

GCSE MARKING SCHEME

METHODS IN MATHEMATICS (LINKED PAIR PILOT)

SUMMER 2012

INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2012 examination in GCSE METHODS IN MATHEMATICS (LINKED PAIR PILOT). They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were 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 conferences was to ensure that the marking schemes were 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' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

UNIT 1 (FOUNDATION TIER)

Methods Unit 1Foundation Tier Summer 2012		FINAL
1.48	B1	
10	B1	
13	B1	
9	B1	
27	B1	
8	B1	
	6	
2.(a) 13506	B1	
(b) seven million five hundred thousand	B1	Accept seven and a half million.
(c) 9000	B1	OR 9 thousand. Accept thousand(s) but not 1000(s).
(d) 3687	B1	
(e) 100×5 or 100×5.1 or 98×5	M1	
= 500 or 510 or 490	A1	Award M1 A1 for unsupported answer of 490 - 510
	6	
3. (a) 19	B1	
(b) 455	B1	
(c) 504	B1	
(d)Any correct method for dividing 602 by 14	M1	Must be a complete correct algorithm that would lead to a
		correct answer
= 43	A1	
(e) 519	M1	Any correct method for the multiplication of 519 by 43
<u>×43</u>		
1557	A1	For either 1557 or 20760 (Apply 'one error' in other
20760		methods)
22317	A1	САО
		Place value errors get M0 A0
(f) Changing 7/10 to 0.7(0)	M1	Or knowing value of 9 in 5.92 is 9/10
6.62	A1	
(g) $9 \div 0.5 =$	M1	
	A1	Award M1A1 for an answer of 18
(18 + 1 =) 19 pylons	B1	FT "their 18" + 1
4.4	13	
4. A at ½	B1	
B at 1	B1	
C at 0	B1	
D at or near ¹ / ₄	B1 4	D should be nearer to ¼ than C or A
5 +2 7 1 + 0 + 2 + 6 5	4 B3	Award B2 for finding at least 3 cards that make -2
5. $+3 - 7 - 1 + 0 + 2 + 6 - 5$	50	Award B2 for finding at least 3 cards that make -2 Award B1 for finding any 2 cards that make -2
	3	Awaru D1 for finding any 2 cards that make -2
6. (a) 6y	B1	
(b) $13a + 12b$	B1 B2	Award B1 for either 13a or + 12b in an expression. If B2
(0) 15a + 120	\mathbf{D}	awarded penalise -1 only for further incorrect working
(c) $20 = 12 + m$	B1	Award B1 for sight of 12 for 2p
m = 8	B1	Accept embedded answers
(d) 30q + 2	B1 B2	ISW. Award B1 for either 30q or 2 or both not in an
(d) 504 + 2	174	expression.
		OR award B1 for $7q + 6q + 3 + 5q + 4q - 2 + 8q + 1$ or
		equivalent
	7	
7. (a) 180 – 90 – 53	M1	Accept 90 - 53
$= 37 (^{\circ})$	A1	*
(b) $360 - 85 - 115 - 84$	M1	
= 76 (°)	A1	
(c) 30(°)	B1	Alternative method 360 – 150 – 90 – 'their 55' M1
360 - 90 - 30 - 125	M1	= 65 A1 CAO
$= 115(^{\circ})$	A1	(180 - 65 =)115 A1 FT their 65 if M1 awarded

Methods Unit 1Foundation Tier Summer 2012		FINAL
8. (a) 12 18 24 30 36	B2	Award B1 for 12 correct.
10 15 20 25 30		
12 16 20 24		
9 12 15 18 12		
(b) 8/36 ISW	B2	FT their table. B1 for a numerator of 8 in a fraction <1. B1
	52	for the 36 in a fraction <1 . Do not penalize incorrect
		reduction of fractions.
(c) $8/36 \times 720$	M1	FT their (b) \times 720 (\neq $\frac{1}{2}$)
= 160	A1	A0 here if there is incorrect reduction
		M1 A0 for 160/720
		Notes Penalise -1 for use of words such as "8 out of 36", "8 in
		36" OR "8:36". When fraction and wrong notation seen,
		DO NOT penalise wrong notation.
	6	
9. At least 3 additional given shapes tessellating correctly with	M1	The additional shapes must consist of at least 1 square and
at least one that meets given shapes At least 6 additional given shapes tessellating correctly	A1	1 hexagon. Award A0 for any error in their tessellation.
At least 6 additional given shapes tessenating correctly	2	Award A0 for any error in their tessenation.
10. $4.5 \times 40 = 180$	B1	
(Cooking time =) 180mins (or 3hrs) + 25 mins	M1	FT their 4.5×40
= 205 mins or 3 hours 25 mins	A1	
(Chef begins cooking at) 10.05 (am)	B1	FT their cooking time
	Q	QWC2 Presents relevant material in a coherent and logical
$4.5 \times 40 = 180 + 25$ will lose at least QWC1	W	manner, using acceptable mathematical form, and with few
	C	if any errors in spelling, punctuation and grammar.
Look for	2	
• spelling		QWC1 Presents material in a coherent and logical manner
• clarity of labels		but with some errors in use of mathematical form, spelling,
• Use of correct notation for time		punctuation or grammar OR
• the use of simplified notation (watch for the use '='		evident weaknesses in organisation of material but using
being appropriate)		acceptable mathematical form, with few if any errors in
QWC2: Candidates will be expected to		spelling, punctuation and grammar.
• present work clearly, with words explaining process		
or steps		QWC0 Evident weaknesses in organisation of material, and
AND		errors in use of mathematical form, spelling, punctuation or grammar.
• make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer		granniar.
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 in their final answer	_	
	6 P1	
11. (a) plots Curve	C1	FT their plots. Must be a curve through the points. Polygon
		gets C0
(b) x-values from their graph	B1	For both x-values.
		FT their graph if at least 2 points of intersection
12(-)(-)(-)(-)(-)(-)(-)(-)(-)(-)(-)(-)(-)(3	
12.(a) (6, -6) or (-10,-6) or (4,2)	B2	B1 for either coordinate correct OR B1 for a correct point plotted (with assumed scale from other points or default 1-1
		scale)
(b) Method to find midpoint – on diagram or calculation shown	M1	FT their parallelogram. Accept point plotted by the
	_	candidate as a method, hence M1
		If calculation method shown, then one correct coordinate
		implies M1.
(1.5,-4) or (-2.5, -4) or (1,-2)	A1	No method shown, one correct coordinate M0, A0
	4	

Methods Unit 1Foundation Tier Summer 2012		FINAL
13.(a) A suitable triangle shown or described	B1	Any use of subtraction ideas must be shown (justified)
(b) E.g.32+8+2, 32+8+2, 16+16+4+4+1+1 (side length 42	B2	B1 for showing selection of rods that make a smaller
cm)		equilateral triangle of side length >10 cm, OR for knowing
		sides are 42(cm)
	3	
14. (a) 7n - 1	B2	B1 for 7n <u>+</u>
(b) -6n + 32	B2	B1 for -6n <u>+</u>
	4	
15. (a) 2680/10 (=268) with method to find 5, 3 or 2 shares	M1	A1 for any one of these correct
1340, 804, 536	A2	Unsupported answers, need sight of 2 of the 3 correct
		responses to imply the method
		Incorrect method seen implies M0, A0
(b)Method to find prime factors, 2 correct before 2 nd error	M1	
2, 2, 2, 2, 3, 5, 5	A1	Ignore 1s for A1 but not for B1
$2^4 \times 3 \times 5^2$	B1	FT provided an index>1 involved. Accept "." for multiply
	6	

UNIT 1 (HIGHER TIER)

Methods Unit 1 Higher Tier Summer 2012						2		FINAL
	1.(a) 16 or equivalent						B1	Accept a product of factors
	b) 180 or equivalent						B1	Accept a product of factors
	(c) 71, 73 and 79						B1	
(d) Atten		aluate 11:	×11				M1	Not just sight of 11×11
	-			21			A1	
							5	
2.(a) (6,	-6) or (-1	0,-6) or (4,2)				B2	B1 for either coordinate correct OR B1 for a correct point
								plotted (with assumed scale from other points or default 1-1
								scale)
(b) Meth	od to find	l midpoin	t – on dia	igram or	calculation	on shown	M1	FT their parallelogram. Accept point plotted by the
								candidate as a method, hence M1
								If calculation method shown, then one correct coordinate
								implies M1.
(1.5	5,-4) or (-	2.5, -4) o	r (1,-2)				A1	No method shown, one correct coordinate M0, A0
2 () ;				., .			4	
3.(a) A su						1 10	B1	Any use of subtraction ideas must be shown (justified)
(b) E.g.3	32+8+2, 3	32+8+2, 1	6+16+4+	4 +1+1 (side leng	th 42	B2	B1 for showing selection of rods that make a smaller
cm)								equilateral triangle of side length >10 cm, OR for knowing
	c	1	- 14	1 • 1			D 1	sides are 42(cm)
(c) Strate Explanat				al sides			B1	Knowing that 4 equal sides are needed
e.g. $32, 3$				aka 20 o	r cimilar		E1 5	Do not accept 'can't find 4 rods the same length', B1, E0 Accept 'not enough to make 4 numbers the same', B1, E1
4.(a)	$52, 10\pm10$	<i>J</i> , 1003 IEI	t omy m	ake 50, 0	i siiiiiai		5	Accept not enough to make 4 numbers the same, B1, E1
4.(<i>a</i>)	1	2	3	4	5	6		
1	3	5	7	4 9	11	13		
2	5	8	11	14	17	20		
3	7	11	15	14	23	20		
4	9	11	19	24	29	34		
5	11	14	23	29	35	41		
6	13	20	27	34	41	48	B3	B2 for any 20 to 26 correct entries,
0	15	20	21	54	41	40		B1 for any 10 to 19 correct entries
								FT for their completed table in (b) and ignore incorrect
								cancel
(b)(i) 8/3	6						B1	ISW
(ii) 4/3							B1	ISW
(iii) 28/							B1	ISW FT $1 - (i)$
							6	
5.(a) 268	0/10 (=20	58) with r	nethod to	find 5, 3	or 2 sha	res	M1	
1340, 804	1340, 804, 536				A2	A1 for any one of these correct		
								Unsupported answers, need sight of 2 of the 3 correct
								responses to imply the method
								Incorrect method seen implies M0, A0
	(b)(i) Method to find prime factors, 2 correct before 2 nd error			^{ad} error	M1	Ignore 1s for A1 but not for B1		
	2, 2, 2, 2, 3, 5, 5				A1			
$2^4 \times 3 \times 5^2$						B1	FT provided an index>1 involved. Accept "." for multiply	
	(ii) 3				B1	FT from their (i)		
(c) 0.131	3 or 0	.1.3.					B2	B1 for 0.13 or 0.13 or 0.13 as an answer or seen in
							E.	working
(d) 0.005	(d) 0.005				B1			
							10	

Methods Unit 1 Higher Tier Summer 2012		FINAL
6.(a)(i) 7n - 1	B2	B1 for 7n
(ii) $-6n + 32$	B2	B1 for -6n Accept N for n, change of letter penalise -1 once only
(b) Total number of tiles $4n^2$ or equivalent (Number of tiles) shaded $2n^2 + 1$ and	B2 B3	B1 (for intention $2n \times 2n$, i.e.) answer for total number $2n^2$ B2 for either correct, OR B1 for $2n^2$ within either answer
(Number of) white $2n^2 - 1$ or equivalents		Sight of $2n^2 + 1$ and $2n^2 - 1$ implies the previous B1 for $4n^2$
Candidates without algebraic generalisations may be awarded QWC2 provided their process steps lead to a statement Look for • spelling • clarity of labels • the use of simplified notation, e.g. n ² rather than n×n, and watch for the use '=' 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 in their 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,	Q W C 2	If no marks, SC2 for 'shaded $n^2 + 1$ and white $n^2 - 1$ ' OR SC1 for a general statement, e.g. '2 more grey than white tiles', or for expression with difference of 2 where number shaded > number white, or candidate looking at second difference in a correct number sequence, or for sight of n^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 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.
spelling, punctuation and grammar in their final answer	11	
7. 360 - 110 - 130 120÷3 40(°) Selecting 40(°) to give largest interior angle 180 - 40 140(°)	M1 M1 A1 B1 M1 A1	FT their 120 CAO Alternative method: Use of interior angles 540(°) clearly as interior B1 540 – 70 – 50 M2 (M1 for 1 error in finding 70 or 50) 420 ÷ 3 M1 140(°) as a final answer A2 (A1 if any further statement of incorrect largest) SC1 for mixed interior and exterior within a calculation ((540 – 240)/3) leading to 100(°) and then selecting 130(°) or stating 80(°) <u>If candidate works with a polygon with >5 sides, then</u> <u>MR-1 and FT for all marks</u>
8.(a) 5.3×10^{-5} (b) 1.8×10^{13}	B1 B2 3	B1 for 18×10^{12} or equivalent correct answer but not in standard form Penalise incorrect notation of power 10s once only -1

Methods Unit 1 Higher Tier Summer 2012		FINAL
9. $3A = 4\Pi r^2$	B1	FT until 2 nd error
$\underline{3A} = r^2$	B1	Accept multiplication signs shown throughout
4Π	DI	
$r = \sqrt{(3A/4\Pi)}$	B1 3	
10.(a) A and D selected	3 B1	
Gradients are both 3 or gradients are the same	E1	Depends on B1 being awarded. Accept 'slope' or similar.
	21	m = 3 or 'both 3x' is insufficient, needs interpretation
(b) A and E selected	B1	
	3	
11.(a) -7 and 5	B2	B1 for each correct answer
(b) All plots correct	B2	FT from (a). B1 for any 5 correct plots
All their 8 plots joined with a curved line (c) -3 and $1.5 (\pm 0.1)$	B1 B2	FT from (a) FT from (b). B1 for each correct answer
(d) $y = 6$ seen or implied	M1	F1 from (b). B1 for each correct answer
(1) y = 0 seen of implied 2.1 (± 0.1) and -3.6 (± 0.1)	Al	FT from (b).
	9	
12. $30 \times 80 = 25 \times CE$ OR $30 \times (30 + 50) = 25 \times CE$	M1	
CE = 96 (cm)	A1	
DE = 96 - 25	m1	
= 71 (cm)	A1	
12 (-) 0 25	4 B2	D1 for 2 compations following through 1 compa
13.(a) 0.25	B2	B1 for 2 correct steps, following through 1 error: reciprocal, cube root, square. B1 for an answer of 1/4
(b) $4(x-20)(x+20)$	B3	B2 for $(2x - 40)(2x + 40)$ or other correct partially
(0) + (X - 20)(X + 20)	0.5	factorised including a correct pair of brackets
		B1 for $4(x 20)(x 20)$ or $(2x 40)(2x 40)$
(c) 27	B1	
(d) $10 + 15\sqrt{2} - 2\sqrt{2} - 6$	B2	B1 for any 3 of the 4 terms correct
$= 4 + 13\sqrt{2}$	B1	CAO. Mark final answer
	9	
14.(a) Correct region shaded	B1	Intersection of the two regions A and B indicated
(b) Correct region shaded (c) Correct region shaded	B1 B1	Outside A and B but within rectangle indicated A together with outside B indicated
(c) confect region shaded	3	A together with outside B indicated
15. Sight of numbers (on the cards): 1, 2, 5, 7, 10, 14, 35, 70	B1	FT in (a) and (b) from incorrect factors, provided all unique
		and at least four numbers are correct factors of 70
(a) Strategy, need to find P(even, odd) and P(odd, even)	S1	OR full alternative
4/8×4/7 seen	M1	
$4/8 \times 4/7 + 4/8 \times 4/7$ OR $2 \times 4/8 \times 4/7$	M1	
= 32/56 or equivalent	Al	Mark final answer
(b) Strategy, e.g. $1 - P(\text{no even})$	S1	Or equivalent complete strategy
$1 - P(\text{no even}) = 1 - \frac{4}{8 \times 37}$ $= \frac{44}{56} \text{ or equivalent}$	M1 A1	Or other full method Mark final answer
	8	
16.(a) $(x-8)^2+2$	B2	B1 for a= -8, B1 for b = 2, only award B2 for $(x - 8)^2 + 2$
(b) Attempt to use common denominator	B1	
3(2x+3) - 4(3x-2) + 2 or equivalent	M2	M1 for 2 of the three terms correct.
(12)		May be expressed as separate fractions, or working without
	A 1	consideration of the denominator
$\frac{6x+9-12x+8+2}{12}$ or equivalent	A1	Convincing step. FT from 1 error, i.e. A1. Denominator must be seen
	A1	Must follow from correct working
$=$ $\frac{19-6x}{12}$ with statement		Accept LHS=RHS or writing $(19 - 6x)/12 = (19 - 6x)/12$
(c) $(2x+7)(x-1)$	B2	B1 for $(2x 7)(x 1)$
(2x + 7)(x - 1) 5(2x + 7)	B1	
$\frac{x-1}{5}$	B1	CAO. Mark final answer
5	11	

UNIT 2 (FOUNDATION TIER)

Methods 2 Foundation June 2012		FINAL
1.(a)		
1/4 0.25	B2	Award B1 for each. Accept equivalent fractions for ¹ / ₄
7/10 70(%)	B2	Award B1 for each. Accept equivalent fractions for 7/10
(b) 38/100 × 790	M1	
300.2	A1	CAO
(c) $4/9 \times 117$	M1	Or equivalent
52	A1	CAO
(d) $\frac{1}{4} \times 40 \ (= 10)$ 30 scarves left	M1 A1	Or equivalent. Sight of 10 implies M1
20% of 30 = 6	M1	FT 'their 30' or 40
(30 - 6 =) 24 left	Al	
30 0- <i>j</i> 24 lott	711	Award SC3 for 45% of $40 = 18$, $40 - 18 = 22$ Award SC2 for 45% of $40 = 18$ Award SC1 for $45/100 \times 40$
(e) 1/8	B1	Award SC1 101 45/100 × 40
	13	
2.(a) Correct diagram	B2	-1 for each incorrect vertex
(b) 4 1 0	B3	Award B3 for all correct
4 1 2		Award B2 for 4 or 5 correct
	5	Award B1 for 2 or 3 correct
		Accept 1 for shape B
		0
3.Correct indication of Diameter	B1	
Chord	B1 B1	
Sector	B1	
	3	
4.(a) Perimeter = 30	B1	
$(Area =) 4 \times 11$	M1	Award M1 for 4×11 seen but ward M0 for perimeter = 11×4
= 44	A1	
(b) Showing a strategy of trialling a length & width that multiply to 20 and would make a perimeter of 24	M2	Award M1 Showing a strategy of trialling a length & width that multiply to 20 or would make a perimeter of 24
(Length =) $10(\text{cm})$ and (Width =) $2(\text{cm})$	A1	CAO. Do not penalise if length = $2(cm)$ and width =
2015 m = /10(011) und (Width = / 2(011)	111	10(cm)
	6	
5. Congruent shape drawn	B1	Do not penalise incorrect labelling for diagrams drawn
Similar shape drawn	B1	
Correct "Full" explanation given	E2	
Eg. A congruent shape is exactly the same size and a		E1 for each
similar shape is a different size.	4	If own shapes correctly drawn for congruent or similar
		shapes it must have a correct explanation to get B1 E1 for congruent shapes and/or B1 E1 for similar shapes.
6.(a) x = 16	B1	Accept embedded answers throughout question
(b) $x = 6$	B1	The second se
	B1	
(c) $x = 56$		
	B1	
(c) $x = 56$	B1 B1 5	FT from one error eg $3x = 22$ x = 22/3 award B0 B1

Methods 2 Foundation June 2012	FINAL
7. Cost for 15 year olds $(5 \times 37.20=)$ (£)186	B1
Cost for under 15s $(9 \times 25.40=)$ (£) 228.6(0) Total cost = (£)414.60	B1 B1 FT their $5 \times 37.20 + 9 \times 25.40$
Saving = $15/100 \times 414.60$	$\begin{array}{c} \text{B1} \\ \text{M1} \end{array}$
Saving of (£)62.19	A1 Penalise -1 if further workings shown as saving e.g. saving = $414.60 - 62.19 = (\pounds)352.41$
Alternative method 3 Week prices for 15 year olds = 186 B1 Week prices for under 15s = 228.6(0) B1 Total for week = 414.60 B1 Weekend prices 15 year olds = $37.20 - (15/100 \times 37.20)$ = (£)31.62 Weekend prices for under 15s = 25.40 - (15/100 × 25.40) = 21.59 Total cost of weekend = $5 \times 31.62 + 9 \times 21.59$ M1 (= 158.10 + 194.31) = 352.41 Saved (414.60 - 352.41=) 62.19	$\begin{array}{l} \label{eq:2.1} \begin{tabular}{lllllllllllllllllllllllllllllllllll$
Notes: QWC2 can only be awarded if the correct unit is shown in the final answer. QWC2 requires words throughout the response not just connected to the final answer. If 0 missing from both 414.60 and 228.60 will lose at least QWC1	Watch for misread of $9 \times 37.20 + 5 \times 25.40 = 334.80 + 127$ B1 for 334.80, B1 for 127 = 461.80 B1 $15/100 \times 461.80$ M1 $= (\pounds)69.27$ A1 MR -1 Q W C
Look for	2
• spelling	
 clarity of labels the use of notation (watch for the use of '=', '£' and '0' appropriately used) 0 missing from both 414.60 and 228.60 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 in their answer QWC1: Candidates will be expected to present work clearly, with words explaining process or steps 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 in their form, spelling, punctuation and grammar in their final answer 	 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.

Methods 2 Foundation June 2012		FINAL
8. Evidence of trying to count cubes	M1	Award M1 if answer 'for 48' in range 44 - 52 inclusive or sight of 24
Number of cubes $= 48$	A1	
Strategy to try to find 3 values that multiply to give 48	S 1	FT their 48
3 values that multiply to give 48 e.g. $2 \times 6 \times 4$	B1	
	4	
9. (a) 24.5	B1	Accept 24.50
(b) 203.593	B2	B1 for sight of 18.4 or 185.193. If only 201.5 or 203.6 or 203.59 shown award B1.
10.	3	If trials shown award B marks as:
6x - 2 = 4x + 5	B1	B1: for at least 2 sensible trials each substituted into
0x - 2 - 4x + 3	DI	both $4x + 5$ and $6x - 2$.
2x = 7	B1	B1: one trial ≥ 3.5 (that is too big) and one trial ≤ 3.5
	21	(that is too small)
x = 7/2 (3.5)	B1	B1 for 3.5
Length of side of square = $4 \times 3.5 + 5$ or $6 \times 3.5 - 2$	M1	Follow through 'their x'
=19	A1	
	5	
11.(a) 85:75	M1	If boys : girls stated, accept 75:85 as M1 and then award A1 for 15:17
17:15	A1	Award SC1 for 15:17
(b) 85/160	B1	ISW
(c) $3/12 \times 100$	M1	
= 25(%)	A1	
(d) 45/100 × 160	M1	
= 72	A1	
(72 + 98 =) 170	B1	FT their 72 provided M1 awarded
170/850	B1	
1/5	B1	FT provided their fraction simplifies
	10	
12. (a) Full explanation given $A/2 = \pi \frac{1}{2} \left(-\pi \frac{1}{2} \frac{2}{2} \frac{2}{2} \frac{2}{2} \frac{2}{2} \right)$	E1	Eg. Upside down dividing
Correct version = $4/3$ or $1^{-1}/_{3}$ or $1.33(33333)$	B1	If no marks awarded, award SC1 for $x = 4 \div 3$ or 1.3 as
		evidence of understanding of error made.
(b) $35x - 28 = 77$ OR $5x - 4 = 77/7$	B1	content of understanding of error made.
35x = 105 $5x = 15$	B1	FT until 2 nd error
x=3	B1	Accept an embedded answer of 3
(c) $6x < 42$	M1	1
x<7	A1	No marks for use of "=", unless finally replaced to give
		x<7 then award M1 A1.
		SC1 for x<52/6 ISW
	7	
13.(a) Enlargement scale factor 2	B2	B1 for any 3 lines correct, or consistent incorrect scale
Correct position	B1	
(b) Correct reflection in $y = 2$	B2	B1 for a reflection in $x=2$ or either axis, OR for sight of the line $y = 2$
(c) Correct translation	B1	
(d) Correct rotation	B2	B1 near miss, OR anticlockwise rotation
	8	

UNIT 2 (HIGHER TIER)

I. (a) $x = 24 \times 4/3$ $x = 32$ (b) $x = 15$ or 0.5 or equivalent (c) $35x - 28 = 77$ $35x = 105$ $x = 3$ Accept embedded answers in parts (a), (b) & (c)(c) $35x - 28 = 77$ $35x = 105$ $x = 3$ PT $35x = 105$ $x = 3$ PT 100 FT from 1 error B1 C1 for $x < 226$ for $x < 22.3$ $x < 7$ then award M1 A1. SC1 for $x < 226$ for $x < 22.3 = 69$ A1 Accept unsupported 23, or a unique answer of 23 from a trial and improvement method. Do not accept $x > 23$ 22.(a)2.(a) $5w + w + 5w + w \text{ or } 12w$ $5^{v} or 5w x w$ $P = 12w$ AND $A = 5w^2$ (b) $\frac{1}{2} \times 4 \times (5 + 9)$ or equivalent $= 28 (cm^2)$ B1 B2 for 1.71(313), OR B1 for 2.9(3483)(c) 1.7 (e) $635 +\dots + 12070= 12705B1 for a reflection in x = 2 or either axis, OR for sight ofthe in w = 2.(c) Correct reflection in y = 2(c) Correct reflection in y = 2(d) Correct reflection in y = 2(e) Correct reflection in y = 2(f) 3.5(h) (i) 3.5(h) (i) 3.5(h) (i) 3.5(h)$	Methods 2 Higher Summer 2012		FINAL
(a) $x = 24 \times 4/3$ B1FT from 1 error(b) $x = 4 \times 0.5$ or equivalentB1FT from 1 error(c) $35x - 28 = 77$ OR $5x - 4 = 77/7$ $35x = 105$ $x=3$ B1(d) $6x < 42$ X $x < 7$ X(e) $x > 67/3$ or $x > 22.3$ B1(e) $x > 67/3$ or $x > 22.3$ M1 $x < 7$ then award M1 A1.SCI for $x < 52/6$ ISW(e) $x > 67/3$ or $x > 22.3$ M1 $x < 7$ then award M1 A1.SCI for $x < 52/6$ ISW(f) $x > 4 \times (5 + 9)$ or equivalent $y = 12w$ AND $A = 5w^2$ (h) $\frac{1}{2} \times 4 \times (5 + 9)$ or equivalent $y = 12w$ AND $A = 5w^2$ (b) $\frac{1}{2} \times 4 \times (5 + 9)$ or equivalent $y = 12w$ AND $A = 5w^2$ (h) $\frac{1}{2} \times 4 \times (5 + 9)$ or equivalent $y = 12w$ AND $A = 5w^2$ (b) $\frac{1}{2} \times 4 \times (5 + 9)$ or equivalent $y = 12w$ AND $A = 5w^2$ (c) 1.7 $(e) 635 +$ $ + 12070$ $= 12705$ B1B1B1B1B1B1B1B1B1B1B1B1B1B1 (a) Enlargement scale factor 2Correct position(b) Correct reflection in $y = 2$ (c) Correct translation(d) Correct reflection in $y = 2$ (e) $(3 25)$ (f) $(3 25)$ (g) $(3 25)$ (g) $(3 25)$ (g) $(3 25)$ (g) $(24/9) \times 100$ (g) $(24/9) \times 100$ <td></td> <td></td> <td></td>			
Note that $x = 32$ B1 (b) $x = 1/2$ or 0.5 or equivalent (c) $35x - 28 = 77$ FT (C) $35x - 28 = 77$ FT (C) $35x - 105$ FT	(a) $x = 24 \times 4/3$	B1	
(b) $x = \sqrt{2}$ or 0.5 or equivalent (c) $35x - 28 = 77$ $35x = 105$ $x = 3$ B1 $x = 3$ Mark final answer FT until 2^{nd} error(d) $6x < 42$ $x < 7$ (f) $5x - 4 = 77/7$ $35x = 105$ B1 Cor sky to $32, 22 = 66$ with $3\times 23 = 69$ Accept unsupported 23, or a unique answer of 23 from a trial and improvement method. Do not accept $x > 23$ B1 Expression B1 for $2x > 26$ so with $3\times 23 = 69$ Accept unsupported 23, or a unique answer of 23 from a trial and improvement method. Do not accept $x > 23$ B1 Equations, CAO2(a) $5w + w + 5w + w$ or $12w$ $5w^2$ or $5w + w \times 2$ or similar $5w^2$ or $5w + w \times 2$ or similar Equations, CAO3.(a) $(432.960) \times 100$ $45(%)$ (b) $820 - 820 \times 2.76$ 623.2 (c) 1.7 3.(a) $(432.960) \times 100$ $(6) 635 + + 12070= 127054.(a) Enlargement scale factor 2Correct position(d) Correct reflection in y = 25.(a)(i) 2.5(ii) 3.5(b)(i) 4.35.(a)(i) 2.5(ii) 3.5(b)(i) 4.36.(b) 2.4(y) \times 100(ii) (28.4y) \times 1006.(c) Correct translation(d) Correct rotation7.(ii) (28.4y) \times 100(ii) (28.4y) \times 1007.(iii) (28.4y) \times 100(iii) (28.4y) \times 1007.(iii) (28.4y) \times 100(iii) (28.4y)$			FT from 1 error
(c) $35x - 28 = 77$ $35x = 105$ OR $5x = 15$ Sx = 17B1 B1 B1FT until 2 nd error(d) $6x < 42$ $x < 7$ No marks for use of "=", unless finally replaced to give $x < 7$ then award M1 A1. SC1 for $x < 226$ ISW(e) $x > 67/3$ or $x > 22.3M123No marks for use of "=", unless finally replaced to givex < 7 then award M1 A1.SC1 for x < 226 ISW(e) x > 67/3 or x > 22.3M123No resk for use of "=", unless finally replaced to givex < 7 then award M1 A1.SC1 for x < 226 ISW(e) x > 67/3 or x > 22.3M123Accept unsupported 23, or a unique answer of 23 from atrial and improvement method. Do not accept x > 232.(a) 5w + w + 5w + w or 12w5w 7 5w + w + 5w + wB1ExpressionExpressionEquations, CAO(b) \frac{1}{2} \times 4 \times (5 + 9) or equivalent= 28 (cm2)B1A1ExpressionB1Equations, CAO(b) \frac{1}{2} \times 4 \times (5 + 9) or equivalent45(%)M1A1Or equivalent full methodA1B1B2 for 1.71(313), ORB1 for 2.9(3483)(e) 635 +\dots + 12070= 12705B1$		B1	
$35x = 105$ $5x = 15$ BI BI BI BI BI(d) $6x < 42$ $x < 7$ $x = 3$ MI AI(e) $x > 67/3$ or $x > 22.3$ 23 MI 23 No marks for use of "=", unless finally replaced to give $x < 7$ then award M1 A1. SCI for $x < 52/6$ ISW(e) $x > 67/3$ or $x > 22.3$ 23 MI 23 No marks for use of "=", unless finally replaced to give $x < 7$ then award M1 A1. SCI for $x < 52/6$ ISW(e) $x > 67/3$ or $x > 22.3$ 23 MI 23 Or sight of $3x > 22 = 66$ with $3x > 23 = 69$ Accept unsupported 23, or a unique answer of 23 from a trial and improvement method. Do not accept $x > 23$ 2.(a) $5w + w + 5w + w$ or $12w$ $5w^2$ or $5w \times w$ $P = 12w$ AND $A = 5w^2$ (b) $\frac{1}{2} \times 4 \times (5 + 9)$ or equivalent $= 28 (cm^2)$ BI Expression BI Equations, CAO(b) $\frac{1}{2} \times 4 \times (5 + 9)$ or equivalent $= 28 (cm^2)$ MI AI3.(a) $(432/960) \times 100$ 623.2 MI $4(32) - 820 \times 24/100$ OR 820×0.76 623.2 MI AI(e) $635 +\dots + 12070= 12705BI for any 3 lines correct, or consistent incorrect scaleBIBIBI for a arg 1 line x_1 or x_2 or sight ofthe in y = 24.(a) Enlargement scale factor 2Correct position(b) Correct rotationBIBIBIBIBI for a arg 1 line scorrect, or consistent incorrect scaleBIBIBIBI for any 3 lines correct, or consistent incorrect scaleBIBIBI for tation shown in all quadrants$			
Left for $x=3$ BI M1No marks for use of "=", unless finally replaced to give $x<7$ then award M1 A1. SC1 for $x<52/6$ ISW(e) $x > 67/3$ or $x>22.3A1No marks for use of "=", unless finally replaced to givex<7 then award M1 A1.SC1 for x<52/6 ISW(e) x > 67/3 or x>22.3M1Or sight of 3x22 = 66 with 3x23 = 69Accept unsupported 23, or a unique answer of 23 from atrial and improvement method. Do not accept x>232.(a) 5w+w+5w+w or 12w5w^2 or 5w×wB1ExpressionP = 12w AND A = 5w^2(b) \frac{1}{2} \times 4 \times (5 + 9) or equivalent= 28 (cm^3)B1Expression3.(a) (432/960) × 10045(%)M145(%)Or equivalent full method4.(b) 820 - 820 \times 24/100 OR623.2M145(%)Or equivalent full method(c) 1.7(c) 1.7B1= 12705B1B1B1B1= 12705B1$			
(d) $6x < 42$ $x < 7$ M1 $x < 7$ No marks for use of "=", unless finally replaced to give $x < 7$ then award M1 A1. SCI for $x < 52/6$ ISW(e) $x > 67/3$ or $x > 22.3$ M1No marks for use of "=", unless finally replaced to give $x < 7$ then award M1 A1. SCI for $x < 52/6$ ISW(e) $x > 67/3$ or $x > 22.3$ M1No marks for use of "=", unless finally replaced to give $x < 7$ then award M1 A1. SCI for $x < 52/6$ ISW2.(a) $5w + w + 5w + w$ or $12w$ $5w^2$ or $5w × w$ B1Expression Equations, CAO2.(a) $5w + w + 5w + w$ or $12w$ $5w^2$ or $5w × w$ B1Expression Equations, CAO(b) $4x < (5 + 9)$ or equivalent $45(%)$ M1 A1Or equivalent full method A1(b) $820 + 820 \times 24/100$ OR 623.2 M1 A1Or equivalent full method A1(e) $635 +$ $ + 12070$ $= 12705$ B1 B1 B1 B1 B1 FT from B1, i.e. either 635 or 12070 correct, with sum on their 2 values calculated correctly4.(a)Enlargement scale factor 2 (c) Correct reflection in $y = 2$ (c) Correct translation (d) Correct rotationB1 B1 B2 B1 B1 for a reflection in $x = 2$ or either axis, OR for sight of the line $y = 2$ 5.(a)(i) 2/5 (i) 3/5B1 (i) 3/5B1 			
x<7AIx<7 then award MI A1. SC1 for x<52/6 ISW(e) x > 67/3 or x>22.3XMIN23AIX<7 then award MI A1. SC1 for x<52/6 ISW		M1	No marks for use of "=" unless finally replaced to give
ControlSC1 for $x < 52/6$ ISW(e) $x > 67/3$ or $x > 22.3$ SC1 for $x < 52/6$ ISW23A123A124Sw $+ w + 5w + w$ or 12w5w 2 or 5w xw P = 12w AND A = 5w ² (b) $\frac{1}{2} \times 4 \times (5 + 9)$ or equivalent $= 28 \text{ (cm3)}$ 3.(a) $(432/960) \times 100$ (b) $820 - 820 \times 24/100$ OR 820×0.76 623.2(c) 1.7(e) $635 +$ $= 12705$ (f) $635 +$ $= 12705$ (g) Correct reflection in $y = 2$ (h) Correct reflection in $y = 2$ (c) Correct reflection in $y = 2$ (c) Correct translation(d) Correct rotation(e) 635 + $= 12705$ B1B2B1B1B2B1B1B1B1B1B2B2B1B2B1B1B2B1 <td></td> <td>A1</td> <td></td>		A1	
(e) $x > 67/3$ or $x > 22.3$ M1Or sight of $3 \times 22 = 66$ with $3 \times 23 = 69$ Accept unsupported 23, or a unique answer of 23 from a trial and improvement method. Do not accept $x > 23$ 2.(a) $5w + w + 5w + w$ or $12w$ $5w^2$ or $5w \times w$ B1 B1 Expression B0 for $5w + w \times 2$ or similar Equations, CAO2.(a) $5w + w + 5w + w$ or $12w$ $5w^2$ or $5w \times w$ $P = 12w$ AND $A = 5w^2$ (b) $\frac{1}{2} \times 4 \times (5 + 9)$ or equivalent $= 28$ (cm ²)B1 B1 Equations, CAO(b) $\frac{1}{2} \times 4 \times (5 + 9)$ or equivalent $= 28$ (cm ²)M1 A1 S3.(a) $(432/960) \times 100$ $45(%)$ M1 A1 S(c)1.00 $45(%)$ M1 A1 S(c)635 + $\dots + 12070$ $= 12705$ B1 B1 B1 B1 FT from B1, i.e. either 635 or 12070 correct, with sum o their 2 values calculated correctly4.(a)Enlargement scale factor 2 Correct positionB2 B1 <b< td=""><td></td><td></td><td></td></b<>			
23At 10Accept unsupported 23, or a unique answer of 23 from a trial and improvement method. Do not accept x>232.(a) $5w+w+5w+w \text{ or } 12w$ $5w^2 \text{ or } 5wxw$ P = 12w AND A = $5w^2$ (b) $\frac{1}{2} \times 4 \times (5 + 9)$ or equivalent = 28 (cm ²)B1 B1 ExpressionExpression Equations, CAO3.(a) $(432/960) \times 100$ $45(%)$ (b) $820 - 820 \times 24/100$ OR 820×0.76 623.2 M1 B1 ExpressionOr equivalent full method A1 D requivalent full method(c) 1.7 (c) 635 + + 12070 = 12705B1 B1 B1 B1 FT from B1, i.e. either 635 or 12070 correct, with sum o their 2 values calculated correctly4.(a) Enlargement scale factor 2 Correct position (d) Correct reflection in $y = 2$ B2 B1 for a reflection in $x=2$ or either axis, OR for sight of the line $y = 2$ (c) Correct translation (d) Correct rotationB1 B2 B1 for a sight of 1.3° ; 0 or anticlockwise rotation5.(a)(i) 2/5 (ii) 3/5, (b)(i) 4:3 (ii) (28/49) \times 100 (57.1(%)B1 AC(ii) (28/49) $\times 100$ 57.1(%)A1 A2	(e) $x \ge 67/3$ or $x \ge 22.3$	M1	
10trial and improvement method. Do not accept x>232.(a) $5w^+ or 12w$ B1ExpressionB0 for $5w + w \times 2$ or similar $5w^2 or 5wxw$ B1ExpressionEquations, CAO(b) $\frac{1}{2} \times 4 \times (5 + 9)$ or equivalentM1A1 $= 28 \text{ (cm}^2)$ A1(b) $\frac{45(\%)}{60}$ M1Or equivalent full method $45(\%)$ A1(c) 1.7B3(e) $635 + \dots$ B1 $\dots + 12070$ B1 $\dots + 12070$ B1 $\dots + 12070$ B1(c) Correct reflection in $y = 2$ (c) Correct rotation(d) Correct rotation5.(a)(i) $\frac{2}{5}$ (ii) $\frac{25}{5}$ (ii) $\frac{28}{49} \times 100$ (ii) $\frac{28}{49} \times 100$ (ii) $\frac{28}{49} \times 100$ 5.(a)(i) $\frac{275}{5}$ (ii) $\frac{28}{49} \times 100$ 5.(a)(i) 27			
2.(a) $5w+w+5w+w \text{ or } 12w$ $5w^2 \text{ or } 5w \times w$ P = 12w AND A = $5w^2$ (b) $\frac{1}{2} \times 4 \times (5 + 9)$ or equivalent = 28 (cm ²)B1 B2 B2 or equivalent full method A1 Or equivalent full method A1 B2 B2 for 1.71(313), OR B1 B1 B2 for 1.71(313), OR B1 B2 for 1.71(313), OR B1 FT from B1, i.e. either 635 or 12070 correct, with sum on their 2 values calculated correctly4.(a) Enlargement scale factor 2 Correct position (b) Correct reflection in $y = 2$ B2 B1 B1 B2 B1 for a reflection in $x=2$ or either axis, OR for sight of the line $y = 2$ 6.(a) (1) $\frac{2}{5}$ (i) $\frac{3}{5}$ (b)(i) 4:3B1 B1 B1 FT 1 - (i) B1 <td></td> <td></td> <td></td>			
$5w^2 \text{ or } 5w \times w$ P = 12w AND A = $5w^2$ B1 SupersonExpression Equations, CAO(b) $V_2 \times 4 \times (5 + 9)$ or equivalent 	2(a) = 5w + w + 5w + w or 12w	-	
P = 12w AND A = $5w^2$ B1Equations, CAO(b) $\frac{1}{2} \times 4 \times (5 + 9)$ or equivalent = 28 (cm²)M1M1A1A1(c) $\frac{1}{2}(56)$ M1Or equivalent full method $\frac{45(\%)}{623.2}$ M1Or equivalent full method(b) $820 - 820 \times 24/100$ OR 820×0.76 M1Or equivalent full method $\frac{623.2}{623.2}$ A1B3(c) 1.7 B1B1(c) $635 + \dots$ $\dots + 12070$ B1(c) $635 + \dots$ $\dots + 12075$ B1(d) Correct position (b) Correct reflection in $y = 2$ B2(e) Correct reflection in $y = 2$ B2(f) Correct rotation (f) $3/5$ B1(g) Correct rotationB1(g) $(28/49) \times 100$ B1(ii) $(28/49) \times 100$ S7.1(%)(ii) $(28/49) \times 100$ A2(ii) $(28/49) \times 100$ A2			
(b) $V_2 \times 4 \times (5 + 9)$ or equivalentM1 A1 53.(a) $(432/960) \times 100$ M1Or equivalent full method45(%)A1(b) $820 - 820 \times 24/100$ OR 820×0.76 M1Or equivalent full method623.2A1(c) 1.7B3B2 for $1.71(313)$, OR B1 for $2.9(3483)$ (e) $635 +$ B1 + 12070B1 $= 12705$ B14.(a) Enlargement scale factor 2B2Correct positionB1(b) Correct reflection in $y = 2$ B2(c) Correct translationB1(d) Correct rotationB1(e) $635 +$ B1(f) Correct rotationB1(g) Correct rotationB1(h) Correct rotationB1(h) Correct rotationB1(h) Correct rotationB1(h) (1/25B1(ii) $3/5$ B1(ii) $(28/49) \times 100$ FT $1 - (i)$ (ii) $(28/49) \times 100$ M1 $57.1(\%)$ A2			
(b) $12 \text{ Vr}(6 = 7)$ of equivalent $= 28 \text{ (cm}^2)$ A1 $= 28 \text{ (cm}^2)$ A1 $3.(a) (432/960) \times 100$ 45(%) $45(\%)$ A1(b) $820 - 820 \times 24/100$ OR 820×0.76 M1 623.2 OR 820×0.76 623.2 A1(c) 1.7 B3(e) $635 +$ B1 $ + 12070$ B1 $= 12705$ B1(f) Correct position10(h) Correct reflection in $y = 2$ (c) Correct translationB1(d) Correct rotationB1(d) Correct rotationB1(e) $635 +$ B1(f) Correct reflection in $y = 2$ (g) Correct rotationB1(h) Correct rotationB1(g) Correct rotation<			
55 $3.(a) (432/960) \times 100$ $45(%)M145(%)Or equivalent full method(b) 820 - 820 \times 24/100OR820 \times 0.76M1A1B3Or equivalent full method(c) 1.7B3= 12705B2 for 1.71(313), ORB1 for 2.9(3483)(e) 635 += 12705B1B1B1B1B1(e) 635 += 12705B1B1B1B1B1B1B1(e) 635 += 12705B1B1B1B1B1B1B1B1B2(e) 635 += 12705B1B1B1B1B1B2(e) 635 += 12705B1B1B1B1B1B2(e) 635 += 12705B1B1B1B1B2(e) 635 += 12705B1B1B1B2(e) 635 += 12705B2B1B1B2(e) 635 += 12705B2B1B1B2(e) Correct reflection in y = 2B2B1 for a reflection in x=2 or either axis, OR for sight ofthe line y = 2(e) Correct translation(d) Correct rotationB1B2B1B1B2(i) 2/5(ii) 3/5B1B1B1B1B1(i) (28/49) \times 100(ii) (28/49) \times 10057.1(\%)B1A2(i) (28/49) \times 10057.1(\%)M1A2(i) $			
$3.(a) (432/960) \times 100$ $45(\%)$ (b) $820 - 820 \times 24/100$ OR 820×0.76 623.2 M1 A1 M1 A1 B3 B2 for $1.71(313)$, OR B1 for $2.9(3483)$ (c) 1.7 B1 $= 12705$ B1<	- 20 (CIII)		
AtAt(b) 820 - 820×24/100OR820 × 0.76M1(c) 1.70820 × 0.76M1(c) 1.70B1 for 2.9(3483)(e) 635 +1B1 + 12070B1 $= 12705$ B14.(a) Enlargement scale factor 2B2Correct positionB1(b) Correct reflection in $y = 2$ B2(c) Correct translationB1(d) Correct rotationB15.(a)(i) 2/5B1(ii) 3/5B1(b)(i) 4.3B1(ii) (28/49) × 10057.1(%)57.1(%)A2A1A1	$3(_{3})(432/960) \times 100$	-	Or equivalent full method
(b) $820 - 820 \times 24/100$ OR 820×0.76 M1Or equivalent full method(c) 1.7 B3B2 for $1.71(313)$, ORB1 for $2.9(3483)$ (e) $635 +$ B1FT from B1, i.e. either 635 or 12070 correct, with sum of(e) $635 +$ B1 $ + 12070$ B1 $= 12705$ B14.(a) Enlargement scale factor 2B2Correct positionB1(b) Correct reflection in $y = 2$ B2(c) Correct reflection in $y = 2$ B1(d) Correct rotationB1(d) Correct rotationB15.(a)(i) 2/5B1(ii) $3/5$ B1(b)(i) 4:3B2(ii) $(28/49) \times 100$ B1 $57.1(\%)$ A1			or equivalent full method
623.2A1(c) 1.7B3(e) $635 + \dots$ B1 $\dots + 12070$ B1 $= 12705$ B14.(a) Enlargement scale factor 2B2Correct positionB1(b) Correct reflection in $y = 2$ B2(c) Correct translationB1(d) Correct rotationB15.(a)(i) 2/5B1(ii) 3/5B1(b)(i) 4:3B1(ii) (28/49) × 100S7.1(%)57.1(%)A1			Or equivalent full method
(c) 1.7B3B2 for $1.71(313)$, OR B1 for $2.9(3483)$ (e) $635 +$ $ + 12070$ B1 $= 12705$ B1 B1 B14.(a) Enlargement scale factor 2 Correct position (b) Correct reflection in $y = 2$ B2 B2 B2 B1 for any 3 lines correct, or consistent incorrect scale B1 B1 B2 B1 for a reflection in $x=2$ or either axis, OR for sight of the line $y = 2$ 6.(a) (i) $2/5$ (ii) $3/5$ B1 (b) (i) $4:3$ 5.(a) (i) $2/5$ (ii) $3/5$ B1 (b) (i) $4:3$ (ii) $(28/49) \times 100$ $57.1(\%)$ B1 42 (ii) $(28/49) \times 100$ $57.1(\%)$ M1 $A2$ (ii) $(28/49) \times 100$ $57.1(\%)$ M1 A2(iii) $(28/49) \times 100$ $57.1(\%)$ M1 A2(iii) $(28/49) \times 100$ $57.1(\%)$ M1 A2(iii) $(28/49) \times 100$ $57.1(\%)$ M1 A2(iii) $(28/49) \times 100$ $57.1(\%)$ M1 A2			
(e) $635 + \dots$ $\dots + 12070$ $= 12705$ B1 B1 B1 B1 B1B1 for $2.9(3483)$ 4.(a) Enlargement scale factor 2 Correct position (b) Correct reflection in $y = 2$ B2 B1 B1 B2B1 for any 3 lines correct, or consistent incorrect scale B1 B2 B1 for a reflection in $x=2$ or either axis, OR for sight of the line $y = 2$ (c) Correct translation (d) Correct rotationB1 B2 B1 B1 near miss (± 2 nm from grid lines), or anticlockwise rotation B0 if rotation shown in all quadrants5.(a)(i) 2/5 (ii) 3/5 (b)(i) 4:3B1 B2 B1 B1 B1 B2(ii) (28/49) × 100 $57.1(\%)$ M1 A2(ii) (28/49) × 100 $57.1(\%)$ M1 A2			B2 for $1.71(313)$ OR
(e) $635 + \dots$ $= 12705$ B1 B1 B1 B1 B1 B1FT from B1, i.e. either 635 or 12070 correct, with sum of their 2 values calculated correctly4.(a) Enlargement scale factor 2 Correct position (b) Correct reflection in $y = 2$ B2 B2 B1 B1 B2B1 for any 3 lines correct, or consistent incorrect scale B1 B2 B1 for a reflection in $x=2$ or either axis, OR for sight of the line $y = 2$ (c) Correct translation (d) Correct rotationB1 B2 B1 B1 B2B1 near miss (±2mm from grid lines), or anticlockwise rotation B0 if rotation shown in all quadrants5.(a)(i) 2/5 (ii) 3/5 (b)(i) 4:3B1 B1 B2FT 1 – (i) B1 B1 for 28:21 with an attempt to find a common factor, or sight of 1.3•:1 or 1:0.75, or reverse answer 3:4 FT their 28, may be 21 used A1 for 57.142857 rounded or truncated	(c) 1.7	20	
(c) $025 + 112070$ B1 $= 12705$ B1 $4.(a)$ Enlargement scale factor 2B2Correct positionB1(b) Correct reflection in $y = 2$ B2B1 for any 3 lines correct, or consistent incorrect scaleB1B1(c) Correct translationB1(d) Correct rotationB1(d) Correct rotationB15.(a)(i) 2/5B1(ii) 3/5B1(ii) (28/49) × 100S7.1(%)(ii) (28/49) × 100M1FT from B1, i.e. either 635 or 12070 correct, with sum on their 2 values calculated correctlyB1B1B2B1 for any 3 lines correct, or consistent incorrect scaleB1B2B1B1B2B1 for a reflection in $x=2$ or either axis, OR for sight of the line $y = 2$ B1B2B1B1B2B1 near miss ($\pm 2mm$ from grid lines), or anticlockwise rotationB2B1B3B1B4B2B5.(a)(i) 2/5B1(ii) (28/49) × 100B1FT their 28, may be 21 used57.1(%)A2A1 for 57.142857 rounded or truncated	(e) $635 \pm$	B1	
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(c) Correct translationB1 B2B1 near miss ($\pm 2mm$ from grid lines), or anticlockwise rotation(d) Correct rotationB2B1 near miss ($\pm 2mm$ from grid lines), or anticlockwise rotation5.(a)(i) 2/5 (ii) 3/5B15.(a)(i) 2/5 (ii) 3/5B15.(a)(i) 2/5 (ii) 3/5B16)(i) (14:3)B16)(i) (28/49) × 100 (57.1(%)B16)(i) (28/49) × 100 (ii) (28/49) × 100M16)(ii) (28/49) × 100 (iii) (28/49) × 100M17)(iii) (28/49) × 100 (iii) (28/49) × 100M16)(iii) (28/49) × 100 (iiii) (28/49) × 100M16)(iii) (28/49) × 100 (iiii) (28/49) × 100M17)(iii) (28/49) × 100 (iiii) (28/49) × 100M16)(iii) (28/49) × 100 (iiii) (28/49) × 100M16)(iii) (28/49) × 100 (iiii) (28/49) × 100M17)(iii) (28/49) × 100 (iiii) (28/49) × 100 (iiii) (28/49) × 100M17)(iii) (28/49) × 100 (iiii) (28/49) × 100M18)(iii) (28/49) × 100 (iiii) (28/49) × 100M18)(iiii) (28/49) × 100 (iiii) (28/49) × 100 (iiii) (28/49) × 1008)(iiii) (28/49) × 100 (iiii) (2			
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			e ,,
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		8	B0 if rotation shown in all quadrants
(b)(i) 4:3B2B1 for 28:21 with an attempt to find a common factor, or sight of $1.3 \cdot 1$ or $1:0.75$, or reverse answer 3:4(ii) $(28/49) \times 100$ M1FT their 28, may be 21 used $57.1(\%)$ A2A1 for 57.142857 rounded or truncated	5.(a)(i) 2/5	B1	
(ii) (28/49) × 100 Sight of 1.3•:1 or 1:0.75, or reverse answer 3:4 (iii) (28/49) × 100 M1 57.1(%) FT their 28, may be 21 used A1 for 57.142857 rounded or truncated	(ii) 3/5	B1	FT 1 – (i)
(ii) (28/49) × 100 M1 FT their 28, may be 21 used 57.1(%) A2 A1 for 57.142857 rounded or truncated	(b)(i) 4:3	B2	B1 for 28:21 with an attempt to find a common factor, or
57.1(%) A2 A1 for 57.142857 rounded or truncated			
57.1(%) A2 A1 for 57.142857 rounded or truncated	(ii) (28/49) × 100	M1	FT their 28, may be 21 used
B1 Accept 2 ¹ / ₂ Do not accept 30/12		A2	A1 for 57.142857 rounded or truncated
(c) 1. a .c	(c) 1: 2.5	B1	Accept 2 ¹ / ₂ . Do not accept 30/12
8		8	-

Methods 2 Higher Summer 2012		FINAL
6. Correct use of area cross section or volume,	M1	OR M1 for finding the area of the cross section 12(cm ²)
$\frac{1}{2} \times base \times 4 \times 10 (= 120)$		Accept as a reverse calculation, i.e. using 6cm to show
(Base of the cross section is) 6(cm)	A1	volume $120(\text{cm}^3)$ or area $12(\text{cm}^2)$
Use of Pythagoras' Theorem $5^2 = 4^2 + (\text{RHS base})^2$	M1	Accept M1, A1 if $4^2 + 3^2$ used to show side 5cm, or
RHS base = $3(cm)$	A1	M1, A1 for reference to 3, 4, 5 triple
Conclusion e.g. 'small left hand side triangle is also 3cm, 4cm, 5cm (so cross section has two sides of length 5 cm,	E1	Depends on all previous marks
so it is isosceles)', 'isosceles as 3 is half of 6'		**If M1, A1 for base 6(cm), but M0, A0 or M1, A0 for Pythagoras' Theorem & E0 then possible award of: SC1 for clear conclusion that it is an isosceles and its dimensions are (5cm,) 5cm with base 6cm OR
Look for		SC1 for a clear conclusion that it is not isosceles based
spellingclarity of text explanations and statements		on incorrect use of, or an error in using Pythagoras' Theorem
• the use of notation		OWC2 Presents relevant material in a scherent and
• units, cm, cm^2 and cm^3		QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and
For QWC2 there must be sufficient process steps shown, with text connecting throughout, or in full summary		with few if any errors in spelling, punctuation and grammar.
within a conclusion. Also units must be shown.	Q	QWC1 Presents relevant material in a coherent and
	W	logical manner but with some errors in use of
Candidates not showing two stages working with the	C	mathematical form, spelling, punctuation or grammar
problem do not have sufficient process steps to be awarded QWC2.	2	OR
awalded QwC2.		evident weaknesses in organisation of material but using
QWC2: Candidates will be expected to		acceptable mathematical form, with few if any errors in
• present work clearly, with words explaining		spelling, punctuation and grammar.
process or steps		
AND		QWC0 Evident weaknesses in organisation of material,
• make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer		and errors in use of mathematical form, spelling, punctuation or grammar.
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 in		
their final answer	7	
7. $5x + x/4 = 18.9$	B1	FT until 2 nd error
$20x + x = 4 \times 18.9$ OR $21x/4 = 189$	B1	FT provided similar format, equivalent level of difficulty Accept FT from $5x + \frac{1}{4} = 18.9$, giving $5x = 18.9 - \frac{1}{4}$
21x = 75.6	B1	
x = 3.6	B1	CAO
		If B0, and similar level of difficulty but trial and
		improvement used, check their answer in their equation,
		if correct then award SC2. If SC2 not awarded, then for
	4	2 correctly evaluated trials, 1 either side of the required
	T	value award SC1

Methods 2 Higher Summer 2012		FINAL
8. Area of circle = $\pi \times 8.2^2$ (211.())	M1	
Area of square = 23.4^2 or 23.4×23.4 (547.56)	M1	
Area remaining, between 336.3 to 336.5 (cm ²) inclusive	A1	CAO
Percentage = (area remaining/ 23.4^2) × 100	M1	FT their area remaining provided at least M1
= 61(.4%)	A1	CAO
		Alternative:
		M1 Area of circle = $\pi \times 8.2^2$ (=211.())
		<i>M1</i> area of square = 23.4^2 (=547.56)
		A1 $\pi \times 8.2^2 / 23.4^2$ (×100) correctly evaluated, 0.38,
		0.385 and 0.386, or 38, 38.5, 38.6 or 39 (or as
		percentages) CAO
		<i>M1</i> % remaining = $100 \times (1 - \text{Area circle / Area square})$
		(FT areas provided at least M1 awarded) or $1 - 38.5$ or 38.6 or 39
	5	A1 61.(4%) CAO
9.(a) $\cos x = 25.8/62.3$	M1	AT 01.(470) CAO
$65.5(3576^{\circ})$ rounded or truncated	A2	A1 for $\cos^{-1} 0.4(141)$
03.5(5570) Iounded of indicated	112	65.8 comes from premature rounding, award M1 and A1
		implied
(b) $z = 14.3 \times \tan 34$	M1	r · · ·
9.6(454) or 9.65	Al	If 9.6 seen in working, award M1 A1, however if not
	5	seen and incorrectly rounded then M1, A0.
		An answer of 9.64 or 9.8 from correct working is M1, A0
		An unsupported answer of 9 gets M0, A0.
10.(a)(i) $230 \times 100 \times 10$ or 230 000	B1	
2.3×10^{5}	B1	FT 'their 230 000', but not 230, correctly expressed in
		standard form
(ii) $8 \times 6 \div 3$	M1	
16 (days)	A1 D2	
(b) $T = xd/w$	B3 7	B2 for xd/w or $T = xd/$ or $T = xd \times$
	-	B1 for sight of xd
11. Sight of 9.6÷7.8 or 9.8/(3.25 + 4.55)	B2	May be within a calculation or implied
or 9.6÷2.4 or 9.6×0.416(66) or equivalent		(2.4 = 7.8/3.25 and 0.4166 = 3.25/7.8)
		B1 for sight of 3.25:4.55 (or 5:7) or 3.25:7.8 or AB/BC = 3.25/4.55 or AB/9.6 = 3.25/(3.25+4.55)
		or equivalent $AB/BC = 5.25/(3.25+4.55)$
AB = 4(cm)	B1	or equivalent
BC = 5.6(cm)	B1	
		Alternative method:
		B1 $x/(9.6-x) = 3.55/4.55$ or simplified versions
		B1 $4.55x = 3.25(9.6 - x)$ or equivalent rearrangement
		$B1 \ AB = 4(cm)$
	4	$B1 \ BC = 5.6(cm)$
12.(a) $y = 8 - x$ OR $x = 8 - y$	M1	
$3x^{2} + x(8-x) + 6 = 0$ $3x^{2} + 8x + 6 = 0$ $3x^{2} + 8x + 6 = 0$ $3x^{2} + 8x + 6 = 0$	M1	Allow 1 error in substitution Or hybrid herror $r^2 + 4r + 2 = 0$ OP $r^2 + 20r + 00 = 0$
$2x^2 + 8x + 6 = 0 \qquad \qquad 2y^2 - 40y + 198 = 0$	A1	Or by halving $x^2 + 4x + 3 = 0$ OR $y^2 - 20y + 99 = 0$ ET aquivalant level of difficulty provided M1
(x + 1)(x+3) = 0 $(y - 11)(y - 9) = 0$	m1	FT equivalent level of difficulty provided M1 Or alternative method to solve , e.g. formula with correct
(x + 1)(x+3) = 0 $(y - 11)(y - 9) = 0$		Substitution and b^2 -4ac correct simplified
x = -1, x = -3 OR $y = 11, y = 9$	A1	substitution and b ac correct simplified
y = 9, y = 11 $y = -1, y = -1y = -1, y = -1$	Al	OR <i>SC1</i> for x= -1, y=9 OR x= -3, y=11
j >, j = 1 $x = 3, x = 1$		$\bigcup_{i=1}^{n} \bigcup_{j=1}^{n} \bigcup_{i=1}^{n} \bigcup_{j=1}^{n} \bigcup_{j=1}^{n} \bigcup_{j=1}^{n} \bigcup_{i=1}^{n} \bigcup_{j=1}^{n} \bigcup_{i=1}^{n} \bigcup_{j=1}^{n} \bigcup_{j$
(b) $\mathbf{x} = \{ -5 \pm \sqrt{(5^2 - 4 \times 2 \times -4)} \} / 2 \times 2$	M1	Allow 1 slip in substitution. Must be correct formula
$x = \{-5 \pm \sqrt{57}\}/4$	A1	1
0.64 and -3.14	A1	
	9	
13. Idea to work with £90.27 as 85%	S1	
or considering the 2 nd step as 118% of original price		
90.27÷0.85 or equivalent	M1	Maybe implied in further working
106.2(0)	A1	
106.2(0)÷1.18	M1	FT their 106.2(0) provided >90.27
(£)90	Al	
	5	

Methods 2 Higher Summer 2012		FINAL
14.(a) Idea of right angled triangle shown or used with	M1	Either answer correct implies M1
height b, base a		
$\sin \theta = b(/1)$	A1	Or b $/\sqrt{a^2 + b^2}$
$\tan \theta = b/a$	A1	
(b) Use of Pythagoras' Theorem	M1	M1 for $a^2 + b^2 = 1$ or $x^2 + y^2 = r^2$
$x^{2} + y^{2} = 1$ or $x^{2} = 1 - y^{2}$ or $y^{2} = 1 - x^{2}$	A1	CAO. Correct equation in any form
	5	
15. $AC^2 = 8.2^2 + 7.6^2 - 2 \times 8.2 \times 7.6 \times \cos 42$	M1	
$AC^2 = 32(.37)$	A1	
AC = 5.689 or 5.7 (cm)	A1	
$\frac{1}{2} \times 8.2 \times 7.6 \times \sin 42 + \frac{1}{2} \times 9.7 \times AC \times \sin 48$	M1	FT their AC, but not 8.2, 7.6 or 9.7 (20.85 + 20.50)
Answers in the range $41.35 \text{ (cm}^2)$ to $41.4 \text{(cm}^2)$ inclusive	A1	
	5	
16. $\mathbf{AB} = 2\mathbf{x} - \mathbf{y}$	M1	
Parallel	A1	
CD twice length AB OR AB is ¹ / ₂ length CD	A1	
	3	

GCSE Methods in Mathematics (Linked Pair Pilot) MS/Summer 2012



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