GCSE MARKING SCHEME

SUMMER 2017

GCSE (NEW)
MATHEMATICS NUMERACY - UNIT 1 (FOUNDATION)
3310U10-1

INTRODUCTION

This marking scheme was used by WJEC for the 2017 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.

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GCSE Mathematics – Numeracy Unit 1: Foundation Tier Summer 2017	Mark	Comment
1(a) (£)125000	B2	Award B1 for sight of 125123 For B1: FT their answer to 269885 - 144762 correctly rounded to the nearest 1000 Allow B1 for sight of 270000 and 145000
1(b) No stated or implied with correct reason given, e.g. 'No because (only) Anglesey, Carmarthenshire and Neath Port Talbot are less than £180000' 'No because (only) £171684, £158973 and £144762 are less than £180000' 'No because there are (only) 3 prices less than £180000' 'No because there are 3 prices more than £180000' 'No because there are 3 prices less than £180000 and 3 prices more than £180000' 'No because ½ of them are more than £180000' 'No because ½ of them are less than £180000' 'No Cardiff, Powys and Ceredigion are more than £180000'	E1	The statement given must imply 3 or ½ Allow e.g. 'No only 3 countries are less than £180000' If yes stated or implied E1 may be awarded provided reason clearly implies 'no'. e.g. 'He is correct because ½ the houses are less than £180000' (contradiction) Do not allow 'Owen correct because average house price in Neath Port Talbot is £144762' 'No Owen not correct because some of the houses are over £180000 like Cardiff and some are less than' Note: Candidates may refer to the counties as houses, prices, countries……..
1(c) £200 000	B1	
2(a) Evidence of counting area in either biscuit Area of Tamsin's biscuit in range 17 – 25 (cm^2) AND Area of Sophie's biscuit in range 22 – 27 (cm^2) AND conclusion given (yes). The conclusion must be consistent with their area values within the ranges given	M1 A2	Look at diagram Award A1 for either area in the range. One correct area implies M1 Allow 'no' if areas are within the ranges given and Tamsin's area is greater than or equal to Sophie's A2 cannot be awarded unless a conclusion is given.
2(b) Table set up with rows or columns: • with all 4 biscuits listed correctly. • Labelled with tallies • Labelled with frequency or equivalent as a heading	 B1 B1 B1	 Accept other biscuits also listed and/or use of "other". Accept abbreviations. Accept tallies drawn Accept total or number of people for frequency

2(c) 3 × 3 × 200 or 30 ÷ 10 × 200 × 3 1800(p) or (£)18(.00)	M2 A1	Award M1 for sight of 3 × 3 or 9 (cost of 1 biscuit) or 3 × 200 or 600 (pence per 10 cm^2 across 200 biscuits) or 30 × 200 or 6000 (total surface area) CAO Allow A1 for £18.00p Award A0 for £1800 or 18p or 18.00p Watch for a method of 3 × **30** × 200 or 3 × 30 = 90 and then 90 × 200 = (£)180 or 18000(p). This would gain M1 only The answer must come from a correct method not from a place value error e.g. 18000p = £18
3(a)(i) 3 (miles)	B1	Accept any indication of 3 miles such as 3.00 (miles)
3(a)(ii)1 hour 56 minutes 33 seconds	B1	Accept any indication of correct time e.g 1:56:33, 1 56 33, 1.56.33
3(b) FALSE TRUE TRUE FALSE	B2	Award B2 for all correct Award B1 for 3 correct
3(c) 9 minutes (and) 31 seconds	B1	Allow 9 31 or 9:31 or 9.31 or 9 mins 31 or 9 31secs or 09:31 or 09.31 Do not accept 9.31 mins or 9.31 secs

4(a) An attempt at multiplying the hours for at least 1 day by 8	S1	May be implied in later working
(From Tuesday to Friday) 17 hours	B1	Working with 17 hours from Tuesday to Friday this may be seen or implied by sight of eg 138 or (120 **and** 18) or (15 **and** 2) or 18 or 136 or (12 **and** 5)
(Pay for Tuesday to Friday) 15 × (£)8 + 2 × (£)9 (=120 + 18) or 17 × (£)8 + 2 × (£)1 (=136 + 2) or 3½×8 + 4×8 + 4½×8 + 3×8 + 2×9 (28 + 32 + 36 + 24 + 18 =138)	B2	FT (their 17 – 15) × (£)9 Award B1 for sight of either 15 × (£)8 or 2 × (£)9 or 120 or 18
(Saturday pay) 3× 2 × (£)8 (=48)	B1	
(Total pay) (£)186(.00)	B1	CAO If last B1 not awarded **and no** marks awarded from the **B2 section** then award SC1 for answers in the range (£)184 to (£)189 from appropriate working **provided no numerical errors made.** (This is from not dealing with the Friday and extra hours) E.g. 28 + 32 + 38 + 42 + 48 = 187 award S1 B1(have worked with 17 hours) B0 B1 B0 SC0 (4½ × 8 and 5 × 8 not correct and addition of values also not correct) Common answers of 28 + 32 + 36 + 40 + 48 = 184 Award S1 B1 B0 B1 B0 SC1 (no extra hours) 28 + 32 + 36 + 45 + 48 = 189 Award S1 B1 B0 B1 B0 SC1 (5 extra hours) 184 + 'their 2' "extra" hours Award S1 B1 B0 B1 B0 SC1
Organisation and communication	OC1	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
Writing	W1	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.

4(b) £37.60	B1	
5. (potatoes for 6 people =) 30 (ounces) (potatoes for 6 or 30 ounces =) 30 × 28 = 840 (grams) (Scale reading =) 480 (grams) (Need 840 – 480 =) 360 (grams)	B1 M1 A1 B1 B1	FT 'their 30 ounces' (including 10 ounces) FT 'their 840' and 'their 480' provided FT answer >0 **Alternative method for the first 3 marks:** (potatoes for 2 people or 10 ounces=10 × 28) = 280 (grams) B1 (potatoes for 6 people or 30 ounces=) 280 × 3 M1 **FT 'their 10 × 28' × 3 for M1 and possible A1 if 'their 10 × 28' × 3 correctly evaluated.** 840(grams) A1 **Alternative method for the first 3 marks:** (potatoes for 1 person or 5 ounces= 5 × 28) = 140(grams) B1 (potatoes for 6 people or 30 ounces=) 140× 6 M1 **FT 'their 5 × 28' × 6 for M1 and possible A1 if 'their 5 × 28' × 6 correctly evaluated.** 840(grams) A1
6. 3 6 7 9 10 10 11(cars) 3 + 6 + 7 + 9 + 10 + 10 + 11 and ÷ 7 8 (cars)	B2 M1 A1	Need not be in this order B1 for sight of (11 -8 =) 3 (cars) **and** at least two 10s FT intention to sum 'their 7 numbers' and divide by 7, **must be** 7 numbers CAO, i.e. FT is only for the method mark If no marks, award SC1 for an unsupported answer of '8'

7(a) 15:30	B1	
7(b) 16 km	B1	
7(c) Indicates or implies 'can't tell', with a reason suggesting, e.g. 'don't know in which direction they travel', 'could be (up to) 14 km apart', 'the graph only says distance from home'	E1	Ignore spurious additional information. Allow 'can't tell' with e.g. 'one sister takes a different route', 'different roads taken', 'one sister changed direction', 'could be 9km apart', 'Eleri may have taken a longer route' Do not accept 'can't tell' with e.g. 'they don't leave from the same place', 'Yvon travels slower than Eleri', 'schools finish at different times', 'the graph shows distance from home not distance from school', 'not known if Yvon travels in a straight line'

8. (Tent ground area) 2.5 × 4.4 = 11 (m^2)	M1 A1	Allow for sight of 2(.)5(0) × 4(.)4(0) Working of the ground area must be seen, i.e. sight of 2.5 × 4.4 **not** 2 × 4 or 3 × 4 CAO, not FT If no **area** calculation seen award M0, A0 then FT for M and A marks, final mark E0
(Total cost for 12 nights, pay for 10 nights =) 10×14 + 2×10×4	M2	FT 'their ground area >12m^2 to calculation 10×16 + 2×10×4 (=£240) for M2 or equivalent M1 (see formula below) If incorrect interpretation of 'their ground area', award M1 only for either area ≤12m^2 with 10×16 + 2×10×4 (=£240), or area>12m^2 with 10×14 + 2×10×4 (=£220), M1 for a sum of two products: (2 x) a × b + (2 ×) 4 × c where a = 10, 11 or 12 b = 14 or 16 c = 10, 11 or 12 The initial (2 ×) is if the error is 2 tents! For example: • 12×14 + 2×10×4 (= £248) • 10×14 + 10×4 (= £180) • 12×16 + 2×12×4 (= £288) Ignore further working attempting to subtract discounts Working with the cost of 1 night, e.g. 14 + 2 × 4 or 16 + 2 × 4, ignore errors in calculation and award M2 or M1 as appropriate when attempt to multiply by 10, 11 or 12 is seen, i.e work may be seen in stages
(140 + 80 = £) 220	A1	CAO If previous M0, A0 for costs, award SC1 for sight of 1 night cost (£)22 or for sight of 10×14 and 2×10×4 without indication of addition
(Saving = 2×) 8 × 15 (£) 240	M1 A1	Allow M1 only 1 person saving CAO, not FT *<u>Alternative</u>* *(How many weeks of saving)* *220 ÷ (2 × 15) M1* *(FT 'their 220' for M1 only)* *7⅓ or 7.3(.....)(weeks) A1 CAO* *If no marks, allow SC1 for 14.6(6... weeks) or 14.7 from 220 ÷ 15* *Or equivalent for working with cost per person, i.e. ½ × 10 × 14 + 10 × 4 = £110 and saving 8 × 15 = £120, all previous marks are available*
Conclusion, e.g. 'planned saving is enough to pay for the holiday'	E1	FT comparison for 'their £240 saved' with 'their total cost', provided at least 2 M marks previously awarded one of which **must be** for area calculation Allow the conclusion 'yes'

9. a = 72° and c = 94° b = 108° d = 86° Correct diagram within ±2mm and ±2° tolerances	 B1 B1 B1 B3	If contradiction between diagram and answer space, mark the answer space, except if a transition slip FT 180 – 'their a' FT 180 – 'their c' Ignore extensions of lines in construction, mark the quadrilateral Attempt (FT) using template irrespective of angles stated B2 for diagram with either of : • 6cm ±2mm **and** a = 72°± 2°**and** either b = 108° ± 2° or d = 86°± 2° • all correct angles ±2° with 6cm incorrect B1 for 6cm ±2mm **and** a = 72°± 2°or d = 86°± 2°
10(a)(10 + 20 + 30) × 0.6 or 60 × 0.6 or (10 + 20 + 30) × 60 ÷ 100 (£)36	M1 A1	Allow intention of brackets i.e. 10 + 20 + 30 × 0.6 CAO and must be from correct working If no marks, award SC1 for an answer of 3600(p), **not** for £3600
10(b) 10 × 20 × 30 (= 6000) × 0.01 or (× 1) ÷ 100 (£)60	M1 m1 A1	An answer of £6000 implies M1 only Depends on previous M1 Award of m1 implies previous M1 CAO If M1 m0 A0 also award SC1 for an answer of 6000p
10(c) 2× {(10×20) + (20×30) + (10×30) (= 2200) × 0.02 or × 2 ÷ 100 (£)44	M2 m1 A1	M1 for sight of **sum** of at least 2 of the 6 possible products: 10×20, 20×30, 10×30 Depends on M2 or M1 previously awarded CAO If M2 m0 A0, also award SC1 for an answer of 4400(p), **not** for £4400
11(a) (Needs a further) 11 (squares)	B2	B1 for sight of 6+5+4+3+2+1 or 21squares
11(b)(States or implies 'correct' with sight of, e.g. • 10+9+8+7+6+5+4+3+2+1, or • … 21, 28, 36, 45, 55, or • … +7, +8, +9, +10 • 5 × (10 + 1)	B1	CAO Do not accept any contradictions, e.g. an incorrect answer for the correct sum, i.e. 10+9+8+7+6+5+4+3+2+1 with an answer other than 55 Allow 'correct' with D10 diagram drawn in the answer space

GCSE MARKING SCHEME

SUMMER 2017

GCSE (NEW)
MATHEMATICS NUMERACY - UNIT 2 (FOUNDATION)
3310U20-1

INTRODUCTION

This marking scheme was used by WJEC for the 2017 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.

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GCSE Mathematics – Numeracy **Unit 2: Foundation Tier** **Summer 2017**	Mark	Comment
1.(a) 50 (miles)	B1	
(b) 5×2×50 500 (miles)	M1 A1	FT 'their 50' If no marks awarded, award SC1 for 250 (miles), or an accurate answer to 5×'their 50' or 7×2×'their 50'
(c)		Abergavenny to Gloucester 45(miles) Gloucester to Bristol 36 (miles)
(alternative route distance=) 45 + 36	M1	Addition of **<u>two</u>** distances from the table, with at least one of 45 and 36 included.
81 (miles)	A1	CAO. Unsupported 81 gets M1 A1. Sight of (extra distance per day = 81 – 50=) 31 or a value for 81 – 'their 50' implies M1A1
(extra distance=) (81 − 50) × 2 or equivalent.	M1	FT 'their 50' if first M1 awarded and 'their 81' providing first M1 awarded and 'their 81' > 'their 50'
=62 (miles)	A1	FT if first M1 awarded. If last M1 not awarded, award SC1 for 31 (miles) ISW

2(a)(i) (Total cost =) (£)39.99+ 2 × 11.98 + 3 × 2.99 = (£)72.92	 M2 A1	 M1 for an attempt to add any two of the three required costs. FT provided M1 awarded If no marks awarded Sc1 for (£)54.96 from (£)39.99+ (£)11.98 + (£)2.99
2(a)(ii) (Gwyn's current order total cost =) (96.62 + 6.99) = (£)103.61 (Gwyn's order plus socks total cost =) (96.62 + 2 × 2.99) = (£)102.6(0) 'Lower cost as no delivery charge' (yet more items ordered) 'If he didn't buy the socks, the delivery charge would apply which is more than the cost of the socks'.	 B1 B1 E1	 B2 'Gwyn makes a saving of (£)1.01' Allow for E1 Statements indicating 'free delivery' or reference to cost of socks. Calculations with words that 'reference the delivery cost OR cost of socks'. Do NOT allow for E1 Calculations without any reference or explanation. 'because it will be cheaper by £1.01' with no further comment. Ignore incorrect statements regarding savings, along with a correct answer e.g. He saves £1.1 because of the free delivery charge. Alternative: *Stating (2 × 2.99=) (£)5.98 makes the total greater than £100. B1* *Compare (£)6.99 and (£)5.98 B1* *Lower cost as no delivery charge (yet more items ordered) E1*
2(b)(i) (£)168	B1	
2(b)(ii) 15/100×200 (£)30 and a statement that he is correct	M1 A1	Or equivalent method 32/200(×100%) Or 16% and a statement that he is correct.
2(b)(iii) 43(%)	B1	
2(c) Ordering at least one set of data (David) 1 1 1 2 5 7 8 (Gwyn) 1 1 1 2 4 6 12 At least one median is 2 A comment explaining that the medians are the same.	M1 A1 E1	 E0 for unsupported comments.

3 (a) A Cuboid B Cylinder	B1 B1	
(b)(i) $\frac{3 \times 270}{5}$ 162(g)	M1 A1	If no marks awarded SC1 for (3×270)= 810 or ($\frac{270}{5}$) = 54
(b)(ii) 100	B2	Award B1 for 2×120 or 240÷2 or use of 50 and a relationship between 120 and 240 e.g. 50÷2=25. Do not award B1 for 25 unsupported.
(c) A correct net of a cube with 6 faces. Lengths of sides of squares 3cm	B1 B1	SC1 for the net of an open box. 5 faces of correct size. Ignore the inclusion of 'tabs'.
(d) (Total cost of 20 candles and boxes) (2.35 + (0.)15) × 20= (£)50	 M1 A1	 Or equivalent CAO May be implied in further work.
(Profit is £84 − £50=) (£) 34.	B1	Or equivalent FT 'their (£)50' provided 20 is used with candles or boxes and 'their (£)50 < (£)84.
Organisation and communication	OC1	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
Writing • Consistent use of £ and p. • Correct use of = sign.	W1	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.

4(a) 09:12	B1	
4(b) 14:55 or 2:55 p.m. or 'five to three'	B2	For B2 allow indicates 14(:)00 bus with 5 minutes to spare Accept times given in 24hr or a.m. format throughout. Allow 2(:)55, 2(:)55 p.m. and 14(:)55p.m. Do **not** allow 2:55 a.m. or 02:55 B1 for idea to look at multiples of 24 minutes from 12 noon, with at least: (12(:)24, 12(:)48 and) 13(:)12 seen or 1(:)12 p.m., OR 60 ÷ 24 = 2.5, OR next bus on the hour is 14(:)00, OR catches 14(:)00 bus, 2 p.m. bus, or 2 o'clock bus Allow B1 for the time sequence 12(:)24, 12(:)48 with 1(:)12, but do not allow with 1(:)12 a.m. Allow use of decimal point, a gap, no gap as a 'spacer' in time throughout
5. 0.4(0) × 65 or (100 ×) 28/65 26 (days) or 43(.07.. %)	M1 A1	Allow sight of 65 × 40% ÷ 100 If 43(...%) not shown, accept sight of 0.43... **with** 0.4(0) Accept sight of 26/65 for M1, A1 Accept without units, however, if units are given they must be correct Must follow from correct working, unless unsupported (- check if a partitioning method is correct for find finding %) Allow a slip in further working following award of M1, A1 provided it does not impact on the conclusion
Conclusion e.g. 'Luigi is correct (as 43% > 40%)', 'Luigi is correct (as it **only** rained on 26 days in west Wales)', 'Luigi is correct' (sight of $\frac{28}{65}$ and $\frac{26}{65}$)	E1	Depends on M1 previously awarded, FT only provided: 'their 43%' > 40% or 'their 26 days' < 28 days Accept an answer 'Luigi is correct' if units are given correctly in workings, with like with like comparison *Alternative (considering did not rain)* *(Did not rain for Luigi 65 – 28) 37 (days), FT 'their 65 – 28'* *0.6(0) × 65 or (100 ×) 37/65 M1* *39 (days) or 56.9(...%) or 57(%) A1* *Conclusion, e.g.* *'Luigi is correct (as 57% < 60%) E1* *Depends on M1 previously awarded* *FT provided:* *'their 39 days' > 37 days or* *'their 56.9%' < 60%*

6 (a) 20%	B1	
6 (b) 38%	B1	
6(c) States or implies 'No' AND gives a reason, e.g. 'Don't know how many members there are in total', 'Hadon's Gym could be a very small gym', 'Workout Palace could be a very large gym', 'because it does not say how many people are in either gym', 'we don't know about the number of people', 'it doesn't tell us how many men in the gyms'	E1	Ignore further spurious or irrelevant explanation if 'no' selected or unambiguously implied Allow, e.g. 'don't know because there are no numbers to indicate that there are more men', Do not accept, e.g. 'there is about the same number of men as women in both gyms', 'there are fewer children in Hadon's gym so that means the percentage of men goes up', 'we don't know the percentages', 'they asked different people'
7(a) No correlation or none	B1	Accept a description, e.g. 'there is no relationship', 'no trend', 'height and mass do not depend on each other' Allow, e.g. 'not negative or positive' Do not accept, e.g. 'scattered', 'neutral', 'spread out', 'random', 'indirect' 'No pattern'
7(b) 55 cm	B1	

8(a) 42 × 3½ 147 (miles)	M1 A1	Do not accept 42 × 3.3 or 42 × 210
8(b) Reason, accept any reasonable response based on information given not being totally accurate, e.g. 'traffic could be different', 'doesn't mean Glenda's average speed for the Flint to Cardiff journey will be 42 mph', '3½ hours might have been given to the nearest ½ hour', 'might not have been exactly 3½ hours', 'average speed could be different', 'only know the average speed for one journey'	E1	Do not credit a correct reason if a contradiction is given Allow, e.g 'she could drive faster (or slower)', 'she may have gone a longer route', 'she may have taken a shorter route', 'we don't know how long she will take this time', 'she could drive faster and get there in less time', 'because the calculation was the average distance', Do not accept the idea that this journey was at an average speed of 42mph but that her speed changed during her journey, e.g. 'it was her average, she might have gone faster for a while and slower for a while', 'her speed may have changed over her journey', 'she could have stopped on the journey', 'I don't know the exact distance', '42 mph means she would have to be travelling at this speed all the way', Do not accept 'only know the average speed'
9(a) 1125 g	B1	
9(b) $\frac{5 \times 428 - 160}{9}$ 220 (°C)	M1 A1	Needs to show intention to calculate 5×428 These answers imply M0, A0 • ((5428 – 160) ÷ 9 =) 585.33... • (5428 – 160 ÷ 9 =) 5410.22... CAO

10(a) 172.5 (miles per hour)	B1	ISW
10(b) Alun 23 (miles per hour) Nikita 20 × 1150.779 ÷ 1000 or 1150.779 ÷ 50 or equivalent 23.01(558..) or 23.02 (miles per hour) Difference 0.02 (miles per hour to 2 d.p.)	B1 M1 A1 B1	CAO *Alternative* *Sight of difference 0.000779* *B1* *Difference = 0.000779 × 20* *M1* *= 0.01(558)* *A1* *0.02 mph (2dp)* *B1 CAO*
11(a)(i) 5	B1	
11(a)(ii) (At least) 28 (pupils)	B1	
11(a)(iii) Assumption stated e.g. 'no one was absent', 'all pupils present on the test day', 'everyone in the class took the test that day'	E1	Needs to show understanding that the number of pupils doing the test may not be the number of pupils in the class Do not accept a description of the method, e.g. 'adding the number of test scores gives the number of pupils', 'used the number of test marks', 'used the numbers who did the test', UNLESS the candidate continues to state an assumption
11(b) Catrin 'incorrect' selected or unambiguously implied with a reason, e.g. '(18 Year 9 pupils but) **only** 4 Year 10 pupils scored 9 or higher', '**only** 2 Year 10 pupils scored 10 or higher', 'more pupils with higher marks in Year 9', '18 pupils in Year 9 scored >8, compared with only 4 pupils in Year 10'	E1	If numbers are given within a reason they must be correct Accept a response based on the means, with mean for Year 9 as 7.46.. and Year 10 is 7.38.. If 'incorrect' selected or unambiguously, allow e.g. 'the mode for Year 10 is 8 (marks), but the mode for Year 9 is 9 (marks)', 'Year 9 mode is higher at 9 (marks)', Do not accept, e.g. 'the highest score in Year 9 is 12, whereas only 10 in Year 10', 'Year 9 had 2 pupils with full marks', 'Some pupils in Year 9 had full marks' *Alternative:* *Catrin 'correct' with a clear reason based on the majority of higher scores, e.g.* *'Yr10 20 people scored 8 or more, Yr9 18 people scored 8 or more'* Note: Unless the mode is considered, there must be comparison of a range of marks

12 (Each van uses) 256 ÷ 8 (= 32 litres per day) **OR** (Each truck uses) 704 ÷ 5.5 (= 128 litres per day)	B1	May be embedded in further working
(Cost for 6 vans) 1.1(0) × 6 × 256÷8 (= £211.20) **AND** (Cost for 10 trucks) 1.1(0) × 10 × 704÷5.5 (= £1408)	M3	May be shown in stages Award of any M mark implies award of previous B1 M2 for <u>either</u> of the 6 vans <u>or</u> 10 trucks full calculations (shown opposite), or M2 for both 6 vans <u>and</u> 10 trucks calculations with '×1.1(0)' omitted, i.e. (total number of litres of fuel) 6 × 256÷8 (= 192 litres) **AND** 10 × 704÷5.5 (= 1280 litres) M1 for <u>either</u> 6 vans <u>or</u> 10 trucks calculations with '×1.1(0)' omitted, i.e. 6 × 256÷8 (= 192 litres) **OR** 10 × 704÷5.5 (= 1280 litres), or M1 for fuel 1 van <u>and</u> 1 truck, i.e. (256÷8 =) 32 **AND** (704÷5.5 =) 128
(Total cost of fuel is) (£) 1619(.20)	A2	Sight of (£)35.2(0) and (£)140.8(0) or (£)176 is award B1, M1 (from 1.1 × 32 and 1.1 × 128) CAO Depends on M3 or M2 previously awarded, award A1 for any 1 of: • the cost for 6 vans (£)211(.20) • the cost for 10 trucks (£)1408 • total fuel used 1472 (litres)

GCSE MARKING SCHEME

SUMMER 2017

GCSE (NEW)
MATHEMATICS NUMERACY - UNIT 1 (INTERMEDIATE)
3310U30-1

INTRODUCTION

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GCSE Mathematics – Numeracy **Unit 1: Intermediate Tier** **Summer 2017**	Mark	Comment
1. 3 6 7 9 10 10 11(cars)	B2	Need not be in this order B1 for sight of (11 -8 =) 3 (cars) **and** at least two 10s
3 + 6 + 7 + 9 + 10 + 10 + 11 and ÷ 7	M1	FT intention to sum 'their 7 numbers' and divide by 7, **must be** 7 numbers
8 (cars)	A1	CAO, i.e. FT is only for the method mark If no marks, award SC1 for an unsupported answer of '8'
2(a) 15:30	B1	
2(b) 16 km	B1	
2(c) Indicates or implies 'can't tell', with a reason suggesting, e.g. 'don't know in which direction they travel', 'could be (up to) 14 km apart', 'the graph only says distance from home'	E1	Ignore spurious additional information. Allow 'can't tell' with e.g. 'one sister takes a different route', 'different roads taken', 'one sister changed direction', 'could be 9km apart', 'Eleri may have taken a longer route' Do not accept 'can't tell' with e.g. 'they don't leave from the same place', 'Yvon travels slower than Eleri', 'schools finish at different times', 'the graph shows distance from home not distance from school', 'not known if Yvon travels in a straight line'

3. (Tent ground area) 2.5 × 4.4 = 11 (m^2)	M1 A1	Allow for sight of 2(.)5(0) × 4(.)4(0) Working of the ground area must be seen, i.e. sight of 2.5 × 4.4 **not** 2 × 4 or 3 × 4 CAO, not FT If no **area** calculation seen award M0, A0 then FT for M and A marks, final mark E0
(Total cost for 12 nights, pay for 10 nights =) 10×14 + 2×10×4	M2	FT 'their ground area >12m^2 to calculation 10×16 + 2×10×4 (=£240) for M2 or equivalent M1 (see formula below) If incorrect interpretation of 'their ground area', award M1 only for either area ≤12m^2 with 10×16 + 2×10×4 (=£240), or area>12m^2 with 10×14 + 2×10×4 (=£220), M1 for a sum of two products: (2 x) a × b + (2 ×) 4 × c where a = 10, 11 or 12 b = 14 or 16 c = 10, 11 or 12 The initial (2 ×) is if the error is 2 tents! For example: • 12×14 + 2×10×4 (= £248) • 10×14 + 10×4 (= £180) • 12×16 + 2×12×4 (= £288) Ignore further working attempting to subtract discounts Working with the cost of 1 night, e.g. 14 + 2 × 4 or 16 + 2 × 4, ignore errors in calculation and award M2 or M1 as appropriate when attempt to multiply by 10, 11 or 12 is seen, i.e work may be seen in stages
(140 + 80 = £) 220	A1	CAO If previous M0, A0 for costs, award SC1 for sight of 1 night cost (£)22 or for sight of 10×14 and 2×10×4 without indication of addition
(Saving = 2×) 8 × 15 (£) 240	M1 A1	Allow M1 only 1 person saving CAO, not FT *<u>Alternative</u>* *(How many weeks of saving)* *220 ÷ (2 × 15) M1* *(FT 'their 220' for M1 only)* *7⅓ or 7.3(.....)(weeks) A1 CAO* *If no marks, allow SC1 for 14.6(6... weeks) or 14.7 from 220 ÷ 15* *Or equivalent for working with cost per person, i.e. ½ × 10 × 14 + 10 × 4 = £110 and saving 8 × 15 = £120, all previous marks are available*

Conclusion, e.g. 'planned saving is enough to pay for the holiday'	E1	FT comparison for 'their £240 saved' with 'their total cost', provided at least 2 M marks previously awarded one of which **must be** for area calculation Allow the conclusion 'yes'
Organisation and communication	OC1	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
Writing	W1	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.

4(a)(i) (10 + 20 + 30) × 0.6 or 60 × 0.6 or (10 + 20 + 30) × 60 ÷ 100 (£)36	M1 A1	Allow intention of brackets i.e. 10 + 20 + 30 × 0.6 CAO and must be from correct working If no marks, award SC1 for an answer of 3600(p), **not** for £3600
4(a)(ii) 10 × 20 × 30 (= 6000) × 0.01 or (× 1) ÷ 100 (£)60	M1 m1 A1	An answer of £6000 implies M1 only Depends on previous M1 Award of m1 implies previous M1 CAO If M1 m0 A0 also award SC1 for an answer of 6000p
4(a)(iii) 2× {(10×20) + (20×30) + (10×30) (= 2200) × 0.02 or × 2 ÷ 100 (£)44	M2 m1 A1	M1 for sight of **sum** of at least 2 of the 6 possible products: 10×20, 20×30, 10×30 Depends on M2 or M1 previously awarded CAO If M2 m0 A0, also award SC1 for an answer of 4400(p), **not** for £4400
4(b) $\frac{60 - 36}{60}$ (×100) 40 (%)	M1 A1	**Strict** FT 'their most expensive' and 'their cheapest' If FT is not a whole number, then accept rounded or truncated to a whole number If no marks, award SC1 for an answer of 60(%) from 36/60 or $\frac{\text{'their cheapest'}}{\text{'their most expensive'}}$ expressed correctly as a percentage

5(a)(i) (£) 560 ÷ 7 (= £ 80) 2 × 560 ÷ 7 OR 6 × 560 ÷ 7 OR ⅓ × (560 – 560 ÷ 7) OR 560 – 560 ÷ 7 (Bryn) (£) 160 (Sophie) (£) 480	B1 M1 A1 A1	 CAO CAO *Alternative:(Total prize money)* *560 ×15 ÷ 7 (=£1200) B1* *2 × 1200 ÷ 15 OR 6 × 1200 ÷ 15 M1* *FT 'their 560 ×15 ÷ 7' (= 1200)* *(Bryn) (£) 160 A1 CAO* *(Sophie) (£) 480 A1 CAO* If no marks, award SC1 only for **either** of the following answers (from initially 560÷15) • (Bryn) (£)74(.66...) or (£)75 • (Sophie) (£)222 or (£)223(.98) or (£) 224
5(a)(ii) 560 - 0.15 × 560 or 0.85 × 560 (=560 - 84) (£)476	M1 A1	Or equivalent full method
5(b) (2015 cost of hosting:) 6600 + 0.1 × 6600 (£7260) (2016 cost of hosting:) 7260 + 0.1 × 7260 (£7986) AND (2017 cost of hosting:) 7986 + 0.1 × 7986 (£8784.60) (2017 cost of hosting is) (£) 8784.6(0)	B1 M1 A1	 For the appropriate **method** of repeatedly increasing by 10% from 2015 to 2017 FT 'their 6600 + 10%' calculation with 'their 7260' + 10% calculation with their 7986' + 10% calculation Allow intention with sight of rounding or truncation within working, e.g. (£)799 as 10% of (£)7986 CAO Ignore any further working *Alternative* *Sight of 6600 × 1.1^3 M1* *Full method to calculate 1.1^3 and multiply by 6600 m1* *(For method not accuracy, allow arithmetic errors if intention clear.)* *(£) 8784.6(0) CAO A1* If no marks, award SC1 for an answer of (£)8580 (from simple interest, as first B mark is embedded)

6(a) 230	B1	
6(b) 40	B1	
6(c) Reason, e.g. 'graph for 18-year olds leans towards the greater times', 'the frequency polygon for times from (the plot at) 30 minutes are greater for the 18-year olds', '**more** 18-year olds spend longer times than 16 year olds', 'more 18-year olds for 30 minutes, same at 40 minutes and more at 50 minutes', 'more 18-year olds at 50 minutes', 'more 18-year olds from 25 minutes onwards', 'many more 16-year olds than 18-year olds spend 20 (or 25) minutes or less', 'median is higher for the 18-year olds', 'more 16-year olds use less time on social media than 18-year olds'	E1	If readings are used they **must be** correct, e.g. at 50 minutes there are • 20 16-year olds and 60 18-year olds, • or 40 more 18-year olds than 16-year olds • 3 times as many 18-year olds spend 50 minutes as 16-year olds Allow e.g. 'half way through the 18-year olds frequency rises higher than for 16-year olds' Do not accept irrelevant, incorrect or incomplete statements e.g. 'more 18-year olds spend 30 minutes', 'more 16-year olds spend 20 minutes', 'because more than 60 18-year olds spend 30 to 50 minutes', 'The mode for 16-year olds using social media is the same as for 18-year olds', '16-year olds frequency is higher to start', 'not true because the frequency polygons would look roughly the same', 'not true because the shapes of the frequency polygons are very different', 'there is only one point where 16 and 18-year olds spend the same amount of time', 'because the polygons are not the same', 'the 2 polygons have different trends', 'the average time is greater for 18-year olds'

7. a = 72° and c = 94° b = 108° d = 86° Correct diagram within ±2mm and ±2° tolerances	 B1 B1 B1 B3	If contradiction between diagram and answer space, mark the answer space, except if a transition slip FT 180 – 'their a' FT 180 – 'their c' Ignore extensions of lines in construction, mark the quadrilateral Attempt (FT) using template irrespective of angles stated B2 for diagram with either of : • 6cm ±2mm **and** a = 72°± 2°**and** either b = 108° ± 2° or d = 86°± 2° • all correct angles ±2° with 6cm incorrect B1 for 6cm ±2mm **and** a = 72°± 2°or d = 86°± 2°

8(a)(i) 2 × 18 × 1.1(0) or 1.1 × 18 ÷ 0.5 or equivalent (=£) 39.6(0)	M1 A1	 Award M1 A1 for a correct response from an error in notation such as 18 × 0.5 = 36 with 36 × 1.1 = (£)39.6(0) Note: 18 ÷ 0.5 = 9, 9 × 1.1 = (£)9.9(0) is M1 A0 as full method shown in stages, but only if the full method is seen, not for an answer of (£)9.9(0)
8(a)(ii) (Length) 6 (m) AND (width) 3 (m)	B2	Accept in either order in the answer space B1 for any 1 of the following: • sight of 18 ÷ 3 • sight of 18 ÷ 6 • either length or width correct (any order) • answers 12 (m) and 6 (m) (any order) • 1x + 2x + 1x + 2x = 18 or similar
8(b) x + 3 + x + 3 + x + x = 16 or x + 3 + x = 8 or equivalent 4x + 6 = 16 or 4x = 16 – 6 or 4x = 10 or 2x + 3 = 8 or equivalent (Length) 5.5 (m) and (width, x) 2.5 (m)	M1 m1 A1	Accept any variable for 'x' Depends on the previous M1 This m1 implies the previous M1 CAO Needs to be in the correct order in the answer space, or clearly labelled *Alternative method to work with y – 3 and y leading to y = 5.5* If no marks, allow SC1 for answers of 5.5(m) and 2.5(m) if no equation given or if 'their equation' not used to elicit these answers, OR SC1 for answers of 9.5(m) and 6.5(m) from sight of x + x + 3 = 16

9(a)(i) (Needs a further) 11 (squares)	B2	B1 for sight of 6+5+4+3+2+1 or 21squares
9(a)(ii) States or implies 'correct' with sight of, e.g. • 10+9+8+7+6+5+4+3+2+1, or • … 21, 28, 36, 45, 55, or • … +7, +8, +9, +10 • 5 × (10 + 1)	B1	CAO Do not accept any contradictions, e.g. an incorrect answer for the correct sum, i.e. 10+9+8+7+6+5+4+3+2+1 with an answer other than 55 Allow 'correct' with D10 diagram drawn in the answer space
9(b)(i) 8	B1	
9(b)(ii) States or implies 'No' with a reason, e.g. 'all Josef's patterns have an odd number of squares', 'same number on each branch from the one top square makes it an odd number', 'one square left over', 'one square short', 'one more needed', 'the arms would be unequal (in length)', '22 is even', 'P10 is (made using) 21 (squares), P11 is (made using) 23 (squares)', 'he would only be able to make a pattern with 21 squares'	E1	Do not accept 'No' with, e.g. 'too many squares', '22 is not part of the pattern', 'it is unequal'
9(b)(iii) P4	B2	Allow P = 4 B1 for sight of 10÷0.5 or 20 (small square edges) or shows 5 squares on each side (stated or diagram in the answer space for (b)(iii)) B0 for P20 unless sight of 10÷0.5 (which is awarded B1)

10(a) 45 (seconds)	B1	
10(b) 30	B1	
10(c) 0.9(0) × 70 = 63 (passengers) (In 60 seconds) 65 (passengers left) OR 63 passengers within (58 or) 59 seconds OR 63 (passengers) in less than 60 seconds Conclusion that the target was met	M1 A1 B1 E1	 Ignore incorrect units Check the diagram for indication, provided values are written FT 'their 63' provided M1 previously awarded Depends on M1, B1 previously awarded *Alternative:* *By 1 minute, 65 passengers left B1* *(100 ×) 65/70 M1* *0.92(8…) or 0.93 or 92(.8%) or 93(%) A1* *Conclusion that target met E1* *(Depends on M1, B1)* *Alternative:* *For candidates **clearly** considering the number of passengers left on the plane, must be evidence of this before awarding marks* *(0.1× 70=)* *7 (passengers left on the plane) B1* *(After 1 minute) 70 – 65 M1* *5 (passengers) A1* *Conclusion that target met E1* *(Depends on M1, B1)*
11(a) April	B1	
11(b) January	B1	
11(c)(i) January and February	B1	In either order
11(c)(ii) 43	B1	
11(d) FALSE TRUE FALSE FALSE	B2	B1 for any 3 correct responses

12(a) 8×10^{-5}	B1	
12(b)(i) 30 (pieces of card)	B2	If working is shown, it needs to be correct for the award of B2 Do not accept final answer of 30mm for B2 B1 for: 3×10^{-2} written as 0.03 (metres) or 3 cm or (0.03m =) 30mm OR for a calculation that could lead to a correct response, e.g. $3 \times 10^{-2} \div 0.001$ or $(3 \times 10^{-2}) \div (1 \times 10^{-3})$ or $3 \times 10^{-2} \times 1000$ (Watch for compensating errors such as $3 \times 10^{-2} = 0.003$, $0.003 \times 1000 = 30$, this is awarded B1 for intention of $3 \times 10^{-2} \times 1000$)
12(b)(ii) Assumption, e.g. 'no gaps between pieces of card', 'all pieces of card completely touch', 'all pieces of card are (exactly) 1 mm thick'	E1	Allow e.g. 'the thickness of each piece of card is the same', 'none of them are folded'
12(c) Use of 1 tonne = 1000 kg $1000 \times 2.88 \times 10^{7} \div (7.2 \times 10^{9})$ or $1000 \times 28\,800\,000 \div 7\,200\,000\,000$ or equivalent 4 (kg per person)	B1 M2 A1	For M2 any calculations **used** by the candidate (which may be seen in stages) need to be correct, unless replaced with a correct calculation, perhaps e.g. reverting back to correct standard form FT 'their 1000', provided a power of 10 and $\neq 1$ M1 for $(2.88 \times 10^{7}$ (tonnes)) $\div (7.2 \times 10^{9})$, or $28\,800\,000 \div 7\,200\,000\,000$, including no attempt to change tonnes to kg or possible place value errors in converting from standard form, this could be implied within working CAO

GCSE MARKING SCHEME

SUMMER 2017

GCSE (NEW)
MATHEMATICS NUMERACY - UNIT 2 (INTERMEDIATE)
3310U40-1

INTRODUCTION

This marking scheme was used by WJEC for the 2017 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 2: Intermediate Tier**	Mark	Comment
1(a) 09:12	B1	
1(b) 14:55 or 2:55 p.m. or 'five to three'	B2	For B2 allow indicates 14(:)00 bus with 5 minutes to spare Accept times given in 24hr or a.m. format throughout. Allow 2(:)55, 2(:)55 p.m. and 14(:)55p.m. Do **not** allow 2:55 a.m. or 02(:)55 B1 for idea to look at multiples of 24 minutes from 12 noon, with at least: (12(:)24, 12(:)48 and) 13(:)12 seen or 1(:)12 p.m., OR 60 ÷ 24 = 2.5, OR next bus on the hour is 14(:)00, OR catches 14(:)00 bus, 2 p.m. bus, or 2 o'clock bus Allow B1 for the time sequence 12(:)24, 12(:)48 with 1(:)12, but do not allow with 1(:)12 a.m. Allow use of decimal point, a gap, no gap as a 'spacer' in time throughout

2. 0.4(0) × 65 or (100 ×) 28/65 26 (days) or 43(.07.. %)	M1 A1	Allow sight of 65 × 40% ÷ 100 If 43(...%) not shown, accept sight of 0.43... **with** 0.4(0) Accept sight of 26/65 for M1, A1 Accept without units, however, if units are given they must be correct Must follow from correct working, unless unsupported (- check if a partitioning method is correct for find finding %) Allow a slip in further working following award of M1, A1 provided it does not impact on the conclusion
Conclusion e.g. 'Luigi is correct (as 43% > 40%)', 'Luigi is correct (as it **only** rained on 26 days in west Wales)', 'Luigi is correct' (sight of $\frac{28}{65}$ and $\frac{26}{65}$)	E1	Depends on M1 previously awarded, FT only provided: 'their 43%' > 40% or 'their 26 days' < 28 days Accept an answer 'Luigi is correct' if units are given correctly in workings, with like with like comparison *Alternative (considering did not rain)* *(Did not rain for Luigi 65 – 28) 37 (days), FT 'their 65 – 28'* *0.6(0) × 65 or (100 ×) 37/65 M1* *39 (days) or 56.9(...%) or 57(%) A1* *Conclusion, e.g.* *'Luigi is correct (as 57% < 60%) E1* *Depends on M1 previously awarded* *FT provided:* *'their 39 days' > 37 days or* *'their 56.9%' < 60%*

3(a) 20%	B1	
3(b) 38%	B1	
3(c) States or implies 'No' AND gives a reason, e.g. 'Don't know how many members there are in total', 'Hadon's Gym could be a very small gym', 'Workout Palace could be a very large gym', 'because it does not say how many people are in either gym', 'we don't know about the number of people', 'it doesn't tell us how many men in the gyms'	E1	Ignore further spurious or irrelevant explanation if 'no' selected or unambiguously implied Allow, e.g. 'don't know because there are no numbers to indicate that there are more men', Do not accept, e.g. 'there is about the same number of men as women in both gyms', 'there are fewer children in Hadon's gym so that means the percentage of men goes up', 'we don't know the percentages', 'they asked different people'
4(a) No correlation or none	B1	Accept a description, e.g. 'there is no relationship', 'no trend', 'height and mass do not depend on each other' Allow, e.g. 'not negative or positive' Do not accept, e.g. 'scattered', 'neutral', 'spread out', 'random', 'indirect', 'no pattern'
4(b) 55 cm	B1	

5(a) 42 × 3½ 147 (miles)	M1 A1	Do not accept 42 × 3.3 or 42 × 210
5(b) Reason, accept any reasonable response based on information given not being totally accurate, e.g. 'traffic could be different', 'doesn't mean Glenda's average speed for the Flint to Cardiff journey will be 42 mph', '3½ hours might have been given to the nearest ½ hour', 'might not have been exactly 3½ hours', 'average speed could be different', 'only know the average speed for one journey'	E1	Do not credit a correct reason if a contradiction is given Allow, e.g 'she could drive faster (or slower)', 'she may have gone a longer route', 'she may have taken a shorter route', 'we don't know how long she will take this time', 'she could drive faster and get there in less time', 'because the calculation was the average distance', Do not accept the idea that this journey was at an average speed of 42mph but that her speed changed during her journey, e.g. 'it was her average, she might have gone faster for a while and slower for a while', 'her speed may have changed over her journey', 'she could have stopped on the journey', 'I don't know the exact distance', '42 mph means she would have to be travelling at this speed all the way', Do not accept 'only know the average speed'

6(a)(i) 1125 g	B1	
6(a)(ii) $\frac{5 \times 428 - 160}{9}$	M1	Needs to show intention to calculate 5×428 These answers imply M0, A0 • ((5428 – 160) ÷ 9 =) 585.33... • (5428 – 160 ÷ 9 =) 5410.22...
220 (°C)	A1	CAO
6(b)(i) ½ × 12 × (15 + 20) 210 (cm^2)	 M1 A1	Accept working seen in (b)(ii)
6(b)(ii) 210 ÷ 65 (=3.23…) OR 4 × 65 (= 260) OR 65 + 65 + 65 + 65 (= 260) OR equivalent	M1	Accept working may be seen in (b)(i) FT 'their 210' provided > 130 Sight of 3 × 65 = 195 **and** 4 packets is selected implies M1
4 (packets) × 1.35	m1	Depends on the award of the previous M1 FT 'their 210'÷ 65 provided • ≠ whole number **and** • evaluation rounded up to a whole number
(£)5.4(0)	A1	FT provided rounding up was necessary for the number of packets Allow £5.4(0)p
6(b)(iii) Yes (indicated or implied) AND showing at least 4 of the given shape to make **360°**	E1	The 4 shapes may include the one given Accept intention of congruent shapes and straight lines (use of a ruler is not required) Allow if intention is clear, but free hand size of the congruent shapes changes, or if shapes don't quite touch (as it is being shown how they would be placed, i.e. slight gaps as if the shapes were tiles with grouting), or showing intention of 4 shapes meeting at a point (allow some drift in adding extra tiles) Do not accept a line of shapes without the **360°** The shape must clearly not be a square or rectangle.

7(a) 172.5 (miles per hour)	B1	ISW
7(b) Alun 23 (miles per hour) Nikita 20 × 1150.779 ÷ 1000 or 1150.779 ÷ 50 or equivalent 23.01(558..) or 23.02 (miles per hour) Difference 0.02 (miles per hour to 2 d.p.)	B1 M1 A1 B1	CAO *Alternative* *Sight of difference 0.000779* *B1* *Difference = 0.000779 × 20* *M1* *= 0.01(558)* *A1* *0.02 mph (2dp)* *B1 CAO*

8(a)(i) 5	B1	
8(a)(ii) (At least) 28 (pupils)	B1	
8(a)(iii) Assumption stated e.g. 'no one was absent', 'all pupils present on the test day', 'everyone in the class took the test that day'	E1	Needs to show understanding that the number of pupils doing the test may not be the number of pupils in the class Do not accept a description of the method, e.g. 'adding the number of test scores gives the number of pupils', 'used the number of test marks', 'used the numbers who did the test', UNLESS the candidate continues to state an assumption
8(b)(i) Indicates 'correct' with a suitable reason e.g. 'as 16 out of the 26 pupils all scored 8 marks', 'scores bunched at 8 marks' **OR** Indicates 'not correct' with a suitable reason e.g. 'mean will be less than 8'	E1	If numbers are given within a reason they must be correct Any reason given must show understanding of the majority of scores being 8 (with few other scores balanced either side) Do not accept responses based on the evaluated calculations of mean(s) (Yr9 209/28 = 7.46..., Yr10 192/26 = 7.38...)
8(b)(ii) Catrin 'incorrect' selected or unambiguously implied with a reason, e.g. '(18 Year 9 pupils but) **only** 4 Year 10 pupils scored 9 or higher', '**only** 2 Year 10 pupils scored 10 or higher', 'more pupils with higher marks in Year 9', '18 pupils in Year 9 scored >8, compared with only 4 pupils in Year 10'	E1	If numbers are given within a reason they must be correct Accept a response based on the means, with mean for Year 9 as 7.46.. and Year 10 is 7.38.. If 'incorrect' selected or unambiguously, allow e.g. 'the mode for Year 10 is 8 (marks), but the mode for Year 9 is 9 (marks)', 'Year 9 mode is higher at 9 (marks)', Do not accept, e.g. 'the highest score in Year 9 is 12, whereas only 10 in Year 10', 'Year 9 had 2 pupils with full marks', 'Some pupils in Year 9 had full marks' *Alternative:* *Catrin 'correct' with a clear reason based on the majority of higher scores, e.g.* *'Yr10 20 people scored 8 or more, Yr9 18 people scored 8 or more'* Note: Unless the mode is considered, there must be comparison of a range of marks

9(a) Perpendicular bisector drawn: Wrexham and Aberporth Caernarfon and Swansea Circle with radius 2cm ±2mm (20 miles) centred at the intersection of the perpendicular bisectors Correct region in Wales identified, from arc radius equivalent to 2cm ±2mm (20 miles)	 B1 B1 B1 B1	 Tolerance ±2mm and ±2° Tolerance ±2mm and ±2° Independent mark FT from the intersection of 'their 2 straight lines', i.e. following previous B0 B0 Independent mark FT provided 'their region' (arc of a circle) spans Wales **and** England to give a similar region which excludes England The region should not include England, shading or indicating the full circle is B0 (Common incorrect response: A circle of the correct radius drawn with the centre at the intersection of straight lines joining Wrexham with Aberporth and Caernarfon with Swansea is awarded B0 B0 B1 B0)

9(b) (Each van uses) 256 ÷ 8 (= 32 litres per day) **OR** (Each truck uses) 704 ÷ 5.5 (= 128 litres per day)	B1	May be embedded in further working
(Cost for 6 vans) 1.1(0) × 6 × 256÷8 (= £211.20) **AND** (Cost for 10 trucks) 1.1(0) × 10 × 704÷5.5 (= £1408)	M3	May be shown in stages Award of any M mark implies award of previous B1 M2 for <u>either</u> of the 6 vans <u>or</u> 10 trucks full calculations (shown opposite), or M2 for both 6 vans <u>and</u> 10 trucks calculations with '×1.1(0)' omitted, i.e. (total number of litres of fuel) 6 × 256÷8 (= 192 litres) **AND** 10 × 704÷5.5 (= 1280 litres) M1 for <u>either</u> 6 vans <u>or</u> 10 trucks calculations with '×1.1(0)' omitted, i.e. 6 × 256÷8 (= 192 litres) **OR** 10 × 704÷5.5 (= 1280 litres), or M1 for fuel 1 van <u>and</u> 1 truck, i.e. (256÷8 =) 32 **AND** (704÷5.5 =) 128 Sight of (£)35.2(0) and (£)140.8(0) or (£)176 is award B1, M1 (from 1.1 × 32 and 1.1 × 128)
(Total cost of fuel is) (£) 1619(.20)	A2	CAO Depends on M3 or M2 previously awarded, award A1 for any 1 of: • the cost for 6 vans (£)211(.20) • the cost for 10 trucks (£)1408 • total fuel used 1472 (litres)
Organisation and communication	OC1	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
Writing	W1	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.

10. 850×0.76 (= £646) or equivalent $\times 0.87^6$ or equivalent (£)280(.1225…)	M1 M1 A1	M1 marks can be awarded in either order (Note: If calculated first 850×0.87^6 = £368.58(22...) Accept answers in the inclusive range (£)280 to (£)281 Award M1, SC1 for an answer ($850 \times 0.76 \times 0.87^7$ = £) in the inclusive range (£)243 to (£)244
11. Sight of any 2 of: 25.5, 36.5, 47.5 OR sight of 25 + 36 + 47 + 1.5 or equivalent Greatest 109.5 (cm) or 109.499999... (cm)	B1 B1	Do not accept '.49' instead of '.5', but allow '.49 recurring' CAO, must be from correct working, or unsupported Allow an answer of 110(cm) from sight of 109.5(cm) Do not accept 109.49 (cm)
12. $\tan^{-1} 0.81(1…)$ or $\tan^{-1} 146/180$ Angle of elevation is 39.(04…°) Statement e.g. '(not safe as) too far (from the foot of the cliff)', 'too far out at sea'	M2 A1 E1	M1 for tan (angle of elevation) = 146/180 FT '**their acute angle'** provided at least M1 previously awarded, **with** • <42° being too far out, or • >45° too near the cliff, or • between these angles it is safe *Alternative for M marks, e.g.:* *sin (elevation) =* $\frac{146}{\sqrt{(180^2 + 146^2)}}$ *(* $= \frac{146}{231.767..}$ *)* ***OR*** *cos (elevation) =* $\frac{180}{\sqrt{(180^2 + 146^2)}}$ *M1* $\sin^{-1} 0.62994....$ *OR* $\cos^{-1} 0.7766...$ *M1* *If no marks:* *Award SC1 for an answer of 50.95…° or 51° AND 'too near'*

13(a) (Length^2 =) $44^2 - 16^2$ or 44^2 = Length^2 + 16^2 (Length =) $\sqrt{1680}$ or Length^2 = 1680 41 (inches)	M1 A1 A2	 2 sig.fig. is required A1 for 41.0, 41.00 or 40.9878… rounded or truncated FT from M1 for the correctly evaluated square root of 'their 1680' provided 'their answer' < 44 (inches) for possible A2 or A1
13(b) (100 ×) 710.40 ÷74 (£)960	M1 A1	
13(c)(i) 23.52 p	B1	
13(c)(ii) 27.44 p	B1	
14. (Old fish tank contains) 60 × 40 × 45 (New fish tank maximum volume is) $\pi \times 25^2 \times 70$ Answer in range 137375 to137500 (cm^3) Conclusion, e.g. '137 375 > 108 000', 'Elin can be certain as the volume of the new tank is greater' 'it fits'	B1 M1 A1 B1	(108 000 cm^3) FT 'their new fish tank calculation' conclusion provided 108 000 (cm^3) seen **and** at least M1 previously awarded *Alternative:* *(To find new fish tank water level)* *(Old fish tank contains) 60 × 40 × 45 B1* *(New tank) π × 25^2 × 'water level' M1* *60×40×45 = π×25^2×'water level' m1* *(Water level) 55.(….cm) with conclusion that contents will be certain to fit* *(55 cm must be correct) A1* *Depends on all previous marks awarded*

15(a) Method of systematic sampling, e.g. '(select one person from the first 12 people at random then) ask every (240÷20 =) 12th person'	E1	*Note to markers:* *There should really be mention of the first person being selected at random, however in this first assessment, with only 1 mark available, not doing so will be condoned in this mark scheme*
15(b) Mid points 20.4, 21.3, 22.2, 23.1 20.4×2 + 21.3×3 + 22.2×10 + 23.1×5 (= 40.8 + 63.9 + 222 + 115.5 =) (Sum of 20 hand spans is) 442(.2 cm) (Sum of all 30 hand spans is) 10×22.8 + 442(.2) (= 670(.2) cm) ÷30 22(.34 cm)	B1 M1 A1 M1 m1 A1	 FT 'their mid points' provided they are all within or at the bounds of the appropriate groups OR estimate of the mean (442.2÷20 =) 22(.11 cm) May be implied in further working OR 10×22.8 + 20×22(.11) FT 'their derived 442.2' provided the correct method seen, including where **one** of 'their mid points' was outside the group Intention to divide the sum of 30 measurements by 30 Depends on M1, M1 and m1 previously awarded (Watch for an answer 22(.. cm) from $\frac{22.1(1) + 22.8}{2}$, award B1M1A1M0m0A0)
15(c) Improvement suggestion, e.g. 'ask more people', 'take a bigger sample', 'ask every 5th person instead', 'collect more data (from different regions in Wales)', 'use all the raw data', 'do both hands', 'stratified sample on age', 'stratified sample on gender', 'by narrowing the groups in the table'	E1	Allow, e.g. 'ask people of different ages' Do not accept, e.g. 'measure more accurately'

16. AB or AC = 2.5 ÷ cos52° OR AB or AC = 2.5 ÷ sin38° OR AB or AC = 4(.06067… m)	M2	M1 for any of the following • cos52° = 2.5/ AB • cos52° = 2.5/ AC • sin38° = 2.5/AB • sin38° = 2.5/AC • equivalent full method without AB or AC as the subject
Total length 2 × 4(.06067…) (+ 6)	m1	FT 'their derived AB or AC' provided M1 awarded
14(.12… metres)	A1	FT from M1, m1 previously awarded
Cost per metre is 410 ÷ 14(.12…)	m1	FT from 'their total length' for m1 only Depends on previous M1
(£)29(.03…)	A1	CAO, i.e. (£)29.(….) (Note: 410 ÷14 = £29(.285…) Accept an answer that would round to (£)29 from correct working

GCSE MARKING SCHEME

SUMMER 2017

GCSE (NEW)
MATHEMATICS NUMERACY - UNIT 1 (HIGHER)
3310U50-1

INTRODUCTION

This marking scheme was used by WJEC for the 2017 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** **Summer 2017**	Mark	Comment
1(a) (£) 560 ÷ 7 (= £ 80)	B1	
2 × 560 ÷ 7 OR 6 × 560 ÷ 7 OR ⅓ × (560 – 560 ÷ 7) OR 560 – 560 ÷ 7	M1	
(Bryn) (£) 160	A1	CAO
(Sophie) (£) 480	A1	CAO *Alternative:(Total prize money)* *560 ×15 ÷ 7 (=£1200) B1* *2 × 1200 ÷ 15 OR 6 × 1200 ÷ 15 M1* *FT 'their 560 ×15 ÷ 7' (= 1200)* *(Bryn) (£) 160 A1 CAO* *(Sophie) (£) 480 A1 CAO* If no marks, award SC1 only for **either** of the following answers (from initially 560÷15) • (Bryn) (£)74(.66...) or (£)75 • (Sophie) (£)222 or (£)223(.98) or (£) 224
1(b) (2015 cost of hosting:) 6600 + 0.1 × 6600 (£7260)	B1	
(2016 cost of hosting:) 7260 + 0.1 × 7260 (£7986) AND (2017 cost of hosting:) 7986 + 0.1 × 7986 (£8784.60)	M1	For the appropriate **method** of repeatedly increasing by 10% from 2015 to 2017 FT 'their 6600 + 10%' calculation with 'their 7260' + 10% calculation with their 7986' + 10% calculation Allow intention with sight of rounding or truncation within working, e.g. (£)799 as 10% of (£)7986
(2017 cost of hosting is) (£) 8784.6(0)	A1	CAO Ignore any further working *Alternative* *Sight of 6600 × 1.1^3 M1* *Full method to calculate 1.1^3 and multiply by 6600 m1* *(For method not accuracy, allow arithmetic errors if intention clear.)* *(£) 8784.6(0) CAO A1* If no marks, award SC1 for an answer of (£)8580 (from simple interest, as first B mark is embedded)
Organisation and communication	OC1	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

Writing	W1	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.
2(a) 230	B1	
2(b) 40	B1	
2(c) Reason, e.g. 'graph for 18-year olds leans towards the greater times', 'the frequency polygon for times from (the plot at) 30 minutes are greater for the 18-year olds', '**more** 18-year olds spend longer times than 16 year olds', 'more 18-year olds for 30 minutes, same at 40 minutes and more at 50 minutes', 'more 18-year olds at 50 minutes', 'more 18-year olds from 25 minutes onwards', 'many more 16-year olds than 18-year olds spend 20 (or 25) minutes or less', 'median is higher for the 18-year olds', 'more 16-year olds use less time on social media than 18-year olds'	E1	If readings are used they **must be** correct, e.g. at 50 minutes there are • 20 16-year olds and 60 18-year olds, • or 40 more 18-year olds than 16-year olds • 3 times as many 18-year olds spend 50 minutes as 16-year olds Allow e.g. 'half way through the 18-year olds frequency rises higher than for 16-year olds' Do not accept irrelevant, incorrect or incomplete statements e.g. 'more 18-year olds spend 30 minutes', 'more 16-year olds spend 20 minutes', 'because more than 60 18-year olds spend 30 to 50 minutes', 'The mode for 16-year olds using social media is the same as for 18-year olds', '16-year olds frequency is higher to start', 'not true because the frequency polygons would look roughly the same', 'not true because the shapes of the frequency polygons are very different', 'there is only one point where 16 and 18-year olds spend the same amount of time', 'because the polygons are not the same', 'the 2 polygons have different trends', 'the average time is greater for 18-year olds'

3(a) (Length) 6 (m) AND (width) 3 (m)	B2	Accept in either order in the answer space B1 for any 1 of the following: • sight of 18 ÷ 3 • sight of 18 ÷ 6 • either length or width correct (any order) • answers 12 (m) and 6 (m) (any order) • 1x + 2x + 1x + 2x = 18 or similar
3(b) x + 3 + x + 3 + x + x = 16 or x + 3 + x = 8 or equivalent 4x + 6 = 16 or 4x = 16 – 6 or 4x = 10 or 2x + 3 = 8 or equivalent (Length) 5.5 (m) and (width, x) 2.5 (m)	M1 m1 A1	Accept any variable for 'x' Depends on the previous M1 This m1 implies the previous M1 CAO Needs to be in the correct order in the answer space, or clearly labelled *Alternative method to work with y – 3 and y leading to y = 5.5* If no marks, allow SC1 for answers of 5.5(m) and 2.5(m) if no equation given or if 'their equation' not used to elicit these answers, OR SC1 for answers of 9.5(m) and 6.5(m) from sight of x + x + 3 = 16
4(a) 8	B1	
4.(b) States or implies 'No' with a reason, e.g. 'all Josef's patterns have an odd number of squares', 'same number on each branch from the one top square makes it an odd number', 'one square left over', 'one square short', 'one more needed', 'the arms would be unequal (in length)', '22 is even', 'P10 is (made using) 21 (squares), P11 is (made using) 23 (squares)', 'he would only be able to make a pattern with 21 squares'	E1	Do not accept 'No' with, e.g. 'too many squares', '22 is not part of the pattern', 'it is unequal'
4(c) P4	B2	Allow P = 4 B1 for sight of 10÷0.5 or 20 (small square edges) or shows 5 squares on each side (stated or diagram in the answer space for (c)) B0 for P20 unless sight of 10÷0.5 (which is awarded B1)

5(a) 45 (seconds)	B1	
5(b) 30	B1	
5(c) 0.9(0) × 70 = 63 (passengers) (In 60 seconds) 65 (passengers left) OR 63 passengers within (58 or) 59 seconds OR 63 (passengers) in less than 60 seconds Conclusion that the target was met	M1 A1 B1 E1	 Ignore incorrect units Check the diagram for indication, provided values are written FT 'their 63' provided M1 previously awarded Depends on M1, B1 previously awarded *Alternative:* *By 1 minute, 65 passengers left B1* *(100 ×) 65/70 M1* *0.92(8…) or 0.93 or 92(.8%) or 93(%) A1* *Conclusion that target met E1* *(Depends on M1, B1)* *Alternative:* *For candidates **clearly** considering the number of passengers left on the plane, must be evidence of this before awarding marks* *(0.1× 70=)* *7 (passengers left on the plane) B1* *(After 1 minute) 70 – 65 M1* *5 (passengers) A1* *Conclusion that target met E1* *(Depends on M1, B1)*
6(a) April	B1	
6(b) January	B1	
6(c)(i) January and February	B1	In either order
6(c)(ii) 43	B1	
6(d) FALSE TRUE FALSE FALSE	B2	B1 for any 3 correct responses

7(a) 8×10^{-5}	B1	
7(b)(i) 30 (pieces of card)	B2	If working is shown, it needs to be correct for the award of B2 Do not accept final answer of 30mm for B2 B1 for: 3×10^{-2} written as 0.03 (metres) or 3 cm or (0.03m =) 30mm OR for a calculation that could lead to a correct response, e.g. $3 \times 10^{-2} \div 0.001$ or $(3 \times 10^{-2}) \div (1 \times 10^{-3})$ or $3 \times 10^{-2} \times 1000$ (Watch for compensating errors such as $3 \times 10^{-2} = 0.003$, $0.003 \times 1000 = 30$, this is awarded B1 for intention of $3 \times 10^{-2} \times 1000$)
7(b)(ii) Assumption, e.g. 'no gaps between pieces of card', 'all pieces of card completely touch', 'all pieces of card are (exactly) 1 mm thick'	E1	Allow e.g. 'the thickness of each piece of card is the same', 'none of them are folded'
7(c) Use of 1 tonne = 1000 kg $1000 \times 2.88 \times 10^{7} \div (7.2 \times 10^{9})$ or $1000 \times 28\,800\,000 \div 7\,200\,000\,000$ or equivalent 4 (kg per person)	B1 M2 A1	For M2 any calculations **used** by the candidate (which may be seen in stages) need to be correct, unless replaced with a correct calculation, perhaps e.g. reverting back to correct standard form FT 'their 1000', provided a power of 10 and ≠ 1 M1 for $(2.88 \times 10^{7}$ (tonnes)) $\div (7.2 \times 10^{9})$, or $28\,800\,000 \div 7\,200\,000\,000$, including no attempt to change tonnes to kg or possible place value errors in converting from standard form, this could be implied within working CAO

8(a) N Time Area OR N Time Area n 8 80n OR n 60/n 600	M1	
600/80 OR 60/8	M1	May be implied. This M1 implies the previous M1
= 7·5 or equivalent = 8 (painters)	A1 A1	CAO. May not be seen. FT provided at least M1 awarded and rounding required A correct answer of 8 (with no errors) from M1 awarded gains all 4 marks *Alternative methods:* *M1 for n painters take 1 hour to paint 10n (m^2)* *M1 for 600/8* *A1 for 75 (m^2 / hour)* *A1 for 8 (painters)* *A correct answer of 8 (with no errors) from M1 awarded gains all 4 marks* *OR* *M2 for* $5 \times \frac{10}{8} \times \frac{600}{500}$ *This is for the correct use of the 5 with all 4 numbers, 10, 8, 600 and 500* *M1 for correct use of the 5 with any 2 of the numbers* *A1 for 7·5 or equivalent. CAO. May not be seen* *A1 for 8 (painters)* *FT provided at least M1 awarded and rounding required* *A correct answer of 8 (with no errors) from M1 awarded gains all 4 marks*
8(b) Valid assumption e.g. 'All painters work at the same rate (or speed)', ‘They all paint 10(m^2) in an hour’ ‘Each painter is equally efficient’	B1	Do not accept e.g. ‘The rooms (or walls) are the same shape’, ‘They had the same breaks’ ‘They don’t have breaks’ ‘Each painter works at a constant speed’

9(a)(i) 4×1 + 4×4 + 4×3 + 8×0·5 = 36	M1 A1	Allow M1 for any 3 correct products CAO
9(a)(ii) Median is in the group 54 to 58 4x = 14 OR 4x = 2 x = 3·5 or equivalent OR x = 0·5 or equivalent (Estimated median =) 57·5 (sec) or equivalent	 S1 M1 A1 A1	FT for all marks from their answer to (a)(i) provided their work in (a)(ii) is of equivalent difficulty. If FT results in the median being at one the group boundaries, then award a possible S1 only if correctly found May be implied in their answer OR $\frac{14}{16} \times 4$ OR $\frac{2}{16} \times 4$ *Alternative method:* *S1 for median group of 54 to 58* *M1 for* $\frac{14{\cdot}5}{16} \times 4$ *OR* $\frac{1{\cdot}5}{16} \times 4$ *(finding the 18·5th time)* *A1 for 3·6(25) OR 0·3(75)* *A1 for 57·6(25) (sec)*
9(b) Freq densities of 1, 2·5, 8, 9, 1·5 Suitable uniform vertical scale Correct bars drawn	B2 B1 B1	B1 for any 2 correct Up to 'their maximum frequency density' provided correct divisions attempted i.e. frequency ÷ class width FT provided at least B1B0 B1 awarded
9(c) Under-30s quicker AND reason e.g. 'Higher proportion for under 58 seconds compared to over 58 seconds', 'Smaller proportion for 58 to 70 seconds compared to 50 to 58' 'Higher bars for the quicker times', 'Median for 30-and-overs was 60 seconds', 'Under-30s have a quicker modal group'	E1	If values or groups are given in their reason, they need to be correct. Allow reasons e.g. 'More under 58 seconds' 'The peak for the under-30s is lower than the 30-and-overs' Do not accept reasons e.g. 'Higher frequency for 54 to 58 seconds' 'Under-30s have a lower average time' 'The frequency densities reached higher for the under 30s' 'Their histogram is more to the left'

10(a)(i) Tangent drawn at t = 50 Idea of increase in speed ÷ increase in time Reasonable approximation for the gradient	S1 M1 A1	 Ignore signs for M1 only Allow 1 slip in reading the scale for M1 only Only award if S1 awarded Accept a fraction not in its lowest terms Mark final answer
10(a)(ii) e.g. 10x = 2·444… and 100x = 24·444… and attempt to subtract 22/90 (ISW)	 M1 A1	 OR x = 0·2444… and 10x = 2·444… M1A0 for 2·2/9 100x – x leads to 242/990 (which simplifies to 22/90). ISW
10(b)(i) Sight of speeds of 10, 15, 25, 30 Split into at least 4 areas and attempt to sum (Area =) ½×20×(10+30 + 2(15 + 25 + 30)) = 1800 (m)	B1 M1 M1 A1	 Or equivalent. (Areas of 250, 400, 550, 600) (If 8 areas used, areas of 110, 135, ≈160, ≈210, 270, 295, 300, 300) Allow 1 slip in reading the scale CAO. A1 for an answer of ≈1780 (m) if 8 areas used. CAO.
10(b)(ii) (Total distance =) 1800 + 30 × (38 to 40 inclusive) = 2940 to 3000 (m) (Average speed =) total distance ÷ 120 = 24·5 to 25 (m/s)	 M1 A1 M1 A1	 FT 'their 1800' FT 'their total distance'
11(a) ⅓×π×5^2×12 and π×3^2×4 (Vol remaining =) ⅓×π×5^2×12 − π×3^2×4 = 100π − 36π (= 64π cm^3)	 B2 M1 A1	Allow the use of numerical values of pi for the B2 and M1 marks B1 for either of these expressions FT use of ⅓×π×10^2×12 Convincing. Must be in terms of π.
11(b) (Slant $length^2$ =) 12^2 + 5^2 Slant $length^2$ = 169 OR (Slant length =) √169 (Slant length =) 13 (cm) (Surface area =) π×5^2 – π×3^2 + π×5×13 = 81π (cm^2)	M1 A1 A1 M2 A1	 May be unsupported Allow the use of numerical values of pi FT 'their 13' provided Pythagoras attempted M1 for the appropriate addition/subtraction of 2 correct terms CAO. Must be in terms of π.

GCSE MARKING SCHEME

SUMMER 2017

GCSE (NEW)
MATHEMATICS NUMERACY - UNIT 2 (HIGHER)
3310U60-1

INTRODUCTION

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GCSE Mathematics – Numeracy **Unit 2: Higher Tier** **Summer 2017**	Mark	Comment
1. 850 × 0.76 (= £646) or equivalent × 0.87^6 or equivalent (£)280(.1225…)	M1 M1 A1	M1 marks can be awarded in either order (Note: If calculated first 850 × 0.87^6 = £368.58(22...) Accept answers in the inclusive range (£)280 to (£)281 Award M1, SC1 for an answer (850 × 0.76 × 0.87^7 = £) in the inclusive range (£)243 to (£)244
2. Sight of any 2 of: 25.5, 36.5, 47.5 OR sight of 25 + 36 + 47 + 1.5 or equivalent Greatest 109.5 (cm) or 109.499999... (cm)	B1 B1	Do not accept '.49' instead of '.5', but allow '.49 recurring' CAO, must be from correct working, or unsupported Allow an answer of 110(cm) from sight of 109.5(cm) Do not accept 109.49 (cm)
3. Perpendicular bisector drawn: Wrexham and Aberporth Caernarfon and Swansea Circle with radius 2cm ±2mm (20 miles) centred at the intersection of the perpendicular bisectors Correct region in Wales identified, from arc radius equivalent to 2cm ±2mm (20 miles)	 B1 B1 B1 B1	 Tolerance ±2mm and ±2° Tolerance ±2mm and ±2° Independent mark FT from the intersection of 'their 2 straight lines', i.e. following previous B0 B0 Independent mark FT provided 'their region' (arc of a circle) spans Wales **and** England to give a similar region which excludes England The region should not include England, shading or indicating the full circle is B0 (Common incorrect response: A circle of the correct radius drawn with the centre at the intersection of straight lines joining Wrexham with Aberporth and Caernarfon with Swansea is awarded B0 B0 B1 B0)

4. $\tan^{-1}$ 0.81(1…) or $\tan^{-1}$ 146/180 Angle of elevation is 39.(04…°) Statement e.g. '(not safe as) too far (from the foot of the cliff)', 'too far out at sea'	M2 A1 E1	M1 for tan (angle of elevation) = 146/180 FT '**their acute angle'** provided at least M1 previously awarded, **with** • <42° being too far out, or • >45° too near the cliff, or • between these angles it is safe *Alternative for M marks, e.g.:* *sin (elevation) =* $\frac{146}{\sqrt{(180^2 + 146^2)}}$ *(* $= \frac{146}{231.767..}$ *)* ***OR*** *cos (elevation) =* $\frac{180}{\sqrt{(180^2 + 146^2)}}$ *M1* $\sin^{-1}$ *0.62994.... OR* $\cos^{-1}$ *0.7766... M1* *If no marks:* *Award SC1 for an answer of 50.95…° or 51° AND 'too near'*
5.(a) (Length^2 =) $44^2 - 16^2$ or 44^2 = Length^2 + 16^2 (Length =) √1680 or Length^2 = 1680 41 (inches)	M1 A1 A2	 2 sig.fig. is required A1 for 41.0, 41.00 or 40.9878… rounded or truncated FT from M1 for the correctly evaluated square root of 'their 1680' provided 'their answer' < 44 (inches) for possible A2 or A1
5.(b) (100 ×) 710.40 ÷ 74 (£)960	M1 A1	
5.(c)(i) 23.52 p	B1	
5.(c)(ii) 27.44 p	B1	

6. (Old fish tank contains) $60 \times 40 \times 45$	B1	(108 000 cm^3)
(New fish tank maximum volume is) $\pi \times 25^2 \times 70$ Answer in range 137375 to137500 (cm^3)	M1 A1	
Conclusion, e.g. '137 375 > 108 000', 'Elin can be certain as the volume of the new tank is greater' 'it fits'	B1	FT 'their new fish tank calculation' conclusion provided 108 000 (cm^3) seen **and** at least M1 previously awarded *Alternative:* *(To find new fish tank water level)* *(Old fish tank contains) 60 × 40 × 45 B1* *(New tank) π × 25² × 'water level' M1* *60×40×45 = π×25²×'water level' m1* *(Water level) 55.(….cm) with conclusion that contents will be certain to fit* *(55 cm must be correct) A1* *Depends on all previous marks awarded*
Organisation and communication	OC1	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
Writing	W1	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.
7.(a) Method of systematic sampling, e.g. '(select one person from the first 12 people at random then) ask every (240÷20 =) 12th person'	E1	*Note to markers:* *There should really be mention of the first person being selected at random, however in this first assessment, with only 1 mark available, not doing so will be condoned in this mark scheme*

7. (b) Mid points 20.4, 21.3, 22.2, 23.1 20.4×2 + 21.3×3 + 22.2×10 + 23.1×5 (= 40.8 + 63.9 + 222 + 115.5 =)	B1 M1	FT 'their mid points' provided they are all within or at the bounds of the appropriate groups
(Sum of 20 hand spans is) 442(.2 cm)	A1	OR estimate of the mean (442.2÷20 =) 22(.11 cm) May be implied in further working
(Sum of all 30 hand spans is) 10×22.8 + 442(.2) (= 670(.2) cm)	M1	OR 10×22.8 + 20×22(.11) FT 'their derived 442.2' provided the correct method seen, including where **one** of 'their mid points' was outside the group
÷30	m1	Intention to divide the sum of 30 measurements by 30
22(.34 cm)	A1	Depends on M1, M1 and m1 previously awarded (Watch for an answer 22(.. cm) from $\frac{22.1(1) + 22.8}{2}$, award B1M1A1M0m0A0)
7. (c) Improvement suggestion, e.g. 'ask more people', 'take a bigger sample', 'ask every 5th person instead', 'collect more data (from different regions in Wales)', 'use all the raw data', 'do both hands', 'stratified sample on age', 'stratified sample on gender', 'by narrowing the groups in the table'	E1	Allow, e.g. 'ask people of different ages', Do not accept, e.g. 'measure more accurately'
8. AB or AC = 2.5 ÷ cos52° OR AB or AC = 2.5 ÷ sin38° OR AB or AC = 4(.06067… m)	M2	M1 for any of the following • cos52° = 2.5/ AB • cos52° = 2.5/ AC • sin38° = 2.5/AB • sin38° = 2.5/AC • equivalent full method without AB or AC as the subject
Total length 2 × 4(.06067…) (+ 6)	m1	FT 'their derived AB or AC' provided M1 awarded
14(.12… metres)	A1	FT from M1, m1 previously awarded
Cost per metre is 410 ÷ 14(.12…)	m1	FT from 'their total length' for m1 only Depends on previous M1
(£)29(.03…)	A1	CAO, i.e. (£)29.(….) (Note: 410 ÷14 = £29(.285…) Accept an answer that would round to (£)29 from correct working

9. 80 × (Number of pupils in Year 11) ÷ 690 (List of unrounded answers =) 35·5(942…), 27·7(101…), 16·6(956…) (Numbers invited =) 35, 28, 17	M1 A1 A1	Sight of this calculation for any one school Accept 'their 307 + 239 + 144' for 690 for M1 only Allow A1 for any 2 correct unrounded answers, OR for final answers of 36,28,17 OR 36,27,17 OR 36,28,16 if unrounded answers not seen CAO
10. Appropriate use of 12 and 2 in the AER formula Sight of 0·0385 and 0·0386 (AER Bannau =) $(1+0{\cdot}0385/12)^{12} - 1$ OR (AER Eryri =) $(1+0{\cdot}0386/2)^{2} - 1$ (AER Bannau =) 0·0391(866…) or 0·0392 OR 3·91(866…) % or 3·92 % AND (AER Eryri =) 0·0389(724…) or 0·0390 OR 3·89(724…) % or 3·9(0) % AND Correct statement e.g. 'Bannau offers better annual rate of interest'	B1 B1 M1 A2	Denominators AND powers Or 3·85/100 and 3·86/100 Do not accept 0·0391(866…)% or 0·0392% Do not accept 0·0389(724…)% or 0·0390% A1 for either correct AER If no marks awarded, SC2 for comparing correct end of year amounts (amount × 1·0392, amount × 1·0390) with a correct conclusion SC1 for calculating the correct end of year amount for one account
11.(a) (Length of arc) $\frac{50}{360} \times 2 \times \pi \times 5$ = 4·3(611…) to 4·4 (cm) OR $500\pi/360$ (cm) Perimeter = 14·3(611…) to 14·4 (cm)	M1 A1 B1	 Or $25\pi/18$. May be implied by B1 FT for adding 10 providing M1 awarded
11.(b) (Area ¼ circle =) 7·065 to 7·1 (cm^2) OR $9\pi/4$ (Area sector =) $\frac{50}{360} \times \pi \times 5^2$ = 10·9(027…) to 10·91 OR $125\pi/36$ (cm^2) (Surface area of badge =) $7 \cdot 06 ... + 10 \cdot 91 ... - \frac{50}{360} \times \pi \times 3^2$ (3·925 to 3·9275) = 14·0(427…) to 14·1 OR $161\pi/36$ (cm^2)	B1 M1 A1 M1 A1	May be implied in further working May be implied in further working FT 'their 7·06…' and 'their 10·91…' provided previous M1 awarded Needs to come from values that are correct to at least 1 decimal place *Alternative method:* *B1 for (* $\frac{20}{360} \times \pi \times 3^2$ *) 1·57 to 1·571 or π/2 (cm^2)* *(may be implied in further working)* *M1 for* $\frac{50}{360} \times \pi \times 5^2$ *A1 for 10·9(027…) to 10·91* OR $125\pi/36$ *(cm^2)* *M1 for* $10 \cdot 9 ... + (2 \times \frac{20}{360} \times \pi \times 3^2)$ *FT 'their 10·9' and 'their 1·57' provided previous M1 awarded* *A1 for 14·0(427…) to 14·1* OR $161\pi/36$ *(cm^2)*

12.(a) Sight of 805 (cm) or 405 (cm) (805 × 405) + (405 × 400) OR a consistent attempt at converting these into metres = 488 025 (cm^2)	B1 M2 A1	Do not accept 804·9 or 404·9, but allow 804·9 recurring or 404·9 recurring FT their upper bounds M1 for 805×405 + (400<n≤405 × 405) (Note: use of 805×405 + 405×405 leads to 490 050) OR 48·8(025) m^2. Allow 488 000 (cm^2) CAO. Ignore attempts to convert into m^2. *Alternative method:* *M2 for $805^2 - 400^2$* *Allow M1 for $805^2 – (395≤n<400)^2$* *A1 for 488 025 (cm^2)* *CAO. Ignore attempts to convert into m^2.*
12.(b) Conversion 48·8(025) (m^2) OR 0·00325 (g/cm^2) 32·5 × 48·8(025) OR 0·00325 × 488 025 = 1586(·08125) (g) AND Statement e.g. 'No, more than 1·5 kg (could be) needed'	B1 M1 A1	FT 'their 488 025' OR 'their 32·5' (805 × 405 + 405 × 405 = 490 050 (cm^2) or 49(·0050) m^2) FT 'their 32·5' provided it is greater than 30 and ≤35, and FT their area provided an attempt made at converting into g/cm^2 or m^2 Accept 1·6 kg from correct working FT 32·5 × 'their area' correctly converted into m^2 *Alternative method:* *M1 for* *0·0325×48·8(025) OR $3·25×10^{-6}$×488 025* *(kg/m^2 × m^2) (kg/cm^2 × cm^2)* *FT 'their 32·5' provided it is greater than 30 and ≤35, and FT their area* *A1 for 1·58(60…) or 1·6 (kg) AND* *Statement e.g.* *'No, more than 1·5 kg (could be) needed'* *FT 32·5 × 'their area' correctly converted into m^2* *OR* *For candidates **clearly** considering the smallest area that could be seeded* *B1 for 1500 (g) OR 0·0325 (kg)* *FT 'their 32·5'* *M1 for 1500 ÷ 32·5 OR 1·5 ÷ 0·0325* *FT 'their 32·5' provided it is greater than 30 and ≤35 for M1 only* *A1 for 46(·15…) (m^2) AND* *Statement e.g.* *'No, more than 1·5 kg (could be) needed'* *FT their area,* *Only award A1 if their area has been correctly converted into m^2 for comparison*

13.(a) True False	B1	
13.(b) (lengths in ratio) 24 : 30 (= 4 : 5)	B1	Ratio can be reversed Or equivalent (e.g. scale factor = 1·25 or 30/24 OR 0·8 or 24/30)
(volumes in ratio) 13824 : 27000 (= $4^3 : 5^3$)	B1	Ratio can be reversed Or equivalent (e.g. 'Volume scale factor' = 1·9(53125) or $1{\cdot}25^3$ or $(30/24)^3$ OR 0·512 or $0{\cdot}8^3$ or $(24/30)^3$
Statement e.g. '125 is not double 64 (so the increase is not double)', or '64 is not half of 125', or 'Increase is 95(·3125)%'	E1	Depends on B2 provided 4^3 and 5^3 have been evaluated correctly or $1{\cdot}25^3$, $(30/24)^3$, $0{\cdot}8^3$ or $(24/30)^3$ evaluated correctly
13.(c) (Scale factor of heights =) $\sqrt{4}$ or 2 OR $\sqrt{\frac{1}{4}}$ or 0·5	B1	
$24 \div \sqrt{4}$ OR $24 \times \sqrt{\frac{1}{4}}$	M1	
= 12 (cm)	A1	*Alternative method:* *M1 for* $24^2 \div 4$ *A1 for* $height^2 = 144$ *or* $(height =) \sqrt{144}$ *A1 for 12 (cm)*

14.(a) (Hyp of triangle =) $1 \div (\sin 7{\cdot}1(°))$ $= 8{\cdot}0(9051\ldots)$ or $8{\cdot}1$ (m) $(AB^2 =) 5^2 + 8{\cdot}0(9051\ldots)^2$ $AB^2 = 90{\cdot}4(564\ldots)$ or $(AB =) \sqrt{90{\cdot}4(564\ldots)}$ $(AB =) 9{\cdot}5(108\ldots)$ (m)	M2 A1 M1 A1 A1	Or equivalent M1 for $\sin 7{\cdot}1(°) = 1 \div$ (Hyp of triangle) Accept 8 (m) from correct working FT their $8{\cdot}0(9051\ldots)$ provided trigonometry attempted FT their rounded $8{\cdot}0(9051\ldots)$ Do not accept $9{\cdot}4$ (m) from use of 8 (m) Needs to be correct to 1 d.p. FT from previous M1 for the correctly evaluated square root of 'their $90{\cdot}4(564\ldots)$' provided 'their answer' > 'their $8{\cdot}09(051\ldots)$' *Alternative method:* *Base of triangle = 1/tan7·1 (=8·0284…) M1* *$5^2 + 8{\cdot}0(284\ldots)^2$ (= 89·456…) M1* *Base diagonal = 9·4(581…) or 9·5 (m) A1* *$1^2 + 9{\cdot}4(581\ldots)^2$ M1* *FT 'their rounded 9·4(581…)'* *$AB^2 = 90{\cdot}4(564\ldots)$ or $(AB =) \sqrt{90{\cdot}4(564\ldots)}$ A1* *(AB =) 9·5(108…) (m) A1* *Needs to be correct to 1 d.p.* *FT from previous M1 for the correctly evaluated square root of 'their 90·4(564…)' provided 'their answer' > 'their 8·09(051…)'*
14.(b) $\sin^{-1}(1/9{\cdot}5(108\ldots))$ $= 6(\cdot0354\ldots)(°)$	M2 A1	FT 'their $9{\cdot}5(108\ldots)$' M1 for $\sin(\text{angle}) = 1/9{\cdot}5(108\ldots)$ Needs to be an answer that is < 7·1 Needs to be correct to 1 d.p. Do not penalise premature rounding on FT if already penalised in (a) *Alternative method:* *$\tan^{-1}(1/9{\cdot}4(581\ldots))$ M2* *$= 6{\cdot}0(354\ldots)(°)$ A1, OR* *$\cos^{-1}(9{\cdot}4(581\ldots)/9{\cdot}5(108\ldots))$ M2* *$= 6{\cdot}0(354\ldots)(°)$ A1 OR* *Alternative method:* *B1 for 'Delyth's route is going up 1(m) in (travelling) 8·0(9051… m).' OR 'The gradient of Delyth's route is (1/8·0(284…)) 0·12(455..)'* *B1 for 'Ioan's route is going up 1(m) in (travelling) 9·5(108…m)' OR 'The gradient of Ioan's route is (1/9·4(581…)) 0·10(572…)'* *B1 for 'So Ioan's route is less steep.'* *This B1 is dependent on previous B1B1 being awarded and provided Ioan's gradient is less steep than Delyth's* *FT their values from (a)*