Objective

Students will be able to discover special right triangles.

Special Right Triangles Activity

Measure the length of the side of your given square. Find the length of the diagonal of your square (NO decimals). Record your findings in your notebook.

Switch squares with someone near you who has a different side length. Repeat process for at least 3 squares and come up with a conclusion about the right triangles formed by the diagonal (what are the angles of the triangles formed and come up with a conclusion about its sides).

Special Right Triangles Activity

Measure the length of the side of your given equilateral triangle. Find the length of the altitude of your equilateral triangle (NO decimals). Record your findings in your notebook.

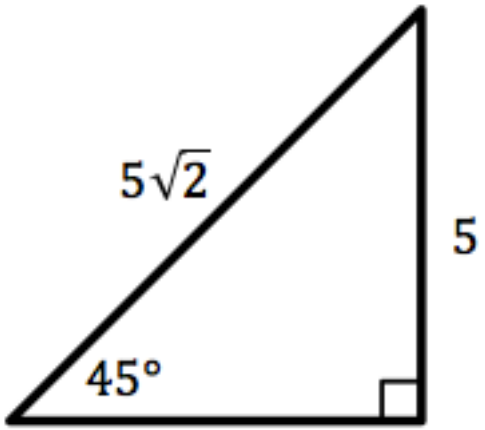
Switch triangles with someone near you who has a different side length. Repeat process for at least 3 triangles and come up with a conclusion about the right triangles formed by the altitude (what are the angles of the triangles formed and come up with a conclusion about its sides).

Objective

Students will be able to apply special right triangles.

Use the Pythagorean Theorem to find the missing sides.

1)



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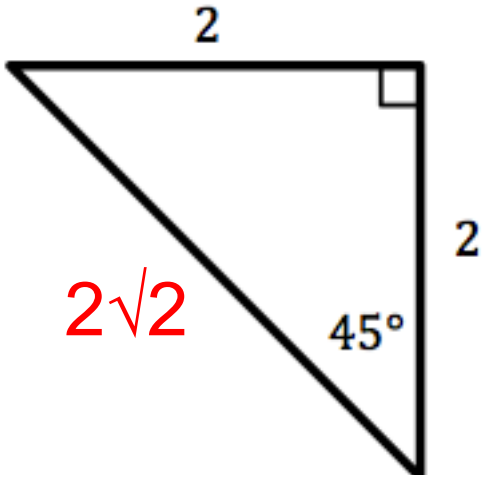
2)



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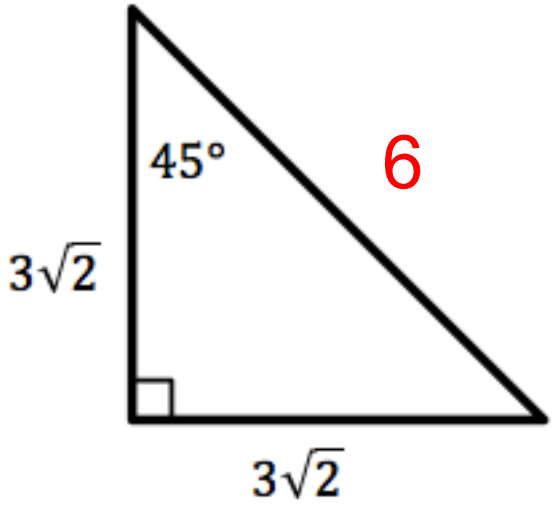

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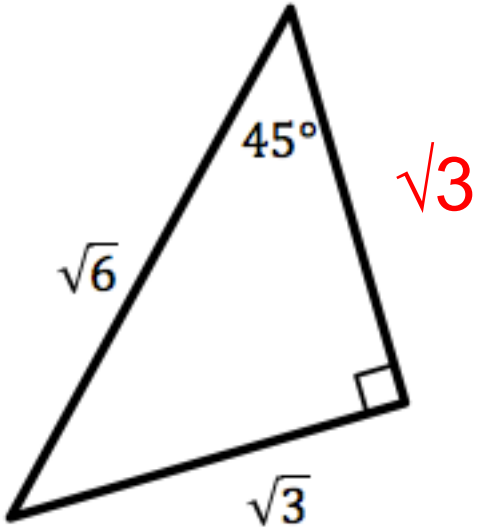


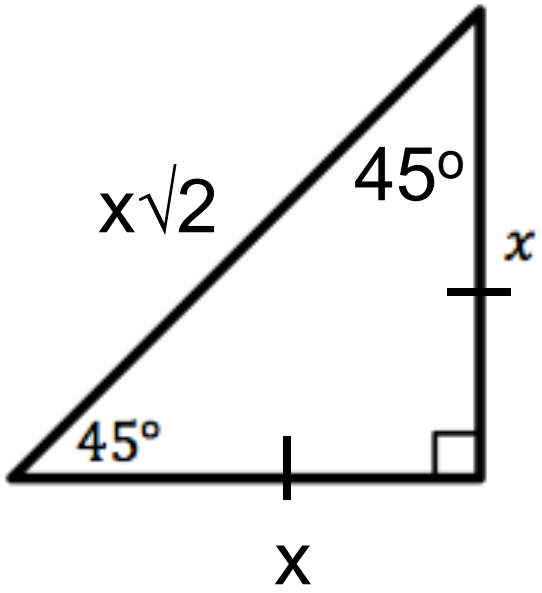
45°-45°-90° Triangles

$x^2 + x^2 = c^2$

$2x^2 = c^2$

$\sqrt{(2x^2)} = \sqrt{(c^2)}$

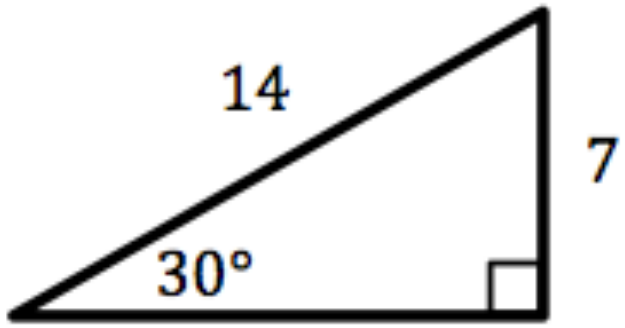
$x\sqrt{2} = c$



<u>45°-45°-90° Triangle Theorem</u>: In a triangle whose angles have the measures 45, 45, and 90, the lengths of the sides opposite these angles can be represented by x, x, and $x\sqrt{2}$, respectively.

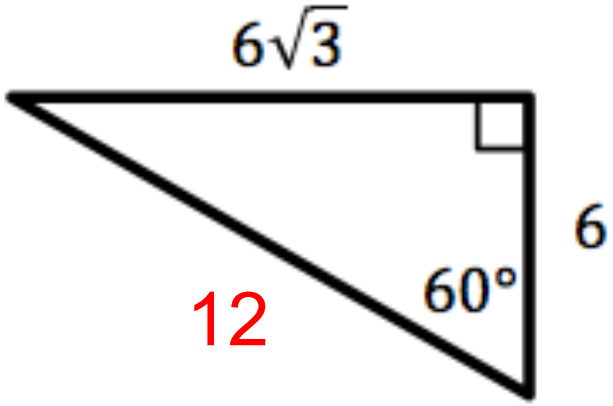
Use the Pythagorean Theorem to find the missing sides.

1)

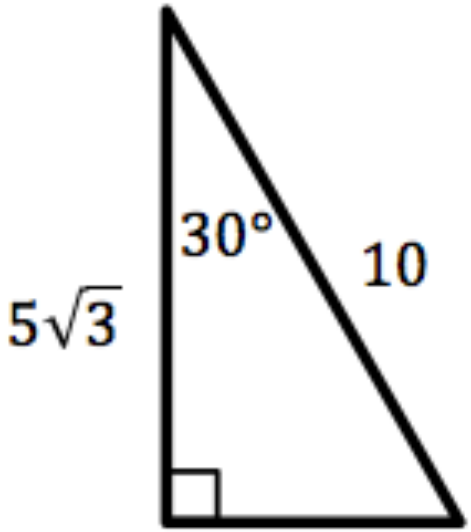


$7\sqrt{3}$

2)

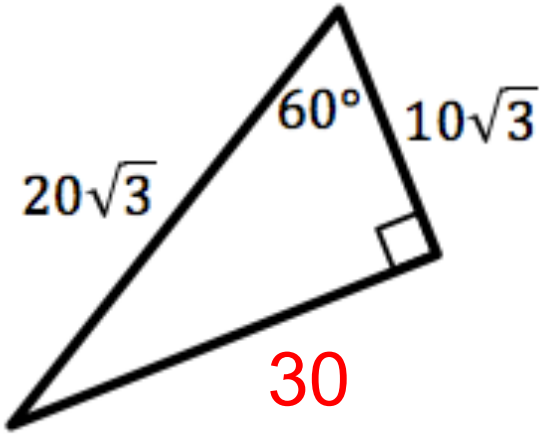


3)



5

4)



30^o-60^o-90^o Triangles

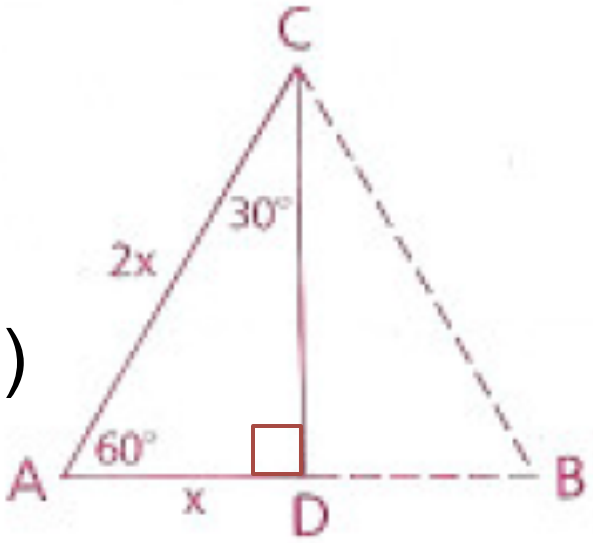
$x^2 + b^2 = (2x)^2$

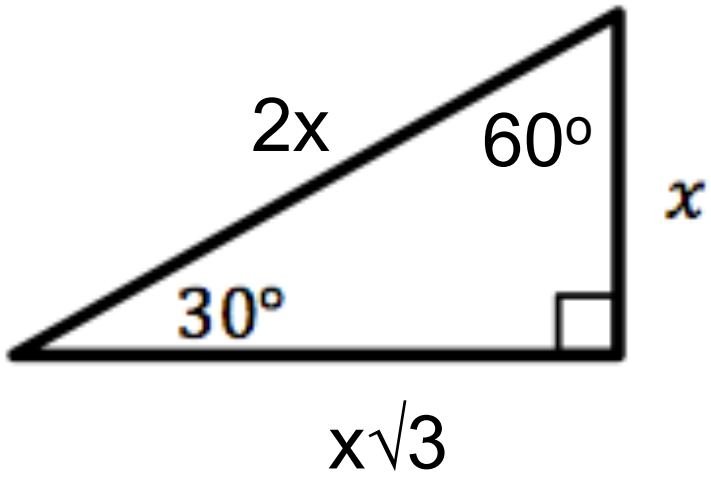
$x^2 + b^2 = 4x^2$

$b^2 = 3x^2$

$\sqrt{(b^2)} = \sqrt{(3x^2)}$

$b = x\sqrt{3}$



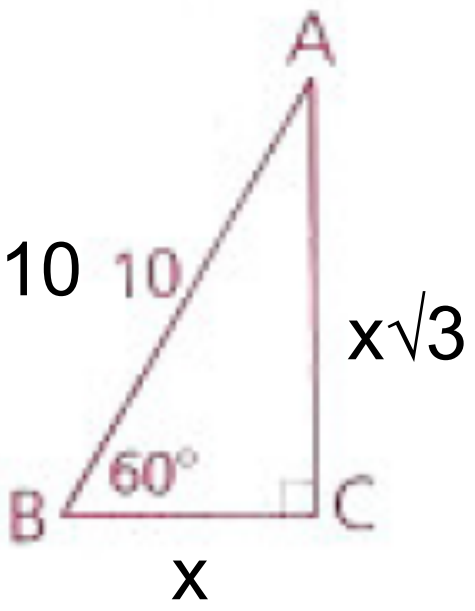


<u>30^o-60^o-90^o Triangle Theorem</u>: In a triangle whose angles have the measures 30, 60, and 90, the lengths of the sides opposite these angles can be represented by x, $x\sqrt{3}$, and 2x, respectively.

Solve for the missing sides of the triangles.

**Hint: Use what you know about the special right triangles to help you solve

1)

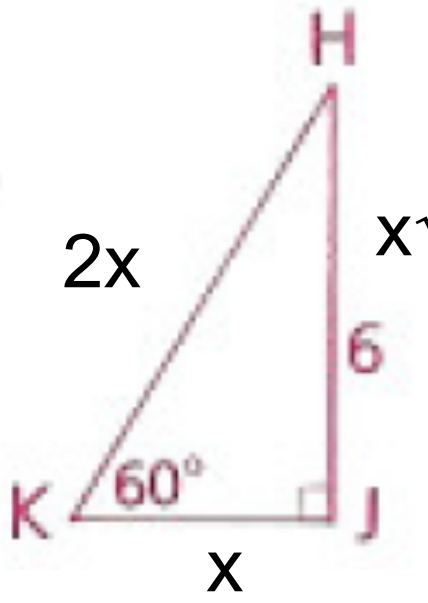


2x = 10

x = 5 so BC = 5
and AC = 5√3

**Rationalize denominator

2)

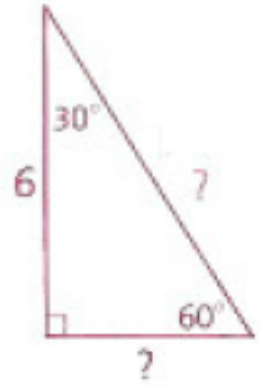


x = 2√3 so KJ = 2√3
and HK = 4√3

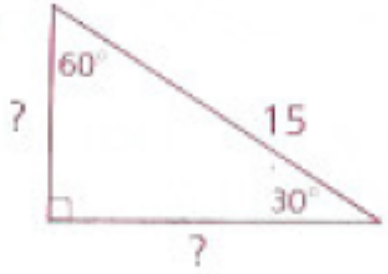
Homework p. 408: 2, 4, 8, 19, 22

2 Find the two missing sides of each triangle. (Hint: These are a bit harder, and you may want to put x, $x\sqrt{3}$, and 2x on the proper sides as shown in the sample problems.)

a

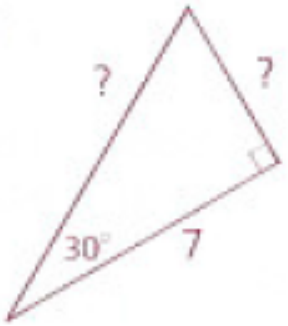


b



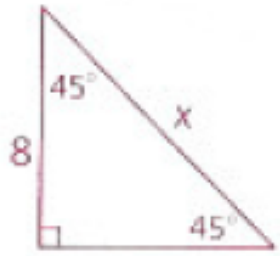
c

d

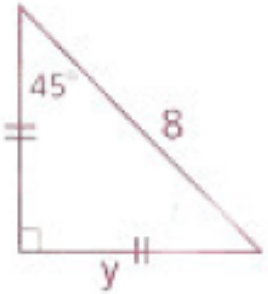


4 Solve for the variable in each of these 45°-45°-90° triangles.

a

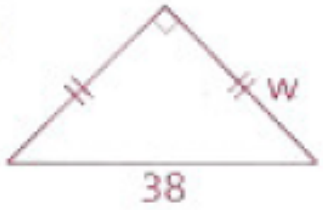


b



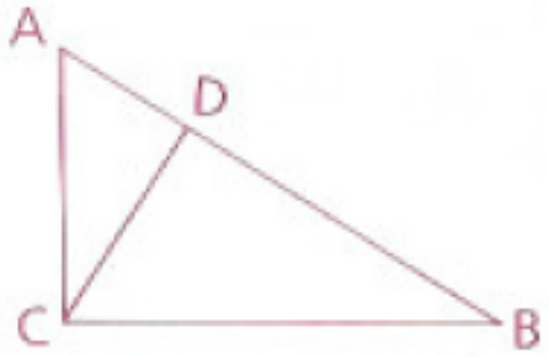
c

d

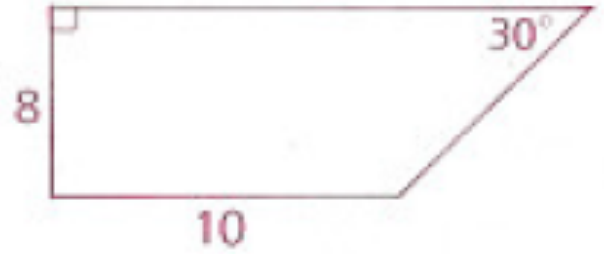


8 Given: $\overline{AC} \perp \overline{BC}$, $\overline{CD} \perp \overline{AB}$, $\angle B = 30°$, $BC = 8\sqrt{3}$

Find: CD



19 Find, to the nearest tenth, the perimeter of the trapezoid.



22 Find the altitude to the base of the isosceles triangle shown.

Objective

Students will be able to understand the three basic trigonometric relationships.

Make sure you have a calculator tomorrow!

Similarity and Trigonometric Ratios Test on Monday, 3/13

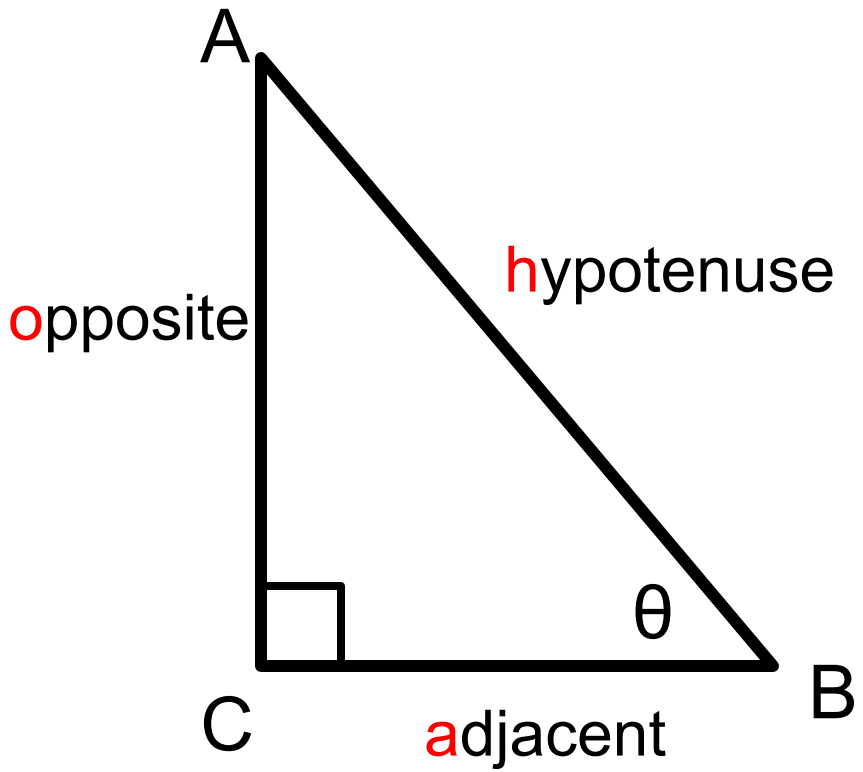
Three Trigonometric Ratios-

sine, cosine, and tangent

$$\sin\theta = \frac{opposite}{hypotenuse}$$ SOH

$$\cos\theta = \frac{adjacent}{hypotenuse}$$ CAH

$$\tan\theta = \frac{opposite}{adjacent}$$ TOA



SOH-CAH-TOA

**only for right triangles

Find the Three Trig Functions of θ and ∠B

$\sin\theta$

7/25

$\sin\angle B$

24/25

$\cos\theta$

24/25

$\cos\angle B$

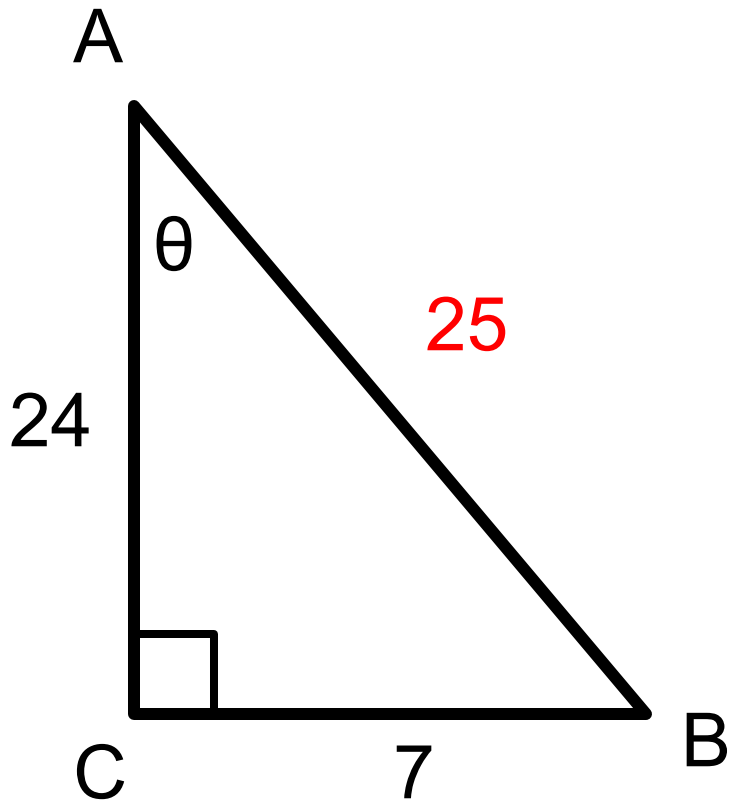
7/25

$\tan\theta$

7/24

$\tan\angle B$

24/7



Find the Three Trig Functions of ∠A and ∠B

$\sin\angle A = \frac{4}{8} = \frac{1}{2}$

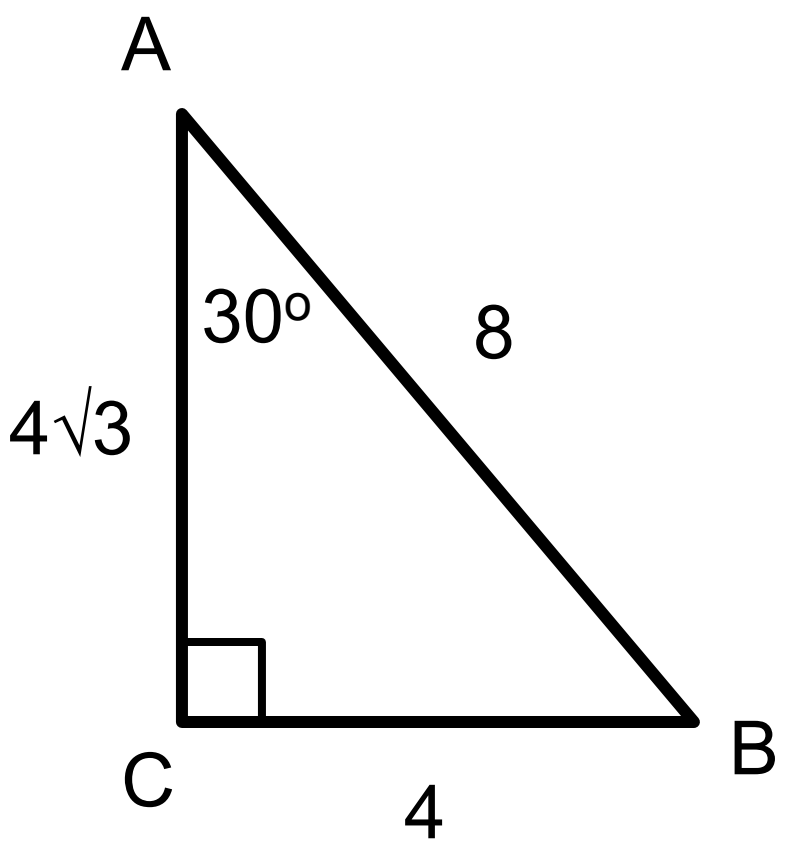
$\sin\angle B = \frac{4\sqrt{3}}{8} = \frac{\sqrt{3}}{2}$

$\cos\angle A = \frac{4\sqrt{3}}{8} = \frac{\sqrt{3}}{2}$

$\cos\angle B = \frac{4}{8} = \frac{1}{2}$

$\tan\angle A = \frac{4}{4\sqrt{3}} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

$\tan\angle B = \frac{4\sqrt{3}}{4} = \sqrt{3}$



Unit Circle

Looking back at your unit circle and thinking about trigonometry, how are the points written?

$$(x, y) = (\cos\theta, \sin\theta)$$

Homework p. 420: 2, 6, 7, 9, 13

2 Find each ratio.

a sin 30°

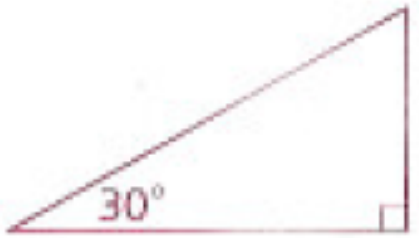
b cos 30°

c tan 30°

d sin 60°

e cos 60°

f tan 60°



6 Using the figure as marked, name each missing angle.

a $\frac{5}{12} = \tan \angle \underline{\quad ? \quad}$

b $\frac{12}{13} = \cos \angle \underline{\quad ? \quad}$

c $\frac{5}{13} = \sin \angle \underline{\quad ? \quad}$

7 Find each quantity.

a BC

b sin ∠A

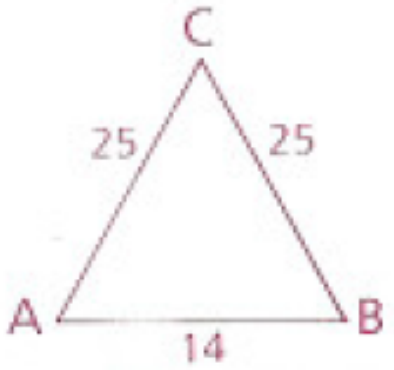
c tan ∠B

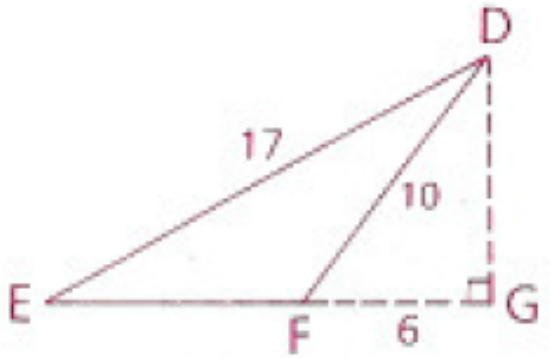
9 Using the given figures, find

a $\cos \angle A$

b $\sin \angle E$

c $\sin \angle DFG$

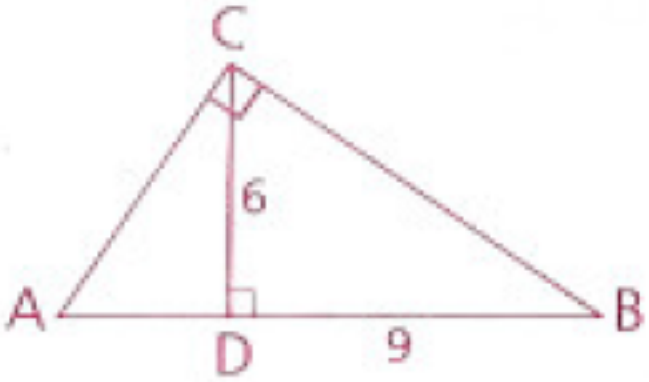




13 Using the figure, find

a $\tan \angle ACD$

b $\sin \angle A$



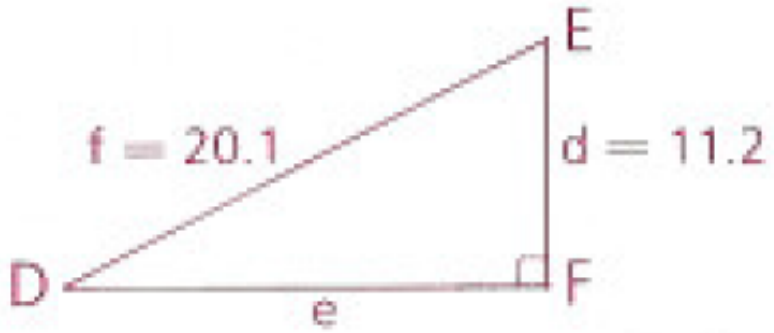
Objective

Students will be able to use trigonometric ratios to solve right triangles.

Similarity and Trigonometric Ratios Test on Monday, 3/13

What is the date on Tuesday?

**The three basic trigonometry functions are on your calculators, if you need to find an angle measure, then you need to use the inverse of the function. BE CAREFUL WITH ROUNDING EARLY.



1) Find *e* to the nearest tenth

$$16.7 \approx e$$

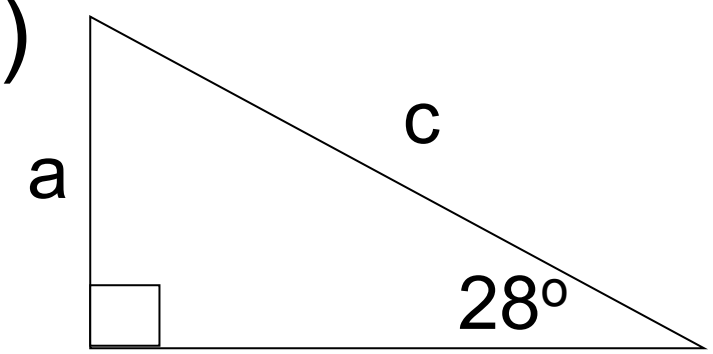
2) Find m∠D to the nearest degree

$$\sin\angle D = \frac{11.2}{20.1} \approx 0.5572 \qquad \sin^{-1}(0.5572) \approx 34$$

m∠D ≈ 34°

Find all angles and sides of the triangle.

1)



$\tan 28^\circ = \frac{a}{15}$ $\cos 28^\circ = \frac{15}{c}$

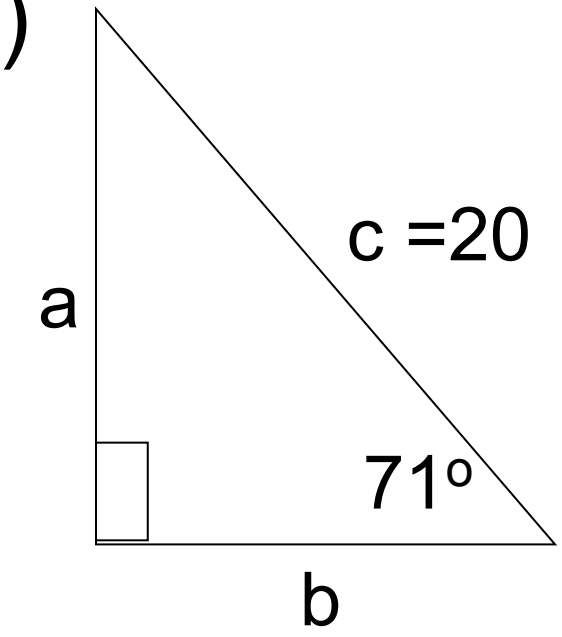
$a = 15\tan 28^\circ$ $c\cos 28^\circ = 15$

$a \approx 7.98$ $c = \frac{15}{\cos 28^\circ}$

B = 180° – 90° – 28° $c \approx 16.99$

B = 62°

2)



$\sin 71^\circ = \frac{a}{20}$ $\cos 71^\circ = \frac{b}{20}$

$a = 20\sin 71^\circ$ $b = 20\cos 71^\circ$

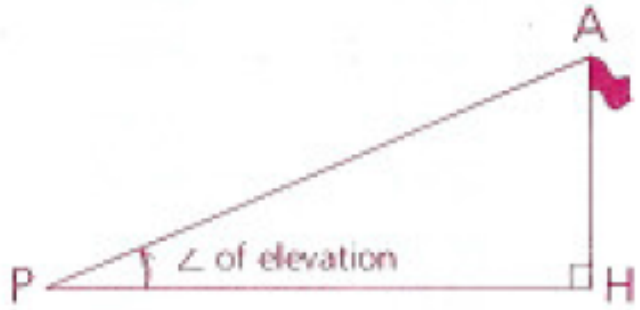
$a \approx 18.9$ $b \approx 6.51$

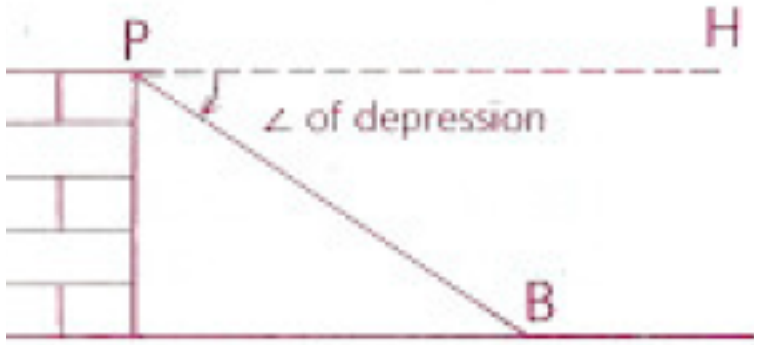
B = 180° – 90° – 71°

B = 19°

Angle of Elevation and Angle of Depression

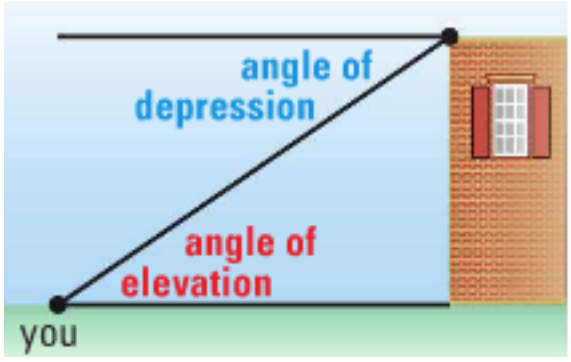
If an observer at a point P looks upward toward an object at A, the angle the line of sight $\overrightarrow{PA}$ makes with the horizontal $\overrightarrow{PH}$ is called the <u>angle of elevation</u>.



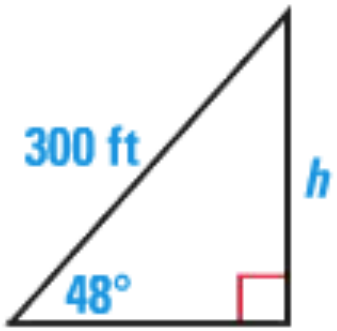


If an observer at a point P looks downward toward an object at B, the angle the line of sight $\overrightarrow{PB}$ makes with the horizontal $\overrightarrow{PH}$ is called the <u>angle of depression</u>.

**Do not forget that the angle of elevation or depression is an angle between a line of sight and the horizontal. Do not use the vertical.



A parasailer is attached to a boat with a rope 300 feet long. The angle of elevation from the boat to the parasailer is 48°. Estimate the parasailer's height above the boat.



$$\sin 48^\circ = \frac{h}{300}$$

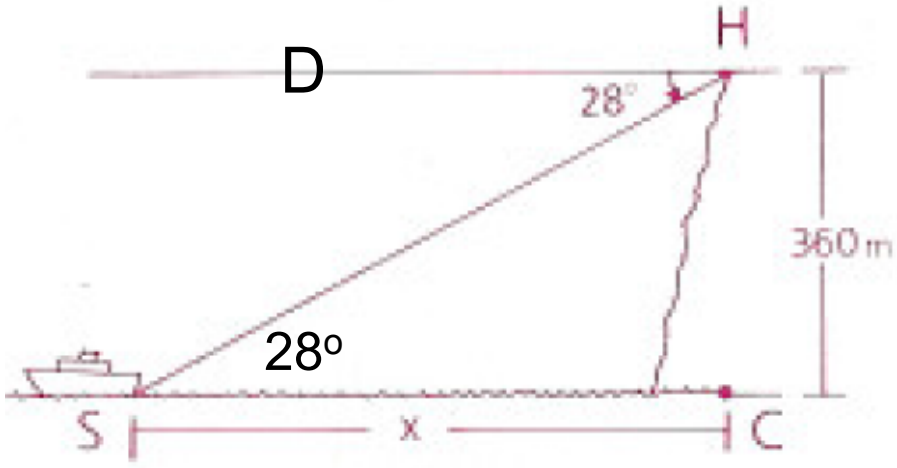
$$h = 300 \sin 48^\circ$$

$$h \approx 223$$

the parasailer is about 223 feet above the boat

To an observer on a cliff 360 m above sea level, the angle of depression of a ship is 28°. What is the horizontal distance between the ship and the observer?

**draw a diagram



∠CSH = 28° b/c
∠CSH ≅ ∠SHD
(alt. int. ∠s)

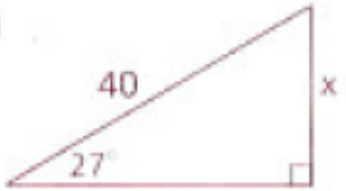
$$\tan 28^\circ = \frac{360}{x} \qquad 0.5317 = \frac{360}{x} \qquad x \approx 677$$

The horizontal distance is about 677 m.

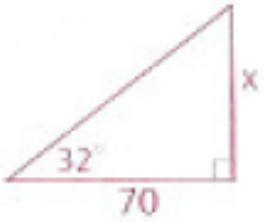
Homework p. 425: 4, 6, 7, 10, 15

4 In each case, find x to the nearest integer.

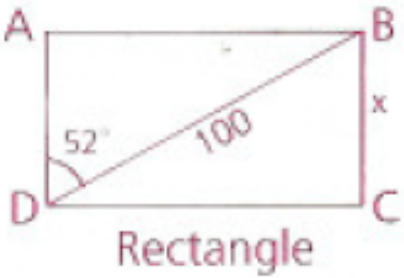
a



b

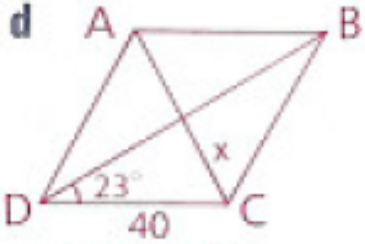


c



Rectangle

d



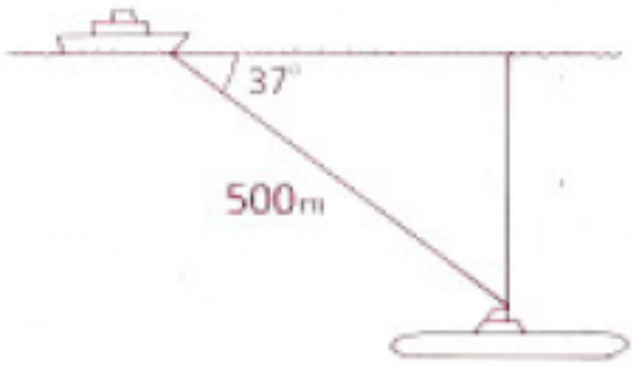
Rhombus

6 Solve each equation for x to the nearest integer.

a $\sin 25° = \frac{x}{40}$ **b** $\cos 73° = \frac{35}{x}$ **c** $\sin x° = \frac{29}{30}$

7 A department-store escalator is 80 ft long. If it rises 32 ft vertically, find the angle it makes with the floor.

10 A sonar operator on a cruiser detects a submarine at a distance of 500 m and an angle of depression of 37°. How deep is the sub?



15 Two buildings are 100 dm apart across a street. A sunbather at point P finds the angle of elevation of the roof of the taller building to be 25° and the angle of depression of its base to be 30°. Find the height of the taller building to the nearest decimeter.