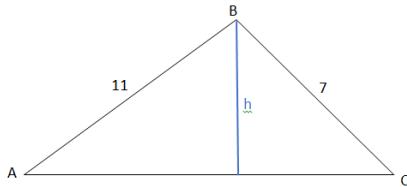


A-Level Unit Test: Trigonometry

Sine and Cosine Rule



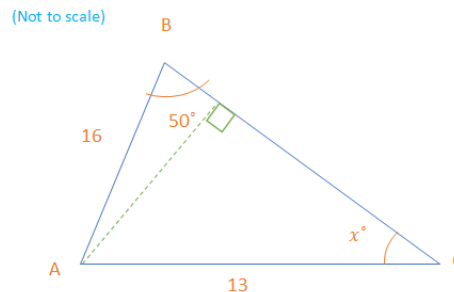
1. In the triangle ABC , $AB = 11\text{cm}$, $BC = 7\text{cm}$, $CA = 8\text{cm}$.



a. Find the size of angle C , giving your answer in radians to 3 significant figures. (3)

b. Find the area of the triangle ABC , giving your answer to 3 significant figures. (2)

2. In the triangle ABC , $AB = 16\text{cm}$, $AC = 13\text{cm}$, angle $ABC = 50^\circ$ and angle $BCA = x^\circ$. Find the two possible values for x , giving your answers to one decimal places. (4)

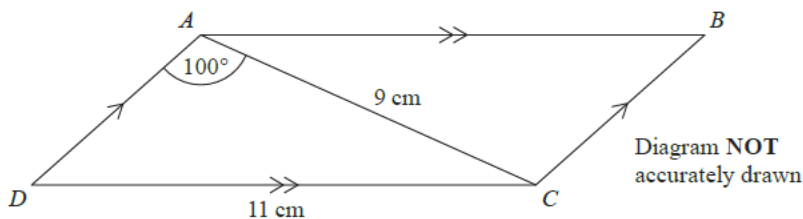


3. In a triangle ABC , the side AB has a length 10cm , side AC has length 5cm and angle $BAC = \theta$, where θ is measured in degrees. The area of triangle $ABC = 15\text{ cm}^2$

a. Find the two possible values of $\cos \theta$ (4)

b. Given that BC is the longest side of the triangle, find the exact length of BC . (3)

4. $ABCD$ is a parallelogram.



$AC = 9\text{ cm}$
 $DC = 11\text{ cm}$
 Angle $DAC = 100^\circ$

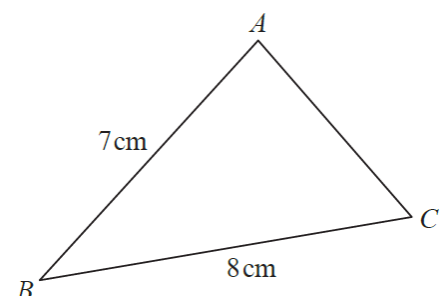
Calculate the area of the parallelogram. Give your answer to 3 significant figures. (4)

5. ABC is an acute angles triangle.

$BA = 7\text{cm}$, $BC = 8\text{cm}$.

The area of the triangle is 18cm^2 .

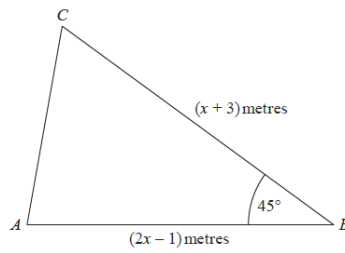
Work out the size of angle BAC . Give your answer correct to 3 significant figures. You must show all your working. (5)



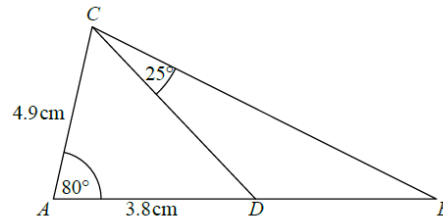
6. The area of triangle ABC is $6\sqrt{2}$ m².

Calculate the value of x and give your answer correct to 3 significant figures.

(5)



7. ABC is a triangle. D is a point on AB . Work out the area of triangle BCD . Give your answer correct to 3 significant figures.



(5)

Total marks: 35



Mark Scheme

1a.

$11^2 = 8^2 + 7^2 - 2 \times 8 \times 7 \cos C$	M1
$C = \cos^{-1}\left(-\frac{8}{112}\right)$	M1
$C = 1.64$	M1

1b.

Area = $\frac{1}{2}h \times 8$ $h = 7 \sin 1.64$ $h = 6.98$	M1
Area = 4×6.98 Area = 27.9 cm^2	M1

2.

$l = 13 \sin x$ and $l = 16 \sin 50$	M1
Therefore, $13 \sin x = 16 \sin 50$ $x = \sin^{-1}(0.943)$ $x = 70.5$	M1
Second answer: $180 - 70.5$	M1
$x = 109.5^\circ$	M1

3a.

Area = $\frac{1}{2}ab \sin C$ $15 = \frac{1}{2}(10)(5)\sin\theta$ $\sin\theta = \frac{3}{5}$	M1
Use of $\sin^2\theta + \cos^2\theta = 1$	M1
$\cos^2\theta = 1 - \left(\frac{3}{5}\right)^2$ $\cos^2\theta = \frac{16}{25}$	M1
$\cos\theta = \pm\frac{4}{5}$	M1

3b.

$a^2 = b^2 + c^2 - 2bc \cos \theta$ $BC^2 = 10^2 + 5^2 - 2(10)(5) \cos\theta$ $BC^2 = 125 - 100\left(\pm\frac{4}{5}\right)$	M1
$BC^2 = 205$ or 45	M1
As it is the longest side, $BC = \sqrt{205}$	M1

4.

$\frac{\sin B}{b} = \frac{\sin A}{a} \rightarrow \frac{\sin B}{9} = \frac{\sin 100}{11}$ $\sin B = \frac{9\sin 100}{11}$ $B = \sin^{-1}\left(\frac{9\sin 100}{11}\right)$ $B = 53.68\dots$	M1
$C = 180 - 100 - 53.86\dots = 26.317\dots$	M1
Area of triangle = $\frac{1}{2} \times 11 \times 9 \times \sin 26.317 \dots$	M1
Area of parallelogram = area of triangle $\times 2 = 43.9 \text{ cm}^2$	M1

5.

$\text{Area} = \frac{1}{2} ab \sin c$ $18 = \frac{1}{2} \times 8 \times 7 \sin C$ $C = 40.0052\dots$	M1
Using the cosine rule: $a^2 = 7^2 + 8^2 - 2 \times 7 \times 8 \times \cos 40.0052\dots$	M1
$a = 5.216$	M1
$\text{Area} = 18 = \frac{1}{2} \times 5.216 \times 7 \times \sin x$ $\sin x = \frac{18}{0.5 \times 5.216 \times 7}$	M1
$x = 80.4^\circ$	M1

6.

$6\sqrt{2} = \frac{1}{2} (x + 3)(2x - 1) \times \sin(45)$	M1
$6\sqrt{2} = \frac{\sqrt{2}}{2} [2x^2 - x + 6x - 3]$ $24 = 2x^2 + 5x - 3$	M1
$2x^2 + 5x - 27 = 0$	M1
$x = -\frac{5 \pm \sqrt{241}}{4}$ $x = 2.63 \text{ or}$ $x = -5.13$	M1
As x must be positive, $x = 2.63 \text{ m}$	M1

7.

$x^2 = 4.9^2 + 3.8^2 - 2 \times 2.9 \times 3.8 \times \cos 80$ $x = 5.655$	M1
$\frac{\sin B}{b} = \frac{\sin A}{a} \rightarrow \frac{\sin B}{4.9} = \frac{\sin 80}{5.655}$	M1
$\sin \phi = \frac{4.9 \times \sin 80}{5.655}$ $\phi = 58.57^\circ$	M1
$C\hat{D}B = 180 - 58.57 = 121.43^\circ$	M1
$D\hat{B}C = 180 - (121.43 + 25) = 35.57^\circ$	M1

