

UNIT 2 (HIGHER TIER)

Methods 2 Higher Summer 2013		Final								
1(a) $(28416/38400) \times 100$ 74(%) (b) $766 + 766 \times 12/100$ OR 766×1.12 (£)857.92 (c) 2/5 or equivalent fraction	M1 A1 M1 A1 B1 5	Or equivalent full method Or equivalent full method CAO								
2(a) Enlargement scale factor 2 Correct position (b) Correct reflection in $y = x$ (c) Correct translation (d) Correct rotation	B2 B1 B2 B1 B2 8	B1 for any 3 lines correct, or consistent incorrect scale At least 2 points are needed to indicate the correct position B1 for a reflection in $y = -x$, OR for sight of the line $y = x$ B1 near miss, OR 90°clockwise rotation about (2, 1), OR 90° anticlockwise rotation about (1, 2)								
3. Method for finding yellow ($2.5 \times 2 \div 3 = 1.666\dots$), or Method for finding red ($2.5 \times 5 \div 3 = 4.166\dots$), or Method for finding white ($2.5 \times 90 \div 3 = 75$) Red 4.166... (litres) AND Yellow 1.666.. (litres) AND White 75 (litres)	M1 A2	Or equivalent correct method for one colour Answers <u>must be from appropriate calculations</u> , correct working with appropriate rounding or truncation A2 for all three correct, accept suitable rounding or truncation, e.g. do not accept red 4 litres, yellow 1 litre For example: Red (<i>accept values 4.1, 4.15, 4.16, 4.17, 4.2, 4.5 litres</i>) Yellow (<i>accept 1.6, 1.7, 2 litres</i>) White (<i>accept 74.7, 74.9, 75 litres</i>) A1 for any two correct FT for their amount of paint provided M1 awarded and more than 1 tin is needed for the colour <u>Accept equivalent tin sizes available, e.g. 5 × 1 litre tins</u>								
<table><tr><td>Colour</td><td>Number and sizes of tins to buy</td></tr><tr><td>White</td><td>7 × 10 litre, 2 × 2.5 litre</td></tr><tr><td>Red</td><td>1 × 2.5 litre, 2 × 1 litre</td></tr><tr><td>Yellow</td><td>2 × 1 litre tins</td></tr></table>	Colour	Number and sizes of tins to buy	White	7 × 10 litre, 2 × 2.5 litre	Red	1 × 2.5 litre, 2 × 1 litre	Yellow	2 × 1 litre tins	B1 B1 B1	For Red do not accept 2 × 2.5 litre nor 5 × 1 litre For Yellow do not accept 1 × 2.5 litre tins
Colour	Number and sizes of tins to buy									
White	7 × 10 litre, 2 × 2.5 litre									
Red	1 × 2.5 litre, 2 × 1 litre									
Yellow	2 × 1 litre tins									
Look for • spelling • connection of colour name with calculation • clarity of text explanations and statements • the use of notation • units (litres or l) 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, spelling, punctuation and grammar in their final answer	QWC2	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.								
	8									

4(a) $x = 60 \times 5/8$ $x = 37.5$ (b) $x = 1/4$ or 0.25 or equivalent (c) $9x - 4 = 7x + 14$ $9x - 7x = 14 + 4$ or $2x = 18$ $x = 9$ (d) $10x > 40$ $x > 4$ (e) $x > 60/9$ or $x > 6.6(666)$ 7	B1 B1 B1 B1 B1 M1 A1 M1 A1 10	FT until 2nd error Accept 300/8 or equivalent. Mark final answer Accept 3/12. Mark final answer FT until 2nd error No marks for use of “=”, unless finally replaced to give $x > 4$ then award M1 A1. SC1 for $x > 5$ from $10x > 50$ OR sight of $9 \times 6 = 54$ AND $9 \times 7 = 63$ Do not accept final answer of $(x) > 7$. Do not penalise use of ‘=’ if 7 is given as a final response, award M1, A1
5(a) 4.5×12.4 $55.8 \text{ (cm}^2\text{)}$ (b) $34.6 = \pi \times r^2$ $r^2 = 34.6/\pi$ $r = 3.3(186... \text{ cm})$ (c) $x + x + 2 + 2x + 3x + 5 + 4x (= ...)$ $11x + 7 = 95$ or $11x = 88$ $x = 8$	M1 A1 M1 A1 A1 M1 m1 A1 8	Accept $56(\text{cm}^2)$ from correct working Accept 3(cm) or 3.3(cm) from correct rearrangement For the expression with intention to sum the terms given CAO. Unsupported $x=8$ is awarded no marks
6(a) 4.4 (b) $637 \quad (\times ...)$ $(... \times) \quad 3192$ $= 2033304$	B2 B1 B1 B1 5	B1 for 4.38(13...) or 4.3 FT correct evaluation of product from 1 correct value If no marks then SC1 for interpretation of ‘product’ and ‘of’ e.g. by sight of $2 \frac{1}{3} \times 273 \times 4 \frac{1}{5} \times 760$
7. Strategy: use of Pythagoras’ Theorem and $C = \pi d$ or $C = 2\pi r$ $h^2 = 4.2^2 + 4.2^2$ $h = \sqrt{35.28}$ diameter = 5.9(39...cm) or radius = 2.9698...(cm) $C = \pi \times 5.939...$ OR $C = 2 \times \pi \times 2.9698...$ 18.5 (cm) to 18.7(cm)	S1 M1 A1 A1 m1 A1 6	OR alternative full correct strategy OR alternative <u>complete</u> method Accept diameter = 6(cm) or radius = 3(cm), do not accept radius = 2.9. Clarification of diameter or radius may be implied in further work, penalise here with A0, then FT FT their radius or diameter as appropriate provided M1 awarded, including use of $r = 5.9(39...)$ ($r = 5.9(39...)$ leads to 37(. 4..cm)
8(a) Method to clear fractions, all 3 terms $3(3x - 1) - 4(x + 6) = 3 \times 6$ $9x - 3 - 4x - 24 = 18$ OR $5x - 27 = 18$ OR $5x = 45$ $x = 9$ (b) $\sin x = 28.7/34.2$ $57(.0537...^\circ)$ or $57(.1^\circ)$ (c) 1.5×10^{11}	M2 A1 A1 M1 A2 B2 9	Intention, i.e. brackets may be missing M1 for clearing fractions 2 terms Fractions must be cleared before M marks can be awarded, not for quotients FT from M1 or M2 FT provided M1 awarded If no marks SC1 sight of $(5x - 27)/12$ A1 for $x = \sin^{-1} 0.839(181...)$ B1 for $1.54(347...) \times 10^{11}$
9. $(x =) 8.4 \times 6/5$ $= 10(.08 \text{ cm})$ or $10.1(\text{cm})$ $(y =) 4.32 / 6/5$ or $(y =) 4.32 \times 5/6$ $= 3.6 \text{ (cm)}$	M1 A1 M1 A1 4	Or equivalent calculation that could lead to correct answer Or equivalent calculation that could lead to correct answer

10.(a) Any two points correct, with no incorrect points Correct straight line drawn from (but not beyond) (30,40) inclusive to (0,10) exclusive (b) Explanation of implied NO, e.g. 'not possible to have a rectangle with zero lengths'	M2 A1 E1 4	Accept (0, 10) as one of the points with 1 other point, provided no other incorrect points plotted M1 any one point correct provided no incorrect points plotted, do not accept (0, 10), OR M1 for any 2 correct points not including (0,10) Accept indication for lots and lots of points between. Accept to (0, 10) but not beyond									
11(a) Two different corresponding sides and an included angle indicated. (b) Right angle, hypotenuse and a corresponding different side indicated OR Right angle, hypotenuse and a corresponding different angle indicated	B2 B2 4	B1 Two corresponding sides not marked as different and the included angle indicated B1 Right angle, hypotenuse and a corresponding different length indicated but not marked as different B1 Right angle, hypotenuse and a corresponding angle indicated but angles not marked as different, or Right angle, hypotenuse & the both of 2 corresponding sides marked differently as appropriate <i>Accept right angles indicated either as 90° or $\square$ at vertex</i>									
12. <table border="1"><tr><th>Amount</th><th colspan="2">After a decrease of</th></tr><tr><td></td><td>40%</td><td>2%</td></tr><tr><td>£820</td><td>£492</td><td>£803.6(0)</td></tr></table>	Amount	After a decrease of			40%	2%	£820	£492	£803.6(0)	B4 4	B3 for 820, or B2 for $492 \times 100/60$, or B1 for '60% is 492', or B1 for $0.98 \times$ 'their 820' correctly evaluated to nearest penny or unrounded
Amount	After a decrease of										
	40%	2%									
£820	£492	£803.6(0)									
13. (a) $-7x + 10y$ (b)(i) $-6x - 3y$ or factorised equivalent (ii) $-6x + 7y$	B1 B1 B1 3	Mark final answer in each part FT (b)(i) $+10y$ simplified correctly If (i) and (ii) both correct but left in unsimplified form allow SC1									
14. Strategy: Use of $\frac{1}{2}ab\sin C$ and cosine rule $42.8 = \frac{1}{2} \times BC \times 17.8 \times \sin 34$ $BC = 8.59987\dots$ $AB^2 = BC^2 + 17.8^2 - 2 \times BC \times 17.8 \times \cos 34$ $AB^2 = 136.98\dots$ $AB = 11.7(\dots \text{ cm})$	S1 M1 A1 M1 A1 A1 6	Or equivalent full strategy FT their BC, but not as 17.8 Accept 12(cm) from correct working. CAO <i>Alternative:</i> <i>S1 complete strategy, e.g. with perpendicular with appropriate trigonometry for both triangles</i> <i>M1, A1 for the RHS triangle</i> <i>M1, A1, A1 for the LHS triangle</i>									
15. Volume sphere $= 4 \times \pi \times 6.7^3/3$ ($=1259(.833 \text{ cm}^3)$) Volume cone $= \pi \times r^2 \times 10.4/3$ $r^2 = \frac{\text{Volume sphere} \times 3}{\pi \times 10.4}$ $r^2 = 115.678\dots$ $r = 10.8(\text{cm})$	B1 B1 M1 A1 A1 5	FT their volume sphere provided dimensions cm^3 for M1 only Or equivalent rearrangement to isolate r^2 CAO. Must be to 1d.p. <i>Alternatively:</i> $4/3 \times \pi \times R^3 = 1/3 \times \pi \times r^2 \times h$ B1 $4 \times R^3 = r^2 \times h$ B1 $4 \times 6.7^3 = r^2 \times 10.4$ M1 $r^2 = 115.678\dots$ A1 $r = 10.8(\text{cm})$ A1 CAO									

16. $x(x+2) = y$ (ISW) $12(5+x) = 4y$ (ISW) $x(x+2) = 15 + 3x$ OR $12(5+x) = 4x(x+2)$ OR equivalent $x^2 - x - 15 = 0$ OR $4x^2 - 4x - 60 = 0$ $x = \{ 1 \pm \sqrt{(-1^2 - 4 \times 1 \times -15)} \} / 2$ OR $x = \{ 4 \pm \sqrt{(-4^2 - 4 \times 4 \times -60)} \} / 2 \times 4$ $x = (1 \pm \sqrt{61})/2$ OR $x = (4 \pm \sqrt{976})/8$ (x =) 4.4 (cm) (x + 2 =) 6.4 (cm)	B1 B1 M1 A1 M1 A1 A1 A1 8	The first two B1 marks maybe implied by the correct quadratic, hence if M1 awarded also award BOTH these B1 marks Equating or substituting, allow 1 error, e.g. missing brackets, or from incorrect expansion. FT provided at least B1 and equivalent level of difficulty Must be equate to zero Allow 1 slip in substitution. FT 'their 3 term quadratic' of equivalent level of difficulty for M1 and final A1 only (-3.4 is not required) FT provided M1 awarded
17. Idea of right angled triangle shown or used with height b, base a $\sin \theta = b/(1)$ $\cos \theta = a/(1)$	M1 A1 A1 3	Accept $b/\sqrt{a^2 + b^2}$ Accept $a/\sqrt{a^2 + b^2}$ If A0 due to notation $-a^2$ as $(-a)^2$ but otherwise correct, then allow SC1 as well as M1