Unit 5: Trigonometry

Review: Right-Angle Trigonometry

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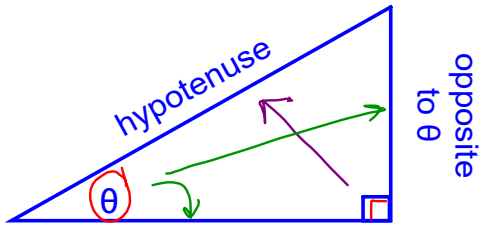
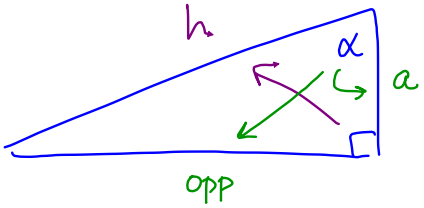
For any angle of interest, there are three (3) primary trigonometric ratios.

$$\text{sine of } \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\text{cosine of } \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\text{tangent of } \theta = \frac{\text{opposite}}{\text{adjacent}}$$





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To remember, use the mnemonic:

S o h C a h T o a

$$\sin = \frac{opp}{hyp} \qquad \cos = \frac{adj}{hyp} \qquad \tan = \frac{opp}{adj}$$

XYZ

$X = \frac{y}{z}$

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To **solve a triangle** means to find all the missing sides and angles.

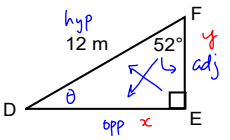
For right triangles use Pythagorean Theorem and/or the primary trigonometric ratios.

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

$s_1^2 + s_2^2 = h^2$

$(\ )^2 + (\ )^2 = hyp^2$

Ex.1 Solve the triangle shown below.



Soh Cah Toa

$\sin 52° = \frac{x}{12}$ $\cos 52° = \frac{y}{12}$ $\tan 52° = \frac{x}{y}$

$12 \sin 52° = x$ exact value

$x \doteq 9.4561$

$x \doteq 9.5$

* make sure calc in "degree" mode!

use for future calculations

use in ∴ statements.

$y = 12 \cos 52°$

$y \doteq 7.3879$

$y \doteq 7.4$

find θ: trig? or Angle Sum Theorem (Complex)

$\theta_1 + \theta_2 + \theta_3 = 180°$

$\theta + 90° + 52° = 180°$

$\theta = 38°$

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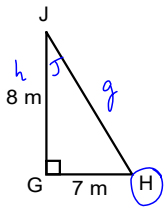
Ex.2 Solve the triangle shown below.



Soh Cah Toa

$g^2 = j^2 + h^2$

$g^2 = 7^2 + 8^2$

$g^2 = 49 + 64$

$g^2 = 113$

$g = \pm\sqrt{113}$, but $g > 0$

$g = \sqrt{113}$ → exact value

$g \doteq 10.6$

∴ g is 10.6 m

$\sqrt{x^2}$

J

$\sin J = \frac{7}{\sqrt{113}}$ $\cos J = \frac{8}{\sqrt{113}}$ $\tan J = \frac{7}{8}$ ✓

$f(x) = x^2$

$f(x) = \sqrt{x}$

$f(x) = \tan(x)$

$\tan^{-1}(\tan(J)) = \tan^{-1}\left(\frac{7}{8}\right)$

$J = \tan^{-1}\left(\frac{7}{8}\right)$

$J \doteq 41.1859°$

$J \doteq 41.2°$

$G + H + J = 180°$

$90° + H + 41.1859° \doteq 180°$

$H \doteq 48.8141$

$H \doteq 48.8°$

OR

$\tan H = \frac{8}{7}$

$H = \tan^{-1}\left(\frac{8}{7}\right)$

$H \doteq 48.8°$

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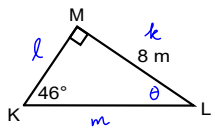
Ex.3 Solve the triangle shown below using only trig.
(not Pythagorean theorem)



SohCahToa : 46°

SohCahToa : θ

$m \times \sin 46^\circ = \frac{8}{m} \times m$

$m \sin 46^\circ = 8$

$m = \frac{8}{\sin 46^\circ}$ exact

$m \doteq 11.1213$

$m \doteq 11.1$

$\tan 46^\circ = \frac{8}{l}$

$l \tan 46^\circ = 8$

$l = \frac{8}{\tan 46^\circ}$

$l \doteq 7.7255$

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

$\cos\theta = \frac{8}{\frac{8}{\sin 46^\circ}}$

$\frac{8}{1} \cdot \frac{\sin 46^\circ}{8} = \sin 46^\circ$

$\cos\theta \doteq 0.7193$

$\theta \doteq \cos^{-1}(0.7193)$

$\theta = 44^\circ$

∴ l is 7.7m
m is 11.1m
θ is 44°

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Assigned Work:

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