MPM 2D
Mr. Kempe

Name: _____
Date :_____

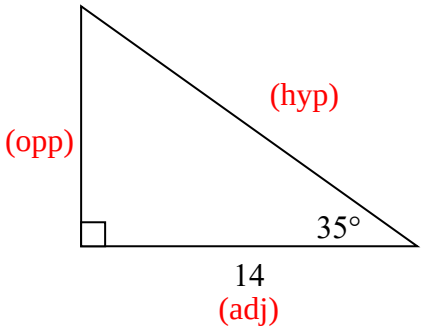
Solving Right Triangles with Trig Ratios

Using Trigonometry to Determine Side Lengths

Need: a known angle (but **not** the right angle) and a side length

You must select an appropriate ratio based on *side you know* and the *side you want*.

Example 1: Determine the missing side lengths of the triangle shown.



We'll start with the **opposite** side.
We know the **adjacent** side, so we will use the **tangent** ratio.

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

$\tan 35 = \frac{x}{14}$ Fill in what you know.

$14\tan 35 = x$ Multiply both sides by 14 to clear the fraction.

$14(0.7002...) = x$ Use a calculator to get tan35.

$x \approx 9.8$ The opposite side is about 9.8.

Next, let's do the **hypotenuse.** We know the **adjacent** side, so we will use the **cosine** ratio.

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

$\cos 35 = \frac{14}{y}$ Fill in what you know.

$y\cos 35 = 14$ Multiply both sides by y to clear the fraction.

$y = \frac{14}{\cos 35}$ Divide both sides by cos35 to isolate y.

$y = \frac{14}{(0.8192...)}$ The hypotenuse is about 17.1.

$y \approx 17.1$

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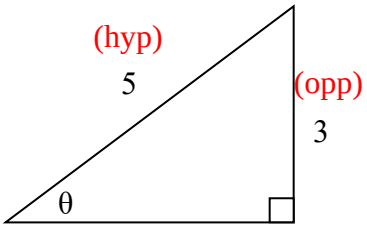
Using Trigonometry to Determine Angles

Need: two sides in a right-angled triangle.

You must select the appropriate ratio based on which *sides you know*.

Example 2: Determine the value of θ.



We know the **opposite** and **hypotenuse**, so we use **sine**.

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

$\sin\theta = \frac{3}{5}$ Fill in what you know.

$\sin\theta = 0.6$ Change the fraction into a decimal.

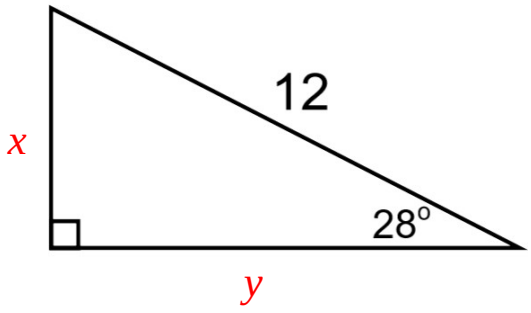
$\theta = \sin^{-1} 0.6$ Use the **sine inverse** on you calculator to get the angle.

$\theta \approx 36.9$

Solving Triangles

To solve a triangle means to determine all missing sides and angles.

Example 3: Solve the triangle.



$$\sin\theta = \frac{opp}{hyp}$$
$$\sin 28 = \frac{x}{12}$$
$$12\sin 28 = x$$
$$12(0.469471562\ldots) = x$$
$$5.6 \approx x$$

$$\cos\theta = \frac{adj}{hyp}$$
$$\cos 28 = \frac{y}{12}$$
$$12\cos 28 = y$$
$$12(0.88294759\ldots) = y$$
$$10.6 \approx x$$

For the remaining angle, we know the angles sum to 180, so 180 – 90 – 28 = **62**.

Practice: pg. 404 #5 – 7, 10, 13, 14