GCSE MARKING SCHEME

SUMMER 2017

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

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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.

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GCSE Mathematics – Numeracy **Unit 1: Higher Tier** **Summer 2017**	Mark	Comment
1(a) (£) 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
1(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) Organisation and communication	B1 M1 A1 OC1	 For the appropriate **method** of repeatedly increasing by 10% from 2015 to 2017 FT 'their 6600 + 10%' calculation <u>with</u> 'their 7260' + 10% calculation <u>with</u> 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) 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

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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'

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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)

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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

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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 $(3 \times 10^{-2}) \div (1\times10^{-3})$ 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

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8(a) N Time Area N Time Area n 8 80n OR n 60/n 600 600/80 OR 60/8 = 7·5 or equivalent = 8 (painters)	M1 M1 A1 A1	 May be implied. This M1 implies the previous M1 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'

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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'

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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.

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