

Solving Right Triangles Wk.3.4.notebook

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Content Objective: I will be able to use trigonometric ratios to find side lengths and angles of right triangles.

INVERSE TRIGONOMETRIC RATIOS:

Let $\angle A$ be an acute angle:

- Inverse Sine: If $\sin A = y$, then $\sin^{-1} y = m\angle A$
- Inverse Cosine: If $\cos A = z$, then $\cos^{-1} z = m\angle A$
- Inverse Tangent: If $\tan A = x$, then $\tan^{-1} x = m\angle A$

Use the right triangle above to fill in the missing lengths to complete the inverse trigonometric ratios.

$$\sin^{-1} \frac{BC}{BA} = m\angle A \quad \cos^{-1} \frac{AC}{BA} = m\angle A \quad \tan^{-1} \frac{BC}{AC} = m\angle A$$

EXAMPLE 1: Set up an equation to solve for the measure of $\angle A$.

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EXAMPLE 1: Set up an equation to solve for the measure of $\angle A$

$$m\angle A = \sin^{-1} \frac{SH}{SA}$$

$$m\angle A = \tan^{-1} \frac{SH}{HA}$$

$$m\angle A = \cos^{-1} \frac{HA}{SA}$$

QUICK CHECK: Set up an equation to solve for the measure of $\angle H$

$$m\angle H = \sin^{-1} \frac{SA}{SH}$$

$$m\angle H = \tan^{-1} \frac{SA}{SH}$$

$$m\angle H = \cos^{-1} \frac{SH}{HA}$$

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EXAMPLE 2: Set up an equation to solve for the measure of $\angle D$ and $\angle F$; round to the nearest degree.

$m\angle D = 46.39^\circ$ $m\angle D = \sin^{-1} \frac{20}{21}$
 $m\angle D = \sin^{-1} .9524$ $m\angle D = 46.39^\circ$

$m\angle F \approx 48.4^\circ$ $m\angle F = \tan^{-1} \frac{20}{21}$
 $m\angle F = \tan^{-1} .9524$ $m\angle F = 48.4^\circ$

EXAMPLE 3: Find the missing measurements of the right triangle, round answers to the nearest tenth.

$m\angle G = 55^\circ$ $m\angle G = \tan^{-1} \frac{15}{55}$
 $m\angle G = \tan^{-1} .2727$ $m\angle G = 55^\circ$

$m\angle L = 34.99^\circ$ $m\angle L = \sin^{-1} \frac{15}{17}$
 $m\angle L = \sin^{-1} .875$ $m\angle L = 34.99^\circ$

$GJ \approx 18.31$ $GJ \approx 18.31$

$LJ \approx 10.5$ $LJ \approx 10.5$

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EXAMPLE 3: Find the missing measurements of the right triangle, round answers to the nearest tenth.

$$\sin 55^\circ = \frac{15}{X}$$

$$.8192X = 15$$

$$X = \frac{15}{.8192}$$

$$X \approx 18.31$$

$$\tan 55^\circ = \frac{15}{Y}$$

$$1.42819 = \frac{15}{Y}$$

$$Y = \frac{15}{1.42819}$$

$$Y \approx 10.5$$

$m\angle G = 55^\circ$ $m\angle G = \tan^{-1} \frac{15}{55}$
 $m\angle G = \tan^{-1} .2727$ $m\angle G = 55^\circ$

$m\angle J = 34.99^\circ$ $m\angle J = \sin^{-1} \frac{15}{55}$
 $m\angle J = \sin^{-1} .2727$ $m\angle J = 34.99^\circ$

QUICK CHECK: Find the missing measurements of the right triangle, round answers to the nearest tenth.

$AC \approx$
 $BC \approx$
 $m\angle A =$

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EXAMPLE 3: Find the missing measurements of the right triangle, round answers to the nearest tenth.

$m\angle G =$
 $GJ =$
 $LJ \approx$

QUICK CHECK: Find the missing measurements of the right triangle, round answers to the nearest tenth.

$\sin 22^\circ = \frac{X}{8}$
 $(.3746)8 = X$
 $X = 3$

$AC = 3$
 $BC = 7.42$
 $m\angle A = 68^\circ$

$\cos 22^\circ = \frac{8}{X}$
 $(.9702)8 = X$
 $X = 7.76$

$m\angle A = \cos^{-1} \frac{3}{7.76}$
 $m\angle A = \cos^{-1} .3875$
 $m\angle A = 61.98^\circ \approx 62^\circ$

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