GCSE MARKING SCHEME

SUMMER 2016

**GCSE MATHEMATICS LINKED PAIR METHODS
UNIT 1 HIGHER
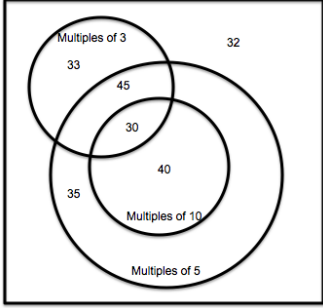4363-02**

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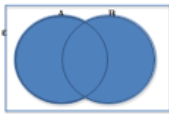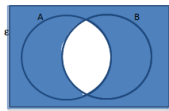
WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

METHODS IN MATHEMATICS
UNIT 2 (HIGHER TIER) SUMMER 2016

Methods in Mathematics Unit 1 Higher Tier	Mark	Comments

1.   x= 40(°)
   y = 75(°)
Sight of 180 – 75 – 40 or 105 – 40 or equivalent
   z = 65(°)
	B1
	B1
	M1
	A1
	4
		
		FT 180 – 'their x' – 'their y'
		FT 180 – 'their x' – 'their y' correctly evaluated

2(a) 0.625
                     $\cdot\ \cdot$
      0.2727… or 0.27
      Recurring, Terminating, Recurring
 	
(b) $\underline{0.27}$ or $\underline{0.9}$ or $\underline{0.3}$ or equivalent correct 1st step
       5.4   18   6
 	
                $\underline{27}$ or $\underline{9}$ or $\underline{3}$ or 0.05
               540   180   60
 	
                                 1/20
 	
(c) Method that '… × 12 + 56 = 200, or
                $\underline{… × 12 + 56}$ = 2
                       100
                       Number is 12
	B1
	
	B1
	B1
	
	M1
	
	M1
	
	A1
	
	M1
	
	A1
	8
		
		FT provided at least 1 of the decimals is correct, i.e. at least B1 previously awarded
		
		Allow for sight of 0.27
		
		FT expressing as a fraction (with whole number numerator and denominator) provided equivalent level of difficulty, 2.7/5.4 = 27/54 or ½ is equivalent level of difficulty (M0, M1, A0)
		
		CAO
		
		OR 2×100, then 'their 200' – 56, then 'their 144' ÷ 12, or trial & improvement with correct operations in the correct order
		CAO

3(a)(i) -8 (ii) -1 (iii) 1 (b)(i) -8g – 29h as an expression (ii) x + 8	B1 B1 B1 B2 B1 6	 B1 for either -8g or -29h Mark final answer Accept $(x + 8)^1$
4.(a) rhombus (b) kite	B1 B1 2	 Do not accept diamond

5.(a)(i) Method that produces prime factors with 2 correct primes before the 2nd error
Prime factors: 2, 2, 2, 3, 5, 5
                $2^3 × 3 × 5^2$
(ii) 2×3 or 6
 	
(b) 440 × 6 ÷ 11
                (£)240
	M1
	
	A1
	B1
	B1
	
	M1
	A1
	6
		
		Ignore 1s included
		FT for equivalent level of difficulty
		FT for equivalent level of difficulty from (i)
		
		Allow with sight of the smaller share

1

Methods in Mathematics Unit 1 Higher Tier	Mark	Comments
6(a) Reason, e.g. 'all multiples of 10 are multiples of 5', 'multiples of 10 are also multiples of 5', 'not all multiples of 5 are multiples of 10', 'multiples of 10 is a subset of multiples of 5'	E1	Do not accept 'some multiples of 10 are also multiples of 5'
(b)(i) 6 numbers placed correctly 	B3	B2 for 4 or 5 numbers uniquely placed correctly, the other 2 or 1 number(s) respectively omitted or incorrectly placed or repeated, OR B1 for 2 or 3 numbers uniquely placed correctly, the other 4 or 3 numbers respectively omitted or incorrectly placed or repeated *Penalise extra numbers included -1 throughout* *In (b)(ii) ignore incorrect cancelling.* FT their Venn diagram

(ii) 0
        1/6
        2/6 (= 1/3)
	B1
	B1
	B1
	7
		CAO

7(a) 360 ÷ 18 20 (sides)	M1 A1	Or equivalent **complete** method
(b) (Total of interior angles) 3×180(°) 540(°)	M1 A1	or $5 \times (180(°) - 360(°) \div 5)$ alternative full method

125(°) + 130(°) + 135(°) + …. + …. = sum of interior angles of a polygon
        (540(°) – 390(°))÷ 2 or 150(°)/2
 	
              (Each interior angle is) 75(°)
	M1
	
	m1
	
	A1
		FT 'their 540' provided > 390
		
		Rearranged form or manipulated correctly to this stage of working
		
		Alternative:
		(Exterior angles are)
		180(°) – 125(°),180(°) – 130(°) & 180(°) – 135(°)
		                                                                M1
		(Each remaining exterior angle) FT from M1
		* 360(°) – 55(°) - 50(°) – 45(°) M1*
		* ÷ 2 m1*
		(depends on at least M1 previously awarded)
		(Each exterior angle is) 105(°) CAO A1
		(Each interior angle is) 75(°) A1
		FT 180 – 'their 105' provided M1, M1 and m1 awarded

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
	
	9
		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.

2

Methods in Mathematics Unit 1 Higher Tier	Mark	Comments
8(a) Showing 6 can be scored in 3 ways, 6×1 2×3 (and 3×2) with no others	B1	Do not accept if 1×6 also given
Idea that there are 32 possible outcomes	B1	Accept from sight of 4 × 8 or 1/8 × ¼ or similar Allow from incorrect evaluation of a suitable calculation
9	B1	FT 'their 3 ways' provided 6×1 is considered or 'their 32' outcomes provided their number of outcomes is >24, that is (96 ÷ 'their number of outcomes')× 'their 3 ways', accept approximation or rounding of division to a whole number An answer only given as a probability, 9/96, is awarded B1, B1, B0
(b) Considering all possibilities, e.g. odd×even=even, even×odd=even, odd×odd=odd and even×even=even, OR	B1	Accept for sight of 24/32 or 8/32

	1	2	3	4	5	6	7	8
1	1	2	3	4	5	6	7	8
2	2	4	6	8	10	12	14	16
3	3	6	9	12	15	18	21	24
4	4	8	12	16	20	24	28	32

	Mark	Comments
Appropriate conclusion, e.g. stating that possible products more often give even, OR stating possibility of odd 8 times with even 24 times, or equivalent, OR P(even) = 24/32 or P(odd) = 8/32	E1	FT from 2 errors in the evaluation of the products *Award B1 and E1 for a statement such as 'You **only** get odd numbers from odd times odd'* If no marks, award SC1 for 'even × odd = even' with an appropriate conclusion stated
	5	
9(a) Correctly completing the tree diagram 0.4, 0.8. 0.8, 0.2	B2	B1 for any one pair of branches correct (total 1)
(b) 0.6 × 0.2	M1	
= 0.12	A1	Or equivalent
(c) 0.4 × 0.2	M1	FT for their tree diagram
= 0.08	A1	Or equivalent
	6	

3

Methods in Mathematics Unit 1 Higher Tier	Mark	Comments
10(a) 12	B2	B1 for one **appropriate** step, e.g. cancelling $\sqrt5/\sqrt5$, or sight of $\sqrt9$ or 3, not $(\sqrt3)^2$ Do not accept $4\sqrt{45}/\sqrt5$ until simplified
(b) 10 (with no working or from correct working)	B3	B2 for 5 <u>AND</u> …/9 respectively B1 for 5 <u>OR</u> …/9 respectively For B2or B1 the 5, …/9 may be in working, rather than expressed as a quotient
(c) 6×10^{-5}	B1	
(d) 3×10^{12}	B2	B1 for 3 000 000 000 000 or sight of … $\times 10^{12}$
(e) $\dfrac{17\pi}{4}$ or $4\frac14\pi$ or 4.25π	B2	Mark final answer B1 for $\dfrac{10\pi}{4} + \dfrac{7\pi}{4}$ or $2.5\pi + 1.75\pi$ or equivalent
	10	
11. Strategy, e.g. 'square + 1 + square' OR attempt to look at second difference	S1	OR break down, for a couple of patterns into: " 'larger square' + 1 + 'smaller square' " Maybe implied by … $+ n^2$ or $(n+1)^2 + …$ or for example '$6^2 + 5^2 + 1$', OR for giving the correct number of squares in any pattern number >4 (strictly >4, not for pattern 4), not for Pattern number 5 written in the table for Pattern n, but allow if shown in a sequence
$(n + 1)^2 + 1 + …$ or $… + 1 + n^2$ or second difference 4	M1	Implies S1 also. Allow for '$n^2 + 1 + n^2$' or '$n^2 + 1 + (n\text{-}1)^2$' or similar
$(n + 1)^2 + 1 + n^2$ or $2n^2 + 2n + 2$ or equivalent	A1	ISW $n+1 \times n + 1 + 1 + n^2$ is awarded S1, M1, A0
	3	
12. $y = - x^2$ $y = 1/x$ $y = x^3 + 1$	B1 B1 B1	
	3	
13. $12 \times 2 = 4 \times k$ $k = 6$ (cm)	M1 A1	Do not accept from incorrect working, e.g. $4 + 2$, is awarded M0, A0
	2	
14(a) Correct region shaded	B1	
(b) Correct region shaded	B1	
	2	

Methods in Mathematics Unit 1 Higher Tier	Mark	Comments
15. (a) 1 or equivalent	B1	*Penalise incorrect cancelling of fractions-1 once*
(b) P(odd, even) + P(even, odd)	S1	OR listing 10 correct no reverse combinations, or 20 correct combinations, or sight of 20 outcomes (e.g. for 5×4)
$4/5 \times 1/4 + 1/5 (\times 4/4)$	M1	Listing all 20 combinations and selecting the correct 8 odd results, or 10 combinations and selection of 4 odd results
$= 8/20 (= 4/10 = 2/5)$	A1	Accept a correct answer from 10 possible combinations. Allow M1 A0 if FT from 1 slip in counting the combinations
	4	
16(a) $2x^2 + 4x - 5x -10 + 3 - 3x + 2x - 2x^2 (+ 1)$ or $2x^2 - x -10 + 3 - x - 2x^2 (+ 1)$	M2	M1 for any 4 terms correct
$-2x - 6 =$	A1	
$-2(x + 3)$	A1	Must be convincing from sight of $-2x - 6$ Allow expanding RHS provided M2, A1 previously awarded
(b) $(x + 3)(x + 4)$	B1	
$(x + 3)(x - 3)$	B1	
$\dfrac{x + 4}{x - 3}$	B1	Mark final answer. FT for equivalent level of difficulty provided B1 previously awarded and cancelling required
	7	
17(a)(i) $3x(°)$ or equivalent	B1	Mark final answer
(ii) $90(°) - x(°)$	B1	Mark final answer
(iii) $2x(°)$	B1	Mark final answer
(b) $180(°) - 2x(°)$ or equivalent	B1	Mark final answer
Reason, '(Opposite angles of a) cyclic quadrilateral (are supplementary)'	E1	Depends on the sight of $S\hat{J}F = 180(°) - 2x(°)$ or equivalent
	5	
18(a) $4(2x - 3) - 3(x + 5)$ as a numerator	B1	Not depending on a correct denominator
12 as a denominator	B1	Attempt common denominator 12 or multiple of 12
$\dfrac{5x - 27}{12}$	B1	Mark final answer
(b) $(x + 9)^2 + 19$	B2	B1 for a= (+)9, B1 for b = (+)19, only award B2 for $(x +9)^2 + 19$
	5	
19(a) $y = \frac{1}{3} x - 5$ or equivalent	B2	Accept $y = 2x/6 + - 5$ or equivalent Mark final answer B1 for m = $\frac{1}{3}$ or equivalent, B1 for c = -5 Only award B2 if given as an equation
(b) Perpendicular gradient -3	M1	FT -1/their m
Mid point $\dfrac{6 + -2}{2}$ or $\dfrac{5 + -5}{2}$	M1	Sight of (…, 0) is insufficient evidence for M1 Accept attempt to plot the 2 points with attempt to find the mid-point
$(2, 0)$	A1	
$y = -3x + 6$	A1	ISW. FT provided M1 and M1 both awarded
	6	