GCSE MARKING SCHEME

AUTUMN 2016

MATHEMATICS - NUMERACY (NEW)
UNIT 2 - INTERMEDIATE TIER

3310U40-1

INTRODUCTION

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

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

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

GCSE Mathematics – Numeracy Unit 2: Intermediate Tier Autumn 2016	Mark	Comment
1(a) 6 km	B1	
1(b) 19:30	B1	
1(c) 18:30	B1	
1(d) Explanation, e.g. ‘still the same distance from home’, ‘keeping the same distance’, 'he was 6 km away from home for the whole time', 'his distance stayed at 6 km from home', ‘does not change distance during this time’, ‘didn’t go any further from home’, ‘didn’t get any closer to home’	E1	Ignore additional incorrect statements except when it implies he was stopped Accept, e.g. 'he was jogging on the spot', 'he was climbing a tower block', 'walking on a circular path (centred on his home)', ‘kept a constant distance’, ‘he was walking but keeping the distance from home’ Allow, e.g. ‘he was stuck in traffic he is still on his journey’ Do not accept, e.g. ‘turning round to head for the supermarket’, ‘he is going in the same direction for 30 minutes’, ‘could be stuck in traffic’, ‘he had a break as the distance didn’t change showing he stayed in the same place’, ‘stayed in the same place for 30 minutes’, ‘he is at the supermarket’, ‘he was walking the same distance for 30 minutes’

GCSE Mathematics – Numeracy Unit 2: Intermediate Tier Autumn 2016	Mark	Comment
2(a)(i) Angle 100° (±2°)	B1	Sight of 100 ignoring any incorrect units is B1 only, until used in a relevant calculation
36000 × 100 (±2) ÷ 360 or 100 × 100 (±2)	M1	FT for M1 only if the angle is out of tolerance but within ±4°
9800 to 10200 (people)	A1	
2(a)(ii) Sport 115° ±2° **and** News 55° ±2°	B1	Both angles within tolerance OR sight of 60 (±4)
36000 × 115 (±2) ÷ 360 - 36000 × 55 (±2) ÷ 360, or 36000 × 60 (±4) ÷ 360 or 11500 (±200) – 5500 (±200)	M1	FT 60 (±4) × 'their number of people per degree' FT for M1 only if one angle is out of tolerance but this one angle is within ±4°
5600 to 6400 (people)	A1	
2(a)(iii) (Talent show is) ¼ of 36000 **and** considering 2/3 of this angle or number of people	B1	OR considering 36000 – 'their drama' – 'their sport' – 'their news' if clearly identifiable
⅔ × 36000 × 90 ÷ 360 or ⅔ × 9000 or equivalent	M1	Or 60 × 'their number of people per degree'
6000 (women)	A1	FT 'their ¼ × 36000' CAO
2(b) 360 × 70/100 or equivalent	M1	OR sight of 700 ÷ 2.7(777…) or 700 ÷ 2.8
252(°)	A1	CAO
3. Sight of (€) 7000 or (€) 24 000 or (€) 31 000	B1	Ignore £ for €
(Tax at 25%) 0.25× 7000	M1	FT use of 'their 10500 - 3500', or 10500, or for sight of (€)2625
(€) 1750	A1	CAO, not FT
(Tax at 35%) 0.35 × 24 000 or 0.35 × (34 500 – 10 500) or 0.35 × (31000 – 7000) or equivalent	M1	FT use of (31 000 – 10 500 =) 20 500 as 'their 24 000', including for sight of (€)7175
(€) 8400	A1	CAO, not FT
Tax (€)10 150	B1	FT 'their 1750' + 'their 8400' provided both M1 marks previously awarded (e.g. FT 2625 + 7175 = (€)9800) *<u>Alternative:</u>* *Sight of (€) 7000, (€) 24000 or (€)31000* *B1* *34500 -* *(0.75 × 7000 + 0.65 × 24000 + 3500)* *M4* *(or M1 for sight of* *0.75 × 7000 + 0.65 × 24000 + 3500)* *(€) 10 150* *A1*

GCSE Mathematics – Numeracy Unit 2: Intermediate Tier Autumn 2016	Mark	Comment
4(a) 450 × 99.4(0) 44 730 (rupees)	M1 A1	If units are given they must be correct *If no marks, award SC1 for sight of digits 4473(0) irrespective of place value*
4(b) (450 × 99.72 =) 44 874 (rupees) Means he can buy 44 500 (rupees) or 89 (500 rupee notes) 44 500 ÷ 99.72 or 450 – (44 874 – 44 500) ÷ 99.72 (£) 446.25	B1 B1 M1 A1	B1 for sight of (500 ÷ 99.72 =) (£)5.01(40…) OR B1 for sight of 44 874 ÷ 500 (=89.748…) **AND** 89 × 500 = 44 500 OR B1 for sight of 450 ÷ 5.01(40…) (=89.748…) **AND** 89 × 500 = 44 500 or 89 notes FT rounding down to nearest 500 rupees provided 450 × 99.72 attempted OR M1 for sight of 446.25 × 99.72 = 44500 from trial & improvement FT 'their 44 500' provided it is a multiple of 500 provided at least B1 previously awarded CAO <u>*Use of 99.40 rupees in (b)*</u> *(450 × 99.40 =) 44 730 (rupees) B0* *Means he can buy 44 500 (rupees) or B1* *89 (500 rupee notes)* *44 500 ÷ 99.40 or* *450 – (44 730 – 44 500) ÷ 99.40 M1* *(£) 447.69 A0 as CAO*

GCSE Mathematics – Numeracy Unit 2: Intermediate Tier Autumn 2016	Mark	Comment
5(a)		Treat use of 0.333, 0.666 or 0.67 as PA-1, do not accept 0.3 or 0.6 as ⅓ or ⅔ respectively (Note ⅓ × 84.50 = 28.1666……) (⅔ × 84.50 = 56.333…..)
(Eleri pays 6 × £84.50 =) (£)507	B1	
(Nerys pays) ⅔ × 6 × 84.5(0)	M1	Or 6 × 84.5(0) − ⅓ × 6 × 84.5(0) FT ⅔ × 'their 6 × 84.5(0)'
+ 30	m1	
Amount in the range (£) 367.98 to (£)368.04	A1	*(Reminder: Depends on both the M and the m mark awarded)*
(Nerys pays £507 – (£367.98 to 368.04) less than Eleri) An answer in the range (£)138.96 to (£)139.02	B1	FT provided attempt 6 × £84.50 for Eleri and M1& m1 awarded for Nerys *(Omitting the cost of the Railcard gives £169, B0)* *Treat single journey considered as MR-1* *(Eleri pays 3 × 84.50 =) £253.50 B1* *(Nerys pays) ⅔×£253.50 M1* *+30 m1* *= (£)198.99 to (£)199.02 A1* *(difference of) (£)54.48 to (£)54.51 B1* *(depends on attempt 3 × 84.50 and M1, m1)* *AND also similar to the alternative shown below* *<u>Alternative looking directly at the saving:</u>* *(Nerys saves=) 1/3 × 6 × (£)84.50 M2* *(£)168.96 to (£)169.02 A1* *– 30 m1* *(FT 'their 169' – 30)* *(=£) 138.96 to (£)139.02 A1*
Organisation and communication	OC1	*Organisation and communication* For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanations and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means
Accuracy of writing	W1	*Accuracy of writing* For W1, candidates will be expected to: • show all their working • make few, if any, errors in spelling, punctuation and grammar • use correct mathematical form in their working • use appropriate terminology, units, etc.

<table>
<tr><th>GCSE Mathematics – Numeracy
Unit 2: Intermediate Tier
Autumn 2016</th><th>Mark</th><th>Comment</th></tr>
<tr><td>5(b) 1/3 × 7(.)80
30 ÷ 2.60

He would need to make 12 (single) journeys (or more) or 6 return journeys (or more)</td><td>M1
M1

A1</td><td>
FT 'their 1/3 × 7(.)80' incorrectly evaluated
Note: Break-even is 11.538.. single journeys.

CAO
Allow ‘if he goes (at least) once a month’

Alternative:
M1 for any one correct discounted return or single cost
M1 for method for the equivalent of 12 single or 6 returns, full and discounted costs, with sight of considering also the £30
A1 For either 6 return journeys or 12 singles, with no incorrect working seen

<table><tr><td>Return, £</td><td>Discounted return, £</td><td>Discounted + cost of rail card, £</td></tr><tr><td>15.60</td><td>10.40</td><td>40.40</td></tr><tr><td>31.20</td><td>20.80</td><td>50.80</td></tr><tr><td>46.80</td><td>31.20</td><td>61.20</td></tr><tr><td>62.40</td><td>41.60</td><td>71.60</td></tr><tr><td>78.00</td><td>52.00</td><td>82.00</td></tr><tr><td>93.60</td><td>62.40</td><td>92.40</td></tr></table></td></tr>
<tr><td>6(a) 0.24 × 303 000 or
303 000 – 0.76 × 303 000 or equivalent

72 720 (hectares)</td><td>M2

A1</td><td>Ignore any further calculations
M1 for sight of 0.76 × 303 000 (= 230 280), then M1 for sight of 303 000 – 230 280

Mark final answer</td></tr>
<tr><td>6(b) $34 \times 0.98^2 \times 1.06^5$

Answer in the range (£)43.67 to (£)43.7(0)</td><td>M2

A1</td><td>OR equivalent method to decrease by 2% and to increase by 6% on different amounts
($34 \times 0.98^2 = 32.6536$)
($34 \times 1.06^5 = 45.4996\ldots$)
M1 for sight of either $\times 0.98^2$ or $\times 1.06^5$ or equivalent calculations

CAO, from correct working</td></tr>
<tr><td>7(a)(i) $2x + 2y$ metres</td><td>B1</td><td></td></tr>
<tr><td>7(a)(ii) 48
$y = 5b/6x$</td><td>B1
B1</td><td></td></tr>
<tr><td>7(b) 2.6 × 33.6/2.1 or 2.6 ×16
41.6 (cm)</td><td>M1
A1</td><td>
CAO

Award M1, A0 for an answer of 40.32 from PA (33.6 × 1.2 = 40.32)</td></tr>
</table>

GCSE Mathematics – Numeracy Unit 2: Intermediate Tier Autumn 2016	Mark	Comment
8(a) (diagonal^2 =) $3.3^2 + 3.3^2$ diagonal^2 = 21.78 or diagonal = $\sqrt{21.78}$ diagonal is 4.7 (cm)	 M1 A1 A1	*Scale drawings are not accepted in Q8* FT from M1 for the correctly evaluated square root of 'their 21.78' provided 'their answer' > 3.3 (cm) Must be to 1 d.p. Accept an unsupported 4.7(cm)
8(b) 11 × 4.6(669…) × 9.5 × 4.6(669…) or 11 × 4.7 × 9.5 × 4.7 or 104.5 × $(4.7)^2$ (Area =) 2276(.01cm^2)	M2 A1	FT for 'their derived diagonal', but not 3.3 cm M1 for sight of either 11 × 4.6(669…) or 9.5 × 4.6(669…) *(Height 44.3355… cm; width 51.3359…cm)* Accept answers in the range 2211 (cm^2) to 2308.41 (cm^2) from appropriate working *(Note: e.g. use of a diagonal such as 5.27(cm) allow appropriate calculation with 5.2 (cm) or 5.3 (cm) for M2, A1; however use of 5 throughout is a possible M2, A0)*

GCSE Mathematics – Numeracy Unit 2: Intermediate Tier Autumn 2016	Mark	Comment
9(a) Sight of 31.2 **and** 3 or 180	B1	
$\frac{31.2}{3}$ OR (9.6 km/h =) 0.16 (km/min) with $\frac{31.2}{180}$	M2	Allow 31.2/7 ÷ 3/7 FT ' $\frac{\text{their total distance}}{\text{'their total time in hours'}}$ M1 for $\frac{\text{'their total distance'}}{\text{'their total time in minutes'}}$ allow 31.2/7 ÷ 180/7
10.4 (km/h) OR 0.17(3.. km/min)	A1	FT from 1 arithmetic error in calculating either 31.2 or 3, i.e. one of these values needs to be correct Do not FT from denominator in minutes unless 0.16 (km/min) seen Allow a final answer from a correct method that rounds to 10.4, e.g. 10.3(54..km/h) from PA *(Note: 31.2 ÷ 7 = 4.45714…* *3 ÷ 7 = 0.42857…* *180 ÷ 7 = 25.71428…)* *If no marks so far, allow SC1 for evaluating 'a distance ÷ time in hours' correctly (Sun to Sat : 10.615.., 10.45, 11, 10.6286, 10.8, 9.4286, 9.2727…)*
% improvement 100 × (10.4 – 9.6) ÷ 9.6 or 100 × 10.4 ÷ 9.6 - 100 or equivalent	M1	FT 'their 10.4' provided it is >9.6 OR FT 'their 0.17(3…)' provided it is >0.16
8(.333…%)	A1	*(Note: use of 10.354… leads to 7.85%)* *If previously M0, A0 for % improvement, allow SC1 for an answer of 108%, or similar from FT*
9(b) tan elevation = $\frac{200}{1600}$ or equivalent	M1	
Angle of elevation is 7(.125….°)	A2	A1 for $\tan^{-1}$ 0.125 or $\tan^{-1}$ (200/1600)

GCSE Mathematics – Numeracy Unit 2: Intermediate Tier Autumn 2016	Mark	Comment
9(c)(i) run = $\frac{300}{\sin 10°}$ 1727(.631… m) or 1728(m)	M2 A1	M1 for sin10° = 300/run ISW Accept reasonable estimates (rounding or truncation) following correct working, e.g. 1700, 1730, 1750
Assumption, e.g. 'road is straight', 'used a right-angled triangle', 'the road is smooth', 'Gwenda runs in a straight line'	E1	Depends on a previous attempt to use right-angled triangle trigonometry or Pythagoras' theorem Accept 'Gwenda doesn't zigzag up the hill'
9(c)(ii) Impact, e.g. 'run could be longer', 'it is an under estimate', 'bumps could make it longer'	E1	Independent of (c)(i) Allow 'it is inaccurate' Do not accept 'shorter' alone However, accept 'shorter than the actual length'
10(a)(i) Mid points : 1.5 , 3 , 4.5, 7	B1	
1.5 × 2 + 3 × 6 + 4.5 × 8 + 7 × 4 (= 3 + 18 + 36 + 28 = 85)	M1	FT 'their mid points' provided each one lies within the appropriate group, including bounds
÷ 20	m1	
4.25 (microns)	A1	Accept 4.3 from correct working, i.e. 85 ÷ 20 seen in working Do not accept 4.2 unless 4.25 or 85 ÷ 20 seen in working

GCSE Mathematics – Numeracy Unit 2: Intermediate Tier Autumn 2016	Mark	Comment
10(a)(ii) 45 dust particles means 3×7 : 3×8 21 : 24 or 21 in total equivalent (A further) 13 (dust particles)	M1 m1 A1	Accept 7×45/(7+8) : 8×45/(7+8) Allow M1, m1, A0 for sight of 8 + 13 = 21 *Alternative:* *Trial & improvement, e.g.* *18 : 27 (is 2 : 3 incorrect)* *19 : 26 (incorrect)* *20 : 25 (is 4 : 5 incorrect)* *21 : 24 (is 7 : 8 correct!!)* *M1 for sight from the above list:* *a trial with correct simplification shown* ***AND*** *--- either for a second trial with correct simplification shown* *--- or the second trial has clearly been dismissed* *m1 Selection of 21 : 24* *A1 (a further) 13 (dust particles)*
10(b) (Circumference) $5 = 2 \times \pi \times r$ or $5 = \pi \times d$ Radius of the cylinder $\frac{5}{2\pi}$ Volume $\pi \times (5/2\pi)^2 \times 2$ 4 (microns^3)	M1 A1 m1 A2	 (5/2π = 0.79577…) FT 'their r' provided M1 awarded provided 'their r' ≠ 5/π A1 for 25/2π or 3.9(…) or 4.0 (microns^3)