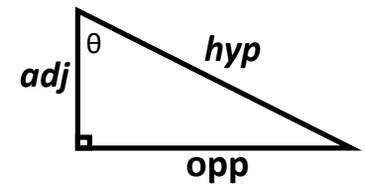
# Lesson 4.0: Review of Trigonometry

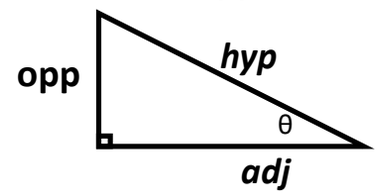
Recall: In a right triangle, the primary trig ratios are:

sine $\sin\theta = \frac{opp}{hyp}$

cosine $\cos\theta = \frac{adj}{hyp}$

tangent $\tan\theta = \frac{opp}{adj}$

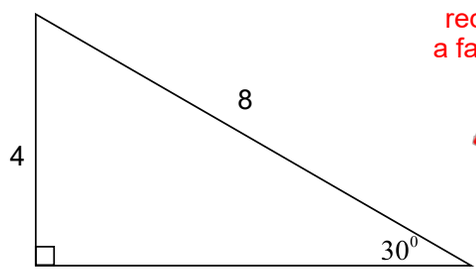



adj
opp
hyp

SOHCAHTOA

These ratios compare the lengths of the sides of a triangle. Trig stems from similar triangles. Any right triangle with a $30^0$ angle (for example), whatever its size, will have the same ratio of sides lengths because the angles are the same!

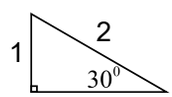



$\sin 30^0 = \frac{4}{8}$

$= 0.5$

reduce by a factor of 4

÷4

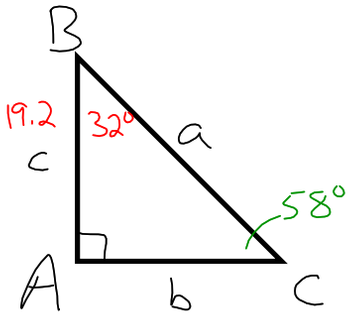



$\sin 30^0 = \frac{1}{2}$

$= 0.5$

Recall: To "solve a triangle" means to find the measures of all 3 sides and all 3 angles.

Ex. 1 In ΔABC, <A = 90°, <B = 32°, and c = 19.2 cm. Solve the triangle. Include a well-labelled diagram.




All angles add to 180°

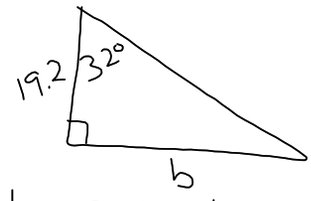
$\angle C = 180° - 90° - 32°$

$= 58°$

$a^2 = b^2 + c^2$

$= 12^2 + 19.2^2$

$a \doteq 22.6$




$\tan 32° = \frac{b}{19.2}$

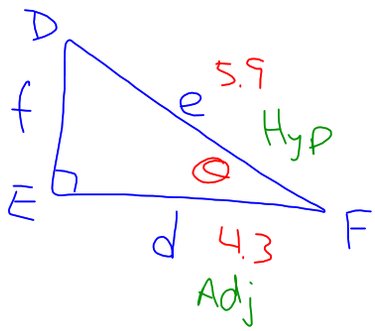
$b = 12$

$\angle C = 58°$

$a = 22.6$

$b = 12$

Ex. 2 In ΔDEF, <E = 90°, d = 4.3 m, and e = 5.9 m. Solve for $< F$.




SOH CAH TOA

$\cos\theta = \frac{Adj}{Hyp}$

$\cos\theta = \frac{4.3}{5.9}$

$\theta = \cos^{-1}\left(\frac{4.3}{5.9}\right)$

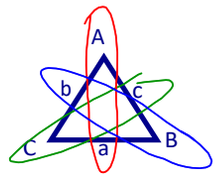
$= 43°$

But what if the triangle is not right-angled?

Recall:

## The Sine Law

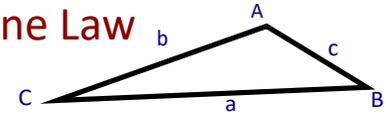
In ΔABC,




$$\frac{a}{sinA} = \frac{b}{\sin B} = \frac{c}{\sin C} \quad or \quad \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

## The Cosine Law

In ΔABC,




$c^2 = a^2 + b^2 - 2ab \cos C$ (Used when finding a side).

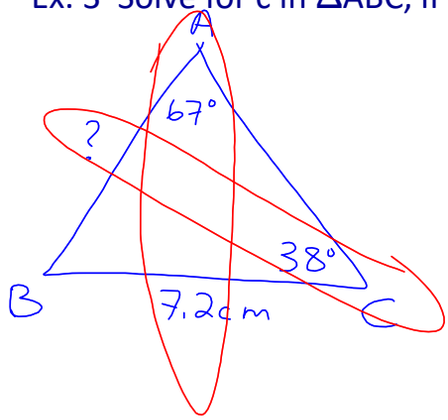
rearrange -->

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

(Used when finding an angle).

We will derive these formulas in lesson 4.4 A

Ex. 3 Solve for c in ΔABC, if <A = 67°, <C = 38°, and a = 7.2 cm.




$$\frac{c}{\sin C} = \frac{a}{\sin A}$$

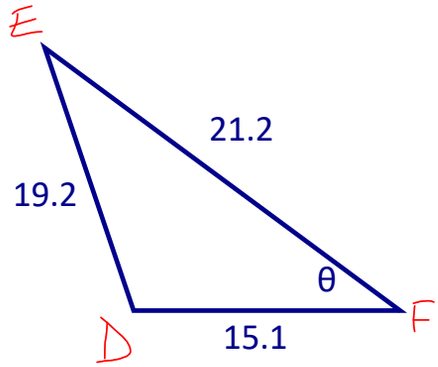
$$\frac{c}{\sin 38^\circ} = \frac{7.2}{\sin 67}$$

$$c = \sin 38^\circ \left(\frac{7.2}{\sin 67^\circ}\right)$$

$$\doteq 4.8$$

∴ Side c is 4.8 cm

Ex. 4 Solve for the unknown angle θ.




$$f^2 = d^2 + e^2 - 2de\cos F$$

$$19.2^2 = 21.2^2 + 15.1^2 - 2(21.2)(15.1)\cos\theta$$

$$19.2^2 - 21.2^2 - 15.1^2 = -2(21.2)(15.1)\cos\theta$$

$$\frac{19.2^2 - 21.2^2 - 15.1^2}{-2(21.2)(15.1)} = \cos\theta$$

$$0.4823 \doteq \cos\theta$$

$$\theta \doteq 61^\circ$$

p. 274 # 1, 2a, 4a, 5a, 6, 7
p. 281 # 7, 8, 12, 16ab