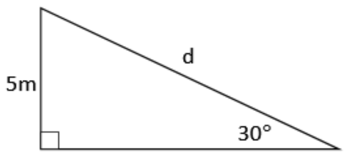
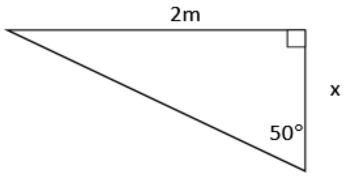
MPM2D Unit 6, Lesson 4

SOH CAH TOA

Trigonometric Ratios – Finding Angles

Warm up - Find the missing side in each triangle below.





$\sin 30^\circ = \frac{5}{d}$

$d = \frac{5}{\sin 30^\circ}$

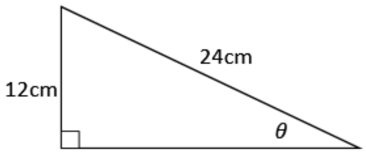
$d = 10$

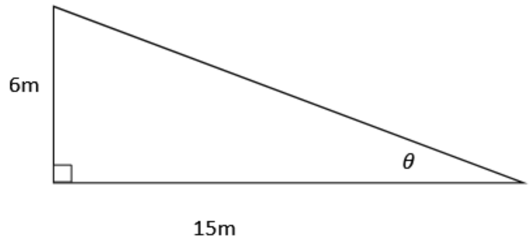
$\tan 50^\circ = \frac{2}{x}$

$x = \frac{2}{\tan 50^\circ}$

$x \doteq 1.68m$

Examine the triangles below. Is it possible to solve for the missing angles?





$\sin\theta = \frac{12}{24}$ $\theta = 30^\circ$

$\sin\theta = \frac{1}{2}$

$\theta = \sin^{-1}(\frac{1}{2})$

$\tan\theta = \frac{6}{15}$

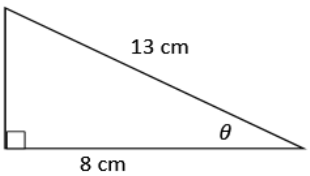
$\theta = \tan^{-1}(\frac{6}{15})$

$\theta \doteq 21.8^\circ$

We can use the "inverse" trigonometric relationships to solve for any angle in a right triangle (given 2 sides).

Examples

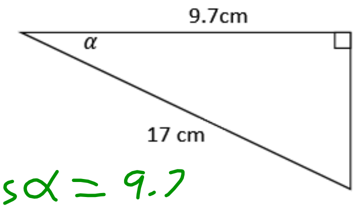
$\boxed{\theta = \cos^{-1}\left(\frac{10}{9}\right)}$



$\cos\theta = \frac{8}{13}$

$\theta = \cos^{-1}(8/13)$

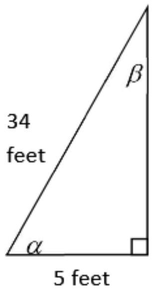
$\theta \doteq 52^\circ$



$\cos\alpha = \frac{9.7}{17}$

$\alpha = \cos^{-1}\left(\frac{9.7}{17}\right)$

$\alpha \doteq 55.2^\circ$



$\cos\alpha = \frac{5}{34}$

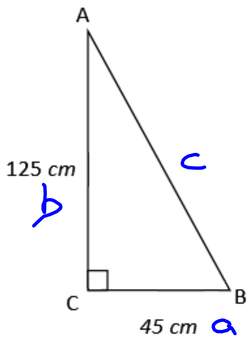
$\alpha = \cos^{-1}\left(\frac{5}{34}\right)$

$\alpha \doteq 81.5^\circ$

$\sin\beta = \frac{5}{34}$

$\beta \doteq 8.5^\circ$

Solving Triangles – to "solve" a triangle means to find all side lengths and angle measurements (that are not already known). Solve the triangles below.



$\tan A = \frac{45}{125}$

$A = \tan^{-1}\left(\frac{45}{125}\right)$

$\boxed{A \doteq 19.8^\circ}$

$c^2 = 45^2 + 125^2$

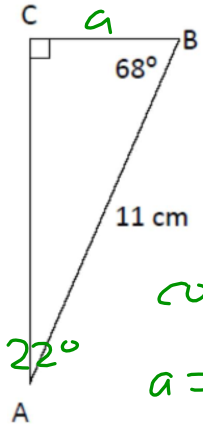
$\boxed{c = \sqrt{17650}}$

$c \doteq 132.85\text{cm}$

$\tan B = \left(\frac{125}{45}\right)$

$B = \tan^{-1}\left(\frac{125}{45}\right)$

$\boxed{B \doteq 70.2^\circ}$



$\angle A = 90 - 68$

$\angle A = 22^\circ$

$\cos 68^\circ = \frac{a}{11}$

$a = 11\cos 68^\circ$

$a \doteq 4.12\text{cm}$

$\cos 22^\circ = \frac{b}{11}$

$b = 11\cos 22^\circ$

$b \doteq 10.19\text{cm}$

Text page 381- 383 #4, 5, 7, 8, 9 and page 348 #1, 2