

METHODS UNIT 2 HIGHER TIER

Methods Unit 2 Higher Tier January 2014	Mark	Comment															
1.(a) 20 (b) $12x - 39 = 45$ OR $4x - 13 = 45/3$ $12x = 84$ OR $4x = 28$ $x = 7$ (c) $x + 4 = 6 \times 12$ $x = 68$	B1 B1 B1 B1 M1 A1 6	FT until 2 nd error Or $x/12 = 6 - 4/12$															
2. 0.45	B2 2	B1 for 0.45267... rounded or truncated															
3.(a) <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Kite</td><td>1</td><td>1</td></tr> <tr> <td>Parallelogram</td><td>0</td><td>2</td></tr> <tr> <td>Rhombus</td><td>2</td><td>2</td></tr> </table> (b) $\pi r^2 = 36\pi$ 6 (cm)	Kite	1	1	Parallelogram	0	2	Rhombus	2	2	B3 M1 A1 5	B2 for any 4 or 5 correct entries, B1 for any 2 or 3 correct entries Allow '0' in top right hand cell For equating, or $r = \sqrt{36}$, or $r^2 = 36$ <i>If no marks allow SC1 for 5.9(9..cm) from calculation</i>						
Kite	1	1															
Parallelogram	0	2															
Rhombus	2	2															
4. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th>Position</th><th>Name</th><th></th></tr> <tr> <td>1</td><td>Catrin</td><td>33(.33...)%</td></tr> <tr> <td>2</td><td>Debbie</td><td>32(.144...)%</td></tr> <tr> <td>3</td><td>Beatrice</td><td>31%</td></tr> <tr> <td>4</td><td>Abbie</td><td>27(.38...)%</td></tr> </table>	Position	Name		1	Catrin	33(.33...)%	2	Debbie	32(.144...)%	3	Beatrice	31%	4	Abbie	27(.38...)%	B3 3	Names in the correct order and all results appropriately and correctly compared (same form) B2 for at least 3 results correctly in a suitable format to compare and their comparisons appropriately sorted B1 for at least 2 results correctly in a suitable format to compare and their comparisons appropriately sorted, OR B1 for at least 3 results correctly in a suitable format to compare <i>Remember: format of 1 of the result with 2 others to compare counts as 3 results</i> <i>If no other marks, then award SC1 for names in the correct order</i> If fractions used for comparison they need to be common denominators or awareness of size, e.g. $1/3 = 9/27$ compared with $9/28$ same numerator Fractions: Catrin $28/84$, Debbie $27/84$ ($=9/28$), Beatrice $\approx 26/84$, Abbie $23/84$ Marks: Catrin 28, Debbie 27, Beatrice ≈ 26 , Abbie 23
Position	Name																
1	Catrin	33(.33...)%															
2	Debbie	32(.144...)%															
3	Beatrice	31%															
4	Abbie	27(.38...)%															
5.(a) $2/15$ ISW (b) $(£400 \times) 1.26 (\times) 0.76$ or equivalent, in either order (c)(i) $2/5 \times 1 \frac{1}{4}$ or 15min per 5cm or 5cm in 15 min or 1cm in 3 min $\frac{1}{2}$ (hour) or 30 (minutes) (ii) 20/75 or 3min per 1cm or 5cm in 15 min or 1cm in 3 min $25 \times 20/75$ or $0.266... \times 25$ or 6.66.... or $20/3$ or $(\frac{1}{3})$ or $0.33..cm$ in 1 min or $3.33..cm$ in 10 min 6.67 (cm)	B2 B2 M1 A1 B1 B1 B1 9	B1 for sight of 15, e.g. $.../15$ or $\frac{2}{2+5+8}$ B1 for sight of either 1.26 or 126/100 OR for 0.76 or 76/100 If no marks SC1 for sight of 383.04 Do not accept $2/5 \times 1.15$, recording of time must be correct If units are given they must be correct FT from (c)(i) FT their depth corrected to 3 significant figures															

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6. (Perimeter) $2x + x - 6 + 2x + 8 + x - 8 = 132$ $6x - 6 = 132$ or $6x = 138$ $x = 23$ (Height of the trapezium $(x - 8)\text{cm} =$ 15 (cm) Look for - the use of notation (watch for the use of '=' being appropriate) - steps shown, not $6x = 636/6$ - labels given 'perimeter', 'height' (in trial and improvement, the trials and choices need to be clearly explained) QWC2: Candidates will be expected to - present work clearly, with words explaining start, 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 start, process or steps OR - make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer	M1 M1 A1 A1 B1 Q W C 2 7	Algebraic notation not required for M, A and B marks FT their sum of terms, including x and number terms, equated to 132 FT their collection for equivalent difficulty FT for evaluation, not left as a fraction FT their x-8 provided M2 awarded <i>Alternative: Trial and improvement</i> M1 Trial to sum the correct 4 sides M1 Clearly working towards 132, more than 1 trial and moving closer A1 Clearly working towards 132, one below and one above A1 23 B1 (Height) 15(cm) FT their x-8 provided M2 awarded 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.
7.(a) $b = 2c$ OR $c = \frac{1}{2}b$ ISW (b) $5n + 7 < 52$ $5n < 45$ OR $n < 45/5$ $n < 9$	B1 B1 B1 B1 4	Do not accept use of '=' in (b) FT from 1 error FT only for a whole number answer
8.(a) Correct rotation (b) Correct enlargement (scale factor 2) in lower left quadrant Correct position	B2 B1 B1 4	B1 for a near miss or for 90° anticlockwise rotation appropriate FT to lower left quadrant
9.(a) Semi C = $\frac{1}{2} \times \pi \times 6.2$ + 6.2 15.9(cm) to 15.94(...cm) (b) Volume = $\pi \times 4.5^2 \times 10.3$ 654.9(...) to 655.5(4...) cm³	M1 m1 A1 M1 A1 U1 6	Accept 16(cm) from correct working For answer of 9.7(...) allow M1 and SC1 If no marks SC1 for sight 19.4(7...) to 19.4(8...) or 25.6(7...) to 25.6(8...) Independent mark

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10(a) $\frac{1}{2} \times 4.6 \times 2.3$ $5.29 \text{ (cm}^2\text{)} \text{ or } 5.3 \text{ (cm}^2\text{)}$ (b) (hypotenuse ² =) $4.6^2 + 2.3^2$ h(ypotenuse) ² = 26.45 or hypotenuse = $\sqrt{26.45}$ h(ypotenuse =) $5.14 \dots \text{ cm}$	M1 A1 M1 A1 A1 5	Only accept 5(cm ²) from correct working Allow FT from M1, A0								
11.(a) $x = 4.5 \times 10^6 \times 3.4 \times 10^{-2}$ $= 1.5 \times 10^5$ (b) $y = 1.2 \times 10^8 - 5.5 \times 10^6$ $= 1.1 \times 10^8$	M1 A2 M1 A2 6	Intention to multiply A1 for 15.3×10^4 or 1.53×10^5 or equivalent including to 2 sig. figs. Intention to subtract in the correct order A1 for 1.145×10^8 or $0.11 \dots \times 10^9$ or $11.4 \dots \times 10^7$ (attempt standard form) or equivalent including to 2 sig. figs.								
12.(a) $PQ = 5.6 \times 5.88 / 8.4$ or equivalent 3.92 (cm) (b) $BC = 2.24 \div (5.88 / 8.4)$ or equivalent 3.2 (cm)	M1 A1 M1 A1 4	Or equivalent calculation that could lead to correct answer Accept 3.9(cm) FT premature approximation of the scale factor or equivalent premature approximation Or equivalent calculation that could lead to correct answer (Alternative: scale factors 0.7 or 10/7 may be used)								
13. Third angle 40(°) or 68(°) Statement that this implies similar Statement 'sides could be different' clearly implies not necessarily congruent	B1 E1 E1 3	Depends on the B1 Accept 'Thomas is correct because sides may be different'. Award this E1 without previous B1 and E1.								
14. Rearrange of equation(s) to format that could lead to a solution Method to find first variable, e.g. equal coefficients, equating a variable to give equation in 1 variable First variable Method to find second variable, e.g. substitution shown for first variable Second variable	M1 M1 A1 m1 A1 5	e.g. $3x + 2y = 1$ with $2x - 5y = -50$, or making either x or y the subject <u>FT from 1 error in rearrangement only</u> Allow 1 error, but not in non equate variable FT their first variable $x = -5$ and $y = 8$								
15. $-(3x + 7y) + 4x + 2y$ $= x - 5y$	M1 A1 2	Allow for intention of using -OA + OB , e.g. $-3x+7y+4x+2y$ or $x + 9y$ Accept $1x - 5y$								
16.(a) Statement C selected Reason, e.g. 'inverse implies the nature is opposite' (b) $f \propto 1/g^2$ OR $f = k/g^2$ $4 = k/5^2$ $f = 100/g^2$ (c) <table border="1"><tr><td>g</td><td>1/2</td><td>5</td><td>(+)100</td></tr><tr><td>f</td><td>400</td><td>4</td><td>0.01</td></tr></table>	g	1/2	5	(+)100	f	400	4	0.01	B1 E1 B1 M1 A1 B2 7	Accept numerical examples Do not accept a repeat of the statement given FT non linear only Maybe implied in part (b) FT their non linear expression B1 for each value
g	1/2	5	(+)100							
f	400	4	0.01							
17. $BC = 8.6/\cos 15$ $BC = 8.9(03375 \dots)$ $\tan \hat{ACB} = 3.8/BC$ $\hat{ACB} = \tan^{-1} 0.4268 \dots$ $23(.113 \dots^\circ)$	M2 A1 M1 M1 A1 6	M1 for $\cos 15 = 8.6/BC$ FT their BC provided not 8.6 or 3.8 OR alternative using AC, following evaluation of AC using Pythagoras' Theorem								

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18. $\frac{x}{x+y} = \frac{z}{AC}$ or $\frac{x}{x+y} = \frac{z}{z+BC}$ $AC = \frac{z(x+y)}{x}$ or $x(z+BC) = z(x+y)$ $BC = \frac{z(x+y)}{x} - z$ or $xz + xBC = xz + yz$ $BC = \frac{xz+yz}{x} - z$ or $xBC = yz$ $BC = yz/x$	M1 m1 M1 M1 A1 5	Or alternative correct first step Rearranged in form 'AC= ...' FT BC = AC – z provided AC in terms of x, y or z Or alternative correct stage of manipulation CAO <i>If no marks then SC2 for BC=yz/x without working, OR SC1 for BC/y = z/x or BC/z=y/x or equivalent</i>
19. General cosine curve with appropriate orientation and position 1 and -1 indicated on y-axis, passes through (0°, 1), (90°,0), (-90°,0) and approximately (-180°,-1) and (180°,-1) General tan curves with appropriate orientation and position Correct indication or use of asymptotes	M1 A1 M1 A1 4	<i>If no marks, SC1 for slight error in 'tends to infinity' or idea of 'the shape of tanx'</i>
20. Use of area = $\frac{1}{2} ab \sin C$ and cosine rule $\frac{1}{2} \times 3.9 \times x \times \sin 96^\circ = 22.8$ $x = 22.8 / (\frac{1}{2} \times 3.9 \times \sin 96^\circ)$ $x = 11.7567...(\text{cm})$ rounded or truncated (longest side y) $y^2 = 3.9^2 + x^2 - 2 \times 3.9 \times x \times \cos 96^\circ$ y^2 accept values between 163 and 164.1 $y = 12.8 (\text{cm})$	S1 M1 A1 A1 M1 A1 A1 7	Correct rearrangement FT their x, not 3.9 or spurious value Accept 13(cm) from correct working, not scale diagram Final A1 depends on previous A1