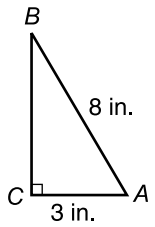
5-2

Practice

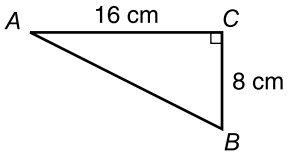
Trigonometric Ratios in Right Triangles

Find the values of the sine, cosine, and tangent for each ∠B.

1.



2.

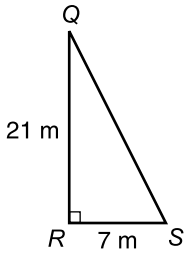


3. If $\tan \theta = 5$, find $\cot \theta$.

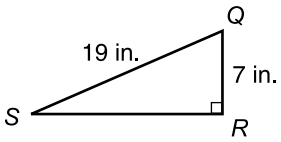
4. If $\sin \theta = \frac{3}{8}$, find $\csc \theta$.

Find the values of the six trigonometric ratios for each ∠S.

5.



6.



7. ***Physics*** Suppose you are traveling in a car when a beam of light passes from the air to the windshield. The measure of the angle of incidence is 55°, and the measure of the angle of refraction is 35° 15′. Use Snell's Law, $\frac{\sin \theta_i}{\sin \theta_r} = n$, to find the index of refraction n of the windshield to the nearest thousandth.

NAME _____ DATE _____ PERIOD _____

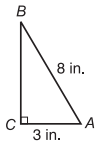
5-2

Practice

Trigonometric Ratios in Right Triangles

Find the values of the sine, cosine, and tangent for each ∠B.

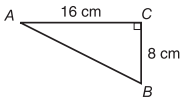
1.



$\sin B = \frac{3}{8}$; $\cos B = \frac{\sqrt{55}}{8}$;

$\tan B = \frac{3\sqrt{55}}{55}$

2.



$\sin B = \frac{2\sqrt{5}}{5}$; $\cos B = \frac{\sqrt{5}}{5}$;

$\tan B = 2$

3. If $\tan \theta = 5$, find $\cot \theta$.

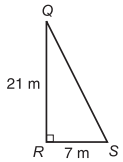
$\frac{1}{5}$

4. If $\sin \theta = \frac{3}{8}$, find $\csc \theta$.

$\frac{8}{3}$

Find the values of the six trigonometric ratios for each ∠S.

5.

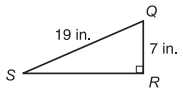


$\sin S = \frac{3\sqrt{10}}{10}$; $\cos S = \frac{\sqrt{10}}{10}$;

$\tan S = 3$; $\csc S = \frac{\sqrt{10}}{3}$;

$\sec S = \sqrt{10}$; $\cot S = \frac{1}{3}$

6.



$\sin S = \frac{7}{19}$; $\cos S = \frac{2\sqrt{78}}{19}$;

$\tan S = \frac{7\sqrt{78}}{156}$; $\csc S = \frac{19}{7}$;

$\sec S = \frac{19\sqrt{78}}{156}$; $\cot S = \frac{2\sqrt{78}}{7}$

7. ***Physics*** Suppose you are traveling in a car when a beam of light passes from the air to the windshield. The measure of the angle of incidence is 55°, and the measure of the angle of refraction is 35° 15′. Use Snell's Law, $\frac{\sin \theta_i}{\sin \theta_r} = n$, to find the index of refraction n of the windshield to the nearest thousandth.
about 1.419

NAME _____ DATE _____ PERIOD _____

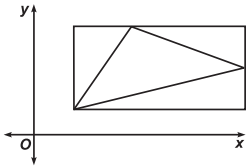
5-2

Enrichment

Using Right Triangles to Find the Area of Another Triangle

You can find the area of a right triangle by using the formula $A = \frac{1}{2}bh$. In the formula, one leg of the right triangle can be used as the base, and the other leg can be used as the height.

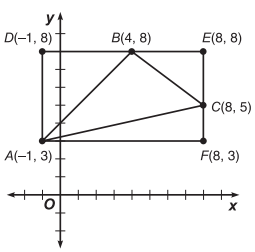
The vertices of a triangle can be represented on the coordinate plane by three ordered pairs. In order to find the area of a general triangle, you can **encase** the triangle in a rectangle as shown in the diagram below.



A rectangle is placed around the triangle so that the vertices of the triangle all touch the sides of the rectangle.

Example **Find the area of a triangle whose vertices are $A(-1, 3)$, $B(4, 8)$, and $C(8, 5)$.**

Plot the points and draw the triangle. Encase the triangle in a rectangle whose sides are parallel to the axes, then find the coordinates of the vertices of the rectangle.



Area $\triangle ABC$ = area $ADEF$ − area $\triangle ADB$ − area $\triangle BEC$ − area $\triangle CFA$, where $\triangle ADB$, $\triangle BEC$, and $\triangle CFA$ are all right triangles.

$$\text{Area } \triangle ABC = 5(9) - \frac{1}{2}(5)(5) - \frac{1}{2}(4)(3) - \frac{1}{2}(2)(9)$$
$$= 17.5 \text{ square units}$$

Find the area of the triangle having vertices with each set of coordinates.

1. $A(4, 6)$, $B(-1, 2)$, $C(6, -5)$ **31.5**

2. $A(-2, -4)$, $B(4, 7)$, $C(6, -1)$ **35**

3. $A(4, 2)$, $B(6, 9)$, $C(-1, 4)$ **19.5**

4. $A(2, -3)$, $B(6, -8)$, $C(3, 5)$ **18.5**