**DATE:** _____

**Unit 5 (Chapter 4): Trigonometric Functions** **Pre-Calculus**

# 4.8 Solving Problems with Trig

Target 5D: Evaluate inverse and composite trigonometric functions and expressions using the unit circle

*Review of Prior Concepts*

If $\sin a = \frac{7}{8}$, what is the value of $\cos a$?

## More Practice

**Trigonometry**

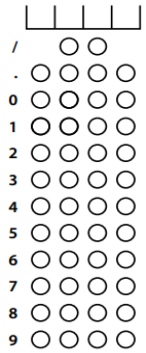
https://www.khanacademy.org/math/trigonometry/trigonometry-right-triangles
http://www.mathsisfun.com/algebra/trigonometry.html
http://www.mathgoodies.com/lessons/vol2/circumference.html
https://www.youtube.com/watch?v=SqFQZWRALGc
https://www.youtube.com/watch?v=Jsiy4TxgIME

## SAT Connection

**Passport to Advanced Math**

**14.** Use structure to isolate or identify a quantity of interest in an expression

Example: In triangle $ABC$, the measure of $\angle B$ is 90°, $BC = 16$, and $AC = 20$. Triangle $DEF$ is similar to triangle $ABC$, where vertices $D$, $E$, and $F$ correspond to vertices $A$, $B$, and $C$, respectively, and each side of triangle $DEF$ is $\frac{1}{3}$ the length of the corresponding side of triangle $ABC$. What is the value of $\sin F$ ?




**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

Solution

## Terminology

**Angle of elevation** (measure with respect to a horizontal line):

**Angle of depression** (measure with respect to a horizontal line):

**Navigational angle** (measure with respect to north, positive direction is clockwise):

**Surveying, bearing angle** (the acute angle at which the direction varies to the east or west from the north-south line):

## Examples

**1)** From a point 384 ft in a horizontal line from the base of a building, the angle of elevation to the top of the building is 36°. How tall is the building?

**2)** A certain piece of land is in the shape of a right triangle. The longest side is 842 meters and bears S36°W. If one of the sides runs north-south, how long is the side that runs east-west?

**3)** A piece of land slopes at an angle of 3° and runs for 280 ft in the direction of the slope. In order to level the land, a retaining wall is to be built at the lower end of the property so that fill-dirt can level the property. How high must the wall be?

**4)** p.394 #14


While hiking on a level path toward Colorado's Front Range, Otis Evans determines that the angle of elevation to the top of Long's Peak is 30°. Moving 1000 ft closer to the mountain, Otis determines the angle of elevation to be 35°. How much higher is the top of Long's Peak than Otis' elevation?

**5)** p. 395 #18


The *Cerrito Lindo* travels at a speed of 40 knots from Fort Lauderdale on a course of 65° for 2 hours and then changes to a course of 155° for 4 hours. Determine the distance and the bearing from Fort Lauderdale to the boat.

**More Practice**

**Trigonometric Ratios**

http://www.themathpage.com/atrig/solve-right-triangles.htm
http://www.mathguide.com/lessons/RightTriTrig.html
https://www.youtube.com/watch?v=l5VbdqRjTXc

**Homework Assignment**

p.393 #3,6,10,13,15
p.394 #16,17,23,25

## SAT Connection

### Solution

**The correct answer is $\frac{3}{5}$ or .6.** Triangle $ABC$ is a right triangle with its right angle at $B$. Thus, $\overline{AC}$ is the hypotenuse of right triangle $ABC$, and $\overline{AB}$ and $\overline{BC}$ are the legs of right triangle $ABC$. By the Pythagorean theorem, $AB = \sqrt{20^2 - 16^2} = \sqrt{400 - 256} = \sqrt{144} = 12$. Since triangle $DEF$ is similar to triangle $ABC$, with vertex $F$ corresponding to vertex $C$, the measure of angle $F$ equals the measure of angle $C$. Thus, $\sin F = \sin C$. From the side lengths of triangle $ABC$, $\sin C = \frac{\text{opposite side}}{\text{hypotenuse}} = \frac{AB}{AC} = \frac{12}{20} = \frac{3}{5}$. Therefore, $\sin F = \frac{3}{5}$. Either $\frac{3}{5}$ or its decimal equivalent, .6, may be gridded as the correct answer.

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