

Sine and Cos Rule and Area Past Paper Answers Edexcel Maths GCSE
Higher Calculator

1.

	$\frac{AC}{\sin 49} = \frac{8.7}{\sin 64}$ $AC = \frac{8.7}{\sin 64} \times \sin 49$ $ (= 7.305\dots)$ $\frac{1}{2} \times 8.7 \times 7.305\dots \times \sin (180 - 64 - 49)$	29.3	5	<p>M1 for $\frac{AC}{\sin 49} = \frac{8.7}{\sin 64}$ oe</p> <p>M1 for $(AC =) \frac{8.7}{\sin 64} \times \sin 49$</p> <p>A1 for 7.3(05...)</p> <p>M1 for $\frac{1}{2} \times 8.7 \times '7.305' \times \sin(180 - 64 - 49)$</p> <p>A1 for 29.19 - 29.3</p> <p>OR</p> <p>M1 for $\frac{BC}{\sin(180 - 64 - 49)} = \frac{8.7}{\sin 64}$ oe</p> <p>M1 for $(BC =) \frac{8.7}{\sin 64} \times \sin 67'$</p> <p>A1 for 8.9(10...)</p> <p>M1 for $\frac{1}{2} \times 8.7 \times '8.910' \times \sin 49$</p> <p>A1 for 29.19 - 29.3</p> <p>OR</p> <p>(X is point such that AX is perpendicular to BC)</p> <p>M1 for $AX = 8.7 \times \sin 49 (= 6.565\dots)$ or $XB = 8.7 \times \cos 49 (= 5.707\dots)$</p> <p>M1 for $XB = 8.7 \times \cos 49 (= 5.707\dots)$ and $CX = '6.565' \div \tan 64$ oe (= 3.202...)</p> <p>A1 for 8.9(10...) or 5.7(07...) and 3.2(02...)</p> <p>M1 for $\frac{1}{2} \times '6.565\dots' \times ('5.707' + '3.202')$ oe</p> <p>A1 for 29.19 - 29.3</p>
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2.

Question	Working	Answer	Mark	Notes
(a)		18.2	2	M1 for $\frac{1}{2} \times 6 \times 7 \times \sin 60$ A1 for answer in range 18.1 to 18.2
(b)		6.56	3	M1 for $6^2 + 7^2 - 2 \times 6 \times 7 \times \cos 60$ M1 for correct order of operation eg $36 + 49 - 42 (=43)$ A1 for answer in range 6.55 to 6.56

3.

Question	Working	Answer	Mark	Notes
		43.9	5	<p>M1 for $\frac{11}{\sin 100} = \frac{9}{\sin D}$ oe</p> <p>M1 for $\sin D = \frac{9 \sin 100}{11}$ (=0.80575...) or $D = 53.68...$</p> <p>M1 for angle $DCA = 180 - 100 - "D"$ (=26.317..)</p> <p>M1 for area of $ABCD = 2 \times \frac{1}{2} \times 11 \times 9 \times \sin "26.317"$</p> <p>A1 for 43.8 – 43.9</p> <p>OR</p> <p>M1 for $\frac{11}{\sin 100} = \frac{9}{\sin D}$ oe</p> <p>M1 for $\sin D = \frac{9 \sin 100}{11}$ (=0.80575...) or $D = 53.68...$</p> <p>M1 for (height=) $9 \times \sin (180 - 100 - "D")$ or height = 3.990...</p> <p>M1 for area of $ABCD = (2 \times \frac{1}{2}) \times 11 \times \text{"height"}$</p> <p>A1 for 43.8 – 43.9</p> <p>OR</p> <p>M1 for $11^2 = AD^2 + 9^2 - 2 \times AD \times 9 \times \cos 100$</p> <p>M1 for $AD = \frac{18 \cos 100 + \sqrt{(18 \cos 100)^2 - 4(1)(-40)}}{2(1)}$</p> <p>M1 for $AD = \frac{18 \cos 100 + \sqrt{169.7(69795...)}}{2(1)}$ (= 4.95195(...))</p> <p>M1 for area of $ABCD = 2 \times \frac{1}{2} \times "4.95195" \times 9 \times \sin 100$</p> <p>A1 for 43.8 – 43.9</p>

4.

		22.5	3	<p>M1 for $\frac{1}{2} \times 7 \times 5 \times \sin 40$ or $\frac{1}{2} \times 7 \times 5 \times \sin(180 - 40)$</p> <p>M1 (dep M1) for doubling the area of the triangle</p> <p>A1 for 22.4 – 22.5</p> <p>OR</p> <p>M1 for complete method to find height of parallelogram, eg $5 \sin 40^\circ$</p> <p>M1 (dep M1) for complete method to find the area of the parallelogram, eg $7 \times 5 \sin 40^\circ$</p> <p>A1 for 22.4 – 22.5</p>
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5.

Question	Working	Answer	Mark	Notes
		80.4	6	<p>M1 for $0.5 \times 7 \times 8 \times \sin x = 18$</p> <p>M1 (dep) for $(x =) \sin^{-1}\left(\frac{18}{0.5 \times 7 \times 8}\right)$ oe (= 40)</p> <p>M1 (dep on at least M1) for $(AC^2 =) 7^2 + 8^2 - 2 \times 7 \times 8 \times \cos "40"$</p> <p>M1 (dep on previous M1) for correct order of evaluation or 27.2(03...) or 5.2(15...)</p> <p>M1 (dep) for $\sin A = \frac{8 \times \sin "40"}{5.2(15.)}$ or $\sin A = \frac{18}{0.5 \times 7 \times 5.2(15.)}$</p> <p>or $\cos A = \frac{5.2(15.)^2 + 7^2 - 8^2}{2 \times 5.2(15.) \times 7}$</p> <p>A1 for answer in the range 80.3 to 80.4 from correct working</p> <p>OR</p> <p>(with perpendicular from A meeting BC at a point X)</p> <p>M1 for $0.5 \times 8 \times h = 18$</p> <p>M1 (dep) for $(h =) \frac{18}{0.5 \times 8}$ (= 4.5)</p> <p>M1 (dep on at least M1) for $BAX = \cos^{-1} \frac{4.5}{7}$ (= 49.99 ...)</p> <p>M1 (dep) for $(BX =) \sqrt{7^2 - 4.5^2}$ (= 5.3619...)</p> <p>M1 (dep) for $CAX = \tan^{-1} \frac{8 - 5.3619}{4.5}$ (= 30.38 ...)</p> <p>A1 for answer in the range 80.3 to 80.4 from correct working</p> <p>NB Similar method applies for use of perpendicular from C to AB</p>

6.

Question	Working	Answer	Mark	Notes
		41.6	6	<p>M1 for $0.5 \times 5.4 \times 7.3 \times \sin B = 19$</p> <p>M1 for $(B =) \sin^{-1}\left(\frac{19}{0.5 \times 5.4 \times 7.3}\right)$ oe (= 74.6)</p> <p>M1 for $(AC^2 =) 5.4^2 + 7.3^2 - 2 \times 5.4 \times 7.3 \times \cos "74.6"$</p> <p>M1 (dep) for correct order of evaluation or 61.(479...)</p> <p>M1 for $\frac{\sin C}{5.4} = \frac{\sin "74.6"}{7.84}$ oe or $0.5 \times 7.3 \times "7.84" \times \sin C = 19$</p> <p>A1 for answer in the range 41.55 to 41.65 from correct working</p> <p>OR</p> <p>(with perpendicular from C meeting AB at a point X)</p> <p>M1 for $0.5 \times 5.4 \times CX = 19$</p> <p>M1 for $(CX =) \frac{19}{0.5 \times 5.4}$ (= 7.037...)</p> <p>M1 for $BCX = \cos^{-1} \frac{7.04}{7.3}$ (= 15.425...)</p> <p>M1 for $(BX =) \sqrt{7.3^2 - 7.04^2}$ (= 1.94...)</p> <p>M1 for $ACX = \tan^{-1} \frac{5.4 - 1.94}{7.04}$ (= 26.17...)</p> <p>A1 for answer in the range 41.55 to 41.65 from correct working</p>

7.

Question	Working	Answer	Mark	Notes
		15.0	3	M1 for $8^2 + 8^2 - 2 \times 8 \times 8 \times \cos 140$ M1 (dep) for correct order of evaluation or 226.(05...) A1 for answer in range 15.0 – 15.04 OR M1 for $\frac{PR}{\sin 140} = \frac{8}{\sin\left(\frac{180-140}{2}\right)}$ M1 for $PR = \frac{8}{\sin\left(\frac{180-140}{2}\right)} \times \sin 140$ A1 for answer in range 15.0 – 15.04 OR M1 for $8 \times \sin 70$ or $8 \times \cos 20$ M1 for $2 \times 8 \times \sin 70$ or $2 \times 8 \times \cos 20$ A1 for answer in range 15.0 – 15.04

8.

	$A = \frac{1}{2} \times x \times 2x \times \sin 30^\circ$ $A = \frac{1}{2} \times 2x^2 \times 0.5$ OR Height = $2x \sin 30^\circ = x$ $A = \frac{x \times x}{2} = \frac{x^2}{2}$ OR Height = $x \sin 30 = \frac{x}{2}$ $A = \frac{1}{2} \times 2x \times \frac{x}{2} = \frac{x^2}{2}$		$x = \sqrt{2A}$ shown	3	M1 $(A =) \frac{1}{2} \times x \times 2x \times \sin 30^\circ$ A1 $A = x^2 \times 0.5$ or $A = \frac{x^2}{2}$ C1 for completion with all steps shown OR M1 height = $2x \sin 30 (= x)$ A1 $A = x^2 \times 0.5$ or $A = \frac{x^2}{2}$ C1 for completion with all steps shown OR M1 for height = $x \sin 30 (= \frac{x}{2})$ A1 $A = x^2 \times 0.5$ or $A = \frac{x^2}{2}$ C1 for completion with all steps shown
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9.

Question	Working	Answer	Mark	Notes
	180-136-“34.4” =9.504	3.73	5	M1 for $\frac{\sin L}{12.8} = \frac{\sin 136}{15.7}$ M1 for $L = \sin^{-1}\left(\frac{\sin 136}{15.7} \times 12.8\right)$ or $\sin^{-1}0.566...$ A1 for 34.4 - 34.5 M1 for $\frac{LN}{\sin(180-136-'34.4')} = \frac{15.7}{\sin 136}$ or $\frac{LN}{\sin(180-136-'34.4')} = \frac{12.8}{\sin '34.4'}$ or $(LN^2 =) 15.7^2 + 12.8^2 - 2 \times 15.7 \times 12.8 \times \cos(180 - 136 - '34.4')$ A1 for 3.73 - 3.74

10.

		8.52	5	<p>M1 for $\frac{BD}{\sin 45} = \frac{7.4}{\sin 80}$ oe</p> <p>M1 for $(BD) = \frac{7.4}{\sin 80} \times \sin 45 (= 5.3133..)$</p> <p>M1 for $5.8^2 + 5.31^2 - 2 \times 5.8 \times 5.31 \cos 100$</p> <p>M1 (dep) for correct order of evaluation or 72.5(73...)</p> <p>A1 for 8.51 – 8.52</p> <p>OR</p> <p>M1 for $\frac{AD}{\sin(180 - 80 - 45)} = \frac{7.4}{\sin 80}$ oe</p> <p>M1 for $(AD) = \frac{7.4}{\sin 80} \times \sin(180 - 80 - 45) (= 6.15...)$</p> <p>M1 for $7.4^2 + (6.15 + 5.8)^2 - 2 \times 7.4 \times (6.15 + 5.8) \times \cos 45$</p> <p>M1 (dep) for correct order of evaluation or 72.5(7398...)</p> <p>A1 for 8.51 – 8.52</p>
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11.

		31.1	5	<p>M1 for $\frac{1}{2} \times 8.4 \times x \times \sin 40 = 100$</p> <p>M1 for $100 \div (0.5 \times 8.4 \times \sin 40) (= 37.(041...))$</p> <p>M1 (dep on 1st M1) for substituting the appropriate figures into the cosine rule eg $8.4^2 + 37.041^2 - 2 \times 8.4 \times 37.041 \cos 40$</p> <p>M1 (dep on previous M1) for correct order of evaluation or ($c^2 =$) 965.(897...)</p> <p>A1 31.07 - 31.1</p>
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