8.4

Date: 2/29/24

Objective: I can use special right triangle formulas to find angles, sides, and trig functions.

Review:

Simplify the following radicals.

1. $\frac{\sqrt{4}}{2\sqrt{64}} = \frac{2}{2 \cdot 8} = \frac{1}{8}$

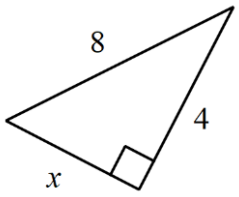
2. $\frac{\sqrt{5}}{\sqrt{16}} = \frac{\sqrt{5}}{4}$

3. $\frac{2\sqrt{15}}{\sqrt{5}} = 2\sqrt{3}$

$\frac{3}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{2}}{2}$

Review: Find the missing side. Leave answers in exact form or simplest radical form. (Use square roots, not decimals.)

1.



Pythag Thm

$8^2 - 4^2 = x^2$

$\sqrt{48} = \sqrt{x^2}$

$\sqrt{48}$

6 8

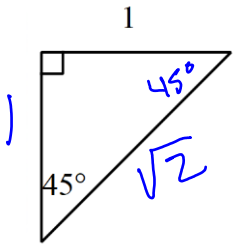
2 3 4 2

2

$4\sqrt{3}$

Find the missing sides of these isosceles triangles. Leave answers in simplest radical form. (Use square roots, not decimals.) Triangles are not drawn to scale. 2 same sides

1.

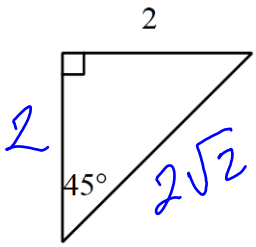


1 1 $\sqrt{2}$

$\sqrt{1^2+1^2}$

$\sqrt{2}$

2.

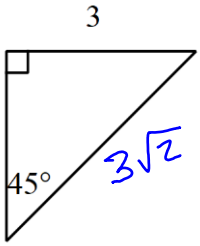


2 $2\sqrt{2}$

2^2+2^2

$\sqrt{8}$

3.

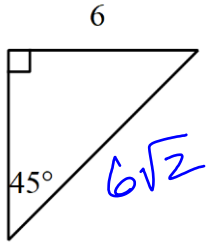


3 $3\sqrt{2}$

3^2+3^2

$\sqrt{18}$

4.

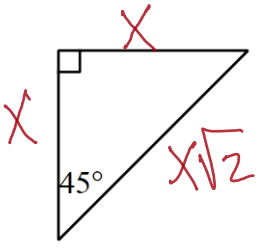


6 $6\sqrt{2}$

What pattern do you see? side times $\sqrt{2}$ = hyp

This pattern works for every isosceles right triangle or $45° - 45° - 90°$ triangles. So we can use this pattern to find the missing sides without needing to show work.

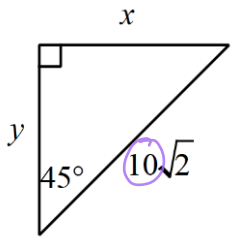
PATTERN for $45° - 45° - 90°$ special right triangles: X = leg



memorize

Use the pattern for $45° - 45° - 90°$ special right triangles to find the missing sides. Leave answers in simplest radical form.

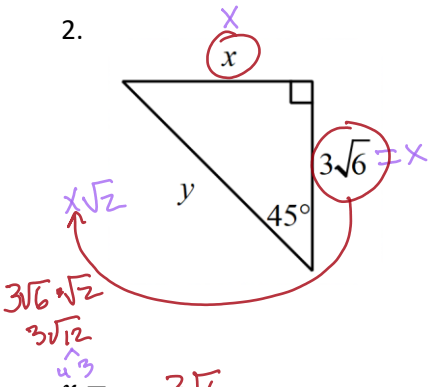
1.



$x =$ 10

$y =$ 10

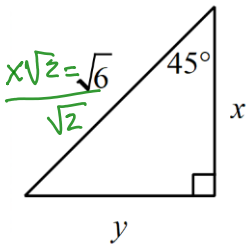
2.



$x =$ $3\sqrt{6}$

$y =$ $6\sqrt{3}$

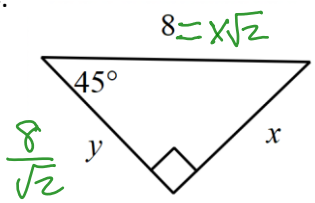
3.



$x =$ $\sqrt{3}$

$y =$ $\sqrt{3}$

4.

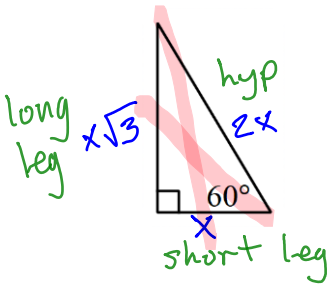


$x =$ $\frac{8}{\sqrt{2}} = 4\sqrt{2}$

$y =$ $\frac{8}{\sqrt{2}} = 4\sqrt{2}$

There is another right triangle that has a pattern. It is a $30° - 60° - 90°$ triangle.

PATTERN for $30° - 60° - 90°$ special right triangles:



NOTICE: Long leg is across from 60°

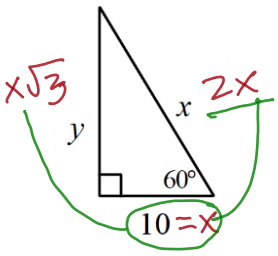
Short leg is across from 30°

memorize

Legs "hold up " the 90° angle

Use the pattern for $30° - 60° - 90°$ special right triangles to find the missing sides. Leave answers in simplest radical form.

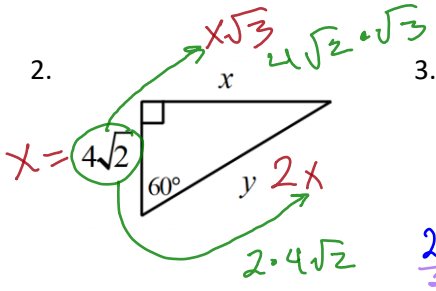
1.



$x =$ 20

$y =$ $10\sqrt{3}$

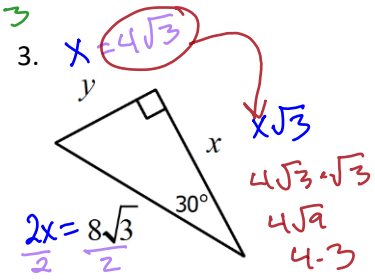
2.



$x =$ $4\sqrt{6}$

$y =$ $8\sqrt{2}$

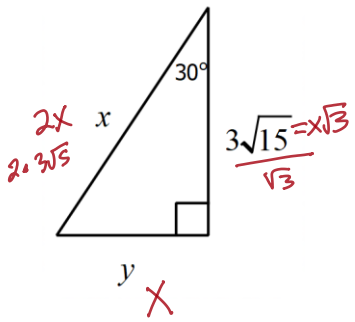
3.



$x =$ 12

$y =$ $4\sqrt{3}$

4.

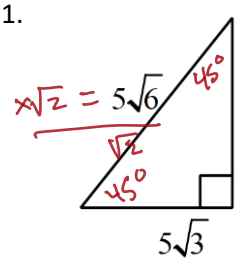


$x =$ $6\sqrt{5}$

$y =$ $3\sqrt{5}$

Given the sides of the right triangle, decide which type of special right triangle it is, ($30° - 60° - 90°$ or $45° - 45° - 90°$). Then write the degree measures of the missing 2 angles in the correct spot. **Triangles are not drawn to scale.**

1.



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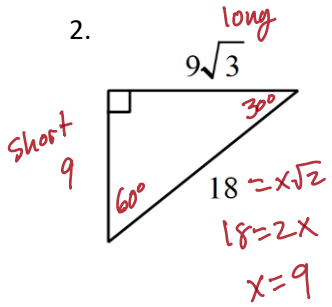

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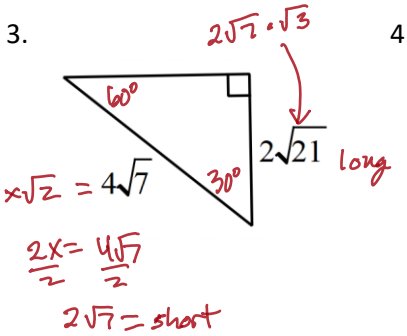
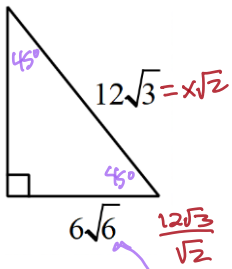


4.



Now we are going to use special right triangle rules to find the trig function of an angle in standard position.

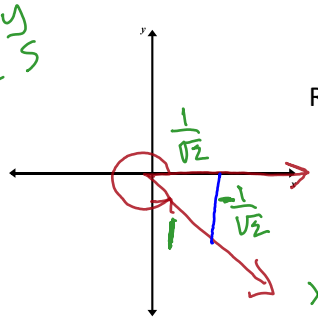
$\frac{\pi}{6} = 30°$ $\frac{\pi}{4} = 45°$ $\frac{\pi}{3} = 60° = $ ref $\angle$

STEPS

1. Draw the angle
2. Draw the reference angle. This makes a right acute triangle.
3. Figure out which special right triangle it is and what all the angles are
4. Pick any number for the hypotenuse $h = 1$
5. Use the rules for the special right triangle to find the other missing sides
6. Use SOH - CAH - TOA to find the answer, leave answer in simplest radical form

EXAMPLE: Find the values of all ~~six~~ 3 trigonometric functions of angle $315°$ hyp = pos

x y
c s



Reference angle: $45°$

a) $\sin 315° = -\frac{1}{\sqrt{2}}$ $x\sqrt{2} = 1$

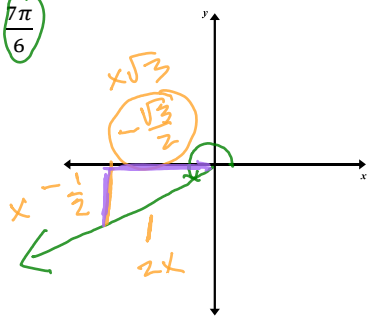
b) $\cos 315° = \frac{1}{\sqrt{2}}$

c) $\tan 315° = -1$ $\frac{-\frac{1}{\sqrt{2}}}{\frac{1}{\sqrt{2}}}$

EXAMPLE: Draw a reference triangle for the given angle. Pick a number for the hypotenuse. Decide which type of special triangle it is and use the rules to find the missing sides. Give the exact value of each trig function without using a calculator.

$\frac{\pi}{6} = 30°$

1. $\cos\frac{7\pi}{6}$

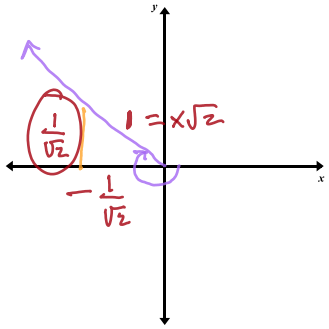


Reference angle: $\frac{\pi}{6}$

$\cos\frac{7\pi}{6} = -\frac{\sqrt{3}}{2}$

$2x = 1$ $\frac{1}{2}\sqrt{3} = \frac{1}{2} \cdot \frac{\sqrt{3}}{1}$

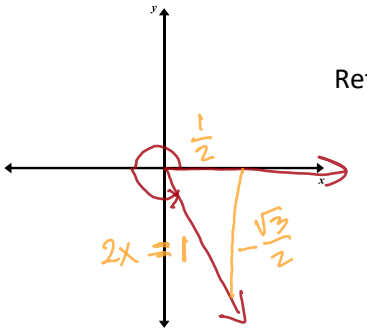
2. $\sin -225°$



Reference angle: $45°$

$\sin -225° = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

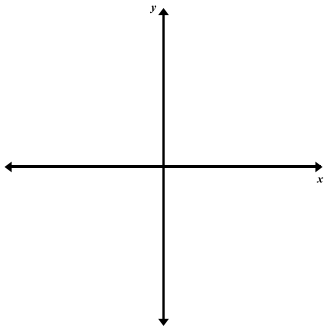
3. $\tan\frac{5\pi}{3}$



Reference angle: $\frac{\pi}{3}$

$\tan\frac{5\pi}{3} =$ $-\sqrt{3}$

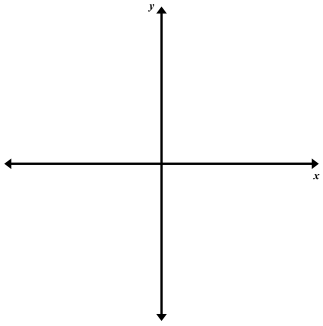
4. $\csc 60°$



Reference angle:

$\csc 60° =$

5. $\sec\frac{7\pi}{4}$



Reference angle:

$\sec\frac{7\pi}{4} =$