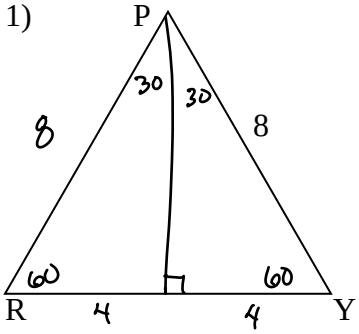
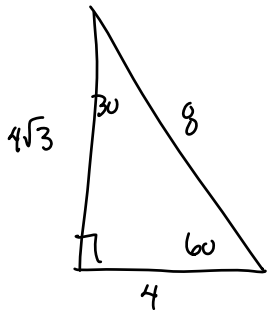
Geometry Special Right Triangles Exploration-Day 2 **Name**_____

Follow the instructions below for the next two examples.

- **In the given equilateral triangle, drop an altitude to the base.**
- **Label the six angle sizes.**
- **Recopy, off to the side or below, one of the two right triangles created.**
- **Find the missing lengths in simplified radical form (no decimals!).**

1)



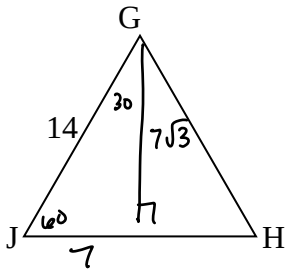


$x^2 + 4^2 = 8^2$

$x^2 = 48$

$x = 4\sqrt{3}$

2)



A. When an altitude is drawn in an equilateral triangle, two right triangles are created. Their angle sizes are:

30 - 60 - 90

B. Across from which angle is the shorter leg always located?

30°

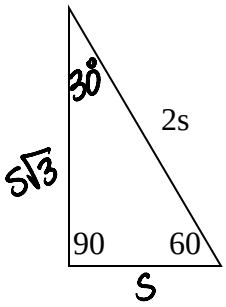
C. How is the size of the shorter leg related to the size of the hypotenuse?

1/2

D. How is the longer leg related to the shorter leg?

leg $\sqrt{3}$

E. Label the missing sides of the $30^\circ - 60^\circ - 90^\circ$ to the right.



F. If you know the size of the leg opposite the 30° angle, how do you calculate the hypotenuse?

double it

G. If you know the size of the leg opposite the 60° angle, how do you calculate:

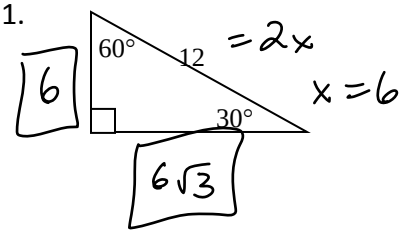
i. the leg opposite the 30?

ii. the hypotenuse?

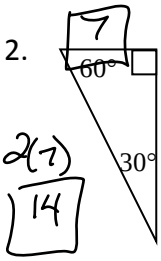
Summary: $30^\circ - 60^\circ - 90^\circ$

$s \quad s\sqrt{3} \quad 2s$

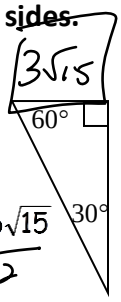
In each of the following triangles, find the lengths of the two remaining sides.

1. 

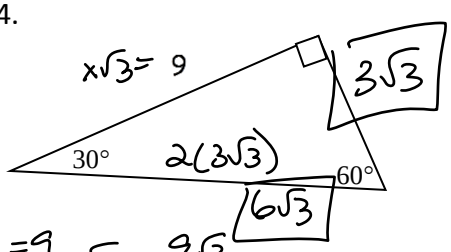
$=2x$
$x=6$

2. 

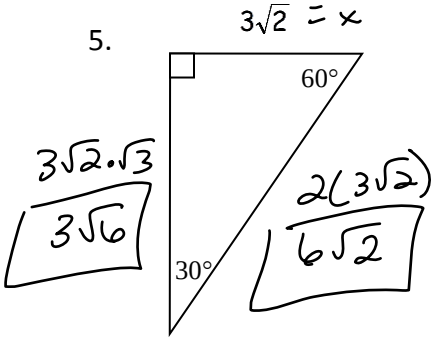
$2(7)$
14
$7\sqrt{3} = x\sqrt{3}$
$7 = x$

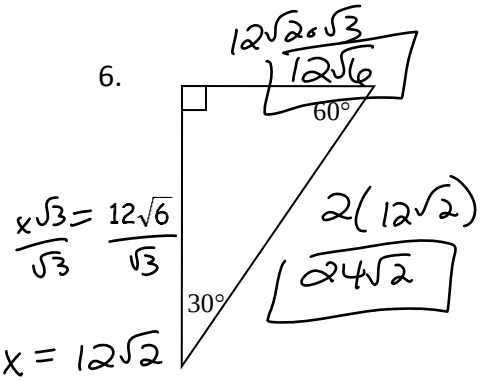
3. 

$\frac{2x}{2} = \frac{6\sqrt{15}}{2}$
$x = 3\sqrt{15}$
$3\sqrt{15}\cdot\sqrt{3}$
$3\sqrt{45}$
$3\sqrt{9}\cdot\sqrt{5}$
$3\cdot 3\sqrt{5}$
$9\sqrt{5}$

4. 

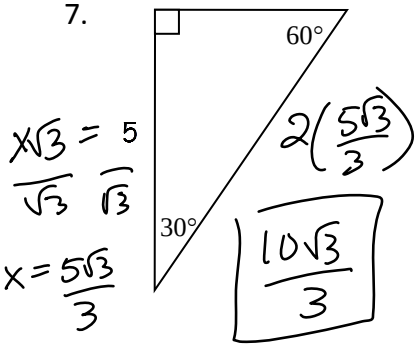
$\frac{x\sqrt{3}}{\sqrt{3}} = \frac{9}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{9\sqrt{3}}{3} = 3\sqrt{3}$

5. 

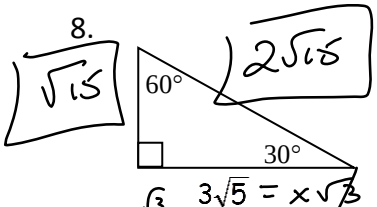
6. 

$\frac{x\sqrt{3}}{\sqrt{3}} = \frac{12\sqrt{6}}{\sqrt{3}}$
$x = 12\sqrt{2}$

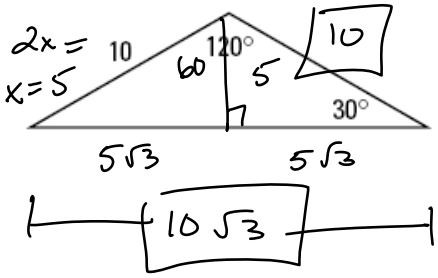
$\frac{5\sqrt{3}}{3}\cdot\sqrt{3} = \frac{5\cdot 3}{3} = 5$

7. 

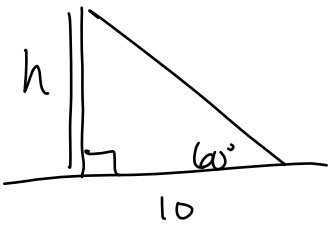
$\frac{x\sqrt{3}}{\sqrt{3}} = \frac{5}{\sqrt{3}}$
$x = \frac{5\sqrt{3}}{3}$

8. 

$\frac{\sqrt{3}}{\sqrt{3}} \cdot \frac{3\sqrt{5}}{\sqrt{3}} = \frac{x\sqrt{3}}{\sqrt{5}}$
$\frac{3\sqrt{15}}{3} = \sqrt{15}$

9. 

10. A guy wire needs to be attached to a telephone pole that is perpendicular to the ground. The guy wire will make a 60° angle with the ground. It will be anchored to the ground 10 feet from the base of the pole. How high up the pole with the guy wire be anchored?



$h = 10\sqrt{3}$ ft