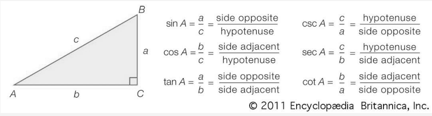
Trigonometric Functions

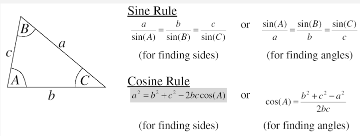


pythagoras's theorem

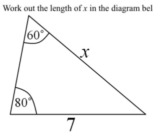
$c^2 = a^2 + b^2$	$c = \sqrt{a^2 + b^2}$
$a^2 = c^2 - b^2$	$a = \sqrt{c^2 - b^2}$
$b^2 = c^2 - a^2$	$b = \sqrt{c^2 - a^2}$

c is the hypotenuse whereas a and b can be switched interchangeably

Sine and cosine rule



Sine rule finding side example



Work out the length of x in the diagram below:

Step 1 Start by writing out the Sine Rule formula for finding sides:

$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)}$$

Step 2 Fill in the values you know, and the unknown length:

$$\frac{x}{\sin(80^\circ)} = \frac{7}{\sin(60^\circ)}$$

Remember that each fraction in the Sine Rule formula should contain a side and its opposite angle.

Step 3 Solve the resulting equation to find the unknown side, giving your answer to 3 significant figures:

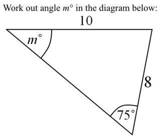
$$\frac{x}{\sin(80^\circ)} = \frac{7}{\sin(60^\circ)} \quad \textit{(multiply by sin(80°) on both sides)}$$

$$x = \frac{7}{\sin(60^\circ)} \times \sin(80^\circ)$$

$x = 7.96$ (accurate to 3 significant figures)

Note that you should try and keep full accuracy until the end of your calculation to avoid errors.

Sine rule Finding Angles example



Work out angle $m°$ in the diagram below:

Step 1 Start by writing out the Sine Rule formula for finding angles:

$$\frac{\sin(A)}{a} = \frac{\sin(B)}{b}$$

Step 2 Fill in the values you know, and the unknown angle:

$$\frac{\sin(m^\circ)}{8} = \frac{\sin(75^\circ)}{10}$$

Remember that each fraction in the Sine Rule formula should contain a side and its opposite angle.

Step 3 Solve the resulting equation to find the sine of the unknown angle:

$$\frac{\sin(m^\circ)}{8} = \frac{\sin(75^\circ)}{10} \quad \textit{(multiply by 8 on both sides)}$$

$$\sin(m^\circ) = \frac{\sin(75^\circ)}{10} \times 8$$

$\sin(m^\circ) = 0.773$ (3 significant figures)

Step 4 Use the inverse-sine function ($\sin^{-1}$) to find the angle:

$m^\circ = \sin^{-1}(0.773) = 50.6^\circ$ (3sf)

Subtract angles of depression by 90 degrees

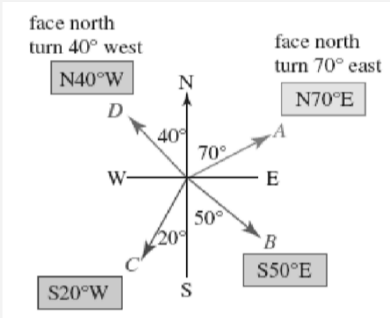
Scale Factor

Scale Factor

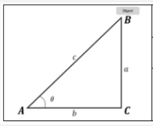
Scale factor is the ratio between the scale of a given original object and a new object, which is its representation but of a different size (bigger or smaller).

sf = larger figure dimensions ÷ smaller figure dimensions

true bearings



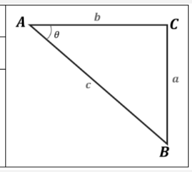
angle of elevation example



sin sin θ = opposite/hypotenuse = a/c	θ = (a/c)
cos cos θ = adjacent/hypotenuse = b/c	θ = (b/c)
tan tan θ = opposite/adjacent = a/b	θ = (a/b)

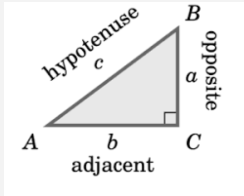
angle of depression example

sin sin θ = opposite/hypotenuse = a/c	θ = (a/c)
cos cos θ = adjacent/hypotenuse = b/c	θ = (b/c)
tan tan θ = opposite/adjacent = a/b	θ = (a/b)



Examples of Trigonometric functions

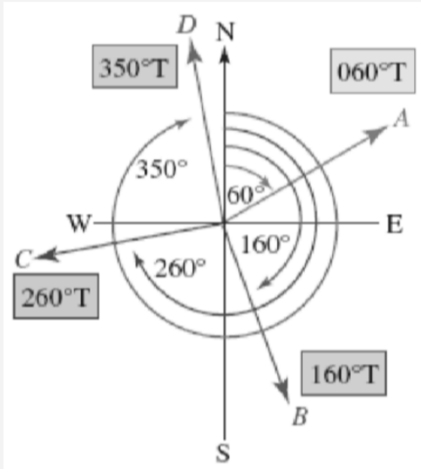
Examples of inverse functions

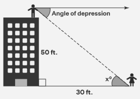


to solve A: sin-1 (a / c) or cos-1 (adjacent/hypotenuse) or tan-1 (a/b)

to solve B: sin-1 (b/c) cos-1 (a/c) tan-1 (b/a)

conventional bearings





Similarity Test for Similar Triangles