GCSE MARKING SCHEME

AUTUMN 2017

**GCSE
MATHEMATICS – NUMERACY
UNIT 2 - INTERMEDIATE TIER
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 Autumn 2017 FINAL	Mark	Comment
1(a) Mass of raspberries 4.5(0) ÷ 3.6(0) or 450 ÷ 360	M1	Place value must consistent Allow sight of 3.60 ÷ 4 = 0.9 with 3.60 + 0.9 = 4.5 for M1
1.25 (kg)	A1	Accept 1250(g), if units are given they must be correct Mark final answer
1(b) Mass of pears (3 × 1.25 =) 3.75 (kg) or 3750(g)	B1	FT 'their 1.25'
Cost of pears (3.75(0) × 2(.)60 =) (£)9.75 or 975(p)	B1	FT 'their 3.75' provided 3 × 'their 1.25' has been attempted If units are given they must be correct
Total cost of raspberries and pears (£4.50 + £9.75 =) £14.25 or 1425(p)	B1	FT correct evaluation of 4.5(0) + 'their 9.75' May be embedded within correct evaluation of their change
Change (£)5.75 or 575(p)	B1	Allow £5.75p, if units are given must be correct FT provided 4.50 + 'their 9.75' has been attempted *Example of FT from no answer in (a): B0, B0 then* *(£4.50 + 3 x £4.50 =) (£)18 B1* *(Change = 20 - 18 =) (£)2 B1*
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
Accuracy of 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.

1

2(a) 0	B1		
2(b) 96	B1		
2(c) 24	B1	Do not accept as a fraction or percentage of any group of pupils, however accept '24 out of ...'

2(d) Sight of the 3 totals:
       (Mandarin) 45
       (French)   43
       (German)   32
 	
(Spanish)   (22 + 2 + 27 =) 51
 	
Most popular is Spanish
	B1
	
	B1
	
	B1
		
		CAO
		
		CAO
		Unsupported 'Spanish' is awarded B0, B0, B1
		Response 'Spanish 51' is awarded B0, B1, B1

2(e) French and Spanish Reason, e.g. 'more pupils selected both these', '27 selected French and Spanish', 'Only 22 selected Spanish and Mandarin'	B1 E1	 Depends on B1 *Ignore any incorrect totals, if 27 for French and Spanish stated* *(Note:S&F 27; M&S 22, M&G 11, G&F10, M&F 8)*

2

3(a) Gives a list of at least 3 year groups, e.g. '7, 8, 9, (10, 11, 12, 13)', 'reception, 1, 2, (3, 4)', OR states, e.g. 'Year Group boxes', 'Year 7 – Year 11', 'Year 7, Year 8 and so on' 'Year 7 to 9, Years 10 and 11'	B1	*In either order* Allow if a least 2 groups are given, with no overlaps or repeats, e.g. 'Key Stage 3, Key Stage 4'	
Gives options, e.g. 'yes, no, (don't care)' , 'yes, no', 'yes, no, other' OR states, e.g. 'yes and no boxes'	B1		
3(b)(i) Black	B1		
3(b)(ii) Measures the angle 60° ± 2°	B1	*Check diagram* FT for 60° ± 2° Allow for appropriate sight of 60, e.g. 60/100, 60%, 60 people, but not as a denominator. *Example of inappropriate sight of 60: 300/5 = 60 or 300 ÷ 5 = 60, B0*	
(Fraction) 60/360	M1	FT 60° ± 2° but ≠ 60° for M1 only Allow sight of 300 × 60/360 or 6/36	
1/6	A1	CAO Allow B1, M1, A0 for an answer of 50 (people) Award B1, M1, A1 for an answer of 1/6 from sight of 360/60 *Alternative:* *50/300 M2* *1/6 A1* If no marks, award SC1 for FT 'blue' from (a) for an answer of (75/300 =) ¼ in (b)	
4(a) 3.2 hours	B1		
4(b) $\dfrac{120}{1\ hr\ 15\ mins\ +\ 2\ hrs\ 15\ mins}$	M1	Allow with incorrect notation for 3 hours 30 minutes, including 120÷ 210, or 120 ÷ (1.15 +2.15), or 120/3.3(0) or sight of answer of 0.57(... mph) or 36.3(63... mph) or 36.4 (mph)	
120 ÷ 3.5 or 120 ÷ 210 × 60 $34\,^2/_7$ (mph) or 34(.2857… mph)	M1 A1	Time notation must be correct	

5(a) 0.12 × 3 063 000 or equivalent	M1	12% of 3 063 000 is M0, unless the required calculation (or correct response) is seen *Allow M1 for sight of 0.12 × 3 063 000 with 0.3(0) × 3 063 000 only or sight of 367560 with 918 900 only or equivalent*
367 560 (people)	A1	Mark final answer *If no marks allow SC1 for use of 2014 data with an answer of 371 040*
Assumption, e.g. 'Wales is typical', 'Wales has a similar population to the rest of the world', '12% of people living in **Wales** are left-handed', 'newspaper is correct for Wales'	E1	Independent mark Do not accept, e.g. '367 560 people who lived in Wales were left-handed' Allow, e.g. 'newspaper report is correct',
5(b) (100 ×) $\dfrac{3\ 063\ 000 - 1\ 559\ 000}{3\ 063\ 000}$	M2	M1 for sight of 3 063 000 -1 559 000 (= 1 504 000)
49.1 (%)	A1	CAO. Must be to 1 decimal place *Alternative (using number of women):* *1 (×100) - $\dfrac{1\ 559\ 000}{3\ 063\ 000}$ (×100) M2* *49.1(%) A1* *If no marks, award SC1 for an answer of 50.9(%)* *Allow M2, A0 for an answer of 49(%), unsupported or provided no incorrect working seen*
5(c) 0.3(0) × 3 092 000 or equivalent	M1	(= 927 600) 30% of 3 092 000 is M0, unless the required calculation (or correct response) is seen
928 000 (people)	A1	CAO. Must be to nearest 1000 *If no marks allow SC1 for use of 2011 data with an answer of 919 000 (must be nearest 1000)*

5(d)		
		Penalise incorrect place value for millions only once
Sight of 2 × 8 (%) OR use of 12% **with** left hand men : left hand women is 2 : 1	M1	
16 (%)	A1	
0.16 × 3 (000 000) or 0.48	m1	FT 'their 16%' provided M1 previously awarded

0.48 million or 480 000 or 4.8 × 10^5	A1	A0 for an answer of 0.48
		<u>Mark final answer</u>
		
		Alternatives:
		0.12 × 6 000 000 or
		0.24 × 3 000 000 *M1*
		          = 720 000 *A1*
		
		$^2/_3$× 720 000 or
		720 000 - 0.08 × 3 000 000 *m1*
		(FT 'their 720 000 provided M1 previously awarded)
		           = 480 000 *A1*
		
		OR
		Use *of population is 50% male* *M1*
		(stated or implied, but not if further incorrect working)
		0.08 × 6 000 000 *m1*
		          = 480 000 *A2*
		(If stated as 480 000 women, then no marks, as no engagement with the question)
		
		OR
		0.08 × 3 000 000 *M1*
		    = 240 000 (left women) *A1*
		(May be implied later, but needs to be clear working with left handed women if no further working)
		             × 2 *m1*
		        = 480 000 *A1*

5

6(a) Midpoints 2.5, 7.5, 15, (25,) 40	B1	Midpoint of 20 ≤ s < 30 (25) is not required for B1	
$10 \times 2.5 + 16 \times 7.5 + 4 \times 15 + 1 \times 40$	M1	25 + 120 + 60 + 40 (= 245) FT their midpoints, including bounds, provided they fall within the classes including upper bounds. FT if 1 slip in one of 'their midpoints', (and only one, including 25) used outside the tolerance of bounds for M1, m1 only	
Intention their ∑fx / 31	m1	(245/31)	
7.9(0…cm)	A1	Following correct working Accept 8 cm from correct working	

6(b)   FALSE
              FALSE
      TRUE
      TRUE
	B2	B1 for any 3 correct	

6(c) (28 x 9 – 63) ÷ 27 or equivalent	M2	M1 for sight of 28 x 9 or 252	
7 (cm)	A1	Allow M2, A1 for an unsupported answer of 7(cm) Award M0, A0 for an answer of 7(cm) from sight of 63 ÷ 9	

6

7(a) An appropriate calculation that could lead to an answer of approximately 32 (acres), e.g. 13 × 10000 ÷ 4046.86 (=32.12367…) 13 × 10000 ÷ 4050 (=32.098…) 10000 ÷ 4046.8 (≈ 2.5), 2.5 × 13 (= 32.5) 13 × 10000 ÷ 4000 (= 32.5) 13 ÷ 0.4 (= 32.5)	M2	M1 for a calculation such as • 13 ÷ 4046.86 (=0.0032…) • 13 ÷ 4050 (=0.0032…) • 13 × 10000 (=130000) • 10000 ÷ 4046.8 (≈ 2.5)
× any number between 4 and 6 inclusive	m1	FT from M2 only
Number of alpacas from appropriate correct calculation: Answer given as a whole number of alpacas in the inclusive range 128 to195	A2	Must be correct working FT from rounding to 32 (acres) Accept an answer as a range with bounds given as whole numbers Award A1 for • 4 and 6 used, leading to one correct and one incorrect answer • a non-whole number answer in the range 128 to 195 • an answer as a range with bounds not given as whole numbers *Note: Only accept answers outside the given range if **fully justified**, e.g. 32.5 rounded to 33 with use of 6 alpacas to give 198 alpacas*
Statement of their assumption, e.g. 'used the mid number 5 alpacas', 'used a range of numbers of alpacas', 'used the least number of alpacas per acre', 'used the greatest number of alpacas per acre', 'all the 13 hectares are suitable for keeping alpaca', 'used 1 acre as 4000m²', 'they left 6 alpacas in every acre', 'they would keep as many alpacas in every acre as they could' (following use of '6'), 'not all their land is suitable'	E1	**The assumption must match their working** Allow, e.g. 'as they could have many small fields, not possible to fit all the alpacas in' (with 4 alpacas used) (fields not being hectares implied) Do not accept, e.g. 'all alpacas weigh the same', 'they will be able to keep .... alpacas on 13 acres', 'alpacas not all the same size', 'they can afford all the alpacas', 'same amount of alpacas on each bit of land' (unless accompanied by further explanation)

7(b)(i)		
Line 6 cm ± 2mm from the south fence **AND** Bisector from south and east fences (±2⁰), or Line 6cm ± 2mm from the east fence	B2	Mark intention Any lines must be of sufficient length to find the intersection for B2 Award B2 for the unsupported or unambiguous correct location indicated provided not from incorrect working, such as spurious or incorrect arcs B1 for sight of one of the following: • Line 6 cm ± 2mm from the south fence • Bisector from south and east fences (±2⁰) • Line 6cm ± 2mm from the east fence
Circle with radius 1.4cm ± 2mm centred at the intersection of the 2 lines	B2	FT 'their intersection' of two straight lines B1 for sight of one of the following: • a circle centred at the intersection of the 2 lines (outside tolerance) • a circle of the correct radius seen (anywhere)
7(b)(ii) (900 litres = 900 000 cm³) $900\,000 = \pi \times 70^2 \times$ height or $0.9 = \pi \times 0.7^2 \times$ height or equivalent	M2	May be shown in stages M1 for sight of any 1 of the following: • $\pi \times 70^2$ (× height) • $\pi \times 0.7^2$ (× height) • $900\,000 = \pi \times 140^2 \times$ height • $0.9 = \pi \times 1.4^2 \times$ height • $900\,000 = \pi \times 70^2 \times$ height or $0.9 = \pi \times 0.7^2 \times$ height *with place value errors with digits 9 and/or 7*
(Height =) $\dfrac{900\,000}{\pi \times 70^2}$ or $\dfrac{0.9}{\pi \times 0.7^2}$	m1	FT from M1 or M2 Allow for correct rearrangement (intended calculation) including place value error with digits 9 and/or 7 and use of diameter as radius
Answers in the range 58.4 to 58.5 (cm)	A1	CAO, must be in centimetres Accept 58(cm) from correct working
7(c) $80 \times 19.20 \div 15.47$ + $20 \times 22.30 \div 15.21$ + $100 \times 24.50 \div 14.93$	M2	M1 for sight of any 1 year calculation seen (£99.288…, £29.322…, £164.099..)
For any 2 of the 3 correct amounts of money (£)99.29, (£)29.32, (£)164.1(0) OR an answer in the inclusive range (£)292 to (£)293	A1	
(£)99.29 + (£)29.32 + (£) 164.1(0) leading to (£) 292.71	A1	CAO not from incorrect working

8

8.			Accept rounding or truncation of 1/2p throughout

(Balls of wool per pair) 135 ÷ 20   (× 40)
    6.75 (balls) or 7 (balls) or
      270 (balls) or 280 (balls)
	M1
	A1		

(Costs are 40 ×) 1.42 × 135 ÷ 20 (+(40 ×) 8)	m1		FT 135 ÷ 20 = 6.75 balls and 7 balls | *Costs*	*1 pair*	*40 pairs*
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6.75 balls	*£9.585*	*£383.40*
7 balls	*£9.94*	*£397.60*	
(Profit = Sales – Costs), e.g. (Profit per pair) 18.95 - 1.42 × 135 ÷ 20 - 8 OR (Profit for 40 pairs) 40 × 18.95 – 40 × (1.42 × 135 ÷ 20 + 8) OR Appropriate amounts used to calculate (100 ×) total sales - 1 (× 100) total costs	M2		*Profit using 6.75 balls* 	*1 pair*	*18.95 - 9.585 - 8 = 18.95 – 17.585 = £1.365*
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40 pairs	*758 - 383.40 - 320 = 758 – 703.40 = £54.60*	 *Profit £, using 7 balls* 	*1 pair*	*18.95 – 9.94 - 8 = 18.95 – 17.94 = £1.01*
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40 pairs	*758 - 397.60 - 320 = 758 – 717.60 = £40.40*	 	M1 for any 1 amount	Amount, £
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Paying sister 40 prs	320
Total sales 40prs	758
Total costs 40prs:	
6.75 balls	703.4(0)
7 balls	717.6(0)
Total cost 1 pair:	
6.75 balls	17.585
7 balls	17.94	 OR M1 for any 1 of the following: • omitting to pay her sister: 18.95 - 1.42 × 135 ÷ 20 or 40 × 18.95 - 40 × (1.42 × 135 ÷ 20) • inconsistent use of × 40: 40 × 18.95 - 1.42 × 135 ÷ 20 - 8 or 18.95 – 40 × (1.42 × 135 ÷ 20 + 8)

Use of appropriate amounts to calculate:
(Percentage profit = 100 ×)   profit
                costs
or (100 ×)   sales - 1 (× 100)
        costs
	m1		FT from previous M1 or M2
			*FT 18.95 – 'their cost per pair' OR
			      'their cost per pair'*
			
			*40 × 'their 18.95' – 'their total costs'
			        'their total costs'*
			OR equivalent

7.8(%) or 5.6(%)	A1		No other FT, must be 2 s.f. 7.8% CAO comes from use of 6.75 balls, 5.6% CAO comes from use of 7 balls

9

9(a) DG = 3.2 (m) and DH = 3.4 (m)	B1	May be seen on the diagram
(GH² =) 3.2² + 3.4²	M1	FT 'their 3.2' and 'their 3.4' provided they are ≠4.8(m) and ≠ 6.8(m)
(GH)² = 21.8 or (GH =) √21.8	M1	FT 'their 3.2' (DG) and 'their 3.4' (DH) including use of 4.8(m) and 6.8(m)
4.7(m) or 4.67(m) or 4.66(9…m) or 4.6(m)	A1	Allow FT from M0, M1 including use of 4.8 and 6.8(m) to give 8.3(2…m) (i.e. B0, M0, M1, A1) FT from M1, M0 for the correctly evaluated square root of 'their 21.8' provided 'their answer' > 3.4 (cm)
9(b) (Perimeter) 4.669… + 3.2 + 3.4	M1	(11.2m, 11.269..m, 11.27m or 11.3m) FT 'their derived 4.669…' (from (a)) + 'their DG <4.8' + 'their DH <6.8', however if no response in (a) accept 'their GH' if clearly stated provided >3.3 but <8.4 (m)
Cost 12 × 3.50	M1	FT 'their derived perimeter' provided: • the perimeter has been derived from the sum of 3 lengths, **AND** • rounded **up** correctly to a whole number
(£)42	A1	**Do not FT further for premature rounding of lengths to find 'their perimeter', no further marks** (Otherwise FT)
Appropriate for the perimeter 70(cm) or 73.(095….cm) or 74(cm) or 80 (cm) left over	B1	**Strict** FT 100 × ('their 12' – 'their **correctly evaluated** derived perimeter<12'), which leads to left over bit ≥ 0 e.g. 74(cm) from a perimeter 11.26m Answer **must** be in cm Accept use of rounded or truncated answers for 'their derived perimeter' *A fully correct FT for rounding lengths up prematurely, e.g. if 4.7m used: 4.7 is 5 strips, 3.4 and 3.2 is 4 strips each, gives 13 m, so 13 × £3.50 = (£)45.5(0) with 170(cm) left over, this is awarded M0, M1, A0, B0*