GCSE EXAMINERS' REPORTS

GCSE (NEW)
MATHEMATICS-NUMERACY

SUMMER 2019

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GCSE MATHEMATICS – NUMERACY

GCSE (NEW)

Summer 2019

UNIT 1 FOUNDATION TIER

General Comments

There was no evidence to suggest that the examination paper was too long for candidates, as there were responses in later questions.
The paper differentiated well, with different styles of questions and a graduation in the level of difficulty.

As 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

Question	Comments
1	Part (a) was very well answered by candidates. Errors occurred with candidates not always drawing a 3m by 4m rectangle or by not ensuring that the rectangle was exactly 2m from the flower bed. In part (b), some candidates did not work out the area within their rectangle. They tried to use the 3m, 1m and 2m given in the bullet points of the previous part of the question. For those that did work out their area most multiplied it by 15; however, some thought that $1m^2$ meant 2 so multiplied their area by 2 and then by 15. Candidates used many strategies when multiplying 12 by 15. Part (c) was very well answered; however, a common incorrect answer was cylinder.
2	This question was well attempted and answered by candidates. Common incorrect answers in parts (a) and (b) were Level 3 and Level 2 respectively. Some gave an incorrect answer in (b) of Level -1 as they included Level 7 when counting down 9 floors. This type of error often appeared in part (c). Many candidates gave an incorrect answer of Level 3 from -1 + 10 as 8 and then subtracting 5. Some candidates also added 1 to 10 before subtracting 5. Several candidates did not show an appropriate calculation.

3	In part (a), many candidates only gained 1 mark from working with 90 × 3. Many did not know how to calculate 40% of a quantity. Some candidates just added or subtracted 40. For those candidates that did correctly attempt 40%, some did not interpret the question correctly and continued with further calculations of 108 + 270 or 270 – 108. In part (b), the conversion was given; yet candidates did not have a strategy to deal with the conversion. Some candidates attempted to continue with 10 miles = 16kms, 15 miles = 24 kms etc but they often made errors with basic number calculations. Some candidates did work with 18 × 8 or 16 × 9.
4	Most candidates attempted this question. The most common mark obtained was £12 for the cost of the cups. Some candidates then worked with finding the amount of lemonade but often did not deal with the number of zeros correctly hence ending up with 6 bottles rather than 60. A common incorrect answer for (a) was £17.40. Some candidates tried to find the number of bottles by working out the number of cups per bottle as 5 but then did not always know what to do from there. Most candidates, who attempted most of the workings structured their response quite well. Many used appropriate labels and the correct units. Many candidates engaged with multiplying 300 by 50; however, several did not deal with changing pence to pounds correctly. Many candidates did not then work out the profit made.
5	Most candidates did not engage with using estimates of the gain in height of each mountain to make the numbers easier to deal with. Most candidates knew that they had to use substitution to obtain their answers with most showing an appropriate substitution. Some candidates did not show any workings and just wrote their estimates in the answer spaces. Several candidates gave an answer of 0 for the temperature loss of Snowdon.
6	Many candidates found this question quite demanding, struggling to remember to engage with all the different steps in order to solve the problem. A common error was to omit working with the change of £2.55 that Mr Thomas received. For those that did work with the change, subtracting £2.55 from £20 caused problems for some with £18.55 being a common wrong answer. Many candidates could not calculate ¼ of £8.60. many just worked with ½ of £8.60 or with £8.60 itself. A number of candidates did not continue to find the cost of 1 kg of raspberries, instead finishing after finding the cost of 1½ kg of raspberries.

7	Part (a) (i) of this question was quite well answered. However, common incorrect answers were either 3/80 or 3/5. In (ii), many candidates thought that the correct answer was either 5:3 or 3:5. For those that did write down workings of 4:4, they usually then gave a correct answer of 1:1. In part (b) many candidates did select 'shorter than Dieter's sunflower', although some candidates did not show working to support their choice. No mark was awarded unless supporting working was given. Some candidates did quote the fact given that 90 cm is 36 inches, but did not use this fact to convert either 80 cm to inches, or 24 inches to cm.
8	In part (a) many candidates did engage with the stages of the question. A common error was to consider incorrectly 1/3 as 30%. Very few candidates were able to work with the ratio; however, they did subtract what Aled's mother paid from the total and split this between Aled and Gareth. Some candidates that did work with the ratio divided by 9 instead of 10. Many candidates did give a response about checking answers, stating that the total should by £660, although of course this isn't a full check as the proportions paid could still be incorrect. Part (b) was not well answered. It is clear that many candidates do not know the conversion of kg to g, or g to kg. 21.13 kg was not handled well by candidates, with many considering this incorrectly to be 2113 g. Part (c) was well attempted. In (i), some candidates did not know a strategy to find £90 in euros. In (ii), some candidates could not divide £11.40 by 2 correctly to find what £5 was worth in euros. Some candidates just subtracted 34.20 euros and 22.80 euros. The frequency diagram in part (d)(i) was often completed correctly, with quite a few correct responses for the modal group in (ii). An incorrect response in (ii) was to select '33'.
9	Parts (a) and (b) were fairly well answered, in particular part (a), although a common incorrect answer was 57miles per gallon as candidates interpreted the question incorrectly. Errors also occurred in reading the scale, particularly in (b), with a common incorrect answer as either 2.4 or 2.25. In part (c) a few candidates read the scale incorrectly and some candidates did not select the 5 cars with the smallest engines. Some candidates used the engine size instead of the fuel economy. However, the idea of mean was well understood. Very few candidates realised that the anomaly had impacted on the mean. In part (d), some candidates incorrectly decided that their line should pass through the top left-hand corner of the graph paper; these lines did not follow the trend. In part (e)a few candidates did notice the cluster of points representing the cars with smaller engines and that there was more data for these cars.
10	This question was not well answered, with very few candidates demonstrating knowledge of bearings. Omitting the zero in part (a) was a common error for those with some knowledge of bearings.

Summary of key points

- Understand that $1m^2$ does not mean to multiply by 2.

- Understand that area is found by counting squares within a shape or by using area of a rectangle = length × width.

- When using the number line, candidates must remember that zero is a number and should not be left out when counting up or down the number line.

- Candidates need to have a correct strategy for finding percentages such as 40%, rather than just adding or subtracting 40.

- Candidates need be careful when dealing with pence and pounds and not mix units.

- The word estimate is in bold. This means that candidates should be considering estimates for values within the question.

- Understanding proportion is an important skill, as it spans many areas of learning. In particular:
  - Using facts such as 5 miles is 8 kms to work out what 90 miles is.
  - Weaknesses were noticed in working with a given fact, that 90 cm is equivalent to 36 inches.
  - Finding that 1½ kg of raspberries is £15.30, but not having a method to calculate the cost of 1 kg of raspberries.

- Candidates need to understand that 1/3 is not 30%.

- Bearings is a topic that need improving.

- Candidates need to know firstly that 1 kg = 1000 g and how to multiply by a decimal number. Converting 21.13 kg to 21130 g meant combining these two aspects and was often not completed correctly.

GCSE MATHEMATICS – NUMERACY

GCSE (NEW)

Summer 2019

UNIT 1 INTERMEDIATE TIER

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 few candidates did not attempt to answer multiple choice questions.

Comments on individual questions/sections

Question	Comments
1	Many candidates found this question quite demanding, struggling to remember to engage with all the different steps in order to solve the problem. A common error was to omit working with the change Mr Thomas received, £2.55. A number of candidates did not continue to find the cost of 1 kg of raspberries, instead finishing after finding the cost of 1½ kg of raspberries. Subtracting £2.55 from £20 caused problems for some with £18.55 being a common wrong answer. A number of candidates did not structure their response well, omitting labelling the stages of working. The £ symbol was often missing and on many occasions 'raspberries' was spelt incorrectly, with either the 'p' or the 'b' missing (i.e. 'rasberries' or 'rasperries'), although the correct spelling was given in the question. 'Mefus' and 'mafon' did not cause difficulty in Welsh.
2	Part (a) of this question was generally well answered, with many candidates selecting the correct responses, particularly in (ii). In part (b) many candidates did select 'shorter than Dieter's sunflower', although some candidates did not show working to support their choice. No mark was awarded unless supporting working was given. Some candidates did quote the fact given that 90 cm is 36 inches, but did not use this fact to convert either 80 cm to inches, or 24 inches to cm.

3	In part (a) many candidates did engage with the stages of the question. A common error was to consider incorrectly 1/3 as 30%. However, many candidates did continue to work with the ratio correctly, with only a few candidates dividing by 9, instead of dividing by 10 as required. Many candidates did give a response about checking answers, stating that the total should by £660, although of course this isn't a full check as the proportions paid could still be incorrect. Part (b) was not well answered. It is clear that many candidates do not know the conversion of kg to g, or g to kg. 21.13 kg was not handled well by candidates, with many considering this incorrectly to be 2113 g. Part (c) was generally well answered, in particular (i). The frequency diagram in part (d)(i) was often completed correctly, with many correct responses for the modal group in (ii). An incorrect response in (ii) was to select '33'.
4	Parts (a) and (b) were fairly well answered, in particular part (a). Where errors occurred, it was generally in reading the scale. In part (c) a few candidates read the scale incorrectly and some candidates did not select the 5 cars with the smallest engines. However, the idea of mean was well-understood. Many candidates realised that an anomaly had impacted on the mean. In part (d), some candidates incorrectly decided that their line should pass through the top left-hand corner of the graph paper; these lines did not follow the trend. In part (e) many candidates did notice the cluster of points representing the cars with smaller engines and that these points demonstrated a correlation, apart from one car, whereas there was less data for the larger engine cars and that the correlation was not as strong.
5	In part (a) a number of candidates correctly worked with a rectangle and a triangle to calculate the area of the trapezium, which is correct. Only a few candidates did not realise what they needed to do to answer this question, although there were errors in finding an area. Many candidates did not make use of the given formula for the area of a trapezium. Some candidates thought the area was the perimeter and some used 8.2 cm as the perpendicular height instead of the 8 cm given on the diagram when actually working to calculate area. A number of candidates mistakenly calculated area of the triangle by doing 8.2 x 2 not by the perpendicular height. In part (b) many candidates did not engage with finding the value of S and F correctly, either not visualising the package or using spurious values from the previous diagram. This part of the question was not well answered, with candidates finding the setup of the cost demanding and also the arithmetic.

6	This question did not ask for construction, but many candidates did show construction arcs. Many candidates had difficulty understanding the requirements, whereas others clearly understood at least the first of the criteria. A few candidates did not extend their perpendicular bisectors sufficiently in order to meet the arc they had drawn.
7	There were many stages within this problem in part (a), with many candidates engaging with many of the stages correctly, but with accuracy letting them down. For example, many candidates calculated 200 × 25 incorrectly. There were also errors in calculating 22% of 200, many candidates found 10% and 1% correctly, but then did not double both to find 22%. In part (b), a few candidates who decided to draw hexagons to tessellate made errors with the number of sides, starting with 6-sided polygons, but also then including 5-sided polygons. It was sufficient to demonstrate that $3 \times 120° = 360°$.
8	Part (a) was not well answered, with few candidates demonstrating sound knowledge of bearings. Omitting the zero was a common error. In part (b)(i) many candidates did have an idea of distance as speed multiplied by time, although some candidates who had learnt a 'triangle of symbols' for deciding whether to multiply or divide, had unfortunately not recalled the facts accurately. Many candidates struggle when they decide to write a time given in hours and minutes as a decimal, although doing so was not strictly necessary in this non-calculator paper. Part (b)(ii) was not well answered, with many candidates not thinking through what the required calculations should be. Of those few who did attempt all the stages, these were often shown in stages, but there were many errors in arithmetic particularly in place value.
9	Part (a) was not well answered and although multiple choice not all candidates attempted to answer both (i) and (ii). Many candidates struggled with the idea of 1 megalitre being 1 million litres, with many place value errors. The question also asked for an estimate and many candidates did not round the surface area or the volume. A few candidates decided on a division but had inverted the calculation required. The response to this question could have been simplified to a volume of approximately 60 gigalitres, which is 60 million litres, divided by the surface area of approximately 5 million, so $60 \div 5 = 12$ metres.
10	It is clear from responses to this question that some candidates have limited knowledge of box and whisker diagrams. However, quite a number of candidates did realise that there was no indication of the number of students in the diagrams, only the proportion of travel times. Part (b) was not well answered.
11	This question was not well answered; many candidates did not consider population density at all, incorrectly looking only at population. This lead, for example, to a common incorrect response in part (b) of Pakistan, which has the largest population, but not the greatest population density. The better responses were in part (a), with evidence of Austria being correctly selected.

Summary of key points

- Understanding proportion is an important skill, as it spans many areas of learning. In particular:
  - Weaknesses were noticed in working with a given fact, that 90 cm is equivalent to 36 inches.
  - Finding that 1½ kg of raspberries is £15.30, but not having a method to calculate the cost of 1 kg of raspberries.
  - Many candidates did not engage with the concept of population density.

- Candidates need to understand that 1/3 is not 30%.

- Candidates need to be aware of the formula list given in the paper. Few candidates made use of the formula given for the area of a trapezium.

- Candidates need to know firstly that 1 kg = 1000 g and how to multiply by a decimal number.
  - Converting 21.13 kg to 21130 g meant combining these two aspects and was often not completed correctly.
  - Multiplication by 0.4 or 4.55 often led to place value errors.
  - 59.7 multiplied by 1 000 000 was often incorrectly calculated

- In a non-calculator paper, it is better to think of 1 hour 20 minutes as 1⅓ hours, and also 1 hour 15 minutes as 1¼ hours.

- Bearings is a topic that needs improving.

GCSE MATHEMATICS – NUMERACY

GCSE (NEW)

Summer 2019

UNIT 1 HIGHER TIER

General Comments

The majority of candidates appeared to have had sufficient time to attempt all the questions, and the paper differentiated well. Candidates generally performed well on questions at the lower end of the paper, but some of the arithmetic involved throughout the paper did cause problems to some and may have resulted in these candidates failing to complete 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 Candidates had to engage with the diagram of the two shoeboxes stuck together in order to answer this question correctly. Many candidates did not however, and performed calculations using the dimensions of a single shoebox. Another cause for error was that some candidates did not understand what the 'sum of the dimensions' meant, with many multiplying the dimensions rather than adding them. This question was poorly answered overall due to these reasons.

Q.2 This question primarily assessed candidates' understanding of drawing loci. It was generally answered well, although many did not construct both loci. Those who did not gain full marks often gained 1 mark from constructing one of the loci. In part (b) many correct responses were seen for the shortest distance between the 2 blocks, although some did not use the scale appropriately.

Q.3 Part (a) was answered well on the whole. Some candidates made arithmetic errors either with 200 x 25, 22% of 200 or with 200 – 44, but the majority of candidates knew the steps they needed to take.

In part (b), many stated the equivalent of 3 x 120 = 360 degrees, showing that 3 hexagons can meet at a point and therefore tessellate. Others showed a diagram of 3 or more hexagons meeting at a point.

Q.4 Although many correct responses were seen in (a), a significant number thought that they needed to multiply speeds in mph with time in minutes to arrive at the distance travelled. Other errors were where candidates did not know how to convert minutes into fractions or decimal parts of hours i.e. did not know how to calculate distances for parts of hours.

Part (b) was quite well answered, with many candidates showing they could multiply accurately with decimal numbers and showed they could use the conversions needed. Multiplying with 4.55 caused the greatest number of errors.

Q.5 Plenty of correct responses seen to the multiple-choice parts in (a). In (b), most correct responses came from converting the volume of water from gigalitres into m^3, and then estimating the answer to the division. Some merit was given to those who did an incorrect conversion, but who knew what calculation had to be done. The simplest way to answer the question was to convert the surface area into mega m^2 (4.54 which many approximated to 4.5 or 5) and then dividing 59.7 (or 60) by this.

Q.6 Many correct responses to all parts of (a). In (ii), some thought that the largest upper quartile of Glanmawr or the largest time recorded of Maesystrad were the reasons for that College's students having the longest travel times. Less success was seen in (b)(ii), where many did not see the link between the inter-quartile range given in (i) and the 75^{th} percentile time of 55 minutes given to them in (ii).

Q.7 Lots of correct responses were seen in part (a). The majority thought that Pakistan had the greatest population density in (b), possibly because of the fact it had the largest population. In (c) those that knew how to calculate population density generally gave the correct figure for Canada of 3.4, but many did not calculate that Argentina's population density was roughly 4 times this figure.

Q.8 This question, that involved using fractional indices, was poorly answered. Most did not know how to work with the fractional index given in the question. Some correct answers were seen in (b), but many thought that the index either needed to be multiplied by 4, or that the $4^{t/2}$ was a mixed number.

Q.9 This question, that primarily tested the use of bounds, was well answered on the whole. Most used correct bounds throughout the question and knew that the voltage needed to be divided by the amperage. Some though divided like with like incorrectly to give what they thought would be the least and greatest values of the resistance, where others had difficulty in calculating the answers to the divisions, especially the one that required the division by 0.15.

Q.10 This 3D Pythagoras question required more visualisation than in past series. Some candidates found the arithmetic involved ($100^2 – 80^2$, and then adding 110^2) quite challenging also, showing a lack of understanding of how to use 10^2, 8^2 and 11^2 in their calculations. Most candidates knew that Pythagoras' theorem was required, although some were not able to use the lengths that were given appropriately.

Q.11 (a) This question required candidates to use the trapezium rule to first estimate the area under the curve, and then to use this to find the total surface area of the pendant and then multiply by 3 to calculate its volume. It was not answered well on the whole. Some read the scale incorrectly on several occasions, others calculated the area of individual trapeziums but did not use the correct formula (even though this formula is given to them in the paper), and others clearly showed a lack of understanding of what was required. Also, many failed to realise the need to multiply their answer by 3 to find the volume of the pendant.

Q.11 (b) The vast majority of candidates showed a correct method to find the number of each type of pendant in the stratified sample. However, many did not show an understanding of how to cancel such calculations so as to ease their final calculations that then resulted in decimal answers. Most who showed a correct method were able to accurately find the number of circular pendants, as the answer was an integer.

Q.11 (c) This question required candidates to equate the volume of the 5 cylinders to the volume of the sphere, and then rearrange this equation to find the radius of each cylinder, giving their answer in surd form in its lowest terms. Most were able to give a correct expression for the volume of the sphere, however many found the arithmetic difficult so as to simplify the answer. Very few showed an equation, although some showed the volume of the sphere being divided by 5, then 40, but critically in most cases not by pi. The fact that their radius still had pi in the answer showed they had not worked correctly with this problem. Very few candidates gained any marks for their work on simplifying the surd at the end.

Q.12 (a) More success was seen in the first part of this question, which possibly candidates were more accustomed to. Some errors came from those that incorrectly multiplied the recurring decimal e.g. stating 100x = 83.3333… rather than 1000x = 83.3333…

It was also disappointing to note that many candidates failed to fully simplify the fraction, finishing with fractions such as 5/60 and 3/36. In the second part of the question, candidates were required to use this fraction to find the area of the sector. Incorrect methods varied from those that thought that their answer from the first part was an angle, to those that did not use a correct formula for the area of a circle.

Q.12 (b) This question required candidates to equate the arc length of the sector to 110 m. Slightly better success was seen here compared to 11c, however many were not able to rearrange the equation correctly. Many candidates were not able to show a correct expression for the arc length to begin with, and no merit was given to these candidates.

Summary of key points

In conclusion, higher tier candidates

- need to be able to use a cancelling method to find fractions of amounts involving large numbers, as these types of calculations are involved in stratified sampling, and in finding arc lengths and sector areas.
- need to be able to form equations and rearrange them correctly to solve certain problems.
- need to know how to work with fractional indices.
- need to be able to efficiently perform arithmetical operations with different types of numbers e.g. decimals, fractions and larger numbers

GCSE MATHEMATICS – NUMERACY

GCSE (NEW)

Summer 2019

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.
The questions that were common with the intermediate tier allowed candidates of all abilities to score marks, despite the content being the top-grade range for this paper.

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.

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

Question	Comments
1	Many correct answers were seen in part (a). Many engaged with the context and understood how to calculate the cost of the petrol. Many could deal with converting pence into pounds or vice versa. Some candidates used the original price of 127.9p instead of 128.9 and some had place value errors in their answer. In part (b), many candidates gave the method of 44.38 × 35 instead of 44.38 ÷ 35. 1.268p was a common incorrect answer.
2	This was a very well answered question. Candidates engaged with the data in the table very well and could identify the correct values required as well as calculating the missing entries. Many candidates were able to write a million in figures and calculated the difference. Several correct answers were seen in part (e)
3	A number of candidates gained the first M1 mark in part (a) for showing evidence of counting squares to find the area. Methods included showing dots or numbering the squares. Those that had an area outside the range accepted, could still gain the last M1A1 marks by correctly multiplying their area by £12.50. It was disappointing to see large numbers of candidates did not attempt part (b). This may be because they did not have a pair of compasses in

	the examination. Many candidates found drawing a circle with the appropriate equipment challenging. Many incomplete circles or circles with bumps were seen. Part (c) was surprisingly not very well answered. Many candidates did not know the relationship between the radius and diameter of a circle and thought the correct answer to be 1·5m or even 3m.
4.	This question 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 parts of the question. Many candidates managed to score 4 marks out of the 6 marks available for the mathematical content. Often the first M1A1 were lost as candidates could not show an appropriate method of calculating 35% of 140. Errors in calculations sometimes appeared due to inefficient use of the calculator or attempts to use non-calculator methods. Incorrect mathematical form in working involved incorrect use of the equals sign, forgetting to include units and writing amounts of money incorrectly, such as £4504.5.
5.	In part (a), many calculated 80°, but then either thought that this was the size of angle b or that the sum of angles at a point on a straight line add to 360° and got an answer for b to be 280°. In part (b), candidates could gain a follow-through mark for identifying the type of angle they had calculated in part (a). Many candidates could continue the drawing of the pattern of red balls in part (c) or could explain that 4 + 5 = 9 balls were required. This was well answered. Many different explanations were accepted and some of these are listed in the marking scheme. It was pleasing to see many correct answers in part (d).
Questions 6 to 10 were common with the Intermediate Tier	
6.	Question 6 was not very well answered by candidates. Naturally candidates found engaging and understanding a pie chart more demanding than understanding the pictogram scale. A few candidates did not show evidence of measuring any angles in the pie chart. Again, this may be that they did not have the correct equipment in the examination. Some candidates did attempt to express responses using fractions in part (a) and part (b). In part (a) some candidates did manage to gain M1 for identifying a correct numerator or denominator (usually 14 or 58). The majority of candidates did state or show that there were 16 pairs of sunglasses sold at the Arthur Avenue shop on Saturday. But, some candidates, in working out the number of sunglasses sold at The Ffordd Owain shop on Saturday, worked out a calculation leading to an answer that wasn't a whole number, but seemed untroubled by this! However, answers were followed through.

7.	In part (a), there were many different starting points in order to answer this question. Many thought that 450g of carrots in *FairMart* cost 57p. Where candidates did engage with the question, the main issue seemed to be units, whether answers to calculations were g, kg, £ or pence or of course pence per kg or g per penny, etc. Giving units and thinking about units does help with the interpretation of responses. In some cases, candidates did approximate their answers prematurely. This is not good practice, although in this case it did not unduly impact on candidates' conclusions. In part (b) there were some correct answers seen for carrot, stock and cream; but a number of these candidates did not offer a **whole** number of onions, instead stating a fraction for onions. Some candidates did not calculate the correct proportion for a recipe for 25 people from a recipe for 4 people but did work consistently with their proportion.
8.	Part (a)(ii) was answered correctly more often than part (a)(i). In part (b) some candidates incorrectly decided to multiply instead of divide. Of the candidates dividing to find the amount of Australian dollars, a number of these candidates did not give their answer correct to the nearest Australian dollar.
9.	There were many correct responses in part (a). A number of different methods were offered that gave an answer of £12.85. However, some candidates did add on an incorrect number of £2.40s. A few candidates did make errors with BIDMAS in the use of non-calculator methods or calculator methods. In part (b) an answer of 2 hours or 120 minutes was a common incorrect response. This response did demonstrate that candidates had engaged with the problem, but not fully, as the minimum number of minutes was not given. However, correct responses of 61 minutes were seen.
10.	Many candidates did offer reasons in part (a)(i) and (a)(ii). Although sometimes these reasons were actually a hypothesis or a conclusion. These were accepted on this occasion, but candidates do need to understand the difference between a conclusion and a reason. In part(a)(iii) many candidates offered only a question without groups for collecting data. The main difficulty was working with continuous data to decide on categories. A gap of nearly one hour between bounds was not accepted, or groups that overlapped. A 1-minute gap was accepted on this occasion. Some gave options of individual times to choose from, usually in hours, which again, was not accepted. In part (b)(i) and (ii) they were major issues in reading the scale of the graph. And some candidates left their answer as a difference, rather than calculating the range. A common error was to evaluate 27 – 25 = 2, using the temperatures at 8a.m. and 11:30a.m. Working with 20 small squares to represent 1 hour caused major difficulties for many candidates. Very few correct responses were seen in this part of the question.

Summary of key points

- 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 should be encouraged to bring the correct equipment to the examination and practice drawing circles using a pair of compasses (question 3b).

- Candidates need to be familiar with the parts of a circle and the relationship between the radius and diameter (question 3c).

- Candidates need to confident in calculating percentages with a calculator (question 4).

- Candidates need to be familiar with measuring angles in pie charts (question 6).

- In calculating best value for money options, considering equal quantities is important, unless a counter example can be given where a larger quantity can be purchased for less money (question 7b).

- Reading scales on graphs is an important skill, considering the value of each little square along an axis, particularly where time is involved (question 10).

GCSE MATHEMATICS – NUMERACY

GCSE (NEW)

Summer 2019

UNIT 2 INTERMEDIATE TIER

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

Question	Comments
1	Naturally candidates found engaging and understanding a pie chart more demanding than understanding the pictogram scale. A few candidates did not show evidence of measuring any angles in the pie chart. Most candidates did attempt to express responses using fractions in part (a) and part (b). A considerable number in part (b) did not attempt to convert their fraction into a percentage. The majority of candidates did state or show that there were 16 pairs of sunglasses sold at the Arthur Avenue shop on Saturday. But, some candidates, in working out the number of sunglasses sold at The Ffordd Owain shop on Saturday, worked out a calculation leading to an answer that wasn't a whole number, but seemed untroubled by this! However, answers were followed through.

2	In part (a), there were many different starting points in order to answer this question. The main issue seemed to be units, whether answers to calculations were g, kg, £ or pence or of course pence per kg or g per penny, etc. Giving units and thinking about units does help with the interpretation of responses. There was much evidence of incorrect units given. Premature approximation is not good practice, although in this case it did not unduly impact on candidates' conclusions. Many candidates did attempt to label calculations, but many candidates did not. Equally there was evidence of lack units. A few candidates did not write anything as a conclusion other than 'Fairmart', although unnecessary writing is not required, it would be good to see a short sentence in an OCW question, such as 'Fairmart offers the best value for money'. In part (b) there were many correct answers seen for carrot, stock and cream; but a number of these candidates did not offer a **whole** number of onions, instead stating a fraction for onions. Some candidates did not calculate the correct proportion for a recipe for 25 people, from a recipe for 4 people, but did work consistently with their proportion.
3	Part (a)(ii) was answered correctly more often than part (a)(i). In part (b) some candidates incorrectly decided to multiply instead of divide. Of the candidates dividing to find the amount of Australian dollars, a number of these candidates did not give their answer correct to the nearest Australian dollar.
4	There were many correct responses in part (a). However, a few candidates did add on an incorrect number of £2.40s. A few candidates did make errors with BIDMAS in the use of non-calculator methods or calculator methods. In part (b) an answer of 2 hours or 120 minutes was a common incorrect response. This response did demonstrate that candidates had engaged with the problem, but not fully, as the minimum number of minutes was not given. However, correct responses of 61 minutes were seen.

5	Many candidates did offer reasons in part (a)(i) and (a)(ii). Although sometimes these reasons were actually a hypothesis or a conclusion. These were accepted on this occasion, but candidates do need to understand the difference between a conclusion and a reason. In part(a)(iii) a few candidates did not give a question, but in the main they did. The main difficulty was working with continuous data to decide on categories. A gap of nearly one hour between bounds was not accepted for full marks, but a 1 minute gap was accepted on this occasion. Some gave options of individual times to choose from, usually in hours. In part (b)(i) they were some issues in reading the scale of the graph. And some candidates left their answer as a difference, rather than calculating the range. A common error was to evaluate 27 – 25 = 2, using the temperatures at 8a.m. and 11:30a.m. Candidates found engaging with the graph and the time scale difficult in part (a)(ii). Working with 20 small squares to represent 1 hour caused difficulties for many candidates.
6	In part (a)(i) an incorrect answer of 7 was often seen, where candidates did not include the 1 from the intersection of car, train and taxi. Many candidates did answer part (a)(ii) correctly. But a number of candidates did not include all 12 values in their total in part (a)(iii). The number 15 from outside the four sets was often not included, yet many of these candidates did have 15 as their numerator. Part (c) was not well answered, with few candidates engaging with bounds, even though the 'correct to the nearest 10 centimetres' was emboldened.

7	In part (a)(i) many candidates were able to work with area of a circle, but didn't all multiply by the height to calculate the volume. Although a number of candidates did not know how to calculate involving a circular base at all, incorrectly deciding to multiply the dimensions given, or calculate the circumference of the base. A common incorrect response in part (a)(ii) was 0.5, simply writing ½ as a decimal, instead of halving the volume they had from part (a)(i). Many candidates did not show a valid method to work with mathematical similarity, instead looking only at difference in radius and height in part (b). There were many methods of answering part (c). The most common was to calculate the percentage of salt and sugar in a tin of baked beans. Some candidates considered the proportion or number of tins of beans that could be eaten to given the recommended daily allowance.
8	In part (a) a number of candidates had very large bills, mainly due to not calculating the number of units of electricity at the outset. However, there were marks still available for these candidates in calculating other stages. There are a number of candidates who do not calculate VAT correctly, as they calculate 5% then subtract this from the cost instead of adding it on. There were a number of ways to answer this question after finding the number of units, either dividing by 3 at an early stage or later on. In part (b) a number of candidates considered only simple interest, incorrectly giving the interest for the first 5 years as £55. Many candidates did use multipliers rather than considering year-by-year individual calculations. Obviously the multiplier method is more efficient and less prone to error. A common error was using 1.22 instead of 1.022%.
9	In part (a)(i) a number of candidates did engage with Pythagoras' Theorem correctly, but some of these candidates prematurely approximated 2.02 to 2 in their working. Candidates found part (a)(ii) more demanding than (a)(ii), being less secure with the application of their trigonometry knowledge. A few candidates decided on an incorrect ratio and some candidates did not have the correct length, whilst others demonstrated no knowledge of any trigonometry. In part (b) many candidates were able to calculate the cost of the brick before the discount accurately. But of these candidates few continued to consider this as the cost after the discount, being 80% of the original. A common error was to calculate 20% from the cost of the bricks that had been calculated, thus not engaging with reverse percentage.

10	Part (a)(i) was well answered, with many correct responses seen. Many candidates in part (a)(iii) did realise that the 4 employees on the highest monthly wages impacted on the majority who earned less than £2100 per month. However, expressing this was not always clear. Some candidates incorrectly focussed on grouped data used rather than raw data. In part (b)(i) many candidates did not engage with the idea of cumulative data, instead plotting at (2400, 24) and (3000, 8) even though a steer had been given in giving the plot (2200, 48) on the diagram. Candidates could access part (b)(iii) as this did not depend on their plots on the diagram.

Summary of key points

- Candidates need to be familiar with measuring angles in pie charts.
- In calculating best value for money options, considering equal quantities is important, unless a counter example can be given where a larger quantity can be purchased for less money.
- Reading scales on graphs is an important skill, considering the value of each little square along an axis, particularly where time is involved.
- Candidates do not engage with bounds, even when 'correct to the nearest 10 cm' is emboldened. A first stage should be to split this 10 cm into 5 cm below and 5 cm above. Candidates often also confuse rounding conventions and bounds.
- Mathematically similar figures is often better understood when scale factors of enlargements are calculated.
- All candidates should be encouraged to attempt multiple choice questions.

GCSE MATHEMATICS – NUMERACY

GCSE (NEW)

Summer 2019

UNIT 2 HIGHER TIER

General Comments

The majority of candidates appeared to have had sufficient time to attempt all the questions, and the paper differentiated well. Candidates performed slightly better on this paper compared to Unit 1.

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 This question assessed candidates' understanding of bounds and metric conversions. The candidates who knew how to convert between metres and centimetres generally answered this question well. Errors varied from those who mis-read the question, believing the accuracy of the measurements were also in metres (giving lower bounds of 5 and 95), to those who used incorrect conversions, and then some who did not know how to work with bounds at all.

Q.2 All parts of this question were generally answered well, showing candidates knew how to calculate the volume of a cylinder, work with similar shapes, and then compare proportions. In (b), allowance was made for candidates that introduced a small amount of error in their work if they used more than 1 step of calculation. In (c), candidates either calculated the percentage of the daily recommended intake for both ingredients, or the number of portions that could be consumed to reach it. Some that went down the latter route thought that sugar provided the greater proportion, interpreting their answers incorrectly.

Q.3 It was pleasing to see that the majority of candidates performed well as regards their organisation, communication and accuracy in writing in part (a). Most labelled the majority of their calculations, showed all their workings, and provided suitable units for their answers. It was evident however that some candidates were unaccustomed to calculating bills of this nature, and did not know how to deal with the meter readings or the standing charge appropriately. Quite a few thought they had to calculate bills for each of the 3 months, even though there were only 2 meter readings. Some of the candidates that worked correctly with the meter readings added the standing charge after their VAT calculation, but allowance was made for this so that they only lost 1 mark.

Good work was also seen in (b), with many candidates efficiently increasing the £500 using compound interest. Some knew the correct method, but used multipliers of 1.22 and 1.16, while others lost a mark by believing they needed to subtract the £500 from their final answer. This was not penalised if the candidates stated that this was the interest gained.

Q.4 The Pythagoras and trigonometry questions in part (a) were answered well, especially Pythagoras. Very few errors were seen. Some candidates thought that the length of the opposite side was 1.1m when using the sine ratio for support 2 (failing to add 0.8m), but no merit was given to this response as this concept was intrinsic to the question.

Less success was seen in (b), with many adding 20% on to cost of the bricks after the labour cost had been subtracted. Some candidates did not subtract the correct labour cost, but merit was still awarded to those that showed a correct reverse percentage calculation.

Q.5 In (a), most candidates gave a correct response for the group that contained the median monthly wage, however less success was seen in (ii) where many did not focus on the skew in the data, and the fact that the few high earners would result in the majority of the workers earning less than the mean.

Lots of good responses were seen in all parts of (b), showing candidates knew how to draw a cumulative graph, estimate the median from it, and then give one number as a percentage of another.

Q.6 Calculating the AER for Banc Gwynedd was a straightforward task, using the given AER formula. Because of this, many candidates were successful in showing the correct method. In order to calculate the difference in the AERs as a percentage correct to 2 decimal places, candidates needed to be careful not to truncate their answers too much. A number of candidates were guilty of doing this however. Less success was seen in calculating the AER for Morgannwg Bank. A correct method either involved raising 100.41% as a decimal to the power of 12, or 0.41% x 12 could have been calculated to arrive at the nominal annual rate, before being substituted into the AER formula. Of course, the AER formula generates 100.41% as a decimal, and so this was the more inefficient method. It was evident though that the vast majority of candidates were unaware of the relationship between the monthly rate and the nominal annual rate.

Q.7 Far more success was seen in this histogram question compared with question 6. The majority of candidates gave good responses to (a), and also in (b) where they showed an understanding that the lightest and heaviest members of the squad could be anywhere in their respective groups. Good responses were also seen in (c), although most estimated the number of players that had a mass of between 104 kg and 110 kg, rather than realising that what was needed was the total number of players in the group 100 to 110 kg. Part (d) would have been unfamiliar to candidates, even though they would have studied estimating the mean from a grouped frequency table. A number of candidates were not sure of the method required, but many correct responses were seen, which was pleasing to see.

Q.8 Many candidates showed the correct method to arrive at the volume of the frustum of a cone in part (a), although most did not show that the radius of the bucket was 9 cm. This required candidates to realise that similar shapes were present. Slightly less success was seen in (b). Many correct answers for the volume of bucket B were seen, with most candidates multiplying the volume of Bucket A by the volume factor. Some though arrived at a correct answer by applying the scale factor to all the dimensions of the diagram in (a), and using the same method of subtraction of volumes they had used previously. Less success was seen however in converting their answer from cm^3 into gallons. Even though the conversion from pints to gallons was given, most candidates did not know how to use this conversion with their answer in cm^3. Candidates generally knew how to change their answer into litres, but many divided by 8 only, instead of also multiplying by 1.75 so as to change their number of litres into pints.

Q.9 Candidates worked well with the sine rule to calculate the distance from Beta to Aberwyn. Many fully correct responses were seen, but slightly less success was seen in calculating the distance of Alpha to Aberwyn using the cosine rule. Incorrect responses generally saw candidates using Pythagoras' theorem.

Q.10 Good work was generally seen in part (a) of this question involving Land Transaction Tax. The different taxable bands are similar to the bands seen with income tax, and it was clear that many candidates knew how to work with these bands. Far less success was seen in (b), where candidates needed to form an equation to calculate the highest price of house Holly could afford so that her total spend would be £327 000. It was hoped that the work they had done in part (a) would give candidates an insight in how to form the equation, but very few were able to. Some candidates arrived at the correct answer from forming an equation where their variable was the amount over £250 000 the house was, but in these cases full credit was not awarded, as they had not answered the question that had been set.

Summary of key points

In conclusion, higher tier candidates

- need to be aware of the relationship between the nominal annual rates of savings accounts and the actual rate that is applied, be it monthly or quarterly etc, depending on the frequency of the interest payments.
- need to know the metric to imperial conversions specified in the syllabus and be skilled in how to apply them.
- need to be proficient in the forming and solving of linear equations, even in non-standard contexts.

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