## wjec cbac

## **GCSE MARKING SCHEME**

**SUMMER 2016** 

GCSE 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.

	Μ	
Summer 2016 Unitised Unit 2	a	
Higher Tier	r	Comment
	k	
1. (a) Correct rotation.	B2	B1 for clockwise rotation about $(0, 2)$
		OR anticlockwise rotation about $(2, 0)$
(b) Connect translation	D1	OR 2 correct vertices.
(b) Correct translation	B1 3	
2. Jewellery Boutique:		
(Cost including VAT = )		
$[36 + 36 \times 20/100] \times 2$ or $[72 + 72 \times 20/100] \times 2$ or equivalent	M1	A complete correct method for increasing by 20%.
(Total cost including P & P = ) (£)86.40 ( + (£)6.95)	A1	Accept sight of $2 \times (\pounds) 43.20$ or $(\pounds) 72 + (\pounds) 14.40$
$=(\pounds)93.35$	B1	FT 'their $\pounds 86.40' + \pounds 6.95$
		If M0A0, award SC1 for sight of (£)7.20 or (£)14.40 or (£)43.20.
		If M1A1 have been awarded, B1 can only be awarded
Come and Car		for a fully correct total.
Gems and Co: (Total cost =)		
$(\pounds)55 + 1/2 \times (\pounds)55$ or equivalent	M1	A complete correct method.
$(\pm)$ ( $\pm)$ ( $\pm)$ ( $\pm)$ ) (\pm) ) ( $\pm)$ ) (\pm) ) ( $\pm)$ ) (\pm) ) ((\pm) ) ) ((\pm)	A1	Correct total.
Conclusion that 'Gems and Co' is cheaper AND by (£)10.85	B1	FT only if both M1 marks are awarded.
Look for		
• relevance	Q	QWC2 Presents relevant material in a coherent and
• spelling in at least 1 statement/sentence	W	logical manner, using acceptable mathematical
• clarity of text explanations,	С	form, and with few if any errors in spelling,
• the use of notation (watch for the use of '=', £, %	2	punctuation and grammar.
being appropriate)		QWC1 Presents relevant material in a coherent and
A clear conclusion statement must be made before		logical manner but with some errors in use of
QWC2 can be awarded.		mathematical form, spelling, punctuation or
QWC: Candidates would be expected to		grammar
<ul> <li>clearly show how they arrived at their solution</li> </ul>		OR
<ul> <li>have few errors in mathematical form, spelling,</li> </ul>		evident weaknesses in organisation of material
punctuation and grammar		but using acceptable mathematical form, with few if any errors in spelling, punctuation and
1 0		grammar.
Count incorrect use of '=' in situations such as		grunnia.
$36 \times 20/100 = 7.20 + 36$ within the 'errors in mathematical		QWC0 Evident weaknesses in organisation of
form'.		material, and errors in use of mathematical form,
QWC2: Candidates will be expected to		spelling, punctuation or grammar.
<ul> <li>present work clearly, with words explaining process</li> </ul>		A final ungung out of statement and a state OWCO
or steps		A final unsupported statement only gets QWC0
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		
<ul> <li>present work clearly, with words explaining process</li> </ul>		
or steps		
OR		
• make few if any mistakes in mathematical form,		
spelling, punctuation and grammar and include units		
$(\pounds)$ in their final answer	8	

## GCSE Mathematics - Unitised Unit 2 Higher Tier Summer 2016 Mark Scheme

	Μ	
Summer 2016 Unitised Unit 2 HigherTier	a r k	Comment
3. Angle <i>BFC</i> or Angle <i>DFG</i> = $42(^{0})$ OR Angle <i>CFD</i> or Angle <i>BFG</i> = $138(^{0})$	B1	May be implied. Check diagram.
(y =) (180 - 138)/2 or $(y =) (180 - [180 - 42])/2$	M1	Or 'Exterior Angle <i>BFC</i> ' / 2 FT 'their 42( <sup>0</sup> )' or 'their 138( <sup>0</sup> )'
(=) 21( <sup>0</sup> )	A1 3	
4. $11x - 1 = 8x + 20$	B1	FT until 2 <sup>nd</sup> error.
3x = 21	B1	
x = 7	B1 3	Mark final answer.
52, -1, 0, 1	B3	B2 for a list with one omission or one extra number.
		B1 for 2 correct integers (and no incorrect integers).
		If an incorrect inequality is given, FT for B2 provided $-2.5$ or 1 seen and equivalent difficulty.
		If no integers are listed, B1 for $-2.5 < n \le 1$ or for $-2.5 < n \le 1$ or for $-2.5 < n \le n \le 1$ (or equivalent).
	3	Award B0 for a list arising from $-5 < n \le 2$ (i.e. disregarding the factor of 2).
6. $400 - 0.35 \times 400$ or equivalent OR $0.65 \times 400$ (No. of non-green beads =) 260	M1 A1	Complete method for finding the number of non-green beads.
(100. 01  holf-green beads =) 200	AI	
$(260 - no. of blue beads OR no. of white beads =)$ $260 - 260 \div 5 \times 2 OR 260 \div 5 \times 3$ $= 156$	M1 A1	FT 'their number of non-green beads'.
(Probability of picking a white bead =) $156/400$ (= 39/100 or equivalent)	A1	FT their answers provided both M1 marks awarded. ISW
		Alternative method: 2/5 × 65% B1 (Probability of picking white =) 100% - 35% - 2/5×65% (FT 'their 65%') M2 100% - 35% - 26% (FT 'their 26%') M1 = 39% (= 0.39) A1
		Alternative method: 3/5× 65% (= 195/500) = 39%
		If M0A0, award SC1 for sight of 140
	5	OR if M0A0 and the word 'remaining' has been ignored, award SC2 for a final answer of ¼ or equivalent, SC1 for 140 green beads or 100 white beads.

	м	
Summer 2016 Unitised Unit 2	M	
Higher Tier	a r	Comment
inghti itti	k	
7. (a) $9n-1$	B2	B1 for sight of 9 <i>n</i> or equivalent.
(b) $(n+2)^2 + 4$ or equivalent	B3	B2 for $(n + 2)^2 + a$ or for omitting brackets.
		B1 for $(n + k)^2 + 4$ OR B1 for each correct term in $n^2 + 4n + 8$ , within a quadratic with more than one term OR B1 for listing the terms of the sequence and finding a $2^{nd}$ difference of 2.
		Look out for alternative ways of considering the spatial arrangements leading to e.g. $n^2 + 4(n+3) - 4$
	5	
8. (a) $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	B1 B1 B1	CAO FT from 1 error, this error may have an impact on further cumulative values, but this counts only as 1 error FT their fractions as decimals, provided between 0 and 1 (not inclusive), accuracy to 2 d.p. if appropriate.
(b) All 6 points plotted correctly	P2	<ul> <li>Plotting must be correct to within half a square on the grid.</li> <li>FT for their cumulative decimals.</li> <li>Ignore joining points.</li> <li>P1 for 4 or 5 points plotted accurately, must be from cumulative results.</li> <li>Do not award if bars are drawn (unless <u>with</u> points plotted).</li> </ul>
<ul> <li>(c) (Statement that Katie's claim is supported with) reason e.g. <u>best</u> estimate of the probability is 0.75, or <u>final</u> relative frequency value is 0.75.</li> </ul>	E1	FT their final column entry in (a), provided clear reference is made to final value.
	6	
9. $x \ge -1$ or equivalent $y \le -x$ or equivalent	B1 B2 3	Accept '>' Accept '<'. B1 for $y = -x$ , $y > -x$ , $y \ge -x$ or B1 for $y \le -kx$ (+ 0), with $k > 0$ or B1 for $y \le x$ .
10. (a) $5.3 \times 10^{-8}$	B1	
(b) $6.19 \times 10^{12}$	B1 B1 2	
11. Method to find the first variable	M1	Allow one slip (but not in the equated variable).
Correct first variable	A1	and only (out not in the equated (analote).
Method to find the second variable	m1	
Correct second variable	A1	x = 0.5, y = -3
	4	

	Μ	
Summer 2016 Unitised Unit 2	а	Comment
Higher Tier	r	Comment
12. (a) $360 - 90 - x - 2x$	<b>k</b> M1	Using quadrilatoral QADC
12. (a) $360 - 90 - x - 2x$	IVI I	Using quadrilateral <i>OADC</i> e.g. Angle $OCD + x + 90 + 2x = 360$
$270(^{\circ}) - 3x$	A1	c.g. T m g c c c D + x + y c + 2x = 500
(b) Angle $ABC = x$	B1	Using the angle in the centre
Angle $DAB = 180 - 2x$	M1	Using triangle <i>DAB</i>
		e.g. Angle $OAB + x + x + 90 = 180$
(Angle $DAB$ – Angle $DAO$ =)		
$90(^{\circ}) - 2x$	A1	
	5	
13.  4c - bc = 2a + d	B1	FT until 2 <sup>nd</sup> error.
c (4-b) = 2a+d	B1	
c = (2a + d) / (4 - b) or equivalent	B1	Mark final answer.
	3	
14. (a) $x = 0.04444$ $10x = 0.4444$ with an attempt to subtract	M1	Or 10 <i>x</i> and 100 <i>x</i> , or equivalent. Or an alternative method.
(1/3 +) 4/90  OR  (1/3 +) 2/45	A1	An answer of $0.4/9$ gains M1 only.
34/90 (= 17/45)	A1	FT 'their 4/90' provided equivalent difficulty.
		Mark final answer. Do not ignore incorrect cancelling.
		Alternative solution
		x = 0.37777B1
		10x = 3.7777 with an attempt to subtract M1
		x = 34 / 90 (= 17/45) A1
		If a smaller equal $d = C(1) f_{cons} = f_{cons} f_{cons} = f_{cons} + 24/00$
		If no marks awarded, SC1 for a final answer of $34/99$ (resulting from using $0.343434$ ) OR SC1 for a
		final answer of 37/99 (resulting from using
		0·373737)
(1) 1/4 0.25	D2	<b>D1</b> for $4^{-1}$ or $1/(1/2 - 1/1/2)^{1/2}$
(b) 1/4 or 0.25	B2	B1 for 4 <sup>-1</sup> or $1/\sqrt{16}$ or $1/16^{1/2}$ or $(1/16)^{1/2}$ Allow $\pm 1/4$ or $\pm 0.25$ for B2
		OR - 1/4 or $-0.25$ for B1
(c) $9 - 3\sqrt{5} - 3\sqrt{5} + 5$	M1	3 or 4 terms correct.
$14 - 6\sqrt{5}$	A1	Mark final answer.
	7	
15. Translation horizontally to the left $(-5, 0)$ and $(-2, 0)$ indicated correctly on the <i>x</i> -axis	B1 B1	Clear intention
(-5, 0) and $(-2, 0)$ indicated correctly on the x-axis with the correct translation.	DI	
		SC1 for right shift with $(3, 0)$ and $(6, 0)$ indicated.
	2	
16. $1 - [P(3 \text{ red balls}) + P(3 \text{ yellow balls})]$	<b>S</b> 1	P(RYY) + P(YRY) + P(YYR) + P(YRR) + P(RYR) + P(RYR)
OR other <u>complete</u> method		P(RRY) or $3 \times P(RYY) + 3 \times P(YRR)$
$= 1 - [5/8 \times 4/7 \times 3/6 + 3/8 \times 2/7 \times 1/6]$	M1	Calculations showing correct sum of products of
(= 1 - [60/336 + 6/336])		probabilities (without replacement).
		Allow one numerical error for M1A0.
270/226 ( A5/56) 1930	A 1	
= 270/336 ( = 45/56) ISW	A1	If no marks awarded, SC1 for sight of 4 or 5 correctly
		calculated products.
	3	1
		·

GCSE Mathematics Unitised Unit 2 HT MS Summer 2016/LG