5-3 Special Right Triangles

$\sqrt{x^2} = x$

$\sqrt{2^2} = 2$

$\sqrt{10}^2 = 10$

$\sqrt{\star}^2 = \star$

$(xy)^2$

$x^2 y^2$

Task
Discovering Special Right Triangles

$a^2 + b^2 = c^2$

legs

hyp

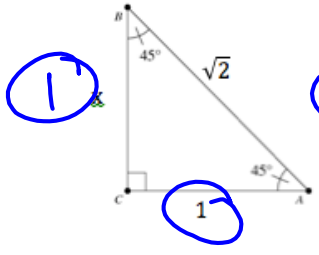
$(3\sqrt{2})^2$

$3^2 \cdot \sqrt{2}^2$

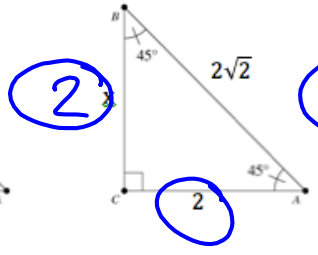
$9 \cdot 2 = 18$

Use the Pythagorean Theorem to find the missing side length of each 45-45-90 degree triangle. **Once you see a pattern use it.**

1.




1

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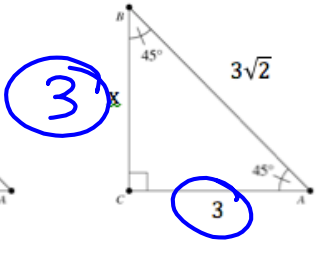
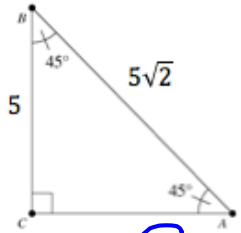



3

#2

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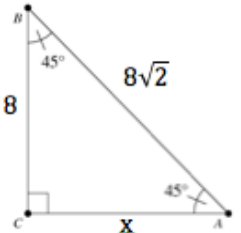


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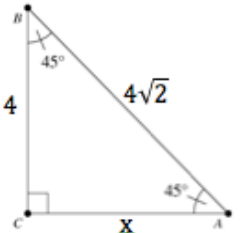
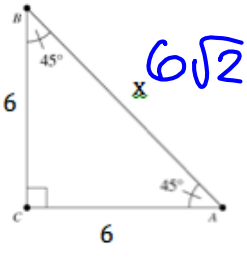
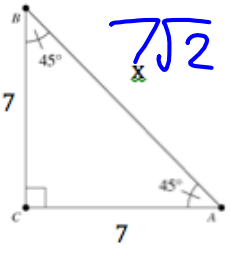



4

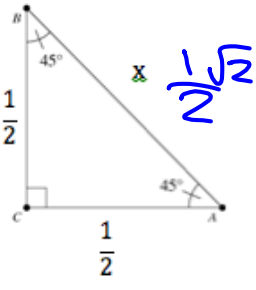
#3




$6\sqrt{2}$

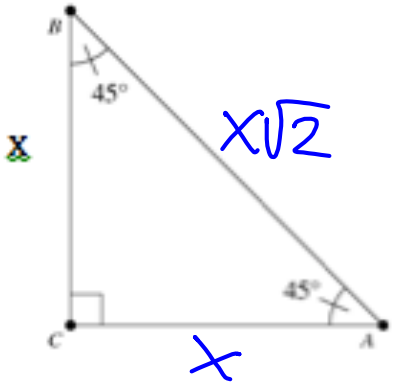



$7\sqrt{2}$



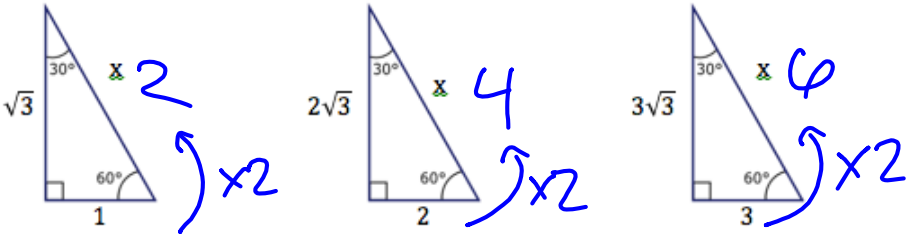

$\frac{1}{2}\sqrt{2}$

#4 Label the sides of the triangle.

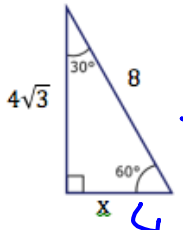



Use the Pythagorean Theorem to find the missing side length of each 30-60-90 degree triangle.

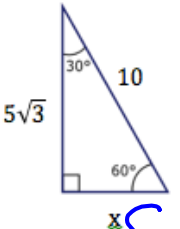
#5



#6




4 ÷2

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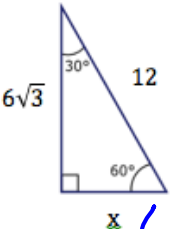
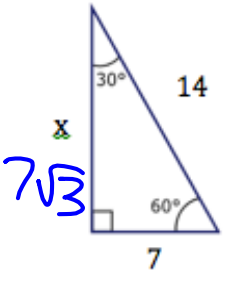
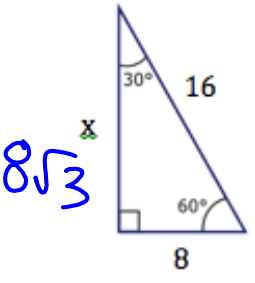



6

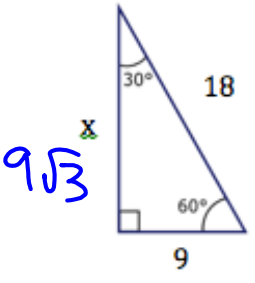
#7




$7\sqrt{3}$

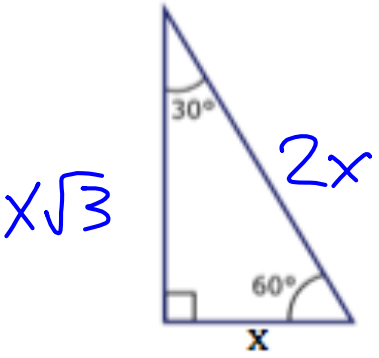



$8\sqrt{3}$

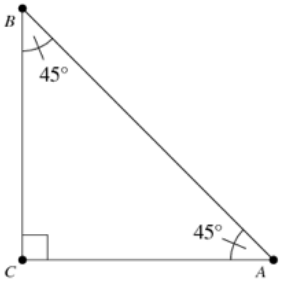


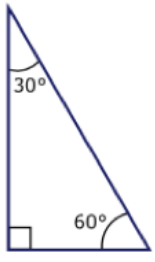

$9\sqrt{3}$

#8

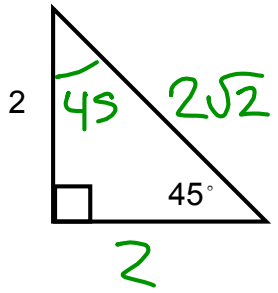



Write both triangles in terms of x.



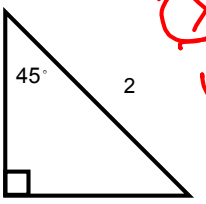



Use the patterns you discovered to find the missing side lengths of each special right triangle.




$2\sqrt{2}$

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

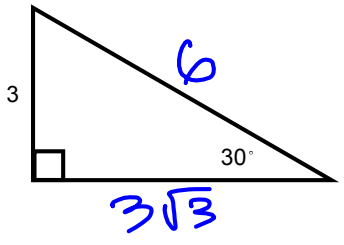



$\frac{2}{\sqrt{2}}$

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

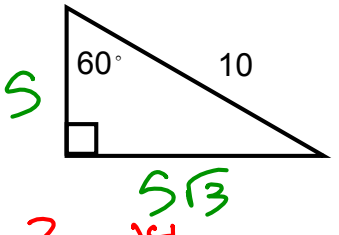
$X = \frac{2}{\sqrt{2}}$

Use the patterns you discovered to find the missing side lengths of each special right triangle.




6

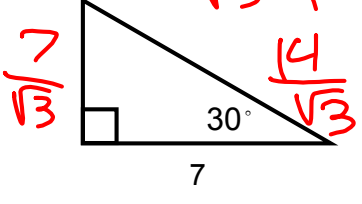
$3\sqrt{3}$




5

$5\sqrt{3}$

$\frac{7}{\sqrt{3}} \cdot \frac{2}{1} = \frac{14}{\sqrt{3}}$



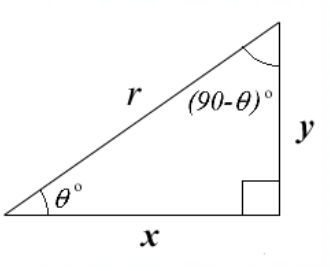

$\frac{7}{\sqrt{3}}$

$\frac{14}{\sqrt{3}}$

$\frac{X\sqrt{3}}{\sqrt{3}} = \frac{7}{\sqrt{3}}$

$X = \frac{7}{\sqrt{3}}$

Trigonometric Relationship of Complimentary Angles



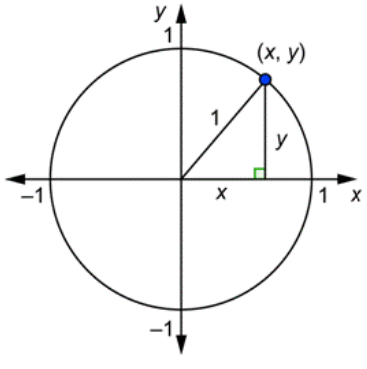

$\sin\theta =$

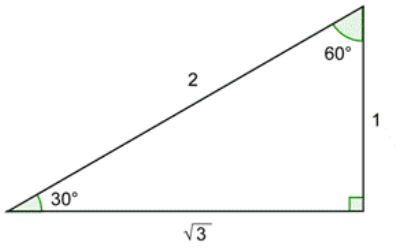
$\cos\theta =$

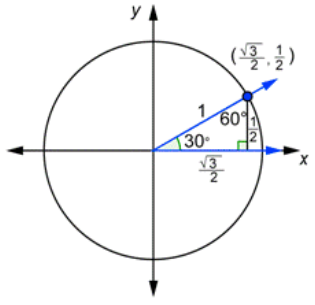
$\sin(90-\theta) =$

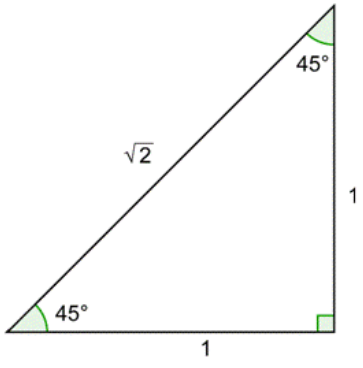
$\cos(90-\theta) =$

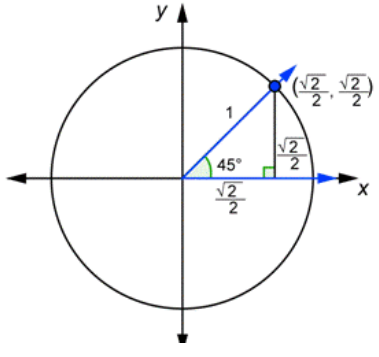
Creating the "Unit Circle" with Special Right Triangles
(Quadrant I only)



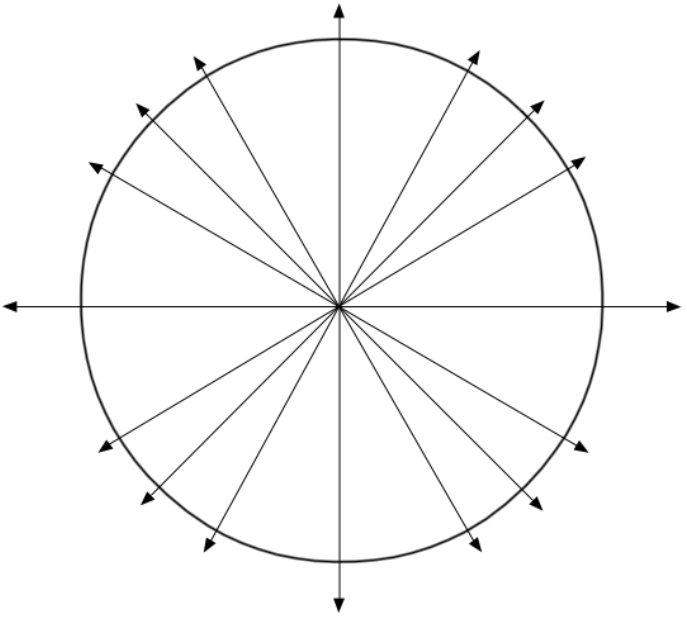

60°
2
1
30°
$\sqrt{3}$


y
$(\frac{\sqrt{3}}{2}, \frac{1}{2})$
1
60°
$\frac{1}{2}$
30°
x
$\frac{\sqrt{3}}{2}$


45°
$\sqrt{2}$
1
45°
1


y
$(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
1
$\frac{\sqrt{2}}{2}$
45°
x
$\frac{\sqrt{2}}{2}$

Use special right triangles to fill in the first quadrant of the unit circle



Evaluate the following trig functions

$\sin 30^\circ =$

$\cos 30^\circ =$

$\cos 90^\circ =$

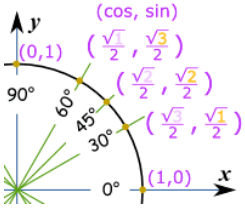
$\sin 45^\circ =$

$\tan 0^\circ =$

$\tan 45^\circ =$

Honors: $\csc 30^\circ =$

$\cot 45^\circ =$



For those who want to use this...

| | 0° | 30° | 45° | 60° | 90° |
|---|---|---|---|---|---|
| **sine** | 0 | 1 | 2 | 3 | 4 |
| **cosine** | 4 | 3 | 2 | 1 | 0 |

| | 0° | 30° | 45° | 60° | 90° |
|---|---|---|---|---|---|
| **sine** | $\frac{\sqrt{0}}{2}$ | $\frac{\sqrt{1}}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{\sqrt{3}}{2}$ | $\frac{\sqrt{4}}{2}$ |
| **cosine** | $\frac{\sqrt{4}}{2}$ | $\frac{\sqrt{3}}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{\sqrt{1}}{2}$ | $\frac{\sqrt{0}}{2}$ |

| | 0° | 30° | 45° | 60° | 90° |
|---|---|---|---|---|---|
| **sine** | 0 | $\frac{1}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{\sqrt{3}}{2}$ | 1 |
| **cosine** | 1 | $\frac{\sqrt{3}}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{1}{2}$ | 0 |