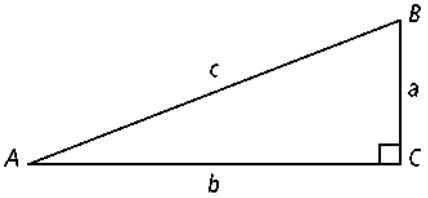
Name_____ Class _____ Date_____

14-3 Reteaching

Right Triangles and Trigonometric Ratios

In the right triangle, $\angle A$ is acute.



The *trigonometric ratios* are:

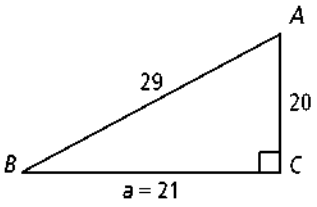
$$\sin A = \frac{\text{length of leg opposite } \angle A}{\text{length of hypotenuse}} = \frac{a}{c} \qquad \csc A = \frac{1}{\sin A} = \frac{\text{length of hypotenuse}}{\text{length of leg opposite } \angle A} = \frac{c}{a}$$

$$\cos A = \frac{\text{length of leg adjacent to } \angle A}{\text{length of hypotenuse}} = \frac{b}{c} \qquad \sec A = \frac{1}{\cos A} = \frac{\text{length of hypotenuse}}{\text{length of leg adjacent to } \angle A} = \frac{c}{b}$$

$$\tan A = \frac{\text{length of leg opposite } \angle A}{\text{length of leg adjacent to } \angle A} = \frac{a}{b} \qquad \cot A = \frac{1}{\tan A} = \frac{\text{length of leg adjacent to } \angle A}{\text{length of leg opposite } \angle A} = \frac{b}{a}$$

Problem

In ΔABC, $\angle C$ is a right angle and $\cos A = \frac{20}{29}$. What is the value of sin *A*, cot *A*, and sin *B* in fraction and decimal form?



Step 1 Draw a right triangle with acute angle *B* such that the leg opposite *B* has length 20 and the hypotenuse has length 29. Find the length of the other leg using the Pythagorean theorem: $a = \sqrt{29^2 - 20^2} = 21$.

Step 2 Use the ratios above to find the values of sin *A*, cot *A*, and sin *B*.

$$\sin A = \frac{\text{length of leg opposite } \angle A}{\text{length of hypotenuse}} = \frac{21}{29} \approx 0.7241$$

$$\cot A = \frac{\text{length of leg adjacent to } \angle A}{\text{length of leg opposite } \angle A} = \frac{20}{21} \approx 0.9524$$

$$\sin B = \frac{\text{length of leg opposite } \angle B}{\text{length of hypotenuse}} = \frac{20}{29} \approx 0.6897$$

Exercises

1. In ΔHJK, $\angle K$ is a right angle and $\sin H = \frac{4}{7}$. Find cos *H*, csc *H*, tan *J*, and sec *J*.

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14-3 Reteaching (continued)

Right Triangles and Trigonometric Ratios

To apply a trigonometric formula correctly, label the triangle's adjacent leg, opposite leg, and hypotenuse first. Follow these steps:

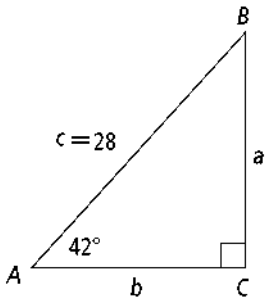
Step 1 Place an index finger on the right angle. Place your other index finger on the side opposite the right angle. Label it the *hypotenuse*.

Step 2 Place an index finger on the given angle. Place your other index finger on the leg touching the given angle. Label it *adjacent*.

Step 3 Keep the index finger on the given angle. Place your other index finger on the leg opposite the given angle. Label it *opposite*.

Problem

In right ΔABC, $m\angle A = 42°$ and $c = 28$. What are the lengths of a and b? Round to the nearest tenth.



$\sin\theta = \frac{\text{opp}}{\text{hyp}}$ To find a, the opposite leg, use sine.

$\sin 42° = \frac{a}{28}$ Substitute values.

$28(\sin 42°) = a$ Multiply each side by 28.

$28(0.6691) = a$ Use a calculator.

$18.7 = a$ Label $a = 18.7$ on the triangle.

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$ To find b, the adjacent leg, use cosine.

$\cos 42° = \frac{b}{28}$ Substitute values.

$28(\cos 42°) = b$ Multiply each side by 28.

$28(0.7431) = b$ Use a calculator.

$20.8 = b$ Label $b = 20.8$ on the triangle.

Exercises

In ΔABC, $\angle C$ is a right angle. Two measures are given. Find the remaining sides and angles to the nearest tenth.

2. $m\angle B = 20°$, $a = 6$

3. $m\angle B = 60°$, $c = 14$

4. $m\angle A = 10°$, $a = 10$

5. $b = 7$, $c = 10$

6. $a = 35$, $b = 21$

7. $m\angle A = 36.5°$, $c = 28.2$