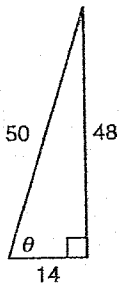
Name _____ Date _____ Class _____

LESSON 13-1

Practice A

Right-Angle Trigonometry

Find the value of the sine, cosine, and tangent functions for θ.

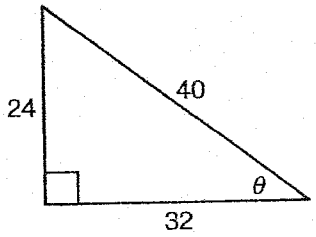
1. 

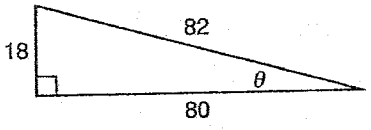
Write and simplify the fractions.

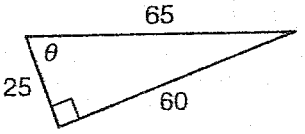
a. $\sin\theta = \frac{\text{opp.}}{\text{hyp.}} =$ _____

b. $\cos\theta = \frac{\text{adj.}}{\text{hyp.}} =$ _____

c. $\tan\theta = \frac{\text{opp.}}{\text{adj.}} =$ _____

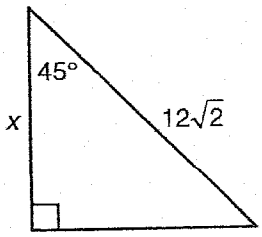
2. 

3. 

4. 

_____ _____ _____

Use a trigonometric function to find the value of x.

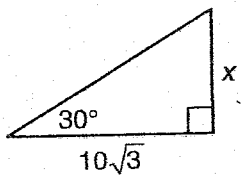
5. 

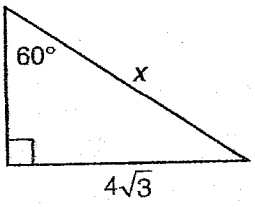
a. Choose the function. _____

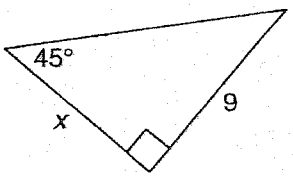
b. Substitute given values. _____

c. Evaluate the trigonometric ratio for the angle measure. _____

d. Solve the proportion for x. _____

6. 

7. 

8. 

_____ _____ _____

Solve.

9. A conveyor belt leads from the ground to a barn door 24 feet high. The angle between the belt and the ground is 32°. What is the length of the conveyor belt to the nearest foot?

_____

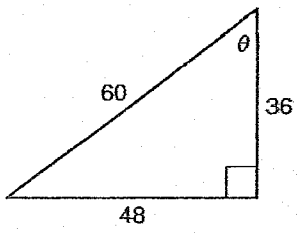
Name _____ Date _____ Class _____

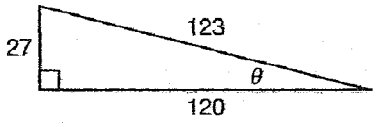
LESSON 13-1

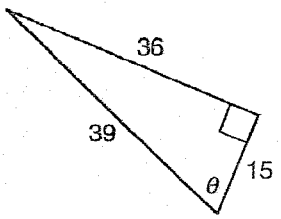
Practice B

Right-Angle Trigonometry

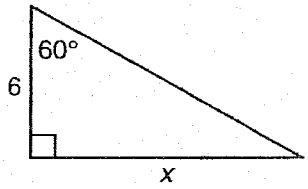
Find the value of the sine, cosine, and tangent functions for θ.

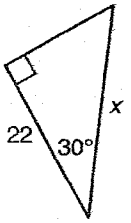
1. 

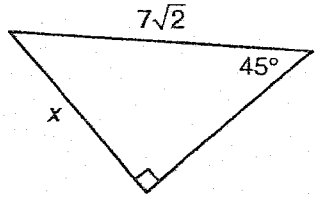
2. 

3. 

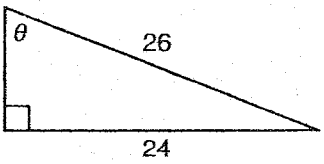
Use a trigonometric function to find the value of x.

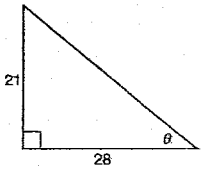
4. 

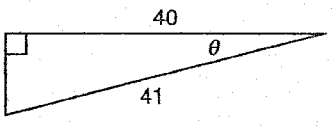
5. 

6. 

Find the values of the six trigonometric functions for θ.

7. 

8. 

9. 

Solve.

10. A water slide is 26 feet high. The angle between the slide and the water is 33.5°. What is the length of the slide?

11. A surveyor stands 150 feet from the base of a viaduct and measures the angle of elevation to be 46.2°. His eye level is 6 feet above the ground. What is the height of the viaduct to the nearest foot?

12. The pilot of a helicopter measures the angle of depression to a landing spot to be 18.8°. If the pilot's altitude is 1640 meters, what is the horizontal distance to the landing spot to the nearest meter?

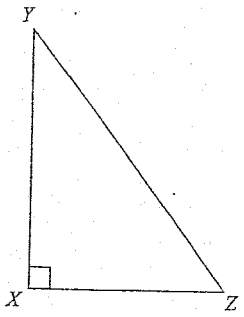
Name _____

Right Angle Trigonometry

NO WORK = NO CREDIT

DO YOUR FIGURING HERE.

1. In the right triangle below, $YZ = 10$ units, and $XZ = 4$ units. What is sin Z?



A. $\frac{4}{10}$

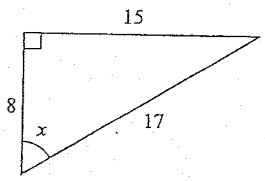
B. $\frac{10}{2\sqrt{21}}$

C. $\frac{2\sqrt{21}}{10}$

D. $\frac{10}{4}$

E. $\frac{4}{2\sqrt{21}}$

2. For the triangle shown below, what is the value of tan x?



F. $\frac{8}{15}$

G. $\frac{8}{17}$

H. $\frac{15}{8}$

J. $\frac{15}{17}$

K. $\frac{17}{8}$

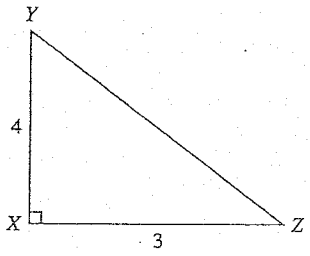
Name _____

Right Angle Trigonometry

NO WORK = NO CREDIT

3. For right triangle XYZ below, what is $\cos \angle Z$?

DO YOUR FIGURING HERE.



F. $\frac{4}{3}$

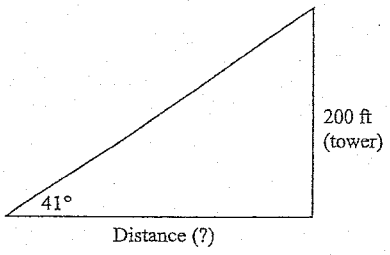
G. $\frac{5}{4}$

H. $\frac{3}{4}$

J. $\frac{3}{5}$

K. Cannot be determined from the given information

4. When measured from a point on the ground that is a certain distance from the base of a cell phone tower, the angle of elevation to the top of the tower is 41°, as shown below. The height of the cell phone tower is 200 feet. What is the distance, in feet, to the cell phone tower?



F. 200 tan 41°
G. 200 sin 41°
H. 200 cos 41°
J. 200 sec 41°
K. 200 cot 41°

5. If $\sin A = \frac{3}{5}$, then which of the following could be $\tan A$?

F. $\frac{1}{4}$

G. $\frac{3}{4}$

H. 1

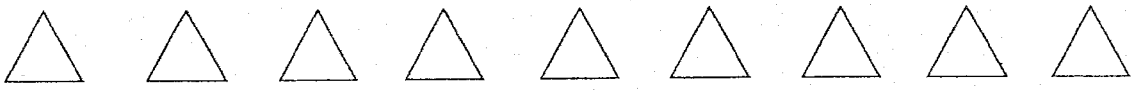
J. $\frac{4}{3}$

K. 4

Name _____

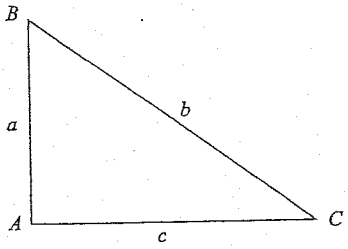
Right Angle Trigonometry

NO WORK = NO CREDIT



6. For the right triangle $\triangle ABC$ shown below, what is $\sin C$?

DO YOUR FIGURING HERE.



F. $\frac{a}{b}$

G. $\frac{a}{c}$

H. $\frac{b}{a}$

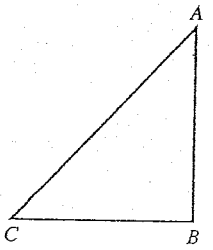
J. $\frac{c}{b}$

K. $\frac{c}{a}$

7. Find the height a 17-foot ladder can reach on the side of a building when it hits the ground at a 65° angle.

A. 7.2 ft
B. 15.4 ft
C. 36.5 ft
D. 48 ft
E. 224 ft

8. The hypotenuse of right triangle ABC shown below is 16 inches long. The sine of angle A is $\frac{3}{5}$. About how many inches long is $\overline{BC}$?



F. 8.0
G. 9.6
H. 12.4
J. 14.3
K. 15.6

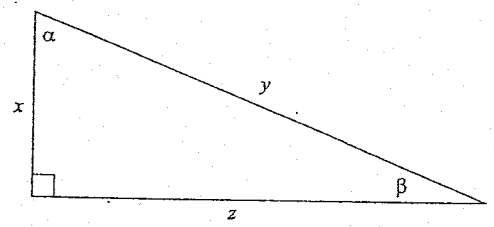
Name _____

Right Angle Trigonometry

NO WORK = NO CREDIT

9. A right triangle that has sides measured in the same unit of length is shown below. For any such triangle, $(\tan \alpha)(\sin \beta)$ is equivalent to:

DO YOUR FIGURING HERE.



F. $\frac{x}{z}$

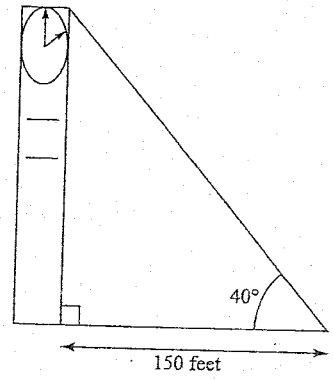
G. $\frac{x^2}{z^2}$

H. $\frac{z}{y}$

J. $\frac{z}{y^2}$

K. $\frac{z^2}{x}$

10. A clock tower casts a 150-foot shadow on level ground, as shown below. The angle of elevation from the tip of the shadow to the top of the tower is 40°. To the nearest tenth of a foot, what is the height of the clock tower?



(Note: $\cos 40° = \sin 50° \approx 0.77$

$\cos 50° = \sin 40° \approx 0.64$

$\tan 50° \approx 1.19$

$\tan 40° \approx 0.84$)

A. 194.8
B. 178.5
C. 150.0
D. 126.0
E. 115.5

Name _____

Right Angle Trigonometry

NO WORK = NO CREDIT

11. In the figure given below, what is $\sin\theta$?

DO YOUR FIGURING HERE.

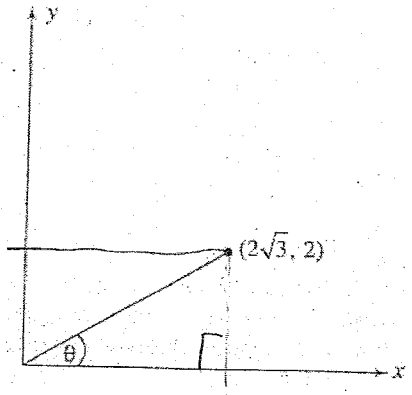
F. $\frac{1}{2}$

G. $\frac{\sqrt{3}}{3}$

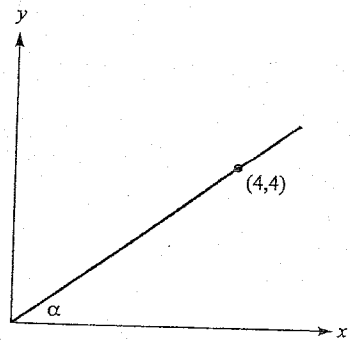
H. $\frac{\sqrt{3}}{2}$

J. 1

K. $\sqrt{3}$



12. In the figure below, $\sin\alpha = ?$



F. $\frac{1}{2}$

G. $\frac{\sqrt{3}}{2}$

H. 1

J. $\frac{\sqrt{2}}{2}$

K. $\frac{\sqrt{2}}{4}$

13. For values of x where $\sin x$, $\cos x$, and $\tan x$ are all defined, $\frac{(\cos x)}{(\tan x)(\sin x)} = ?$

F. $\frac{\cos^2 x}{\sin^2 x}$

G. $\tan^2 x$

H. 1

J. $\sin^2 x$

K. $\sec x$

Name _____

Right Angle Trigonometry

NO WORK = NO CREDIT

14. If $\cos A = \frac{4}{5}$, and $\sin A = \frac{3}{5}$, then $\tan A = ?$

DO YOUR FIGURING HERE.

F. $\frac{3}{4}$

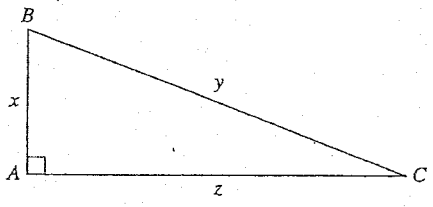
G. $\frac{3}{5}$

H. $\frac{4}{5}$

J. $\frac{4}{3}$

K. $\frac{12}{5}$

15. The lengths of the sides of right triangle ABC are shown in the figure below. What is the cotangent of $\angle B$?



A. $\frac{x}{y}$

B. $\frac{x}{z}$

C. $\frac{y}{z}$

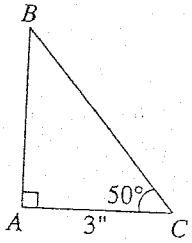
D. $\frac{z}{x}$

E. $\frac{z}{y}$

16. Which of the following is the best approximation of the perimeter, in inches, of the triangle shown below?

(Note: You may use the following values, which are correct to two decimal places:

$\sin 50° = .77$, $\cos 50° = .64$, $\tan 50° = 1.19$)



A. 4.7

B. 7.3

C. 8.3

D. 11.5

E. 12.0

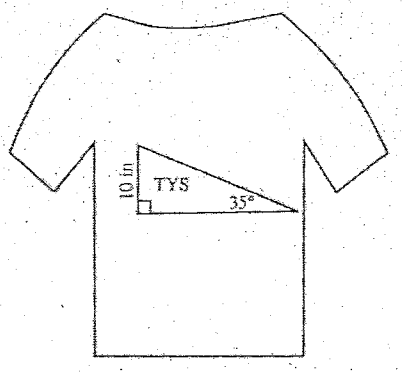
Name _____

Right Angle Trigonometry

NO WORK = NO CREDIT

17. A rock band, The Young Sohcahtoans, is trying to design a t-shirt logo. The measurements they have chosen are represented on the figure below. The angle to the right of the logo "TYS" has a degree measure of 35°, and the side of the figure has a measure of 10 in. Which of the following expressions gives the measure, in inches, of the diagonal top side of the figure?

DO YOUR FIGURING HERE.



A. $10\tan 35°$

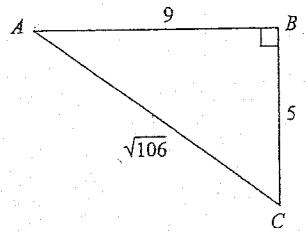
B. $10\cos 35°$

C. $10\sin 35°$

D. $\dfrac{10}{\sin 35°}$

E. $\dfrac{10}{\cos 35°}$

18. For right triangle ABC with dimensions in centimeters as given below, what is $\tan C$?



A. $\dfrac{5}{9}$

B. $\dfrac{5}{\sqrt{106}}$

C. $\dfrac{9}{\sqrt{106}}$

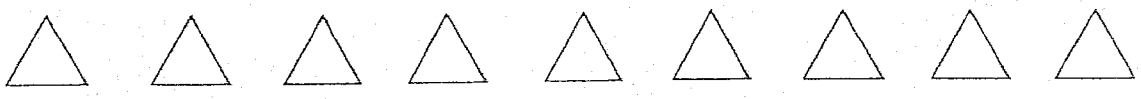
D. $\dfrac{\sqrt{106}}{9}$

E. $\dfrac{9}{z}$

Name _____

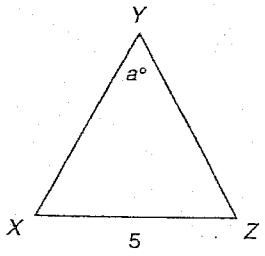
Right Angle Trigonometry

NO WORK = NO CREDIT



19. In the figure below, $\overline{XY} = \overline{YZ}$. If $a = 40°$, than $\overline{XY}$ =?

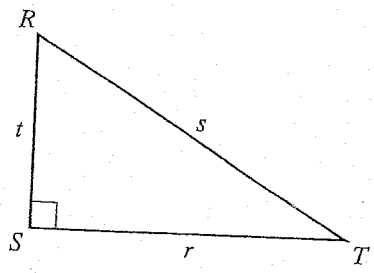
DO YOUR FIGURING HERE.



F. 9.50
G. 8.75
H. 7.75
J. 6.25
K. 5.50

20. For right triangle $\triangle RST$ shown below, what is tan R ?

F. $\frac{t}{s}$
G. $\frac{t}{r}$
H. $\frac{r}{t}$
J. $\frac{t}{s}$
K. $\frac{s}{t}$



Name _____ Date _____ Class _____

LESSON 13-3

Practice A

The Unit Circle

Convert each measure from degrees to radians or from radians to degrees.

1. $60°$

$60° \left(\frac{\pi \text{ radians}}{180°}\right) =$ _____

2. $\frac{2\pi}{5}$

$\left(\frac{2\pi}{5}\right)\left(\frac{180°}{\pi \text{ radians}}\right) =$ _____

3. $\frac{5\pi}{6}$ _____

4. $315°$ _____

5. $-\frac{3\pi}{4}$ _____

6. $-105°$ _____

7. $\frac{4\pi}{3}$ _____

8. $-\frac{\pi}{6}$ _____

9. $300°$ _____

10. $-10°$ _____

11. $\frac{16\pi}{9}$ _____

Find the exact value of each trigonometric function. Use the unit circle.

12. $\sin 60°$

   a. At what point on the unit circle does the angle terminate? _____

   b. Use $\sin\theta = y$. _____

13. $\cos\frac{5\pi}{3}$ _____

14. $\tan 225°$ _____

15. $\tan\pi$ _____

16. $\sin 330°$ _____

17. $\cos 150°$ _____

18. $\tan 240°$ _____

Solve.

19. John is adding a curved edge to the landscaping in front of the high school. The curve is an arc of a circle with a radius of 1600 feet. The central angle that intercepts the curve measures $\frac{\pi}{8}$ radians. Find the length of the curve to the nearest foot.

_____

Name _____ Date _____ Class _____

LESSON 13-3

Practice B

The Unit Circle

Convert each measure from degrees to radians or from radians to degrees.

1. $\frac{5\pi}{12}$ _____
2. $215°$ _____
3. $-\frac{29\pi}{18}$ _____
4. $-180°$ _____
5. $\frac{5\pi}{3}$ _____
6. $-\frac{7\pi}{6}$ _____
7. $400°$ _____
8. $\frac{3\pi}{10}$ _____
9. $35°$ _____

Use the unit circle to find the exact value of each trigonometric function.

10. $\cos\frac{2\pi}{3}$ _____
11. $\tan\frac{5\pi}{4}$ _____
12. $\tan\frac{5\pi}{6}$ _____
13. $\sin 315°$ _____
14. $\cos 225°$ _____
15. $\tan 60°$ _____

Use a reference angle to find the exact value of the sine, cosine, and tangent of each angle.

16. $150°$ _____
17. $-225°$ _____
18. $-300°$ _____
19. $\frac{11\pi}{6}$ _____
20. $-\frac{2\pi}{3}$ _____
21. $\frac{5\pi}{4}$ _____

Solve.

22. San Antonio, Texas, is located about 30° north of the equator. If Earth's radius is about 3959 miles, approximately how many miles is San Antonio from the equator?

_____

Name _____

Evaluating Trig Functions

NO WORK = NO CREDIT

DO YOUR FIGURING HERE.

1. If $\cos\theta = -\frac{3}{5}$ and $\frac{\pi}{2} < \theta < \pi$, then $\tan\theta = ?$

   F. $-\frac{5}{4}$

   G. $-\frac{4}{3}$

   H. $-\frac{3}{5}$

   J. $\frac{3}{4}$

   K. $\frac{4}{3}$

2. What is $\sin\frac{\pi}{12}$ given that $\frac{\pi}{12} = \frac{\pi}{3} - \frac{\pi}{4}$ and that $\sin(\alpha - \beta) = (\sin\alpha)(\cos\beta) - (\cos\alpha)(\sin\beta)$?

   (Note: You may use the following table of values.)

θ	$\sin\theta$	$\cos\theta$
$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$
$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$

   F. $\frac{1}{4}$

   G. $\frac{1}{2}$

   H. $\frac{\sqrt{3}-2}{4}$

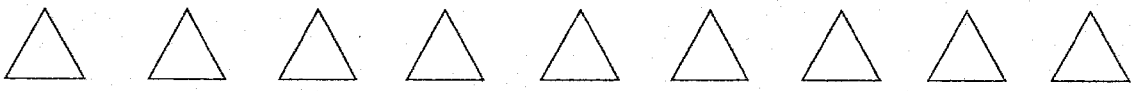
   J. $\frac{\sqrt{3}-\sqrt{2}}{2}$

   K. $\frac{\sqrt{6}-\sqrt{2}}{4}$

Name _____

Evaluating Trig Functions

NO WORK = NO CREDIT



DO YOUR FIGURING HERE.

3. If $\tan x = \frac{3}{4}$ and $0° \leq x° \leq 90°$, then $\cos x = ?$

A. $\frac{5}{3}$

B. $\frac{4}{3}$

C. $\frac{5}{4}$

D. $\frac{4}{5}$ E. $\frac{3}{5}$

4. What is $\cos \frac{5\pi}{12}$ given that $\frac{5\pi}{12} = \frac{\pi}{4} + \frac{\pi}{6}$ and that $\cos(\alpha + \beta) = (\cos \alpha)(\cos \beta) - (\sin \alpha)(\sin \beta)$? (Note: You may use the following table of values.)

θ	sin θ	cos θ
$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$
$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$

F. $\frac{1}{4}$

G. $\frac{1}{2}$

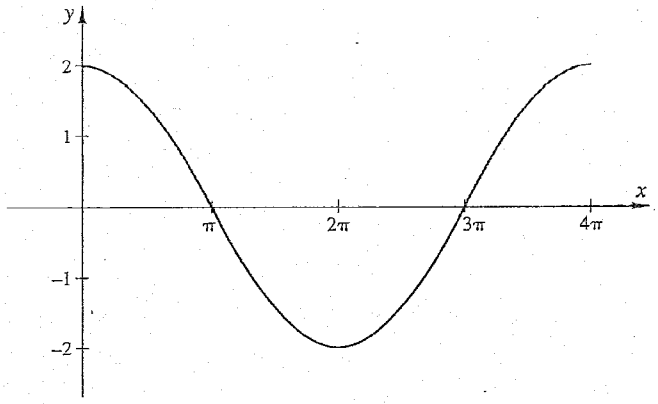
H. $\frac{\sqrt{6}-\sqrt{2}}{4}$

J. $\frac{\sqrt{3}-\sqrt{2}}{2}$

K. $\frac{\sqrt{6}+2}{4}$

PRACTICE 13-4 Practice

Given below is one full period of the graph of a trigonometric function.



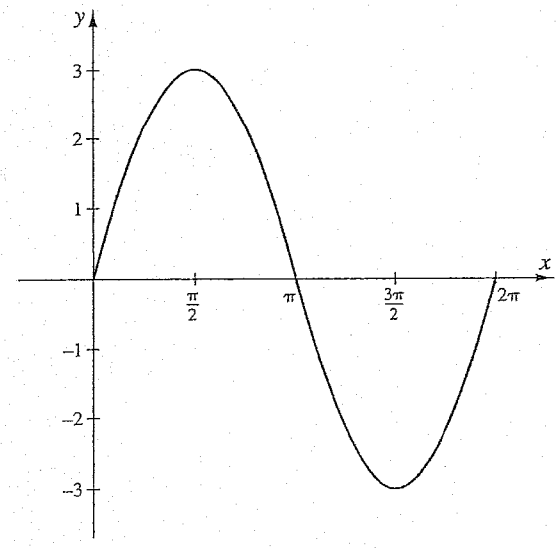
1. What is the amplitude of the graph?
2. What is the period of the graph?
3. What is the equation of the graph?

Look at the equation below.

$y = \frac{1}{2} \csc x$

4. What is the amplitude of the graph of this equation?
5. What is the period of the graph?
6. Draw a graph of one period of this function

Given below is one full period of the graph of a trigonometric function.



7. What is the amplitude of the graph?
8. What is the period of the graph?
9. What is the equation of the graph?
10. Draw a graph of one period of the function $y = -\cos 2x$.

(Answers on page 393)

Name _____

Graphs of Trig Funcitons

NO WORK = NO CREDIT

DO YOUR FIGURING HERE.

1. Which function has an amplitude of 4 and a period of 8?

   A. $y = -4\sin\theta$

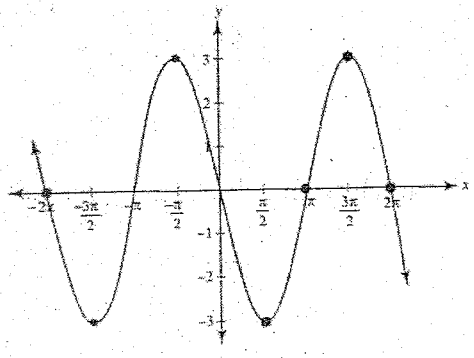
   B. $y = \sin\frac{\pi}{8}\theta$

   C. $y = 4\sin\frac{\pi}{8}\theta$

   D. $y = 4\sin\frac{\pi}{4}\theta$

   E. $y = \sin\frac{\pi}{4}\theta$

2. The amplitude of the trigonometric function shown below is defined as the average of the absolute values of the maximum value of $f(x)$ and the minimum value of $f(x)$. The trigonometric function graphed below can be described by the equation $f(x) = a\sin(bx + c)$, where a, b, and c are real numbers. Which of the following values describes the amplitude of this function?

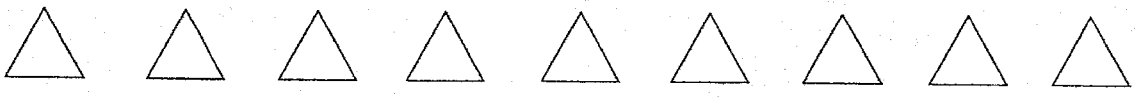


   A. 1
   B. 2
   C. 3
   D. π
   E. 2π

Name _____

Graphs of Trig Functions

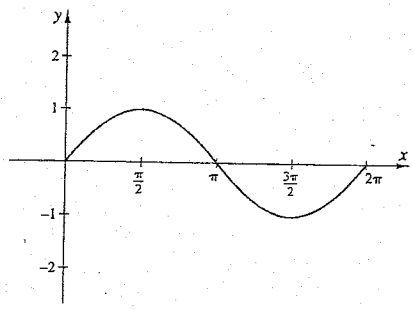
NO WORK = NO CREDIT



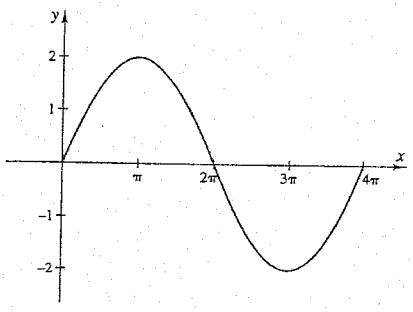
3. Which of the following is a graph of the function $y = \frac{1}{2} \sin 2x$?

DO YOUR FIGURING HERE.

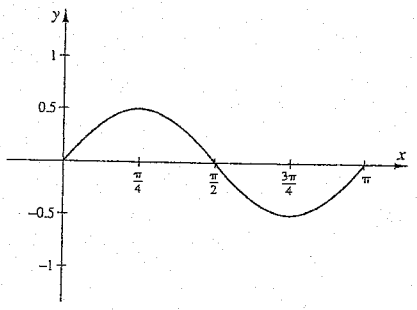
A.



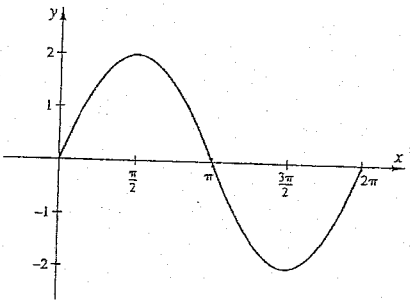
B.



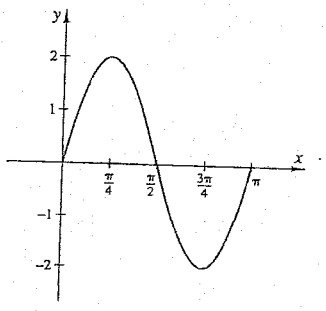
C.



D.



E.



4. What is the smallest possible value for a where $y = \sin 2a$ reaches its maximum?

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. π

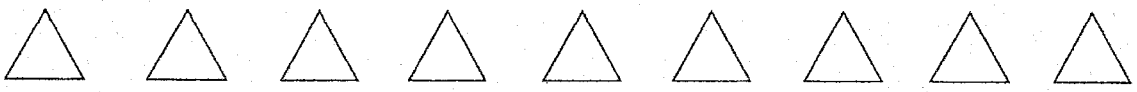
D. 2π

E. 4π

Name _____

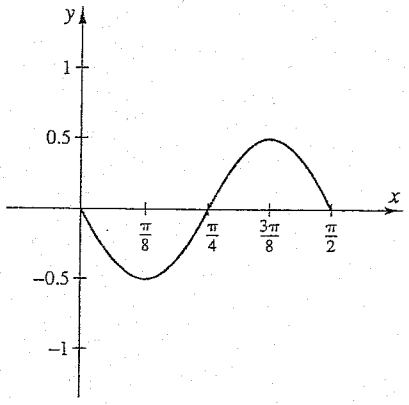
Graphs of Trig Functions

NO WORK = NO CREDIT



DO YOUR FIGURING HERE.

5. Which of the following choices is the equation of the graph shown below?



F. $y = 2 \sin 2x$

G. $y = -\frac{1}{2} \cos \frac{1}{2}x$

H. $y = -\frac{1}{2} \sin 4x$

J. $y = 4 \sin\left(-\frac{1}{2}x\right)$

K. $y = 2 \cos 2x$

6. What is the period of the graph of the equation $y = -2\cot \pi x$?

A. $\frac{\pi}{2}$

B. 1

C. -1

D. $-\frac{\pi}{2}$

E. $-\pi$

Chapter 4 Practice

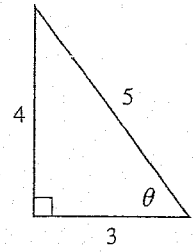
Subtest

Trigonometry

This Subtest has eight of the types of trigonometry items found on the ACT. The actual ACT will have four trigonometry items. If you don't know an answer, eliminate and guess. Circle the number of any guessed answer.

Then check your answers on page 394. You will find explanations for the answers and suggestions for further study.

1. $\sin \theta = ?$



A. $\frac{3}{5}$

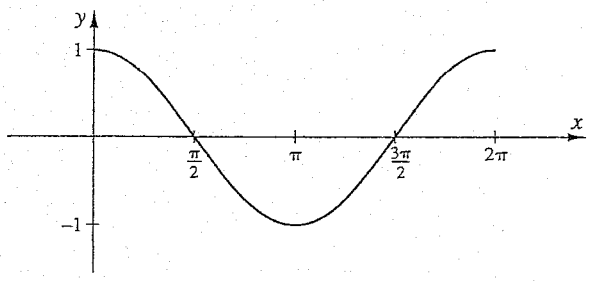
B. $\frac{4}{5}$

C. $\frac{5}{4}$

D. $\frac{4}{3}$

E. $\frac{5}{3}$

2. The graph below is one period of which trigonometric function?



F. $\cos \theta$

G. $\sin \theta$

H. $\tan \theta$

J. $\sec \theta$

K. $\csc \theta$

3. Given that $0° \leq \theta < 360°$, what is the value of θ if $\cos \theta \times \sin^2 \theta + \cos^3 \theta = 1$?

A. $\theta = 270°$

B. $\theta = 180°$

C. $\theta = 135°$

D. $\theta = 90°$

E. $\theta = 0°$

4. $(\sec^2 \theta - 1) \times \csc^2 \theta$ is equivalent to which of the following?

F. $\tan^2 \theta$

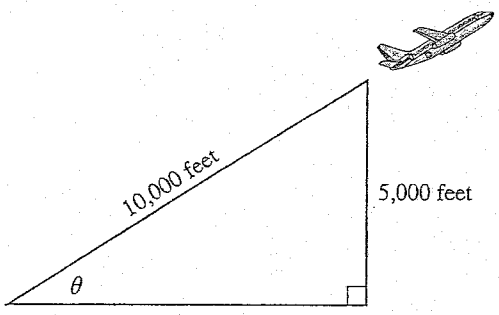
G. $\cos^2 \theta$

H. $\sec^2 \theta$

J. $\cot^2 \theta$

K. $\csc^2 \theta$

5. An airplane leaves a runway at an angle of θ. When the airplane has reached an altitude of 5,000 feet it has traveled 10,000 feet in the direction it took off. At what angle (θ) did the airplane leave the runway?



A. 15°

B. 30°

C. 45°

D. 60°

E. 75°

6. If $\sec \theta = \sqrt{2}$, then the measure of angle $\theta = ?$

F. 30°

G. 45°

H. 60°

J. $\frac{7\pi}{4}$

K. 2π

Chapter 4 Practice

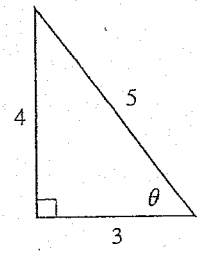
Cumulative ACT Practice

Trigonometry

This Cumulative ACT Practice gives you an additional opportunity to practice trigonometry concepts in an ACT format. If you don't know an answer, eliminate and guess. Circle the number of any guessed answers.

Then check your answers on page 393. You will also find explanations for the answers and suggestions for further study.

1. $\tan \theta = ?$



A. $\frac{4}{3}$

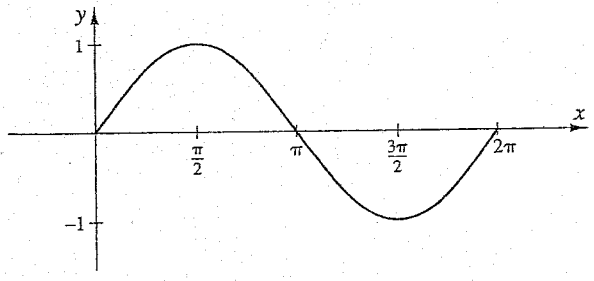
B. $\frac{3}{4}$

C. $\frac{3}{5}$

D. $\frac{4}{5}$

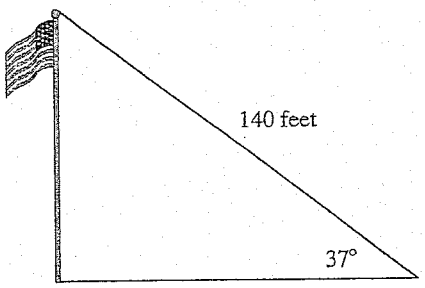
E. $\frac{5}{4}$

2. The graph below shows one period of which of the following trigonometric functions?



F. $\tan \theta$
G. $\cos \theta$
H. $\sin \theta$
J. $\sec \theta$
K. $\cot \theta$

3. A 140-foot rope is tied taut to the top of a flagpole and staked into the ground forming a 37° angle with the ground. Which of the following choices could be used to find the length from the base of the flagpole to where the rope is staked into the ground?

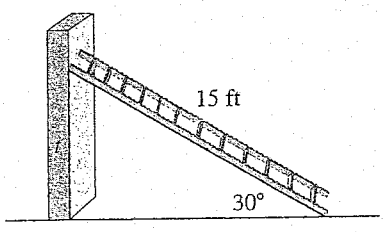


A. $x = (140 \text{ ft}) \times \sin 37°$
B. $x = (140 \text{ ft}) \times \cos 37°$
C. $x = (140 \text{ ft}) \times \sec 37°$
D. $x = (140 \text{ ft}) \times \csc 37°$
E. $x = (140 \text{ ft}) \times \tan 37°$

4. $(\cos^2 \theta + \sin^2 \theta) \times \frac{\sin \theta}{\cos \theta}$ is equivalent to which of the following?

F. $\sec \theta$
G. $\cot \theta$
H. $\cos \theta$
J. $\sin \theta$
K. $\tan \theta$

5. A 15-foot ladder is laid against a wall forming a 30° angle with the ground. How high up does the ladder touch the wall?



A. 5 feet
B. 7.5 feet
C. 9 feet
D. 12 feet
E. 13.5 feet