GCSE MARKING SCHEME

SUMMER 2016

GCSE MATHEMATICS UNITISED UNIT 1 HIGHER TIER

4351/02

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.

Summer 2016 Unitised Unit 1 Higher Tier	✓	Mark	Comments
1. 	N° of pets	Frequency
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0	9
1	6
2	10
3	3 | $(9\times0 +) 6\times1 + 10\times2 + 3\times3$ $(= 35)$ $\div 28$ $= 1\cdot25$ ISW		B1 M1 m1 A1	Table completed and all correct. FT 'their table'. Attempt at $\sum fx$. C.A.O. for 'their table'.

2(a)   **Use overlay**
    Position at 108° from A.
    Position at 230° from B.
    Position marked OR two intersecting lines.
		M1
		M1
		A1
			± 2° (use overlay). Allow the M marks for dots, crosses or any unambiguous indication that the correct bearings have been offered.
			FT if at least M1 and two intersecting lines. (Lines must originate from point A and point B respectively)

2(b) Some comment about the different nature of the terrain between the points and the finish OR that the route was different in some way. E.g. 'Uphill from B downhill from A', 'there was (*insert obstacle name)* between B and P', 'Krysta wasn't able to run in a straight line', 'easier terrain', 'it was straighter', 'it was flat', 'a more direct route', 'Krysta went the wrong way' etc.		E1	Do not accept any reference to different running speeds or tactics.

3   900
          18
        918
          18.36
        936.36
          18.72(72)
        955.08(72)
                (£) 955.09   OR   95509(p)
		B1
		
		M1
		
		A1
		A1
			For the evaluation of a correct 2% OR Sight of $1\cdot02$ (54 and 954 imply use of 3×18 and gain B1)
			
			For attempting to find 3 different 2%.
			OR $900 \times 1\cdot02^3$.
			
			Or A1 for sight of (£)55.08(….) or (£)55.09.
			FT one error if rounding required and shown.
			Note $900 \times 1\cdot02^3 = 955.10$ is B1,M1,A0 (incorrect) and A0 (no rounding shown).
			Accept £955.09p. Do not accept 955.09p.
			Mark final value of investment (i.e. do not penalise if they continue to give £55.09)

4. $14160 = \dfrac{2\cdot65 \times 8000 - C}{1\cdot25}$ $(C =)\ 2\cdot65 \times 8000 - 1\cdot25 \times 14160$ $(\ 21200\ -\ 17700\ )$ $= (£)\ 3500$		B1 M1 A1	For correct substitution into given formula. Also B1 for $14160 = \dfrac{21200 - C}{1\cdot25}$ Allow $1\cdot25 \times 14160 - 2\cdot65 \times 8000\ (= -C)$ CAO If B1 not awarded allow SC1 for (£)2800.

Summer 2016 Unitised Unit 1 Higher Tier	✓	Mark	Comments

Ribbon marking for 5(a) and 5(b)
 5(a)
     A correct point plotted at $(k, 175k)$ $k \neq 0$
 	
     A line joining (0,0) and their plotted point.
 Correct line drawn between (0, 0) and (50, 8750 ± 50).
		B1
		
		 B1
		 B1
			Allow (±£0.50, ±50yen) i.e. '½ a small square'.
			 B0 if any incorrect plots used e.g. 'dog-leg'.
			 Allow unambiguous attempt at plotting an inappropriate point e.g. (1, 175) which may lead to B1,B1,B0.
			 If no line drawn award B1 for any 4 correct plots.
			 CAO but award B1 if line starts at (10, 1750)
			 This implies all previous marks.

Ribbon marking for 5(a) and 5(b)
 5(b)   Correct method using their graph
      e.g. 4 × reading at 5000 yen
 	
             (£)114(to nearest £)
		M1
		
		 A1
			F.T. 'their graph'(allow ± ½ a small square).
			
			 Must be to the nearest pound.
			 E.g. using graph to give
			   5000yen = £29, so 20000yen = £116 is M1A1
			
			 Alternative method
			 20 000 ÷ 175 *M1*
			 (£)114(to nearest £) *A1*
			 (£)114.28……. or (£)114.29 gains M1A0
			 If graph not used then allow SC1 for
			 £114 < Answer ≤ £115 (may be from trial and improvement).

6(a)   Valid reason for misleading impression
     e.g. 'No scale (numbers / %) for pass rate.'
 	
   Suitable example,
     e.g. '*Porws* may have gone from 10% to 20% but
      Gorry may (be better) at constant 80%'.
     '*Gorry*'s results are better'.
		E1
		
		 E1
			<u>Must</u> refer to there being no information regarding scale for this E1'.
			 Do not accept e.g. 'different number of pupils'.
			
			 Allow any form of suggestion that *Gorry School* (may) still have better results than *Porws School*.

6(b)   A statement that refers to the actual numbers
       not being known.
     e.g. 'no figures given'.
		E1	'There could be more councillors at Eastbridge' is E1.
			 'There could be more councillors at Westbridge' is E0.

7. 4·87		B2	B1 for sight of 4·86(68…) or 4·9(0) or 4·8(0) or 4·870.

8.
         Beca's total score >21
         Beca's median score < 5
 	
            Beca's range < 7
		B1
		 B1
		
		 B1
			Mark scores given in table.
			 Possible to allow if table not completed if total > 21.
			 Possible to allow if enough of table completed to ensure median < 5.
			 All of table must be completed for this B1.
			 Penalise −1 from any marks gained if a score > 10 is included in the table.

9.
   100   × 6 × 60 or equivalent (e.g. ÷ 0·0027…)
         ÷ 1000
        × 5/8   or equivalent (e.g. ÷ 1·6)
 	
                   = 22·5 (mph)
	✓
	 ✓
	 ✓
	
	 ✓
		M1
		 M1
		 M1
		
		 A1
			Calculations <u>must</u> be linked to the 100 at some stage before any M marks can be awarded.
			 If a calculation using any of the values is repeated (e.g. ×6×60 followed by ÷360, or ÷1000 used twice) then M0.
			 Ignore units throughout solution.
			 Award the M1 at any stage. Allow FT if a previous M1 has not been awarded.
			 C.A.O. Mark final answer.

			Summer 2016 Unitised Unit 1 Higher Tier	✓	Mark	Comments
10.	(Declared as *Gift Aid* = ⅓ × £24810 =) (£)8270 (Claimed as *Gift Aid*) $\dfrac{8270}{10}$ = 827 827 × (£)2.5(0) = (£)2067.5(0)	✓ ✓ ✓ ✓ ✓	B1 M1 A1 M1 A1	For sight of (£)8270 F.T. 'their (£)8270' (even £24810) FT 'their 827' (even if not a whole number). Mark final answer for claimed amount. *Alternative methods. (FT previous values for each M)* *8270 B1 2481 B1* *8270 × 1·25 M1 2481 × 2·50 M1* *(£)10337.50 A1 (£)6202.50 A1* *10337.50 – 8270 M1 6202.50 ÷ 3 M1* *(£)2067.50 A1 (£)2067.50 A1* *8270 B1* *8270 × 0·25 M2* *(£)2067.50 A2*

Look for
- spelling
- clarity of text explanations and correct units shown
- the use of notation (watch for the use of '=' , '+', '−', '×' and '÷' being appropriate)

QWC2: Candidates will be expected to
- present work clearly, with words explaining process or steps

AND
- make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer

QWC1: Candidates will be expected to
- present work clearly, with words explaining process or steps

OR
- make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer

| ✓
✓ | QWC
2 |

QWC2. Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.

QWC1. Presents relevant material in a coherent and logical manner, but with some errors in use of mathematical form, spelling, punctuation or grammar.
OR
Evident weakness in organisation of material but using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar.

QWC0. Evident weakness in organisation of material and errors in use of mathematical form, spelling, punctuation and grammar.

<u>An unsupported answer is QWC0.</u>

11.	$27 × \dfrac{8}{6}$ $× \dfrac{5}{9}$ = 20 (min).		M1 M1 A1	M2 for correct use of the '27' with all four of the numbers 8, 6, 5 and 9. M1 for correct use of the '27' with any two of the numbers 8, 6, 5 and 9. C.A.O.
12.	95% ≡ (£)137 750 $\dfrac{(£)137\,750 × 100}{95}$ or equivalent. =(£)145 000		B1 M1 A1	Accept any indication.

Summer 2016 Unitised Unit 1 Higher Tier	✓	Mark	Comments
13.(a) (Area of one sector =) $\dfrac{37}{360} \times \pi \times 7^2$		M1	
$= 15\cdot8(2\ldots)(m^2)$		A1	Accept 15·81 to 15·83 inclusive OR 15·8. Accept 16 provided correct working seen. *Also accept combining sectors and working with 74° to give 31·64(m^2) for M1A1.*
(Total area = $2 \times 15\cdot82 + 7^2$ =) $80\cdot6(4)(m^2)$		A1	F.T. 'their 15·82'. Allow SC1 for 58(·0..) [9·04 + 49]
13.(b) (Arc length =) $\dfrac{37}{360} \times 2 \times \pi \times 7$		M1	
$= 4\cdot5(2\ldots)(m)$		A1	Accept 4·51 to 4·53 inclusive OR 4·5. *Also accept combining sectors and working with 74° to give 9(·04)(m) for M1A1.*
(Perimeter length = $2 \times 4\cdot52 + 28$ =) $37(\cdot04m)$		A1	F.T. 'their 4·52'. Allow SC1 for 59·6(..)(m) [31·64 + 28] *For those who take diameter to be 7m allow SC1 for giving arc length as 2·25 to 2·3 inclusive AND A further SC1 for final answer of 32·5 to 32·6 inclusive.*
14. Sight of 950(miles) AND 1050(miles) Sight of 25·5(gallons) AND 26·5(gallons)	✓ ✓	B1 B1	Allow 1049·9… recurring. Allow 26·49….recurring. If both B0 allow SC1 for any two correct values. (e.g. 950 with 1049 AND 25·5 with 26·49 is B0B0,SC1) F.T. only if 900≤ lowest distance <1000, 1000< greatest distance ≤1100, 25 ≤ lowest gall.< 26 and 26< highest gall.≤ 27.
Sight of $\dfrac{950}{26\cdot5}$ and Sight of $\dfrac{1050}{25\cdot5}$	✓ ✓	M2	M1 for each.
(Lowest) 35·8(mpg) AND (Highest) 41·2(mpg)	✓	A1	Must be unambiguously identified AND given correct to 1 decimal place.
15. (Volume of TWO spheres =) $\dfrac{8\pi r^3}{3}$	✓	B1	Accept $\dfrac{4\pi r^3}{3} + \dfrac{4\pi r^3}{3}$
(Volume of cylinder =) $9\pi r^3$	✓	B1	Accept $\pi r^2 9r$.
$\dfrac{8\pi r^3}{3} + 9\pi r^3 = 3340$	✓	M1	F.T. 'their volumes' ONLY if dimensionally correct and 2 different shapes involved.
$r^3 = 91(\cdot1\ldots.)$ or equivalent	✓	A1	C.A.O.
$r = 4\cdot5(cm)$	✓	A1	F.T. from 'their r^3' if M1 awarded. Note that an unsupported answer of 4·5(cm) is zero marks.
$x = 58\cdot5(cm)$	✓	B1	F.T. 13 × 'their stated r'

16.
   Sight of correct corresponding values for volumes.
E.g.   ⅓πr^2h with ⅓π(r/2)^2(2h)
     or   ⅓π(2r)^{2}h with ⅓πr^2(2h) etc.
		B2	F.T. 'their consistent notation for radius and height'.
			B1 for unambiguous intent but missing brackets.

'NO' because $\dfrac{\pi r^2 h}{3} > \dfrac{\pi r^2 h}{6}$ or $\dfrac{4\pi r^2 h}{3} > \dfrac{2\pi r^2 h}{3}$		E1	Dependent on B2 AND correctly simplified in order to convincingly state 'NO'. A convincing statement required. SC2 for correctly evaluated answers using specific numerical values for radius and height of cone A and correct corresponding values for radius and height of cone B AND stating 'No'. SC1 for correct answers with no (or an incorrect) conclusion.