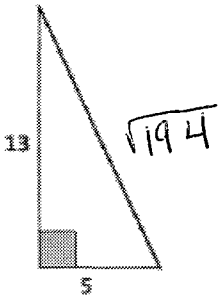


LESSON #6: SPECIAL RIGHT TRIANGLES

Do Now:

1. In the triangle below, find:
 - a) The length of the hypotenuse.
 - b) The perimeter of the triangle.
 - c) The area of the triangle.

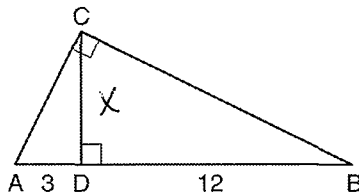


a) $5^2 + 13^2 = x^2$
 $25 + 169 = x^2$
 $\sqrt{194} = \sqrt{x^2}$
 $x = \sqrt{194}$
 $x = 13.9$

b) $13 + 5 + \sqrt{194}$
 $13 + 5 + 13.9$
 31.9

c) $\frac{1}{2} bh$
 $\frac{1}{2} (5)(13)$
 32.5

2. In the diagram below of right triangle ABC , altitude \overline{CD} is drawn to hypotenuse \overline{AB} .



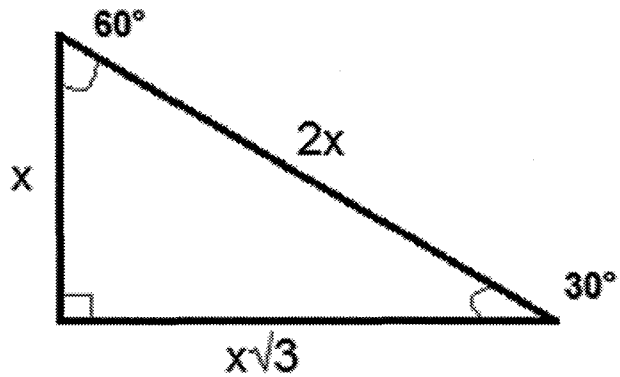
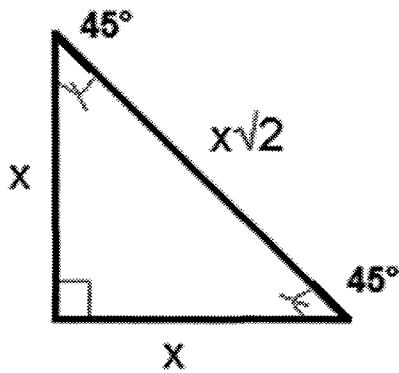
If $AD = 3$ and $DB = 12$, what is the length of altitude \overline{CD} ?

- 1) 6
- 2) $6\sqrt{5}$
- 3) 3
- 4) $3\sqrt{5}$

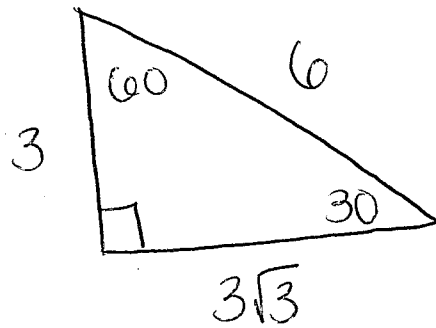
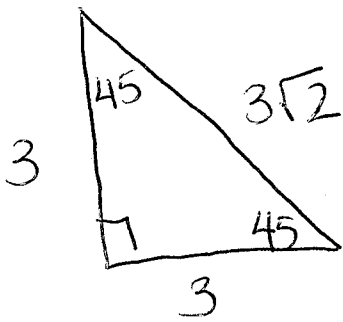
$\frac{3}{x} = \frac{x}{12}$
 $\sqrt{x^2} = \sqrt{36}$
 $x = 6$

IT'S TIME FOR OUR...

SPECIAL! RIGHT! TRIANGLES!



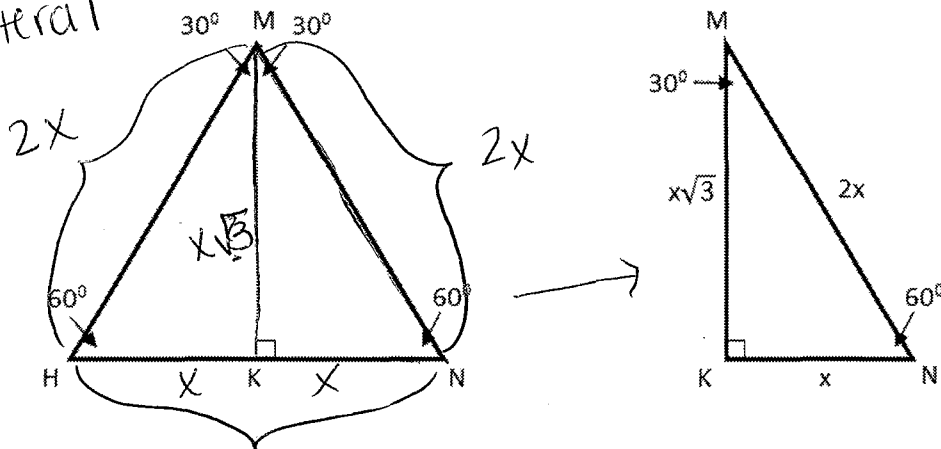
So...for example...



Where is all of this @#%^&\$ coming from?!?!?

Let's first consider the 30-60-90 right triangle.

Equilateral



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

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

$$-x^2 \quad -x^2$$

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

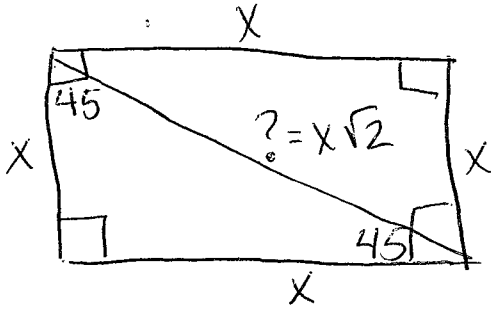
$$b = x\sqrt{3}$$

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

$$b^2 = 3x^2$$

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

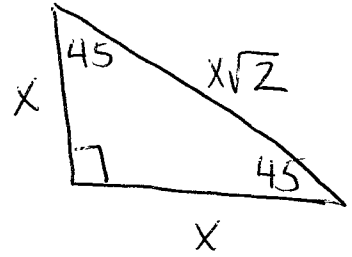
Now let's think about the 45-45-90 right triangle.



$$X^2 + X^2 = C^2$$

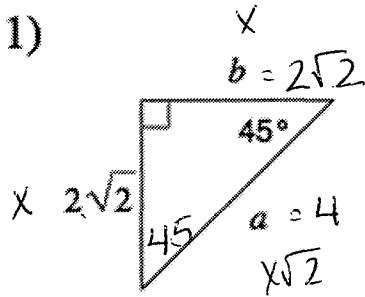
$$\sqrt{2X^2} = \sqrt{C^2}$$

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



Now let's do some examples!

For each of the following solve for the missing side(s). Leave your answers in simplest radical form.



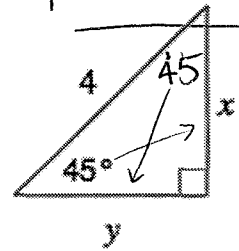
X	X	$X\sqrt{2}$
$2\sqrt{2}$	$2\sqrt{2}$	$(2\sqrt{2})\sqrt{2}$
		$2 \cdot 2$
		4

$$a = 4$$

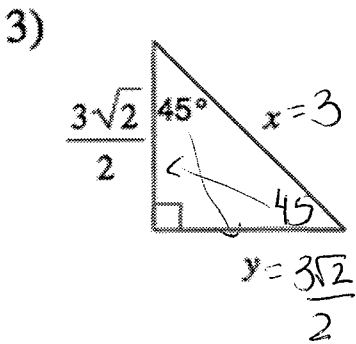
$$b = 2\sqrt{2}$$

2)

$$X = Y = \frac{4}{\sqrt{2}}$$



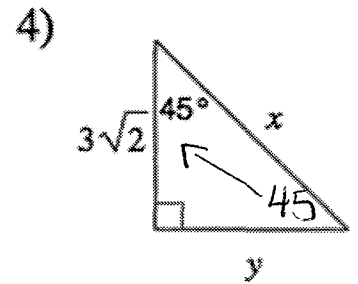
X	X	$X\sqrt{2}$
$\frac{4}{\sqrt{2}}$	$\frac{4}{\sqrt{2}}$	$\frac{4}{\sqrt{2}} \sqrt{2} = \frac{4}{\sqrt{2}}$
		$X = \frac{4}{\sqrt{2}}$



X	X	$X\sqrt{2}$
$\frac{3\sqrt{2}}{2}$	$\frac{3\sqrt{2}}{2}$	$(\frac{3\sqrt{2}}{2})\sqrt{2}$
		3

$$X = 3$$

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

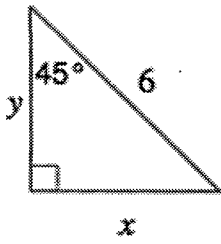


X	X	$X\sqrt{2}$
$3\sqrt{2}$	$3\sqrt{2}$	$(3\sqrt{2})\sqrt{2}$
		$3 \cdot 2$
		6

$$X = 6$$

$$Y = 3\sqrt{2}$$

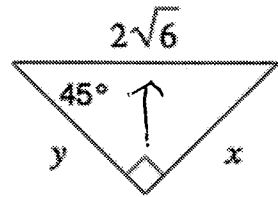
5)



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

$$x = y = \frac{6}{\sqrt{2}}$$

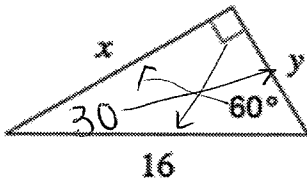
6)



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

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

7)

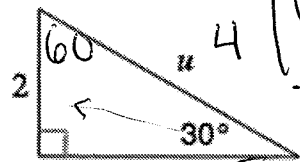


30	60	90
x	$x\sqrt{3}$	2x
8	$8\sqrt{3}$	$\frac{16}{2} = \frac{2x}{2}$
		$x = 8$

$$y = 8\sqrt{3}$$

$$x = 8$$

8)

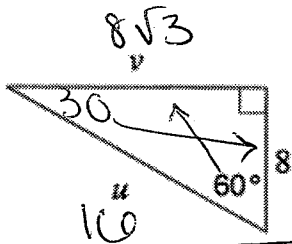


30	60	90
x	$x\sqrt{3}$	2x
2	$2\sqrt{3}$	$2(2) = 4$

$$u = 4$$

$$v = 2\sqrt{3}$$

9)

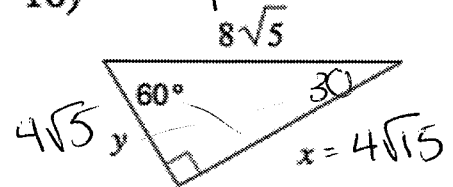


30	60	90
x	$x\sqrt{3}$	2x
8	$8\sqrt{3}$	$2(8) = 16$

$$u = 16$$

$$v = 8\sqrt{3}$$

10)

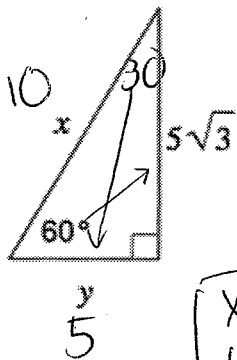


30	60	90
x	$x\sqrt{3}$	2x
$4\sqrt{5}$	$4\sqrt{5}\sqrt{3}$	$\frac{8\sqrt{5}}{2} = \frac{2x}{2}$
		$x = 4\sqrt{5}$

$$x = 4\sqrt{5}$$

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

11)



30	60	90
x	$x\sqrt{3}$	2x
x=5	$\frac{5\sqrt{3}}{\sqrt{3}} = \frac{x\sqrt{3}}{\sqrt{3}}$	$2(5) = 10$
		$x = 5$

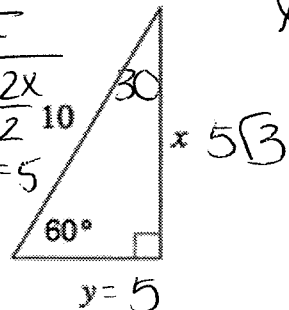
$$x = 10$$

$$y = 5$$

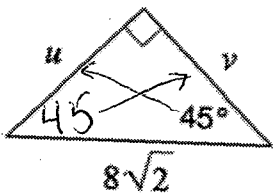
30	60	120	90
x	$x\sqrt{3}$	2x	
5	$5\sqrt{3}$	$\frac{10}{2} = \frac{2x}{2}$	
		$x = 5$	

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

$$y = 5$$



13)



45	45	90
x	x	$x\sqrt{2}$
8	8	$\frac{x\sqrt{2}}{\sqrt{2}} = \frac{8\sqrt{2}}{\sqrt{2}}$

$x=8$

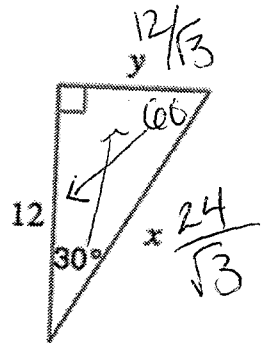
$$u=8$$

$$v=8$$

$$x = \frac{24}{\sqrt{3}}$$

$$y = \frac{12}{\sqrt{3}}$$

14)

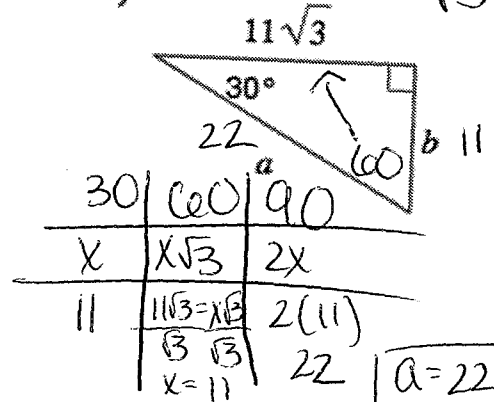


30	60	90
x	$x\sqrt{3}$	2x
$\frac{12}{\sqrt{3}}$	$\frac{12 = x\sqrt{3}}{\sqrt{3} \cdot \sqrt{3}}$	$2(\frac{12}{\sqrt{3}})$

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

$\frac{24}{\sqrt{3}}$

16)

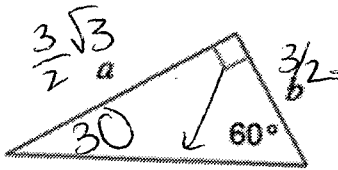


30	60	90
x	$x\sqrt{3}$	2x
11	$\frac{11\sqrt{3} = x\sqrt{3}}{\sqrt{3} \cdot \sqrt{3}}$	2(11)

$x=11$

$a=22$
 $b=11$

15)



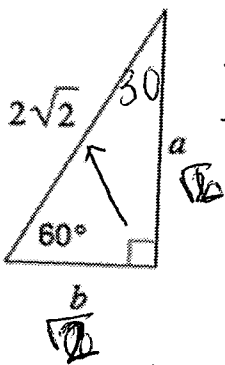
$$a = \frac{3\sqrt{3}}{2}$$

$$b = \frac{3}{2}$$

30	60	90
x	$x\sqrt{3}$	2x
$\frac{3}{2}$	$\frac{3\sqrt{3}}{2}$	$\frac{3 = 2x}{2 \cdot 2}$

$x = \frac{3}{2}$

17)



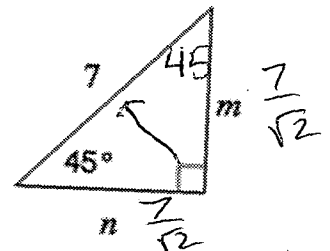
$$a = \sqrt{6}$$

$$b = \sqrt{2}$$

30	60	90
x	$x\sqrt{3}$	2x
$\sqrt{2}$	$\frac{(\sqrt{2})(\sqrt{3})}{\sqrt{6}}$	$\frac{2\sqrt{2} = 2x}{2}$

$x = \sqrt{2}$

18)



45	45	90
x	x	$x\sqrt{2}$
$\frac{7}{\sqrt{2}}$	$\frac{7}{\sqrt{2}}$	$\frac{7 = x\sqrt{2}}{\sqrt{2} \cdot \sqrt{2}}$

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

$$m = n = \frac{7}{\sqrt{2}}$$

