Name: Date: Period: 4

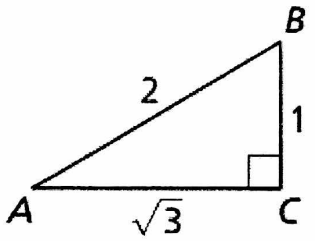
Solving Right Triangles

Lesson Objective: IWBAT find acute angle measures in right Δs using side lengths.

1. What type of triangle is ΔABC? How do you know?

2. Determine which of the two acute angles has a cosine of 0.5.

   ∠B

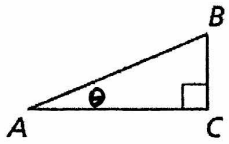


3. What must the measure of the angle from problem #2 be? Briefly explain your answer.

   60°

Inverse Trigonometric Ratios

Let $\angle A$ be an acute angle in right ΔABC.

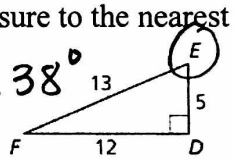


Inverse Tangent	*Inverse Sine*	*Inverse Cosine*
$\tan A = \frac{BC}{AC}$	$\sin A = \frac{BC}{AB}$	$\cos A = \frac{AC}{AB}$
$\updownarrow$	$\updownarrow$	$\updownarrow$
$m\angle A = \tan^{-1}\left(\frac{BC}{AC}\right)$	$m\angle A = \sin^{-1}\left(\frac{BC}{AB}\right)$	$m\angle A = \cos^{-1}\left(\frac{AC}{AB}\right)$

Example:

4. Determine which of the acute angles has a sine ratio of $\frac{12}{13}$. Then, approximate that angle measure to the nearest hundredth.

   $\sin E = \frac{12}{13} \rightarrow m\angle E = \sin^{-1}\left(\frac{12}{13}\right)$ $m\angle E \approx 67.38°$



5. Let $\angle G$, $\angle H$ and $\angle K$ be acute angles. Use a calculator to approximate the measures of $\angle G$, $\angle H$ and $\angle K$ to the nearest hundredth of a degree.

$\tan G = 0.43$	$\sin H = 0.68$	$\cos K = 0.94$
$m\angle G \approx 23.27°$	$m\angle H \approx 42.84°$	$m\angle K \approx 19.95°$

Solve a Right Triangle: To solve a right triangle means to find ALL unknown side lengths and angle measures. You can solve a right triangle when you know either of the following:

1. 2 sides in a right Δ
2. one side and one acute ∠ in a right Δ

Example:

6. Solve the right triangle. Give answers in exact form, and also round them to the nearest hundredth.

$3^2+2^2=c^2$

$c=\sqrt{13}$

$c\approx 3.61$

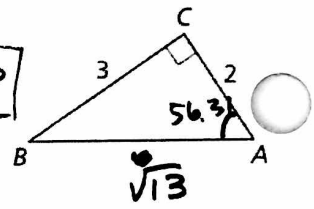
$\tan A=\frac{3}{2}$

$m\angle A=\tan^{-1}\left(\frac{3}{2}\right)$

$m\angle A\approx 56.31°$

$m\angle B\approx 33.69°$

by Δ sum thm



7. Solve the right triangle. Give answers in exact form, and also round them to the nearest hundredth.

$m\angle G=65°$

by Δ sum thm

$\sin(25)=\frac{h}{13}$

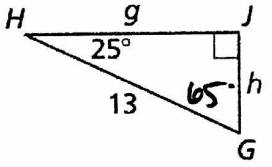
$h=13(\sin 25)$

$h\approx 5.49$

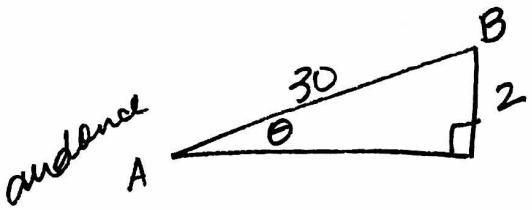
$\cos(25)=\frac{g}{13}$

$g=(\cos 25)13$

$g\approx 11.78$



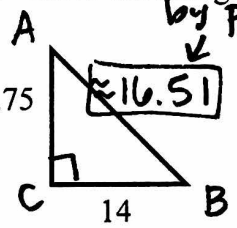
8. Your school is building a raked stage (slants upward from front to back to give tha audience a better view). The stage will be 30 feet long from front to back, with a total rise of 2 feet. You want the rake (in other words, the angle of elevation) to be 5° or less for safety purposes. Is the raked stage within your desired range?



$\theta=\sin^{-1}\left(\frac{2}{30}\right)$

$\approx 3.82°$

9. Solve the triangle. Round to hundredth.



by Pyth. Thm

$\tan A=\frac{14}{8.75}$

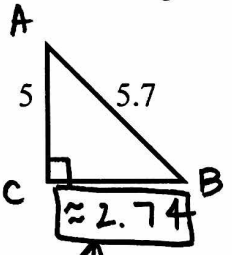
$m\angle A=\tan^{-1}\left(\frac{14}{8.75}\right)$

$m\angle A\approx 57.99°$

$m\angle B\approx 32.01°$

by Δ sum thm

10. Solve the triangle. Round to hundredth.



by Δ sum thm

$m\angle A\approx 28.69°$

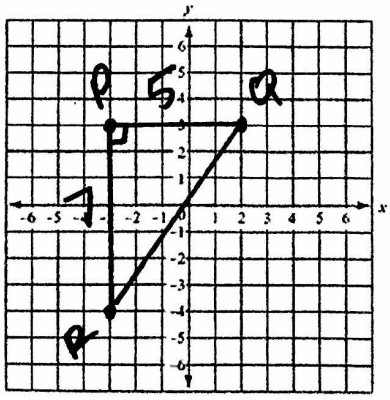
$m\angle B\approx 61.31°$

by Pyth. Thm

$\sin B=\frac{5}{5.7}$

$m\angle B=\sin^{-1}\left(\frac{5}{5.7}\right)$

11. Solve the triangle if in ΔPQR, P(-3, 3), Q(2, 3), R(-3, -4)



$RQ\approx 8.60$ ← by Pyth. Thm

$m\angle Q\approx 54.46°$ ← $\tan Q=\frac{7}{5}$, $m\angle Q=\tan^{-1}\left(\frac{7}{5}\right)$

$m\angle R\approx 35.54°$

by Δ sum thm