GCSE MARKING SCHEME

JANUARY 2016

MATHEMATICS UNITISED - UNIT 2
HIGHER TIER
4352/02

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.

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1. $4x - 6 = 1$
    $4x = 7$
    $(x =)$ 7/4 or 1 ¾ or 1·75
	B1
	B1
	B1
	
	3
		FT until 2nd error.
		
		Mark final answer
		Alternative solution:
		    2x – 3 = ½ *B1*
		        2x = 3·5 *B1*
		        (*x =) 7/4 or 1 ¾ or 1·75* *B1*

2.   <u>Method 1 (total profit = total selling price – total cost price)</u>
(Cost of making candles =)
$60 \times$ (£)2.50 + 20 × (£)5
            (= £150 + £100 = £250)
 	
(Money taken from selling candles =)
[60 – 12] × (£)6 + [20 – 8] × (£)11
            (= £288 + £132 = £420)
 	
(£)250 AND (£)420
 	
(Profit =) (£)420 – (£)250 – (£)40
 	
                    = (£) 130
 	
OR
 	
<u>Method 2 (total profit = large candle profit + small candle profit – £40)</u>
(Large candle profit =)
[20 – 8] × (£)11 – 20 × (£)5
            (= £132 – £100 = £32)
 	
(Small candle profit =)
[60 – 12] × (£)6 – 60 × (£)2.50
            (= £288 – £150 = £138)
 	
(£)32 AND (£)138
 	
(Total profit =) (£) [32 + 138 – 40]
 	
                = (£) 130
	
	M1
	
	M1
	
	A1
	
	m1
	
	A1
	
	OR
	
	M1
	
	M1
	
	A1
	
	m1
	
	A1
		
		FT 'their £250' and 'their £420' provided M1 awarded
		
		FT 'their £32' or 'their £138' provided at least one correct and M1 awarded
		
		If first 3 marks are not gained, award M1 M0 A0 for a method which disregards the fact that there were unsold candles (and the remaining m1A1 can then be followed through),

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		e.g. (Cost of making candles =) $60 \times$ (£)2.50 + $20 \times$ (£)5 $\qquad\qquad$ (= £150 + £100 = £250) (Money taken from selling candles =) $60 \times$ (£)6 + $20 \times$ (£)11 $\qquad\qquad$ (= £360 + £220 = £580) or e.g. (Large candle profit + small candle profit =) $20 \times$ [(£)11 – (£)5] + $60 \times$ [(£)6 – (£)2.50] $\qquad\qquad$ (= £120 + £210 = £330) OR If first 3 marks are not gained, award M1 M0 A0 for a method which does not include the production costs of the unsold candles (and the remaining m1A1 can then be followed through), e.g. (Cost of making candles =) $48 \times$ (£)2.50 + $12 \times$ (£)5 $\qquad\qquad$ (= £120 + £60 = £180) (Money taken from selling candles =) $48 \times$ (£)6 + $12 \times$ (£)11 $\qquad\qquad$ (= £288 + £132 = £420) or e.g. (Large candle profit + small candle profit =) $12 \times$ [(£)11 – (£)5] + $48 \times$ [(£)6 – (£)2.50] $\qquad\qquad$ (= £72 + £168 = £240)
QWC: Candidates would be expected to • clearly show how they arrived at their solution • have few errors in mathematical form, spelling, punctuation and grammar 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	QWC2 7	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 weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. A final unsupported statement only gets QWC0

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3. $12·5 \times 12 \times 10$ (mm) or equivalent
    1500 (mm)
                $1·5$ (m)
 	
	M1
	A1
	B1
	
	3
		
		FT 'their derived length'.
		Penalise if derived from incorrect working.
		
		Unsupported 1·5 (m) gains 3 marks.

4.
$3x + 8 +\ 4x - 2 + 90 = 180$ or equivalent
 	
   $7x = 84$ OR $7x + 96 = 180$ OR $7x + 6 = 90$
                $x = 12(°)$
 	
$(4 \times 12 - 2 =)\ 46(°)$
$(y = 180 - 46 =)\ 134(°)$
 	
	M1
	
	A1
	A1
	
	B1
	B1
	
	5
		Check diagram
		
		CAO
		FT 'their ax = b', a $\neq$ 1
		
		Alternative method (for first 3 marks),
		using trial and improvement to equate the
		sum of the base angles to 90:
		2 appropriate trials M1
		Trials of 11 and 13 or trials of 11 and 12 or
		trials of 12 and 13 A1
		x = 12(°) A1
		
		Unsupported $x = 12(°)$ gains M1A1A1.
		
		FT 'their x' (provided $x < 23(°)$)
		FT 'their $46(°)$'
		
		   Alternative method (for final 2 marks):
		   (y =) 3 × 12 + 8 + 90 B1
		   (=) 134(°) B1
		
		Unsupported $x = 12(°)$ AND $y = 134(°)$ gains
		5 marks

Unit 2 GCSE Maths January 2016 Higher Tier Markscheme	M A R K	Comment
5. 320 (seconds) OR 364 (seconds)	B1	
Complete method for finding 15% of 320	M1	FT from 'their times' in seconds. Accept 364 ÷ 1.15 (= 316.52.... [seconds]).
48(seconds) 368 (seconds) or 6 minutes (and) 8 (seconds) AND correct conclusion 'No, because .....'	A1 A1	CAO *Alternative method:* *320 (seconds) OR 364 (seconds) B1* *Difference in times = 44(seconds) M1* *% difference=(364 – 320)/320 ×100(%) M1* *13.75% or 14% AND 'No' A1* *Alternative method:* *320 (seconds) OR 364 (seconds) B1* *Difference in times = 44 (seconds) M1* *Complete method for finding 15% of 320 M1* *48(seconds) AND correct conclusion A1*
	4	
6. $5n – 14$	B2 2	B1 for sight of $5n$ (± …..)
7. (Angle of orange sector = 234(°) / 3 =) $\qquad$ 78 (°)	B1	
(Angle of purple sector =) $\qquad$ 360(°) – 234 (°) – 78(°) = $\qquad$ (= 48(°))	M1	FT 'their 78°'
(Probability of landing on the purple sector =) $\qquad$ 48/360 $\qquad$ = 2/15	A1 A1	FT 'their 48' CAO
	4	
8. (a) Method that produces at least 2 correct prime factors Sight of correct factors (2, 5, 5, 7) in any order	M1 A1	FT until 2nd error Ignore 1s seen
$\qquad$ $2 \times 5^2 \times 7$	B1	FT their (prime) factors (with at least 1 index >1 used). Do not ignore 1s within the product. B0 for a sum or list. Accept any order, provided indices are correctly used.
(b) Valid explanation e.g. not all powers are even	B1	
(c) $7·23 \times 10^{-6}$	B1	
	5	

Unit 2 GCSE Maths January 2016 Higher Tier Markscheme	MARK	Comment
9. Correct enlargement	B3 3	B2 for any 2 correct vertices OR for correct enlarged (and INVERTED) shape in incorrect position OR scale factor -3 consistently used B1 for scale factor of $+2$ or -1 consistently used

10. (a) Correct line drawn for $x + 3y = 6$
 	
(b) $x + 3y = k$ OR $y = -1/3\,x + c$ or equivalent
	B2
	
	B1
	3
		B1 for a line with
		     correct gradient drawn $(= -1/3)$
		  OR correct y-intercept plotted $(0, 2)$
		  OR correct x-intercept plotted $(6, 0)$
		
		If no line drawn,
		B1 for any two points calculated or plotted correctly (with no more than 2 incorrect points)
		
		$k \neq 6,\ c \neq 2$

11. $9w^2 = 1 - x^2$ $w^2 = (1 - x^2)/9$ or $3w = (\pm)\surd(1 - x^2)$ $w = (\pm)\surd[(1 - x^2)/9]$ or $(\pm)\,\surd(1 - x^2)\,/\,3$	B1 B1 B1 3	FT until 2nd error (for equivalent difficulty) Square root must clearly be over complete expression (or correct use of brackets) if denominator is 9 OR clearly over numerator only if denominator is 3 FT 'their w^2' (provided the expression has more than one term) Mark final answer e.g. $\surd(1 - x^2) = 1 - x$ gets B0
12. $4c + l = 35,\ 2c + 3l = 40$ Method to find the first variable Correct first variable Correct second variable	S1 M1 A1 A1 4	Strategy of forming a pair of equations. (Do not penalise for not defining variables.) Allow one slip (but not in equated variable). FT 'their equations' (provided equivalent difficulty) FT their first variable $c = 6.5$(cm), $l = 9$(cm) Unsupported answers get 0 marks.

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13. Angle BCD or BAD = 90(º) Angle CBD = 27(º) or BAC= 63(º) Angle BDC = 63(º)	B1 B1 B1 3	Check diagram throughout. First B1 may be implied. Do not award if 63 is derived from incorrect working. Where applicable, annotations on the diagram must correspond to working.

14. (a) $x = 0.06262.....$ $100x = 6.26262.....$ with an attempt to subtract
                62/990 (= 31/495)
 	
(b) $4\sqrt{5} + 15 - 2\sqrt{5} - 5$
   $= 2\sqrt{5} + 10$
 	
(c) 3/5 or 0·6
	M1
	
	A1
	
	B1
	B1
	
	B2
	
	6
		Or $10x$ and $1000x$, or equivalent. Or an alternative method.
		CAO (6·2/99 gets M1 A0)
		
		FT from one incorrect term
		<i>Alternative method:</i>
		$\sqrt{5}(2 + 2\sqrt{5})$ B1
		$2\sqrt{5} + 10$ B1
		
		B1 for $(5/3)^{-1}$ or $1/(5/3)$ or $(9/25)^{1/2}$ or $\sqrt{9}/\sqrt{25}$ or $\sqrt{(9/25)}$ or $\sqrt{0.36}$
		
		B0 for $9/25^{1/2}$ or $9^{1/2}/25$

15. (a) $2/6 \times 1/5 + 3/6 \times 2/5$
        8/30 (= 4/15)
 	
(b) $1/6 \times 2/5 + 2/6 \times 1/5$
        4/30 (= 2/15)
	M2
	A1
	
	M2
	A1
	
	6
		M1 for one correct product
		CAO
		If no marks awarded,
		SC1 for an answer of 13/36 resulting from a calculation 'with replacement'.
		
		M1 for one correct product
		CAO
		If no marks awarded,
		SC1 for an answer of 4/36 (= 1/9) resulting from a calculation 'with replacement'.

16. (a) Sketch with downwards shift – 4 indicated on y-axis or $(0, – 4)$ given (b) Reflection in x-axis, passing through $(0, –2)$ (coordinates need not be labelled) (c) Reflection in y-axis, passing through $(0, 2)$	B1 B1 B1 B1 4	Clear intention to draw same curve. Depends on first B1. Clear intention to reflect same curve. Clear intention to reflect same curve.