Geo. **Simplifying Radicals** Name _____

Some things to remember about Square Roots;

~ *r* is a **square root** of a number '*s*' if $r^2 = s$

~ a positive number has 2 square roots:

ex/ $4^2 = 16$ $(-4)^2 = 16$ SO… the 2 square roots of 16 are $\sqrt{16} = 4$ and -4

VOCABULARY:

radical = $\sqrt{a}$ **radical sign** = $\sqrt{\ }$ **radicand** = the number under the radical sign

Properties of Square Roots

Product Property ~

Quotient Property ~

Use the properties to simplify square roots!

{keep asking…*"does the number under the radical sign have ANY perfect square factors?"*}

A square root is simplified if....

1. **No radicand has a *perfect-square* factor other than 1**

   perfect-squares are numbers with whole number square roots…list them

   (1), 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, …

2. **There is no radical in the denominator**

*Simplify the radical. Leave your answers in **SIMPLEST RADICAL form** (no decimals!!!)*

1) $\sqrt{54}$

$\sqrt{9}\sqrt{6}$

$3\sqrt{6}$

2) $\sqrt{72}$

$\sqrt{9}\sqrt{8}$

$3\sqrt{4}\sqrt{2}$

$3 \cdot 2\sqrt{2}$

$6\sqrt{2}$

OR $\sqrt{36}\sqrt{2}$

$6\sqrt{2}$

3) $\sqrt{48}$

$= \sqrt{16}\sqrt{3}$

$4\sqrt{3}$

4) $2\sqrt{90}$

$2 \cdot \sqrt{9}\sqrt{10}$

$2 \cdot 3\sqrt{10}$

$6\sqrt{10}$

5) $\frac{\sqrt{18}}{6\sqrt{8}} \frac{\sqrt{8}}{\sqrt{8}} = \frac{\sqrt{144}}{6 \cdot 8} = \frac{12}{48} = \frac{1}{4}$

6) $\frac{6\sqrt{12}}{\sqrt{4}} = \frac{6\sqrt{4}\sqrt{3}}{2} = 6\sqrt{3}$

Rationalizing the Denominator

Form of the Denominator	Multiply numerator and denominator by:
$\sqrt{b}$	$\sqrt{b}$

7) $\frac{\sqrt{5}}{\sqrt{3}}\frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{15}}{3}$

8) $\frac{\sqrt{5}}{\sqrt{2}}\frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{10}}{2}$

9) $\frac{8}{3\sqrt{12}}\quad \frac{8}{3\sqrt{4}\sqrt{3}} = \frac{8}{6\sqrt{3}}$

$\frac{4}{3\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}} = \frac{4\sqrt{3}}{9}$

10) $\frac{\sqrt{11}}{\sqrt{7}}\frac{\sqrt{7}}{\sqrt{7}} = \frac{\sqrt{77}}{7}$

11) $\frac{\sqrt{7}}{\sqrt{8}}\frac{\sqrt{8}}{\sqrt{8}} = \frac{\sqrt{56}}{8}$

$= \frac{\sqrt{4}\sqrt{14}}{8} = \frac{2\sqrt{14}}{8} = \frac{\sqrt{14}}{4}$

12) $\frac{6}{5\sqrt{20}}\frac{\sqrt{20}}{\sqrt{20}} = \frac{6\sqrt{20}}{100} =$

$\frac{3\sqrt{4}^{2}\sqrt{5}}{50} = \frac{6\sqrt{5}}{50} = \frac{3\sqrt{5}}{25}$

PRACTICE:

1) $\sqrt{54}$

$\sqrt{9}\sqrt{6}$

$3\sqrt{6}$

2) $3\sqrt{24}$

$3\sqrt{4}\sqrt{6}$

$6\sqrt{6}$

3) $7\sqrt{5}\sqrt{2}$

$7\sqrt{10}$

4) $\frac{8\sqrt{3}\sqrt{20}}{\sqrt{64}} = \frac{8\sqrt{3}\sqrt{4}^{2}\sqrt{5}}{8} = 2\sqrt{15}$

5) $\sqrt{180}$

$\sqrt{9}\sqrt{20}$

$3\sqrt{4}\sqrt{5}$

$3\cdot 2\sqrt{5}$

$6\sqrt{5}$

6) $\sqrt{640}$

$\sqrt{64}\sqrt{10}$

$8\sqrt{10}$

Name

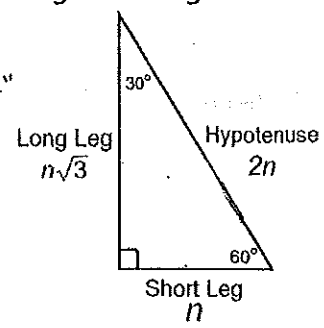
Trigonometry Prerequisite: Special Right Triangles

Special Right Triangles: 30° - 60° - 90°

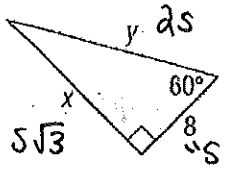
Hypotenuse = 2 * Short Leg

Long Leg = Short Leg * $\sqrt{3}$

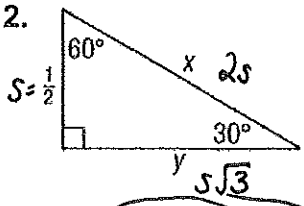
① Label sides "s", "$s\sqrt{3}$", "2s"
② Write eqn. w/ given value.
③ Solve for "s"
④ Substitute in for "s"



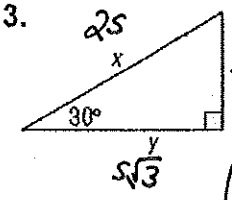
Find the value of x and y in each triangle.

1. 

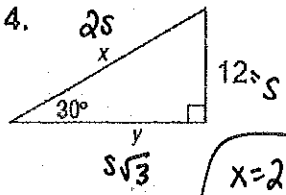
$y = 16$, $x = 8\sqrt{3}$

2. 

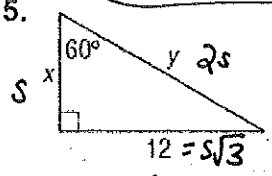
$x = 1$, $y = \frac{1}{2}\sqrt{3}$ or $\frac{\sqrt{3}}{2}$

3. 

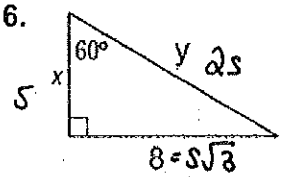
$x = 28$, $y = 14\sqrt{3}$

4. 

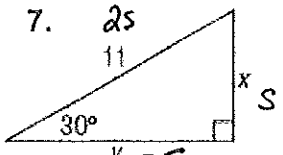
$x = 24$, $y = 12\sqrt{3}$

5. 

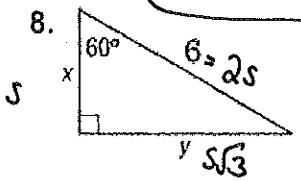
$s = \frac{12}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{12\sqrt{3}}{3} = 4\sqrt{3}$
$x = 4\sqrt{3}$, $y = 8\sqrt{3}$

6. 

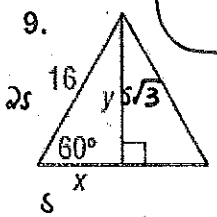
$s = \frac{8}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{8\sqrt{3}}{3}$
$x = \frac{8\sqrt{3}}{3}$, $y = \frac{16\sqrt{3}}{3}$

7. 

$2s = 11$
$s = 5.5$
$x = 5.5$
$y = 5.5\sqrt{3}$

8. 

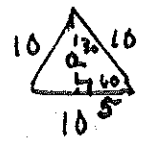
$2s = 6$
$s = 3$
$x = 3$
$y = 3\sqrt{3}$

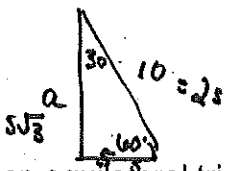
9. 

$2s = 16$
$s = 8$
$x = 8$
$y = 8\sqrt{3}$

Sketch the figure that is described. Then, find the requested measure.

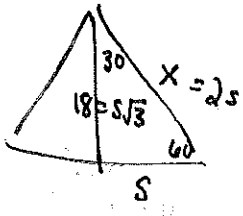
10. An equilateral triangle has a side length of 10 inches. Find the length of the triangles altitude.





$s = 5$
alt. = $5\sqrt{3}$

11. The altitude of an equilateral triangle is 18 inches. Find the length of a side.



$18 = s\sqrt{3}$

$s = \frac{18}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{18\sqrt{3}}{3} = 6\sqrt{3}$

$2s = 12\sqrt{3}$

$12\sqrt{3}$

8.4

Name ANSWERS

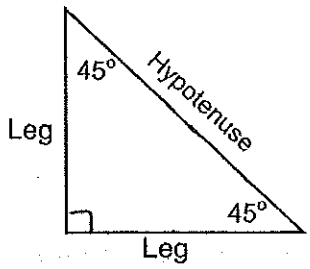
Trigonometry Prerequisite: Special Right Triangles

Special Right Triangles: 45° - 45° - 90°

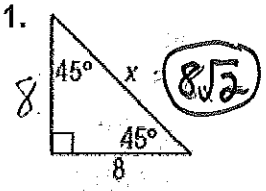
Hypotenuse = Leg * $\sqrt{2}$

Leg = $\frac{\text{hypotenuse}}{\sqrt{2}}$

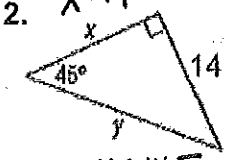
① Label sides, "s", "s", "s$\sqrt{2}$"
② Write eqn. w/ given value.
③ Solve for "s"
④ Substitute in for "s"



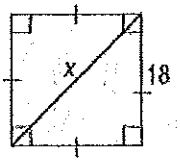
Find the value of x in each triangle.

1. 

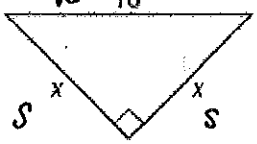
$8\sqrt{2}$

2. X = 14


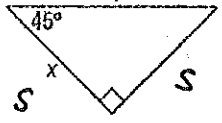
$y = 14\sqrt{2}$

3. 

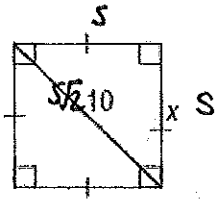
$x = 18\sqrt{2}$

4. $s\sqrt{2} = 18$


$s\sqrt{2} = 18$
$s = \frac{18}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{18\sqrt{2}}{2} = 9\sqrt{2}$

5. $s\sqrt{2} = 8$


$s\sqrt{2} = 8$
$s = \frac{8}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{8\sqrt{2}}{2} = 4\sqrt{2}$

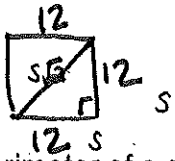
6. 

$s\sqrt{2} = 10$
$s = \frac{10}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{10\sqrt{2}}{2}$
$x = 5\sqrt{2}$

Sketch the figure that is described. Find the requested measure.

7. The perimeter of a square is 48 meters. Find the length of a diagonal.

$\frac{48}{4} =$ 12

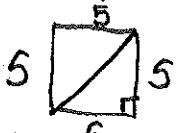


s

diag. = $12\sqrt{2}$

8. The perimeter of a square is 20 cm. Find the length of a diagonal.

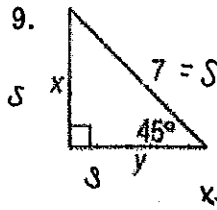
$\frac{20}{4} =$ 5



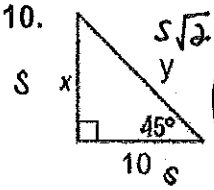
s

diag. = $5\sqrt{2}$

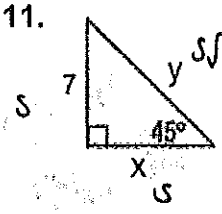
Find the value of x and y in each figure.

9. 

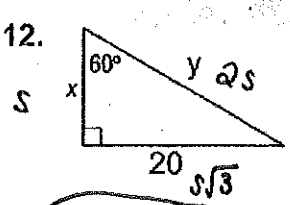
$s = \frac{7}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$
$x = y = \frac{7\sqrt{2}}{2}$

10. 

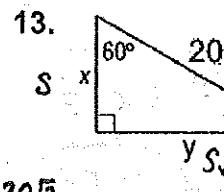
$x = 10$
$y = 10\sqrt{2}$

11. 

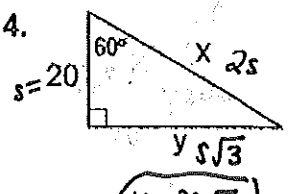
$x = 7$
$y = 7\sqrt{2}$

12. 

$s\sqrt{3} = 20$
$s = \frac{20}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{20\sqrt{3}}{3}$
$x = \frac{20\sqrt{3}}{3}$ $y = \frac{40\sqrt{3}}{3}$

13. 

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

14. 

$y = 20\sqrt{3}$
$x = 40$

Geometry **8.2 Special Right Triangles** Name ANSWERS

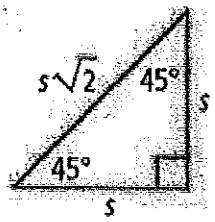
Objective: *To use the properties of 45°-45°-90° and 30°-60°-90° triangles*

Some right triangles have properties that allow us to use shortcuts to find side lengths instead of using the Pythagorean Theorem!

45°-45°-90° Triangle Theorem

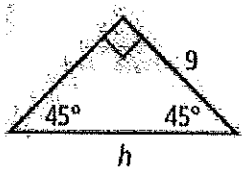
In a 45°-45°-90° triangle, both legs are congruent and the length of the hypotenuse is $\sqrt{2}$ times the length of a leg.

$$\text{hypotenuse} = \sqrt{2} \cdot \text{leg}$$

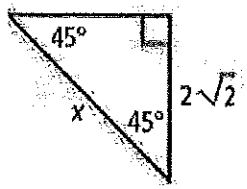


1. What is the value of each variable?

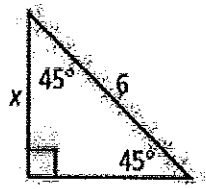
a.



b.



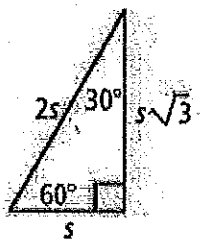
c.



30°-60°-90° Triangle Theorem

In a 30°-60°-90° triangle, the length of the hypotenuse is twice the length of the shorter leg. The length of the longer leg is $\sqrt{3}$ times the length of the shorter leg.

$$\text{hypotenuse} = 2 \cdot \text{shorter leg}$$
$$\text{longer leg} = \sqrt{3} \cdot \text{shorter leg}$$

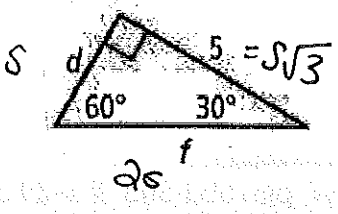


2. What is the value of d in simplest radical form? What is the value of f in simplest radical form?

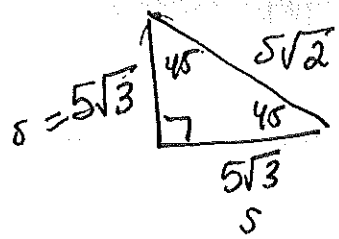
$5 = s\sqrt{3}$

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

$f = \frac{10\sqrt{3}}{3}$



3. What is the length of the hypotenuse of a 45°-45°-90° triangle with leg lengths $5\sqrt{3}$?

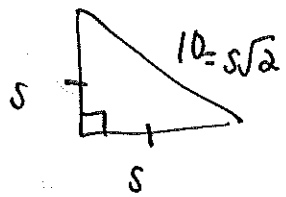


$s = 5\sqrt{3}$

$5\sqrt{2} = 5\sqrt{3} \cdot \sqrt{2}$

$5\sqrt{6}$

4. The length of the hypotenuse of a 45°-45°-90° triangle is 10. What is the length of one leg?

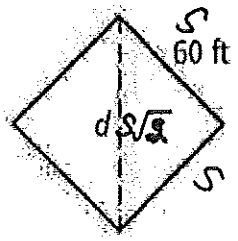


$s = \frac{10}{\sqrt{2}} \frac{\sqrt{2}}{\sqrt{2}} = \frac{10\sqrt{2}}{2}$

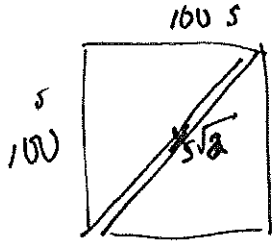
$5\sqrt{2}$

5. A high school softball diamond is a square. The distance from base to base is 60ft. To the nearest foot, how far does a catcher throw the ball from home plate to second base?

$d = 60\sqrt{2}$ ft.

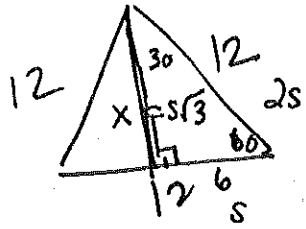


6. You plan to build a path along one diagonal of a 100ft by 100ft square garden. To the nearest foot, how long will the path be?



diag $= 100\sqrt{2}$

7. What is the height of an equilateral triangle with sides that are 12cm long? Round to the nearest tenth.



$s = 6$

$x = 6\sqrt{3}$ ≈ 10.4

HW pgs. 503-505 # 1-29 odd (geo 21 also do #30 & 34)