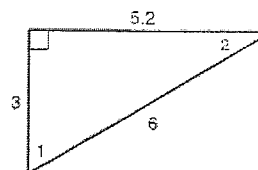Name _____ Date _____ Class_____

Sine and Cosine Ratios

Practice and Problem Solving: A/B

After verifying that the triangle to the right is a right triangle, use a calculator to find the given measures. Give ratios to the nearest hundredth and angles to the nearest degree.

1. Use the Pythagorean Theorem to confirm that the triangle is a right triangle. Show your work.

_____

2. $\sin \angle 1 = \dfrac{\square}{\square} \approx$ _____

3. $\sin \angle 2 = \dfrac{\square}{\square} =$ _____

4. $\cos \angle 1 = \dfrac{\square}{\square} =$ _____

5. $\cos \angle 2 = \dfrac{\square}{\square} \approx$ _____

6. Show how to find $m\angle 1$ using the inverse sine of $\angle 1$.

_____

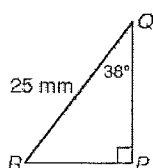7. Show how to find $m\angle 2$ using the inverse sine of $\angle 2$.

_____

Use a calculator and trigonometric ratios to find each length. Round to the nearest hundredth.
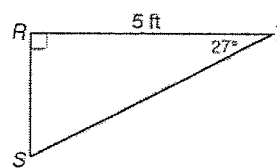
8.

11 m

62°

$BD =$ _____

9.

38°

25 mm

$QP =$ _____

10.

5 ft

27°
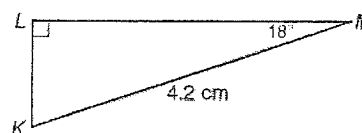
$ST =$ _____
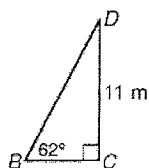
Use sine and cosine ratios to solve Problems 11–13.

11. Find the perimeter of the triangle. Round to the nearest
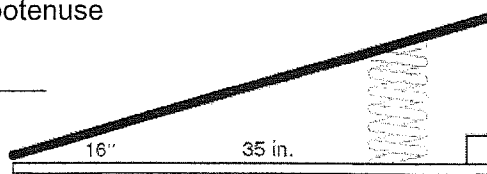
 0.1 centimeter. _____

18°

4.2 cm

12. To the nearest 0.1 inch, what is the length of the hypotenuse

 of the springboard shown to the right? _____

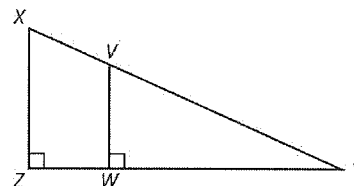13. What is the height of the springboard (the dotted

 line)? _____

16"   35 in.

LESSON 13-2

Sine and Cosine Ratios

Practice and Problem Solving: C

For Problems 1–5, tell the trigonometric relationships in the figure to the right.

1. $\sin\angle YVW = \dfrac{\square}{\square} = \dfrac{\square}{\square}$

2. $\sin\angle Y = \dfrac{\square}{\square} = \dfrac{\square}{\square}$

3. Simplify: $\sin Y - \cos Y = $ _____

4. Simplify: $\dfrac{\sin Y}{\cos Y} = $ _____

5. Simplify as much as possible (to a single number): $(\cos Y)^2 + (\sin Y)^2$.
   Show your work and explain your reasoning.

_____

_____

Use trigonometric ratios to solve Problems 6–9. Show your work in the space to the right of each problem.

6. The steepness, or grade, of a road or a ramp can be given as a percent. The grade of a treadmill ramp is 7%, which means that it would rise 7 inches over a horizontal distance of 100 inches. If the length of the ramp itself is 53 inches, to the nearest 0.1 inch, how many inches does it rise vertically? Show your work.

   _____

7. A wheelchair ramp has a slope of 1:12 (1 foot of rise over a horizontal distance of 12 feet). To the nearest 0.1 foot, how many feet of ramp will be needed to rise 3 feet? (Round the angle of incline to the nearest 0.01°.) Show your work.

   _____

8. The hypotenuse of a right triangle measures 9 inches, and one of the acute angles measures 36°. To the nearest square inch, what is the area of the triangle? Show your work.

   _____

9. Given the lengths of two sides of any triangle and the measure of the included angle, the area of the triangle can be found. In the figure, suppose the lengths b and c and the measure of $\angle A$ are known. Develop a formula for finding the area. Explain your answer. (*Hint:* Draw an altitude.)

_____

_____

_____

1. $\dfrac{WY}{VY} = \dfrac{ZY}{XY}$

2. $\dfrac{VW}{VY} = \dfrac{XZ}{XY}$

3. $\dfrac{VW - WY}{VY}$

4. $\tan Y$

5. $(\cos Y)^2 + (\sin Y)^2 =$

$\left(\dfrac{ZY}{XY}\right)^2 + \left(\dfrac{XZ}{XY}\right)^2 = \dfrac{(ZY)^2 + (XZ)^2}{(XY)^2}$

By the Pythagorean theorem, $(ZY)^2 + (XZ)^2 = (XY)^2$. Substituting this value for $(XY)^2$ into the previous equation, $(\cos Y)^2 + (\sin Y)^2 = 1$.

6. 3.7 in.; Find the angle at which the ramp rises: $\tan A = \dfrac{7}{100}$; $A \approx 4°$; $\sin 4° = \dfrac{x}{53}$; $x \approx 3.7$.

7. 36.2 ft; $\tan A = \dfrac{1}{12}$; $\tan^{-1}\dfrac{1}{12} \approx 4.76°$;

$\sin 4.76° = \dfrac{3}{x}$; $x \approx 36.2$

8. 19 in²; $\sin 36 = \dfrac{h}{9}$. $h \approx 5.3$ in.; $\cos 36 = \dfrac{b}{9}$;

$b \approx 7.3$ in.; Area $= \dfrac{1}{2}bh = \dfrac{1}{2} \times 7.3 \times 5.3 \approx 19$

9. Possible answer: Draw an altitude from $\angle B$ and call its length h. Then $\sin A = \dfrac{h}{c}$, so $h = c \sin A$. The formula for the area of a triangle is Area $= \dfrac{1}{2}$ base $\times$ height. Substitution gives Area $= \dfrac{1}{2}bc \sin A$.

Handwritten note:

#6 Prob c

Use P.T twice

? ← find 1st

7 |___
   100   then

53   proportion

x

LESSON 13-2

Practice and Problem Solving: A/B

1. $3^2 + 5.2^2 = 6^2$. $9 + 27.04 = 36.04$. $\sqrt{36.04} \approx 6.00$. The side lengths satisfy the Pythagorean theorem, so the triangle is a right triangle.

2. $\dfrac{5.2}{6} \approx 0.87$

3. $\dfrac{3}{6} = 0.50$

4. $\dfrac{3}{6} = 0.50$

5. $\dfrac{5.2}{6} \approx 0.87$

6. $m\angle 1 = \sin^{-1}0.87 = 60°$

7. $m\angle 2 = \sin^{-1}0.50 = 30°$

8. 12.46 m

9. 19.70 mm

10. 5.6 ft

11. 9.5 cm

...fied

...5)