only stated the depth of water at either 08:30 or 08:40 and did not state the difference between the times for both days. A number of candidates referred to Saturday's line as being "straight" or "nearly straight", this was insufficient as it does not refer to the steepness of the line. Some also stated that Saturday's was faster.

Part (e) was well answered.

Q.7 In part (a), several candidates struggled to show a method to find 15% of a quantity, with some finding 50% for 10% and then halving their 50% value for their 5%. However, there were some that were successful in calculating 15% of the cost of 5 lessons but did not then subtract this discount. A number of candidates had difficulty subtracting £17.50 from £115. There were some correct responses and other responses where the cost of the single lesson was omitted.

In part (b), very few candidates correctly wrote 18/300. Some tried to calculate 300 divided by 18, rather than 18 by 300. Some candidates started incorrectly by adding £18 to £300. However, there were some correct responses seen, some of which were from a partitioning method considering 1% as £3 and considering 3 × 6 = 18.

Q.8 The majority of candidates could state that 24 bananas cost £2 at FruitCo. Many candidates were also able to find the cost of 24 bananas at Quick Fruit as each banana cost 8p. However, most candidates were unable to find the cost of 24 bananas at Bach Market, sometimes due to not knowing that 1kg = 1000g. Several incorrectly stated that 100g was equal to 1kg. Many candidates gave an incorrect answer for Bach Market as £1.70 where they had only worked with 2kg of bananas. Those candidates that did try to find the cost of the extra 400g, did this by estimating the cost incorrectly. The few candidates that worked with 8.5p per banana at Bach Market usually were able to reach a correct answer of £2.04.

Q.9 In part (a) many candidates showed little understanding of bearings. There were many reasons for candidates not being awarded marks, including no understanding, omitting the zero in (i), or inaccuracy of measurement.

Part (b) was not well answered. A number of candidates did not interpret the question carefully, seeing the 2 miles and the 30 minutes giving an answer of 4mph or even 15mph. A few candidates did realise the 2 miles between Cwmbelan and Llanidloes was giving them the scale and were able to write their distance within the accepted range. Most candidates did not work out the average speed in mph. A few candidates considered incorrectly that dividing a number by 0.5 meant halving the number rather than doubling it.

Summary of key points

- A number of candidates have poor skills of multiplication, including working with decimals and of subtraction.
- Knowledge of place value of decimal places is poor eg 3 hundredths is 0.03.
- Knowledge of conversion facts, as stated in the specification, is essential.
  For example: 1 kg ≈ 2.2 pounds.
- Knowledge of conversion of metric units such as 1000g = 1kg is essential.
- Candidates need to look carefully at the scale on the axes of graphs.

- Candidates need to understand that cm^2 is the unit for area and does not mean that they square their area value or even multiply it by 2.

- Candidates need to know how to find 10% of a number that does not end in zero and not mistake the method as being the same as finding 50%. They also need to know that 5% is half their 10% value.

- Candidates need knowledge that a discount is subtracted from the full price. A discount is not the amount paid nor is it added to a cost.

- When calculating an average speed, candidates need to consider the unit of their answer. If this unit is miles per hour, then hours or fractions of hours should be used in the calculation.

MATHEMATICS - NUMERACY

GCSE (NEW)

November 2021

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 This question was generally well answered, in particular parts (b) and (c). Although most candidates selected “5:30 p.m.”, the common error was to select “5:30 a.m.”

Q.2 Many candidates were able to interpret the graph to answer at least one or two parts of this question correctly.

In part (a) a number of candidates misread the vertical scale, showing ‘151’mm instead of 155mm, not considering first the scale.

In part (d) a number of candidates only referred to the difference in depth at 08:40, which did not answer the question. A number of candidates referred to Saturday’s line as being “straight” or “nearly straight”, this was insufficient as it does not refer to the steepness of the line.

Part (e) was well answered.

Q.3 In part (a) a number of candidates struggled to show a method to find 15% of a quantity. However, many candidates were successful in calculating 15% of the cost of 5 lessons, but some incorrectly decided to add this discount on to the cost of these lessons. A number of candidates had difficulty subtracting £17.50 from £115. There were many correct responses and other responses where the cost of the single lesson was omitted.

OCW was assessed in this part of the question, with many candidates showing working, giving units and labelling their calculations being awarded OCW2. Other candidates did not label their working. Consequently, they were not awarded OCW2.

In part (b), many candidates did start correctly by writing 18/300, however a number of these candidates proceeded incorrectly by attempting to divide 300 by 18, rather than 18 by 300. A few candidates started incorrectly by adding £18 to £300. However, there were many correct responses seen, some of which were from a partitioning method considering 1% as £3 and considering 3 × 6 = 18.

Q.4 In part (a) many candidates showed little understanding of bearings. There were many reasons for candidates not being awarded marks, including no understanding, omitting the zero in (i), or inaccuracy of measurement.

Part (b) was not well answered. A number of candidates did not interpret the question carefully, seeing the 2 miles and the 30 minutes giving an answer of 4mph. Other candidates did realise this 2 miles between Cwmbelan and Llanidloes was giving them the scale, but did not work to find the average speed in mph, with many candidates expressing their distance divided by 30 (minutes) rather than 0.5 (hours). A few candidates considered incorrectly that dividing a number by 0.5 meant halving the number rather than doubling it.

Q.5 The majority of candidates stated that 24 bananas cost £2 at FruitCo. Many candidates were also able to find the cost of 24 bananas as Quick Fruit as each banana cost 8p. However, some candidates were unable to find the cost of 24 bananas at Bach Market, sometimes due to not realising that 1kg = 1000g. Those candidates working with 8.5p per banana at Bach Market were more likely to reach a correct answer of £2.04. Some candidates worked out 2kg for £1.70, than thought 0.4kg was ⅕ or ½ kg. A few candidates decided only to work out the cost of 3kg of bananas at Bach Market. However, most candidates were awarded at least 1 mark for FruitCo being £2 for 24 bananas.

Q.6 In part (a), of the number of candidates knowing the accurate conversion, the majority used "× 1.6", rather than "× 8 ÷ 5". However, of the candidates calculating 7500 × 1.6, many arrived at an incorrect answer to their calculation. A common incorrect response was to write 7500 ÷ 1000 = 7.5 (km), thinking incorrectly that converting miles to kilometres was division by 1000.

In part (b) many candidates did calculate 80 × 30 and 25 × 30 to find the length in cm, but then did not convert to metres correctly, sometimes incorrectly deciding to divide by 10 or 1000.

Part (c) was not particularly well answered. Candidates should have been able to eliminate the second and third answers, as they are areas, then focus on the volume answers. There was some evidence that a few candidates did consider the units of the choices. The last volume of 2000ft^3 was also a common incorrect response.

In part (d) 1.55×10^6 and 155×10^6 were common incorrect selections.

Q.7 In part (a)(i), a number of candidates did refer to the data being grouped, but many candidates just answered saying the table didn't show the information without explaining why that was the case. Other candidates incorrectly said that 'no rainfall' was not included in the table.

Part (a)(ii) was not particularly well answered. A number of candidates did write the mid points of the groups, but then often went wrong, sometimes simply adding the mid points and dividing by 4. Some did find the correct sum of the appropriate products but also incorrectly divided by 4, not 30. A few candidates made errors in dividing 210 by 30, giving an incorrect answer of 0.7mm or 70mm.

Part (b) was not well answered, with few candidates showing a correct method. A number of candidates did attempt 25×4.4, but many did not progress further, also with many errors seen in evaluating 25×4.4.

Q.8 Part (a) was not well answered, with very few correct responses. Most candidates did not appear to know the number of sides in a tetrahedron. There was not a clear pattern in the incorrect responses.

In part (b) the majority of candidates attempted to find the total cost to make the boxes of chocolates. Many of these candidates correctly found the cost to make 150 boxes (£3). There were many errors in calculation, including errors with place value in money, with 4200p often becoming £4.20. Many candidates were able to calculate the profit for their total cost of making the boxes of chocolates.

Q.9 Although not particularly well answered, a number of candidates did give 2 correct responses. Errors and difficulties in the question included "adding on" spurious amounts and calculating $3 \div 2$ incorrectly, giving an incorrect scale factor of 1.1 although the overall methods were sometimes correct.

Q.10 Many candidates found this question demanding, not starting correctly by attempting to complete the cumulative frequency table with increasing values. This meant that candidates would not be able to interpret a number of parts of the question. However, answering part (d) and part (f) were still possible from referring back to the initial table given in the question. A number of candidates attempting to draw a graph did not use the scale carefully, some candidates did not join their points and some joined all points apart from to (0,0). Many candidates with a cumulative frequency graph were unable to interpret it correctly, for example in part (e) they wrote values in an ordered list and attempted to find the middle value, instead of correctly using their cumulative frequency graph using the time for the reading at 30.

Summary of key points

A number of candidates have poor skills of multiplication, including working with decimals and of subtraction.

- Candidates need to look carefully at the scale on the axes of graphs. Assumptions that both the scales on horizontal and vertical axes being the same should not be made.

- Candidates need knowledge that a discount is subtracted from the full price. A discount is not the amount paid nor is it added to a cost.

- When calculating an average speed, candidates need to consider the unit of their answer. If this unit is miles per hour, then hours or fractions of hours should be used in the calculation.

- Candidates need to know the conversion of km to miles and miles to kilometre and use, as a check, knowledge that a mile is longer than a kilometre.

MATHEMATICS - NUMERACY

GCSE (NEW)

November 2021

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.
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 part of the question was not well answered, with many thinking the answer was 2000 ft^2 or 2000 ft^3, i.e., they thought the answer could be found from finding the product of the two measurements given in the question.

(b) Far more success was seen in this part of the question. The most common incorrect answer was 1.55×10^6, with these candidates possibly connecting the word million to 10^6.

Q.2 **(a)** **(i)** Many good responses were seen. Most quoted that the data was grouped as the reason. Incorrect responses included many who said the table didn't show the number of days it didn't rain.

(ii) This question was quite well answered. Some did not work with correct mid-points. Others used the widths of the groups rather than the mid-points, whilst some divided by 4 rather than 30 to arrive at their final answer.

(b) This problem-solving question on the mean proved difficult for many candidates. For those who knew the correct method, errors included some who failed to accurately calculate 25×4.4, and others who did not round their final answer to 3 significant figures correctly.

Q.3 This question was answered well on the whole. Some failed to correctly find the cost of the chocolates in 150 boxes, but more success was seen with finding the cost of the card needed. Nearly all candidates were able to correctly calculate 20% of their final total cost. This was the OCW question on the paper, and work was generally well set out and easy to follow. Clear labels to calculations were used by many, however poor use of the = sign was penalised in a number of cases e.g. Cost of the card needed = $150 \div 25 = 6 \times 50p = 300p$.

Q.4 This question was again well answered by many candidates. Most calculated the scale factor as being 1.5, and then multiplied and divided by this. More success was seen with the multiplication compared with the division. It was good to see the efficient use of × 3/2 and × 2/3 by some candidates.

Q.5 **(a)** Most candidates completed the cumulative frequency table correctly.

(b) Most candidates tried to draw a cumulative frequency diagram, although a number had errors in their plotted points from reading the scale incorrectly, and others who did not correctly join their points with straight lines or a curve down to (0, 0). Some though drew bars, showing an unfamiliarity with cumulative frequency diagrams.

(c) A little more success was seen in this part, although again some inaccurate readings from the graph at 10 minutes were observed.

(d) Most of those who interpreted the question correctly were able to gain full marks in this question, although some answers of 90% were seen.

(e) Most were able to correctly find the median from their graph, but some did not go on to find the difference in the medians, whilst others did not round their answer to the nearest minute.

(f) This part of the question was answered quite well, with the majority calculating 80% of 60 as being 48 patients and concluding the target was not met.

Q.6 **(a)** Most candidates correctly calculated the volume of the cylinder, but it was evident that some were unaware that the formula for the volume of a sphere was given on the formula sheet at the front of the paper. The division to arrive at the number of spheres proved difficult for the majority of candidates. Those who chose not to give their volumes in terms of pi very often had final answers that were far away from the correct answer, whilst those working with volumes in terms of pi had difficulty in dividing by a fraction.

(b) The majority of candidates set up a correct equation and arrived at an answer of $\sqrt{80}$ for the radius. A number of fully correct answers were seen, but some showed incorrect surd work, with $16\sqrt{5}$ being a popular final answer.

Q.7. **(a)** The majority of candidates knew that they needed to find the areas of the bars, although many arithmetical errors were seen, and a number incorrectly used 550 as the width of the first bar. Many fully correct responses were seen.

(b) Very few candidates showed a correct method for finding the lower quartile of the distribution. Some incorrectly interpreted the question and tried to find the upper quartile, but again very few showed a correct method.

Q.8 **(a)** Those candidates who knew that a tangent was required, generally went on to gain the majority of the marks in this question. Sadly, many didn't know a tangent was needed, meaning the only mark they could gain was from giving the correct units for the acceleration.

(b) **(i)** This part of the question was answered quite well. Very few errors in reading the scale were observed. The vast majority chose to sum up individual areas, and nearly all used correct expressions for these areas.

(ii) A number of steps needed to be taken to convert the speed from m/s into mph in this question. Many just gained 1 mark for finding the speed in m/s, whilst others only knew some of the steps needed.

Q.9 It was pleasing to see that the majority of candidates gave this question a good attempt. The work was not always well organised though. Many did not correctly count the number of rectangular faces on the pillars. Most gave a correct expression for the area of a semicircle, but again did not use the correct number of these areas in their calculations. These semi-circular areas needed to be subtracted from the areas of two rectangles, and some thought that $1200 - 200\pi$ could be simplified to 1000 or 1000π. Few candidates gave correct expressions for the areas of the curved surfaces, with many not realising that these surfaces needed to be included.

Summary of key points

- More care is needed with the use of the = sign, ensuring that calculations on either side are equal.
- The reading of graph scales could be a lot better, as a number of marks were lost by those with poor skills in this area.
- Candidates need to be better prepared for finding the median and quartiles from a histogram.
- Candidates need to be aware that giving expressions in terms of pi is more efficient and accurate when working without a calculator. Much time was lost by those who, on many occasions in the paper, tried to multiply numbers by 3.14.

MATHEMATICS - NUMERACY

GCSE (NEW)

November 2021

UNIT 2 FOUNDATION TIER

General Comments

The paper differentiated well, with different styles of questions and a graduation in the level of difficulty. The paper contained questions that were accessible to the whole range of ability.

As commented on in previous series, a calculator paper is designed to assess the use of the calculator. Although non-calculator methods can yield correct responses, they often increase the difficulty of the question and result in unnecessary errors. Candidates should be encouraged to use a calculator as much as possible on Unit 2 but must remember to show their working where appropriate.

A few candidates did not attempt to answer multiple-choice 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.

Comments on individual questions/sections

Q.1 Although many correct responses were seen in part (a), some candidates struggled to interpret the place value of the numbers. A common error was to write the number as three million, three hundred thousand and fifty-one.

In part (b), many engaged with the context and understood how to calculate Geraint Thomas's age when he won. Some candidates did not read the question carefully enough and subtracted from 2021 instead of 2018, the year Geraint Thomas won the race.

In part (c),many correct answers were seen, and several candidates managed to gain part marks for partially correct answers. Many understood that the times needed to be added but dealing with the addition and converting seconds into minutes caused some candidates problems. One mark was awarded to those that gave 83 hours 18 minutes and 64 seconds as an answer as well to those who subtracted 1 minute 51 seconds correctly to get a final answer of 83 hours 15 minutes and 22 seconds.

Part (d) was a very well answered question.

In part (e) two marks were awarded for two lines drawn within the $\pm$ 2° tolerance. Some candidates gained 1 mark for sight of 120° and some drew their lines freehand. Maybe these candidates did not have the appropriate equipment to correctly draw the angles needed.

Q.2 In part (a), many engaged with the context and found that that the sum of Ystwyth and Taf was 900. Some candidates found it challenging to find two numbers with a total of 900 where one value was double the other.

The most common correct reasons given in part (b) was reference the Conwy points being incorrect and the width of the Taf being different to the rest. Other correct reasons given was referring to the incorrect vertical scale, the lack of spaces between the bars and missing labelling.

Q.3 Many found the area of a rectangle correctly in part (a)(i), although some misread their calculator to give an answer of 8250 instead of 82500. Candidates should remember that the question does ask to state the units of your answer. This is an independent mark, and the mark can be gained even if the previous 2 marks are lost. Although the question did not ask candidates to convert to cm (or m), some candidates did attempt this and, more often than not, errors were introduced resulting in them losing marks.

In part (a)(ii) the common errors included not giving their final answers for a and b in cm or omitting one of the 15 mm borders when finding the value of a, or omitting either the 15 mm border or the 4 mm adhesive strip when finding the value of b.

Several candidates gained M1 in part (b) for the substitution of their attempt at 15 hours 30 minutes into the formula, for example, $23 \times 15{\cdot}3 + 237.6(0)$ or $23 \times 930 + 237.6(0)$. Many candidates find converting times such as 15 hour 30 minutes into hours challenging.

Q.4 Part (a)(i) assessed the quality of organisation, communication and accuracy in writing. It was very pleasing that many candidates were aware that this was OCW question and had attempted to structure their responses logically with labels attached to the different plans set out in the question. There are a number of candidates who continually misuse '=' and omit the correct units. Candidates should be encouraged to write a conclusion stating which plan is cheaper.

Several candidates successfully found the annual cost for Plan A and compared this to the one annual payment in Plan B.

Some candidates could find 15% of £135, but some then used £20.25 as their discounted joining fee.

Those who did not engage with the 15% discount at all could still gain the final 3 marks by comparing their Plan A cost with Plan B and stating a correct conclusion.

Some candidates misread the question and calculated £31.99 × 12 + £135, and then calculated 15% of this total.

In part (a)(ii), one mark was awarded for stating a possible disadvantage of choosing the cheaper plan. Many disadvantages were credited with a mark, and these included the downside of paying £480 in one sum ("she may not have £480 to pay in one go", "a lot to pay in one go"). Many stated that Laura could decide to stop going and waste a lot of money, which also gained a mark.

Many correct responses were seen in part (b), where candidates used the clues to correctly identify the four classes Laura attended that week.

Q.5 In part (a), although a number of candidates completed the bill correctly, a number of other candidates made errors in their working. These errors included: adding the meter readings and stating this incorrectly as the number of units used, introducing a place value error in multiplying by 18p, and subtracting the VAT from the total charges.

Part (b) Some candidates successfully worked with the correct percentages. However, a number of candidates did interpret 2% and 2.3% as 0.2 and 0.23 respectively. A number of candidates calculated the total payment including interest, £411.39, or calculated the individual interest charges, but omitted to state the total interest as the question asked.

Q.6 Many candidates gave a correct response to this question. Where errors occurred, they were generally in the calculation of 3/16 of 1920g.

Q.7 A number of candidates have very little knowledge of area and perimeter, for both rectangles and circles. Other candidates, with some knowledge, confused perimeter and area. The two parts of this question are interlinked, with a conclusion in part (b) referring back to results in part (a). Many candidates did interlink conclusions, but often based on confusion of perimeter and area. This question was not well answered.

Q.8 Of the multiple choices parts, part (b) was often correct with a mix of responses in part (a) a number of candidates giving 1.02 m^2 from misreading the vertical scale. Many candidates located the points by showing working in part (c).

Q.9 Some candidates converted units accurately, chose the appropriate operation to use and evaluated accurately. Candidates using trial and improvement, generally settled on 8 applications without justification of why not a greater number.

Summary of key points

- Candidates should be encouraged to read the question carefully. A number of candidates lost marks from not stating the units of their answer (Qn 3(a)(i)) or by not giving answers in a particular format (Qn 3(a)(ii)).
- Candidates should practise converting seconds into minutes (Qn1(c)) and hours and minutes to hours (Qn3(b))
- Candidates should be encouraged to use a calculator as much as possible on Unit 2 but must remember to show their working where appropriate.
- Candidates need to understand that the number of units used, when working with a utility bill, is the difference in the meter readings not the sum of these readings.
- Candidates need to be familiar with writing percentages of less than 10% as decimals.

MATHEMATICS - NUMERACY

GCSE (NEW)

November 2021

INTERMEDIATE TIER 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.

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 The most common incorrect response in part (a) was $2025m^2$ selected rather than $202.5m^2$, perhaps from a misinterpretation of where 0.05 acres is on the horizontal scale.

Q.2 In part (a), although a number of candidates completed the bill correctly, a number of other candidates made errors in their working. These errors included: adding the meter readings and stating this incorrectly as the number of units used, introducing a place value error in multiplying by 18p, and subtracting the VAT from the total charges.

Part (b) was generally fairly well answered, with many candidates working with the correct percentages. However, a number of candidates did interpret 2% and 2.3% as 0.2 and 0.23 respectively. A number of candidates calculated the total payment including interest, £411.39, or calculated the individual interest charges, but omitted to state the total interest as the question asked.

Many candidates did show their working, labelled calculations and stated units for the award for OCW2. However, a number of candidates showed only working with units, or no working with only a final statement. These candidates were not awarded OCW2. A common spelling error seen was to omit an ‘e’ from ‘interest’, writing ‘intrest’. There are a number of candidates who continually misuse ‘=’.

Q.3 In part (a), many candidates gave a correct response to this question. Where errors occurred, they were generally in the calculation of 3/16 of 1920g.

In part (b) the common error was to halve the 852g and sometimes halve again, through a misinterpretation of the flour having double the mass of the butter. There were also many correct responses seen.

Q.4 Some candidates have very little knowledge of area and perimeter, for both rectangles and circles. Other candidates, with some knowledge, confused perimeter and area. The two parts of this question are interlinked, with a conclusion in part (b) referring back to results in part (a), many candidates did interlink conclusions, but often based on confusion of perimeter and area. This question was not particularly well answered.

Q.5 Part (a) was well answered, with many candidates converted units accurately, chose the appropriate operation to use and evaluated accurately. Candidates using trial and improvement, generally settled on 8 applications without justification of why not a greater number.

Part (b) was also well answered, with many candidates comparing like volumes of sun cream. Candidates considering 'ml per penny' often reached the incorrect conclusion.

Q.6 Of the multiple choices parts, part (b) was often correct with a mix of responses in part (a), a number of candidates giving 1.02 m^2 from misreading the vertical scale. Many candidates located the points by showing working in part (c). Candidates also engaged fairly well with the increase percentage required in part (d), although a number of candidates calculating 1.77(m) did not then give the correct area of the skin.

Q.7 Overall this question was not well answered. A number of candidates gave the incorrect answer of 37 in part (a), showing a lack of understanding of interpreting the frequency polygon and engaging with the context of the times students took to start a task.

There were many incorrect choices in part (b), including those that are clearly not groups.
In part (c), some candidates listed points and arranged in order, not engaging with the (n + 1)/2th or (n/2)th time.

No part was particularly well answered, but some candidates did realise they needed to find 25% of a total in part (e), but didn't realise that using 37 as that value was nonsensical.

Q.8 Many candidates calculated £325 to spend on dollars, and many candidates converted this to $442, some then realised this would mean buying $440, whilst other candidates went no further. As for the money left, many candidates gave an incorrect answer of
(£500 - £325 =) £175, having not considered the $2 underspend from buying dollars.

Q.9 Many candidates had little knowledge of calculating the volume of a cylinder. A number of candidates did show a procedure that could had led them to a correct answer had they had knowledge of $\pi r^2 h$. However, there were a number of candidates who made little progress in attempting to answer this question. One particular error in premature truncation of '12.9' to '12' glasses per jug, was the cause of a few candidates not being awarded 5 marks in this question for an otherwise correct solution, in this case a maximum of 4 marks were available.

Q.10 In part (a), many candidates did engage with the application of Pythagoras' Theorem in order to calculate the length of the panel. Of these candidates working correction, many rounded down to 4.3m to select a length of panel too short to solve the problem. Very few candidates selected a suitable number of 1-metre-wide panels, with an overlap, to fit along the length of the shelter.

Of the candidates using trigonometry, many inverted the 'opposite divided by adjacent' and as a consequence did not calculate the size of the required angle. A number of candidates did not round their answer to 3 significant figures, however for other candidates this was the only mark they were awarded in answering this question.

Summary of key points

- Candidates need to understand that the number of units used, when working with a utility bill, is the difference in the meter readings not the sum of these readings.
- Candidates need to be familiar with writing percentages of less than 10% as decimals.
- Candidates need knowledge of calculating the circumference and area of a circle. It is important distinguish between the formulae and apply the correct one with an appropriate measure of radius or diameter.
- The concept of buying foreign currency is not fully understood by a number of candidates. They understand how to convert but need also to engage with the idea that currency is bought, generally by buying notes and that coins are not usually available when buying currency.
- Premature approximation, by rounding or truncation can lead to incorrect results or conclusions. Candidates need to avoid rounding or truncating during intermediate steps in solving a problem unless it is realistic to do so.

MATHEMATICS - NUMERACY

GCSE (NEW)

November 2021

HIGHER UNIT 2

General Comments

The majority of 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 Nearly all candidates were able to increase 1.5 by 18% correctly. Some thought the answer of 1.77 m was their final answer. Others chose the incorrect point on the graph to read off, misinterpreting the scale.

Q.2 **(a)** The majority knew that what was needed in this part of the question was to add the frequencies of the plotted points. Some though thought the first point (37) gave the total number of students, possibly thinking they needed the modal frequency.

(b) Far less success was seen in finding the median group. This along with responses in other parts of this question suggested many were unfamiliar with frequency polygons, and the fact that grouped data is being shown. Some gained a mark by giving the correct position of the median within the distribution.

(c) Even less success was seen in this part of the question. Those that understood that grouped data was being shown answered it well. Misunderstandings were exemplified by those who thought the slowest students to start did so after 27.5 seconds, and those that thought there were students that started after 30 seconds, thinking that the line connecting the last 2 points on the graph represented students.

(d) More success was seen in this part of the question, with many successfully calculating 25% of 140 and deciding the answer meant there was not an improvement.

Q.3 This question was answered well on the whole. Those that did not gain full marks either failed to correctly convert 13/20 of £500 into dollars, whilst some did not round their final answer correctly to the nearest penny.

Q.4 A lot of good work was also seen in this question. A number of different methods were used by candidates, and work on the whole was well labelled with good mathematical form, meaning both OCW were gained by many. Errors from some were seen in their volume of a cylinder, and with others in their final steps to find the number of full jugs that were left over.

Q.5 **(a)** Most applied Pythagoras's theorem correctly in this part of the question. Many went on to gain full marks, although some did not account for the need of an overlap, choosing either 3 panels (misinterpreting the question), or 6 panels. Some also chose to use 4.3 m lengths instead of realising that these would be too short as the length that needed to be spanned was 4.34... m, therefore requiring 4.4 m lengths.

(b) This part was answered quite well, but a number of candidates chose to use the sine rule rather than the tangent ratio. This introduced an accuracy error for those who did not carry forward the accurate value for the hypotenuse of the triangle.

Q.6 **(a)** This part of the question was generally answered quite well. Candidates had to give the correct expression for the length of one of the arcs to gain any marks in this question. Some used the formula for the area of a circle in their arc length expression. Some did not add on the correct straight lengths to reach the perimeter of the shape. Some also thought their calculation for the arc length included the radius.

(b) **(i)** This again was generally well answered, although some thought the rectangle to be added was of size 4m by 4m.

(ii) Far less success was seen in this part. A significant number knew that they had to apply an area factor of 200^2, but most only divided by 100 rather than 100^2 in their conversion from cm^2 to m^2.

(c) This part of the question was answered quite well by candidates, although some increased the sale amount by 10% and then by 20% incorrectly, whilst others incorrectly combined the percentage reductions and then applied a reverse 30% reduction.

Q.7 **(a)** This part of the question was fairly well answered. The most common incorrect answer was 291º, where these candidates did not take into account the co-interior angle at Birmingham.

(b) Slightly less success was seen in this part of the question. A number of candidates did not realise that the cosine rule was necessary to calculate the distance from Cardiff to Anglesey. Some errors were seen in the speed calculation also, where 30 minutes was used rather than 0.5 hours.

(c) A number of candidates successfully calculated one of the other angles inside the triangle using either the sine or cosine rules, but far less success was seen in the bearing calculation, mirroring the difficulty that many had in part (a).

Q.8 This question was answered quite well by candidates. Many used an incorrect decimal version of the monthly interest rate, whilst others clearly had difficulty in using their calculators accurately with such a complex formula.

Q.9 **(a)** The majority of candidates realised that they needed to use Pythagoras's theorem in this question, but many only applied it in one plane, using the 400cm and 480cm given in the diagrams. These candidates did not realise they needed to find the horizontal distance from C to A to carry on. Many fully correct responses were seen, but some lost accuracy from premature approximation in their first step.

(b) Most candidates answered this part of the question well, although some only covered one length rather than two, whilst others incorrectly rounded before doubling.

Summary of key points

- A number of candidates seemed unfamiliar with frequency polygons and the fact that grouped data is being shown.
- The formula for arc length does not include the length of the radius of the sector.
- The majority of candidates did not know how to correctly convert from cm^2 into m^2.
- Very few candidates were able to perform bearing calculations using co-interior angles and angles at a point.
- Marks can be lost in 3-D Pythagoras questions when accurate values are not carried forward into the second step of calculations.

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