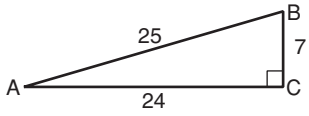
Name _____ Date _____ Class _____

LESSON 8-2

Practice B

Trigonometric Ratios

Use the figure for Exercises 1–6. Write each trigonometric ratio as a simplified fraction and as a decimal rounded to the nearest hundredth.



1. sin *A* _____

2. cos *B* _____

3. tan *B* _____

4. sin *B* _____

5. cos *A* _____

6. tan *A* _____

Use special right triangles to write each trigonometric ratio as a simplified fraction.

7. sin 30° _____

8. cos 30° _____

9. tan 45° _____

10. tan 30° _____

11. cos 45° _____

12. tan 60° _____

Use a calculator to find each trigonometric ratio. Round to the nearest hundredth.

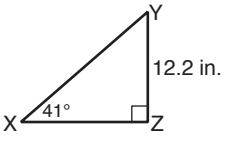
13. sin 64° _____

14. cos 58° _____

15. tan 15° _____

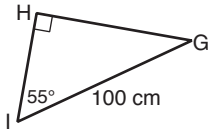
Find each length. Round to the nearest hundredth.

16.



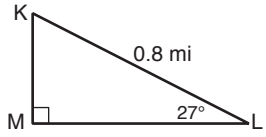
XZ _____

17.



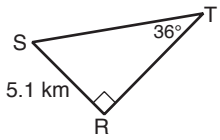
HI _____

18.



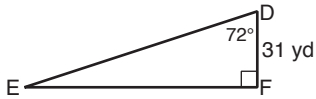
KM _____

19.



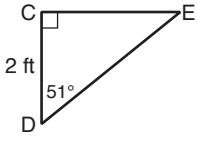
ST _____

20.



EF _____

21.



DE _____

LESSON 8-2

Practice A

Trigonometric Ratios

In Exercises 1–3, fill in the blanks to complete each definition. Then use side lengths from the figure to complete the indicated trigonometric ratios.

1. The sine (sin) of an angle is the ratio of the length of the leg ___opposite___ the angle to the length of the ___hypotenuse___.

   $\sin A = \frac{a}{c}$ $\sin B = \frac{b}{c}$

2. The cosine (cos) of an angle is the ratio of the length of the leg ___adjacent___ to the angle to the length of the ___hypotenuse___.

   $\cos A = \frac{b}{c}$ $\cos B = \frac{a}{c}$

3. The tangent (tan) of an angle is the ratio of the length of the leg ___opposite___ the angle to the length of the leg ___adjacent___ to the angle.

   $\tan A = \frac{a}{b}$ $\tan B = \frac{b}{a}$

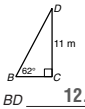
Use the figure for Exercises 4–6. Write each trigonometric ratio as a simplified fraction and as a decimal rounded to the nearest hundredth.

4. $\sin L$ ___$\frac{3}{5}$; 0.60___
5. $\cos L$ ___$\frac{4}{5}$; 0.80___
6. $\tan M$ ___$\frac{4}{3}$; 1.33___

Use a calculator to find each trigonometric ratio. Round to the nearest hundredth.

7. $\sin 33°$ ___0.54___
8. $\cos 47°$ ___0.68___
9. $\tan 81°$ ___6.31___

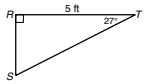
Use a calculator and trigonometric ratios to find each length. Round to the nearest hundredth.

10. 

BD ___12.46 m___

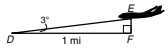
11. 

QP ___19.70 mm___

12. 

RS ___2.55 feet___

13. The glide slope is the path a plane uses while it is landing on a runway. The glide slope usually makes a 3° angle with the ground. A plane is on the glide slope and is 1 mile (5280 feet) from touchdown. Use the tangent ratio and a calculator to find *EF*, the plane's altitude, to the nearest foot.



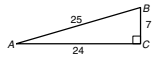
___277 feet___

LESSON 8-2

Practice B

Trigonometric Ratios

Use the figure for Exercises 1–6. Write each trigonometric ratio as a simplified fraction and as a decimal rounded to the nearest hundredth.



1. $\sin A$ ___$\frac{7}{25}$; 0.28___
2. $\cos B$ ___$\frac{7}{25}$; 0.28___
3. $\tan B$ ___$\frac{24}{7}$; 3.43___
4. $\sin B$ ___$\frac{24}{25}$; 0.96___
5. $\cos A$ ___$\frac{24}{25}$; 0.96___
6. $\tan A$ ___$\frac{7}{24}$; 0.29___

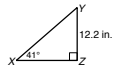
Use special right triangles to write each trigonometric ratio as a simplified fraction.

7. $\sin 30°$ ___$\frac{1}{2}$___
8. $\cos 30°$ ___$\frac{\sqrt{3}}{2}$___
9. $\tan 45°$ ___1___
10. $\tan 30°$ ___$\frac{\sqrt{3}}{3}$___
11. $\cos 45°$ ___$\frac{\sqrt{2}}{2}$___
12. $\tan 60°$ ___$\sqrt{3}$___

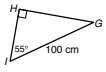
Use a calculator to find each trigonometric ratio. Round to the nearest hundredth.

13. $\sin 64°$ ___0.90___
14. $\cos 58°$ ___0.53___
15. $\tan 15°$ ___0.27___

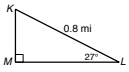
Find each length. Round to the nearest hundredth.

16. 

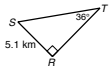
XZ ___14.03 in.___

17. 

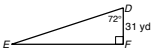
HI ___57.36 cm___

18. 

KM ___0.36 mi___

19. 

ST ___8.68 km___

20. 

EF ___95.41 yd___

21. 

DE ___3.18 ft___

LESSON 8-2

Practice C

Trigonometric Ratios

1. Given the lengths of two sides of a 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.)

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

Use the formula you developed in Exercise 1 to find the area of each triangle. Round to the nearest hundredth.

2. 

___18.66 m^2___

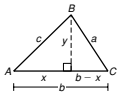
3. 

___28.39 ft^2___

4. 

___12.05 in^2___

5. The law of cosines is a formula to find the length of the third side of any triangle given the lengths of two sides and the measure of the included angle. (*Note:* The law of cosines applies to any triangle, but deriving it for an obtuse triangle requires more knowledge than you have learned so far.) In the figure, suppose the lengths b and c and the measure of $\angle A$ are known. Develop the law of cosines to find a. Explain your answer. (*Hint:* Use the cosine function and the Pythagorean Theorem.)



Possible answer: The Pythagorean Theorem shows that $x^2 + y^2 = c^2$. It also shows that $(b - x)^2 + y^2 = a^2$. Expanding the latter equation gives $b^2 - 2bx + x^2 + y^2 = a^2$. Substituting, $b^2 - 2bx + c^2 = a^2$. But $\cos A = \frac{x}{c}$, so $x = c \cos A$. Another substitution gives $a^2 = b^2 + c^2 - 2bc \cos A$.

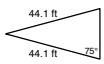
Use the formula you developed in Exercise 5 to find the missing side length in each triangle. Round to the nearest hundredth.

6. 

___6.78 cm___

7. 

___15.18 km___

8. 

___22.83 ft___

LESSON 8-2

Review for Mastery

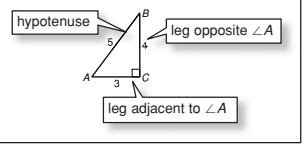
Trigonometric Ratios

Trigonometric Ratios

$\sin A = \frac{\text{leg opposite } \angle A}{\text{hypotenuse}} = \frac{4}{5} = 0.8$

$\cos A = \frac{\text{leg adjacent to } \angle A}{\text{hypotenuse}} = \frac{3}{5} = 0.6$

$\tan A = \frac{\text{leg opposite } \angle A}{\text{leg adjacent to } \angle A} = \frac{4}{3} \approx 1.33$



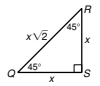
You can use special right triangles to write trigonometric ratios as fractions.

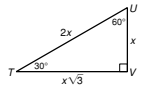
$\sin 45° = \sin Q = \frac{\text{leg opposite } \angle Q}{\text{hypotenuse}}$

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

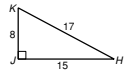
$= \frac{\sqrt{2}}{2}$

So $\sin 45° = \frac{\sqrt{2}}{2}$.





Write each trigonometric ratio as a fraction and as a decimal rounded to the nearest hundredth.



1. $\sin K$ ___$\frac{15}{17} \approx 0.88$___
2. $\cos H$ ___$\frac{15}{17} \approx 0.88$___
3. $\cos K$ ___$\frac{8}{17} \approx 0.47$___
4. $\tan H$ ___$\frac{8}{15} \approx 0.53$___

Use a special right triangle to write each trigonometric ratio as a fraction.

5. $\cos 45°$ ___$\frac{\sqrt{2}}{2}$___
6. $\tan 45°$ ___$\frac{1}{1} = 1$___
7. $\sin 60°$ ___$\frac{\sqrt{3}}{2}$___
8. $\tan 30°$ ___$\frac{\sqrt{3}}{3}$___