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)	B1	
Nikita 20 × 1150.779 ÷ 1000 or 1150.779 ÷ 50 or equivalent	M1	
23.01(558..) or 23.02 (miles per hour)	A1	
Difference 0.02 (miles per hour to 2 d.p.)	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