NAME _____ DATE _____ PERIOD _____

5-5

Practice

Solving Right Triangles

Solve each equation if $0° \leq x \leq 360°$.

1. $\cos x = \frac{\sqrt{2}}{2}$

2. $\tan x = 1$

3. $\sin x = \frac{1}{2}$

Evaluate each expression. Assume that all angles are in Quadrant I.

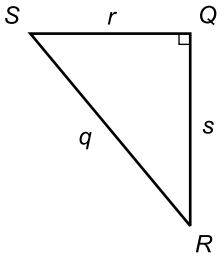
4. $\tan\left(\tan^{-1} \frac{\sqrt{3}}{3}\right)$

5. $\tan\left(\cos^{-1} \frac{2}{3}\right)$

6. $\cos\left(\arcsin \frac{5}{13}\right)$

Solve each problem. Round to the nearest tenth.

7. If $q = 10$ and $s = 3$, find S.

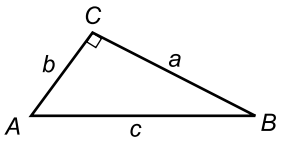


8. If $r = 12$ and $s = 4$, find R.

9. If $q = 20$ and $r = 15$, find S.

Solve each triangle described, given the triangle at the right. Round to the nearest tenth, if necessary.

10. $a = 9, B = 49°$



11. $A = 16°, c = 14$

12. $a = 2, b = 7$

13. ***Recreation*** The swimming pool at Perris Hill Plunge is 50 feet long and 25 feet wide. The bottom of the pool is slanted so that the water depth is 3 feet at the shallow end and 15 feet at the deep end. What is the angle of elevation at the bottom of the pool?

NAME _____ DATE _____ PERIOD _____

5-5

Practice

Solving Right Triangles

Solve each equation if 0° ≤ x ≤ 360°.

1. $\cos x = \frac{\sqrt{2}}{2}$
45°, 315°

2. $\tan x = 1$
45°, 225°

3. $\sin x = \frac{1}{2}$
30°, 150°

Evaluate each expression. Assume that all angles are in Quadrant I.

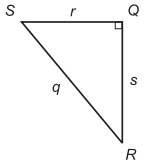
4. $\tan\left(\tan^{-1}\frac{\sqrt{3}}{3}\right)$
$\frac{\sqrt{3}}{3}$

5. $\tan\left(\cos^{-1}\frac{2}{3}\right)$
$\frac{\sqrt{5}}{2}$

6. $\cos\left(\arcsin\frac{5}{13}\right)$
$\frac{12}{13}$

Solve each problem. Round to the nearest tenth.

7. If $q = 10$ and $s = 3$, find S.
17.5°

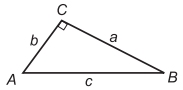


8. If $r = 12$ and $s = 4$, find R.
71.6°

9. If $q = 20$ and $r = 15$, find S.
41.4°

Solve each triangle described, given the triangle at the right. Round to the nearest tenth, if necessary.

10. $a = 9, B = 49°$
$A = 41°, b = 10.4, c = 13.7$



11. $A = 16°, c = 14$
$a = 3.9, b = 13.5, B = 74°$

12. $a = 2, b = 7$
$c = 7.3, A = 15.9°, B = 74.1°$

13. ***Recreation*** The swimming pool at Perris Hill Plunge is 50 feet long and 25 feet wide. The bottom of the pool is slanted so that the water depth is 3 feet at the shallow end and 15 feet at the deep end. What is the angle of elevation at the bottom of the pool? **about 13.5°**

NAME _____ DATE _____ PERIOD _____

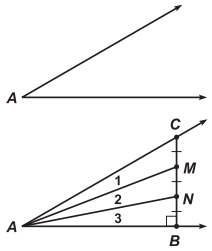
5-5

Enrichment

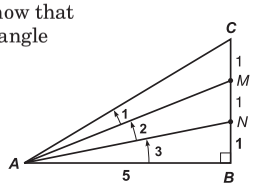
Disproving Angle Trisection

Most geometry texts state that it is impossible to trisect an arbitrary angle using only a compass and straightedge. This fact has been known since ancient times, but since it is usually stated without proof, some geometry students do not believe it. If the students set out to find a method for trisecting angles, they will probably try the following method. It is based on the familiar construction which allows a segment to be divided into any desired number of congruent segments. You can use inverse trigonometric functions to show that application of the method to the trisection of angles is not valid.

Given: $\angle A$
Claim: $\angle A$ can be trisected using the following method.
Method: Choose point C on one ray of $\angle A$. Through C construct a perpendicular to the other ray, intersecting it at B. Construct M and N, the points that divide $\overline{CB}$ into three congruent segments. Draw $\overline{AM}$ and $\overline{AN}$, which trisect $\angle CAB$ into the congruent angles $\angle 1$, $\angle 2$, and $\angle 3$.



The proposed method has been used to construct the figure below. $CM = MN = NB = 1$. $AB = 5$. Follow the instructions to show that the three angles $\angle 1$, $\angle 2$, and $\angle 3$, are not congruent. Find angle measures to the nearest tenth of a degree.



1. Express $m\angle 3$ as the value of an inverse function.
$m\angle 3 = \text{Arctan}\ \frac{1}{5}$

2. Find the measure of $\angle 3$.
$m\angle 3 \approx 11.3°$

3. Write $m\angle MAB$ as the value of an inverse function. **$m\angle MAB = \text{Arctan}\ \frac{2}{5}$**

4. Find the measure of $\angle MAB$. **$m\angle MAB \approx 21.8°$**

5. Find the measure of $\angle 2$. **$m\angle 2 \approx 10.5°$**

6. Find $m\angle CAB$ and use it to find $m\angle 1$. **$m\angle 1 \approx 9.2°$**

7. Explain why the proposed method for trisecting an angle fails.
The tangent function is not linear. The ratio of the measures of two angles is not equal to the ratio of the tangents of the angles.