GCSE MARKING SCHEME

AUTUMN 2016

MATHEMATICS - NUMERACY (NEW)
UNIT 1 - HIGHER TIER

3310U50-1

INTRODUCTION

This marking scheme was used by WJEC for the 2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

GCSE Mathematics – Numeracy Unit 1:Higher Tier Autumn 2016	Mark	Comment
1. Unambiguous straight line from midpoint, ± 2mm, AD towards BC Unambiguous angle bisector of DÂB ± 2° Arc centre A with radius 3cm ± 2mm Correct region indicated	 B1 B1 B2 B1	All lines and arcs must be of sufficient length to be able to select the correct region Intention of straight line with or without a ruler B1 for arc centre A of either insufficient length or tolerance > ± 2mm but <± 5mm, or for an arc with correct radius but centred at B Do not accept if arcs are included at C or D FT provided similar region with an attempt at the horizontal line and the sloping straight line from A, and provided at least B1 awarded for the arc
2(a)(i) Reason, e.g. 'because it is not 30% less than the original amount', 'it is 30% less of a different amount', '30% for Lotty is not the same as 30% for Rafael', '30% of his share is more than 30% of her share', 'it would be 30% of Lotty's winnings so it would not be 30% of Rafael's total winnings', 'Lotty's share will increase by 30% not by the percentage of his amount'	E1	Ignore additional spurious comments Allow a correct reason ignoring calculations provided the reason is not based on calculations Allow 'they do not get the same amount of money to begin with', 'because Rafael has 3 of the ratio when Lotty has the total of 2', 'because Rafael gets a higher ratio than Lotty' Do not accept 'this is because the shares wouldn't be even', 'because Rafael will get more than Lotty', 'he would get 30% less'
2(a)(ii) 2000 × 2 ÷ 5 or equivalent × 1.3(0) or equivalent (£) 1040	 M1 M1 A2	 A1 for intermediate answers of (£)800 or (£)2600
2(a)(iii) (Rafael now wins 2000 – 1040) (£) 960 New ratio fully simplified 13 : 12	B1 B2	FT 2000 - 'their 1040' provided both previous M marks awarded This mark may be implied in further working B1 for new ratio (1040 : 960) with at least one step of simplification, e.g. 104 : 96, 520 : 480 FT provided equivalent difficulty, award B1 only if only 1 common factor in the simplification, or B1 for 12 : 13 given in the answer space
2(b) 0.94 × 3000	B1	Allow 3000 × 94/100 Do not accept 3000 – 0.06 × 3000

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3(a) 605 cm	B1	
3(b) 249.5 cm	B1	
3(c) Consistent use of units for comparison, e.g. desk 200cm if another measure is given in cm	B1	<u>Penalise -1 only the use of the 'their desk' ≠ 200</u> Accept comparison with one other length, e.g. sight of 2000mm = 200cm is sufficient if any other working seen in cm (irrespective of use of bounds)
Use of 147.5 (cm) or 250.5 (cm) or 595(cm)	B2	'Use of' can be any of these values used within a length calculation (including the bookcase, the wardrobe and either the wall or the desk), or 595(cm) used in the interpretation within a conclusion Allow 147.49•(cm) or 250.49•(cm) respectively throughout (Otherwise award:) B1 for sight of 147.5 (cm), 250.5 (cm) or 595(cm)
Correctly evaluated calculation which could be interpreted to show the desk (200cm) would not fit, i.e. a counter example showing the desk can not fit	B1	Interpretation is not required for this B1, it is a calculation (showing that the wall or the gap is of insufficient length, i.e.) with an answer >595(cm) or <200(cm) as appropriate <u>Examples</u> (In cm, but working in m or mm is also accepted) *Giving an answer >595:* 147.5 + 250.5 + 200 = 598, or 147 + 250 + 200 = 597, or 146.5 + 249.5 + 200 = 596 OR *Giving an answer <200:* 595 – 250.5 – 147.5 = 197, or 595 – 250 – 147 = 198, or 595 – 249.5 – 146.5 = 199 i.e. working with lengths in the inclusive ranges 146.5 to 147.5 and 249.5 to 250.5 is accepted, condoning mix of upper and lower bounds provided the calculation leads to >595 or <200 appropriately
Conclusion from a correct interpretation of a correctly evaluated calculation, e.g. 'no, not certain as greater than the least length of the wall which is 595(cm)', 'no, 197(cm) is less than the length of the desk which is 200(cm)', 'no, 598(cm) > 595(cm)'	E1	This E1 depends on the award of the previous B1 Sight of 200(cm) or 595(cm) as appropriate for the comparison is required, i.e. 'no, not certain as greater than the least length of the wall' or 'no, 197 cm is less than the length of the desk' would only be awarded E1 if 595(cm) or 200(cm) respectively, has been seen previously

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4(a)(i) 52 hours	B1	
4(a)(ii) 10 girls	B1	
4(a)(iii) FALSE TRUE TRUE FALSE	B2	B1 for any 3 correct answers If no marks, award SC1 for an answer TRUE, TRUE, TRUE, TRUE (as it is a repeat misunderstanding/error)
4(b) Statement 1: Complete method to calculate the interquartile range Girls' IQR (59 or 58 - 33 or 32 =) 25 to 27 AND Boys' IQR (46 or 45 – 19 or 18 =) 26 to 28 AND Trefor correct if IQR boys > IQR girls or Trefor incorrect if IQR boys ≤ IQR girls Statement 2: Conclusion, e.g. 'Incorrect, as the median for the boys is 40 hours which is lower than girls median (52 hours)'	M1 A2 E1	Based on sight of method for either boys or girls, or either IQR correct provided not clearly from incorrect working A1 for either IQR correct Ignore incorrect time notation, e.g. '26.30 hours' for 26.5 hours Conclusion must include statement that 'boys' median is 40 hours' FT for a reason based on 'their 52 hours', (a)(i) and 40 hours. Accept responses based on comparisons of the modal groups 50 to 60 hours (with 52) girls and 40 to 50 hours (with 60) boys Accept comparisons of the estimated means, boys 33·8(571…hours) and girls 45·2(857…hours)
5(a) Axes labelled appropriately, e.g. (total) cost and (number of) people, **AND** uniform number of people scale from 20 (or less) to at least 80 Reasonable uniform total cost scale from 500 (or less) to at least 1700 Correct representation of the total cost for between 20 and 80 people	B1 B1 B2	Allow people and costs on either axis Allow '£' for costs People: 20, 40, 60, 80 Cost £: 500, 900, 1300, 1700 FT 'their scale' if possible Ignore showing for less than 20 people (and up to 100 people) May be indicated by an appropriate straight line from 20 to 80 people (£500 to £1700) B1 for any 2 correct points given (indicated in working or plotted) OR B1 for all points (indicated in working or plotted), within the range 20 to 80 people inclusive, with a gradient of 20
5(b) $P = 20 + \frac{100}{N}$ or equivalent	B3	Mark final answer B2 for 20 + 100/N or P = … + 100/N B1 for sight of 100/N
5(c) (2240 – 200) ÷ 20 102 (people)	M1 A1	Full method may be shown in stages

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6(a) Range: Trefwen 50(mm), Nawrby 49 (mm) Median: Trefwen 30 (mm), Nawrby 28 (mm) IQR: Trefwen 25 (mm), Nawrby 30 (mm)	B4	B3 for any 5 correct entries, OR B2 for any 3 or 4 correct entries, OR B1 for any 1 or 2 correct entries
6(b) Reason, e.g. based on comparisons of **median** (with the median rainfall for Nawrby being (slightly) lower)**,** OR little rain as lower whisker 1mm compared with Trefwen at 5mm, OR Reason based on comparison of lower quartile	E1	Values are required within a reason statement, however accept if reference is to values in (a) without restatement, e.g 'the median for Nawrby is less than the median for Trefwen' Accept 'because on average there is less mm of rainfall in Nawrby than Trefwen' (as the median is the only average in (a)) FT provided 'their median for Nawrby' < 'their median for Trefwen' provided one of the medians is correct Ignore other averages and the range, provided the median is mentioned, unless mention of comparisons of lower quartiles
7(a) 14:30 to 14:45	B1	Accept any ¼ hour period within 14:27 to 14:57 inclusive Allow e.g. 2:30(p.m.) to 2:45(p.m.)
7(b) Answer in the range 15:09 to 15:15 inclusive	B1	Allow e.g. 3:09(p.m.) to 3:15(p.m.) inclusive
7(c) $\frac{18 \times 1000}{60 \times 60}$ 5 (metres per second)	M1 A1	Or equivalent e.g. 18 × 5 ÷ 18
7(d) ½ × 18 + ½ × 1 × (18 + 14) (= 9 + 16) 25 (km)	 M2 A1	Do not penalise a more accurate estimate that uses the velocities at 14:00, 15:00 and 16:00, e.g. using ½-hour intervals. M1 for one of the two areas correct in the sum, OR M1 for 1 slip in reading If a more accurate estimate used, M2 for a full correct method M1 for a full method with at least 1 correct area calculation A1 is dependent on M2 being awarded No FT from M1 *Alternative method:* *M2 for ½×1×((0+)14+2(18))* *Award M1 if 1 error made* *A1 for 25 (km) No FT from M1*

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7(e) Shows the distance travelled from the graph, e.g. ½ × 1 × 14 (= 7 km) or ½ × ½ × (14 + 12) + ½ ×½ × 12 (= 9.5 km)	M1	
Distance from the graph 7 (km) to 12 (km)	A1	If units are given they must be correct Must follow their working correctly
Shows use of 5 miles ≈ 8 km with a comparison conclusion, e.g. '7 km is reasonably close 8 km which is 5 miles', 'not really as 5 miles ≈ 8 km, so 9.5 km is a greater distance'	E1	Depends on M1 previously awarded Need sight of conversion 5 miles ≈ 8 km, or equivalent For this question, accept use of 3 miles is approximately 5 km
Organisation and communication	OC 1	*Organisation and communication* For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanations and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means
Accuracy of writing	W1	*Accuracy of writing* For W1, candidates will be expected to: • show all their working • make few, if any, errors in spelling, punctuation and grammar • use correct mathematical form in their working • use appropriate terminology, units, etc.

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8(a) 2	B1	
8(b) 0	B1	
8(c) Selects to use 1st histogram and work with area, sight of any single area calculated is sufficient 1×2 + 0.5×6 + 0.5×8 + 0.5×10 + 0.5×4 + 1×1 (= 2 + 3 + 4 + 5 + 2 + 1) 17 (anglers last year) 51 (anglers this year)	S1 M1 A1 B1	*Note: check histogram for working* Allow one error CAO FT 3×'their 17' provided S1 previously awarded and their final answer is an integer
8(d) Number of fish caught last year 8×0.25 + 32×0.25 + 40×0.25 + 24×0.25 + 32×0.25 + 16×0.25 + 4×0.5 40 (fish caught last year) Median is the 20th or 20.5th fish Last year median fish weighed 0.75 (kg) Difference is 0.15 (kg)	M1 A1 B1 B1 B1	*Note: check histogram for working* Allow one error (= 2 + 8 + 10 + 6 + 8 + 4 + 2) CAO FT 'half their 40' or 'half their 40' + 0.5 FT 'half their 40' or 'half their 40' + 0.5, provided their answer is in the range 0.5 to 1.25 inclusive FT 0.9 – 'their 0.75' correctly evaluated, or reversed if their 0.75 > 0.9 provided M1 previously awarded
8(e)(i) (Percentage last year within 1 hour) 2/17 (×100 %) or equivalent Appropriate statement e.g. 2/17 > 1/10, 2/17 > 2/20, 11(.76… %) or 12% > 10%, or equivalent	M1 A2	FT from (c), 'their 2'/'their 17', including if not working with area OR as two A1s: A1 for 11(.76… %) or 12% A1 for an appropriate conclusion from 'their 11(.76… %) or 12%' e.g. 'this is greater than 10%', 'not quite as good as last year', 'quite similar to last year', 'proportionally about the same' OR A1 only for 2/17 > 10% *Alternative* *10% of 17 = 1.7 M1* *1.7 < 2 A2*
8(e)(ii) Reflection, e.g. 'no, as the number taking part is nowhere near the same'. 'no, as the competition has grown', 'no, as the conditions might not have been the same', 'no, as the weather conditions could have been very different'	E1	'No' may be stated or implied Accept 'Yes' provided their reason has reference to comparing like with like e.g. proportions, percentages

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9. FALSE FALSE TRUE TRUE TRUE	B2	B1 for any 4 entries correct
10(a) $35 - \frac{240}{360} \times \pi \times 2 \times 6$ or equivalent $35 - 8\pi$ (cm)	M2 A1	M1 for sight of $\frac{240}{360} \times \pi \times 2 \times 6$ or equivalent Ignore attempts to substitute a value for π into this expression Do not ignore further incorrect simplification of the expression *If no marks allow SC1 for an answer of 35 - 4π (cm) from sight of* $\frac{240}{360} \times \pi \times 6$ *or equivalent*
10(b)(i) Sight of $\frac{240}{360} \times \pi \times 6^2$ OR $\frac{240}{360} \times \pi \times 3^2$ Area of region $\frac{240}{360} \times \pi \times (6^2 - 3^2)$ or equivalent $= 18\pi$ (cm^2) Cost of paint is 270π (p) or £ 2.7π	B1 M1 A1 A1	Or equivalent expressions Accept shown in stages FT 15 × 'their 18π' provided their answer is a multiple of π, and in its simplest form If units are given they must be correct
10(b)(ii) (£)162	B1	FT 'their 2.7' or 'their 270' provided M1 previously awarded