

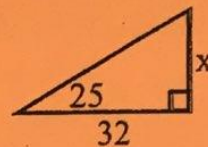
# Triangle Toolkit

Tool Name: tangent

When can we use this?

$$\frac{\tan \theta}{1} = \frac{\text{opp}}{\text{adj}}$$

Example (must show all steps):



Right  $\Delta$  ONLY!

Involves: an acute  $\angle$

its opposite  
and its adjacent

$$\frac{\tan(25)}{1} = \frac{x}{32}$$

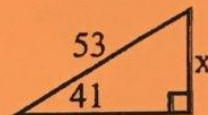
$$x = 14.92$$

Tool Name: sin

When can we use this?

$$\frac{\sin \theta}{1} = \frac{\text{opp}}{\text{hyp}}$$

Example (must show all steps):



Right  $\Delta$  ONLY!

Involves: an acute  $\angle$

its opposite  
and the hypo

$$\frac{\sin(41)}{1} = \frac{x}{53}$$

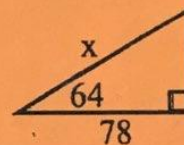
$$x = 34.77$$

Tool Name: cosine

When can we use this?

$$\frac{\cos \theta}{1} = \frac{\text{adj}}{\text{hyp}}$$

Example (must show all steps):



Right  $\Delta$  ONLY!

Involves: an acute  $\angle$

its adjacent  
and the hypo

$$\frac{\cos(64)}{1} = \frac{78}{x}$$

$$78 = x(\cos 64)$$

$$x = 177.93$$

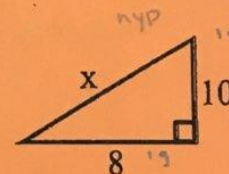
Tool Name: Pythagorean Theorem

When can we use this?

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

$$\text{side 1}^2 + \text{side 2}^2 = \text{hypo}^2$$

Example 1 (must show all steps):



Right  $\Delta$  ONLY!

Involves: Angle measures ok, but not needed

Must have: 2 sides

Trying to find: 3<sup>rd</sup> side

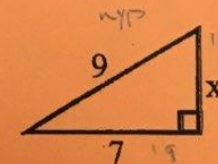
$$10^2 + 8^2 = x^2$$

$$100 + 64 = x^2$$

$$\sqrt{164} = \sqrt{x^2}$$

$$12.81 = x$$

Example 2 (must show all steps):



$$7^2 + x^2 = 9^2$$

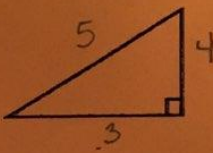
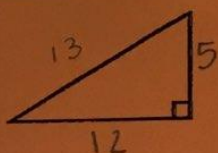
$$49 + x^2 = 81$$

$$-49 \quad -49$$

$$x^2 = 32$$

$$x = 5.67$$

Common triples:



Tool Name: Inverse Trig Example (must show all steps):

When can we use this?  $\sin^{-1}\left(\frac{\sin \theta}{1}\right) = \left(\frac{24}{60}\right) \sin^{-1}$

Right  $\Delta$  ONLY!

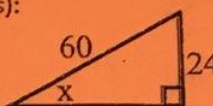
Involves: Must have: 2 sides

Trying to find: angle

Can be: inverse sin, cos, tan

$\theta = \sin^{-1}\left(\frac{24}{60}\right)$

$\theta \approx 23.58^\circ$



Tool Name: 30-60-90 GENERIC  $\Delta$  \*\*Just multiply the sides of the GENERIC by the zoom factor\*\*

When can we use this?

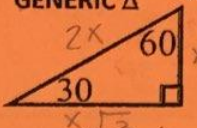
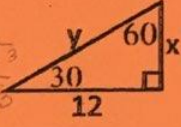
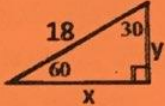
30-60-90  $\Delta$  ONLY!

Must have:  $30^\circ, 60^\circ, 90^\circ$

Generic sides:  $2x, 60, x$  (top, right, bottom)

Zoom factor  $\sqrt{3}$ :  $x = 4\sqrt{3}, y = 8\sqrt{3}, 2x = 12$

Zoom factor  $\sqrt{3}$ :  $x = 9, y = 9\sqrt{3}, 2x = 18$

Tool Name: 45-45-90 GENERIC  $\Delta$  \*\*Just multiply the sides of the GENERIC by the zoom factor\*\*

When can we use this?

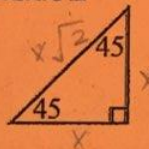
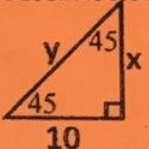
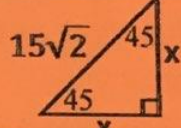
45-45-90  $\Delta$  ONLY!

Must have:  $45^\circ, 90^\circ$

Generic sides:  $x\sqrt{2}, 45, x$  (hypotenuse, leg, leg)

Zoom factor 10:  $x = 10, y = 10\sqrt{2}, 2x = 20$

Zoom factor 15:  $x = 15, y = 15\sqrt{2}, 2x = 30$

Tool Name: LAW of Sines Example (must show all steps):

When can we use this?

Must have: 2 angles, 1 opp. side

Trying to find: other opp. side

OR

Must have: 2 sides, 1 opp. angle

Trying to find: other opp. angle

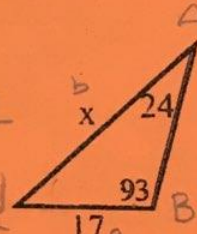
$\frac{\sin(A)}{a} = \frac{\sin(B)}{b}$

$\frac{\sin(24)}{17} = \frac{\sin(93)}{x}$

$17 \sin(93) = x (\sin 24)$

$\frac{17(\sin 93)}{\sin(24)} = x$

$41.74 = x$



Tool Name: Law of Cosines non-right Example (must show all steps):

When can we use this?

Must have: SAS

Trying to find: 3 side

OR

Must have: SSS

Trying to find: 1 angle

$c^2 = a^2 + b^2 - 2ab(\cos c)$

$x^2 = 12^2 + 15^2 - 2(12)(15)(\cos 110)$

$x^2 = 492.127251597$

$x = 22.18$

