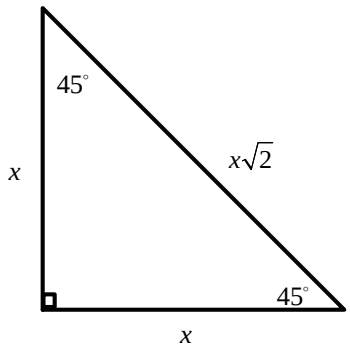
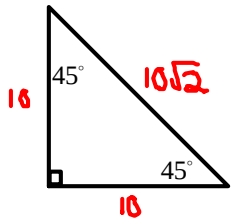
Special Right Triangles

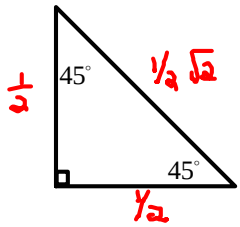
$45^\circ - 45^\circ - 90^\circ$



$x = 10$



$x = \frac{1}{2}$



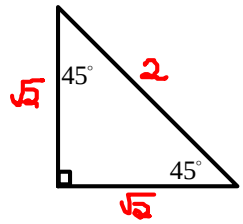
$x = \sqrt{2}$

$x\sqrt{2}$

$\sqrt{2} \cdot \sqrt{2}$

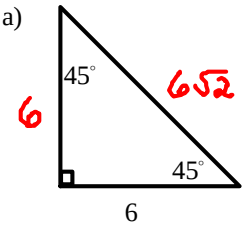
$\sqrt{4}$

2

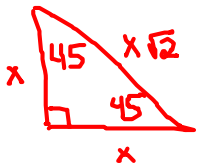


1. Find the missing sides of each $45^\circ - 45^\circ - 90^\circ$ triangle.

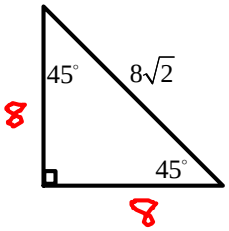
a)



$x = 6$



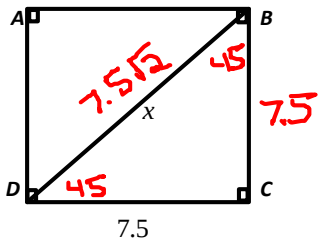
b)



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

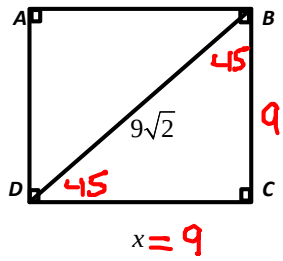
$x = 8$

c) *ABCD* is a square.



$x = 7.5\sqrt{2}$

d) *ABCD* is a square.

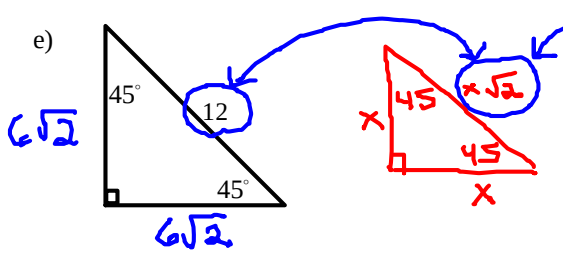


$x = 9$

$\frac{x\sqrt{2}}{\sqrt{2}} = \frac{9\sqrt{2}}{\sqrt{2}}$

$x = 9$

e)

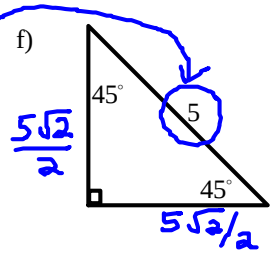


$\frac{x\sqrt{2}}{\sqrt{2}} = \frac{12}{\sqrt{2}}$

$x = \frac{12}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{12\sqrt{2}}{\sqrt{4}}$

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

f)

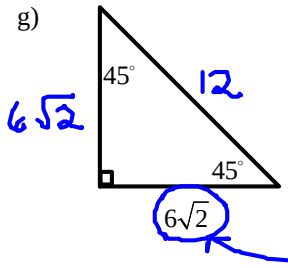


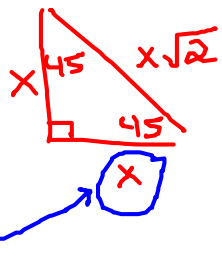
$\frac{x\sqrt{2}}{\sqrt{2}} = \frac{5}{\sqrt{2}}$

$x = \frac{5}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{5\sqrt{2}}{\sqrt{4}}$

$x = \frac{5\sqrt{2}}{2}$

g)





$x = 6\sqrt{2}$

$x\sqrt{2}$

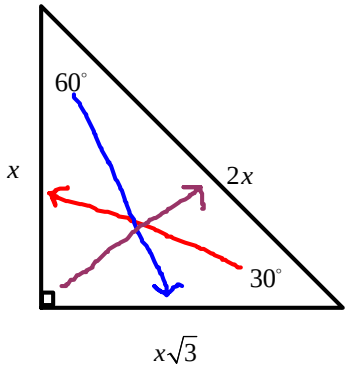
$6\sqrt{2} \cdot \sqrt{2}$

$6\sqrt{4}$

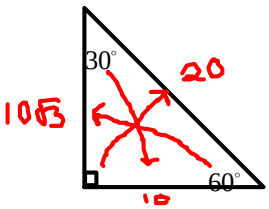
$6 \cdot 2$

12

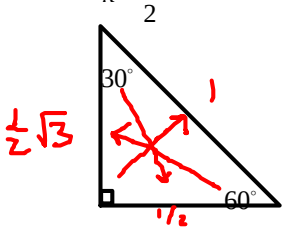
$\underline{30^\circ - 60^\circ - 90^\circ}$



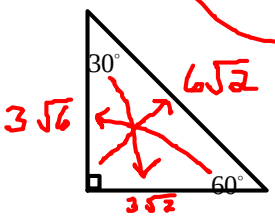
$x = 10$



$x = \frac{1}{2}$



$x = 3\sqrt{2}$



$x\sqrt{3}$

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

$3\sqrt{6}$

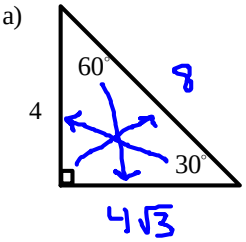
$2x$

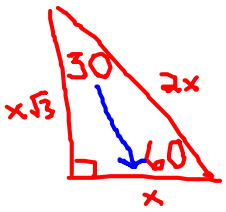
$2 \cdot 3\sqrt{2}$

$6\sqrt{2}$

2. Find the missing sides of each $30^\circ - 60^\circ - 90^\circ$ triangle.

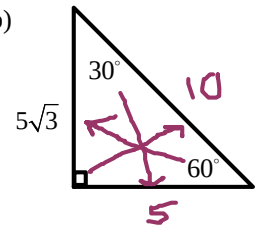
a)

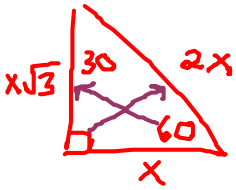




$x = 4$

b)

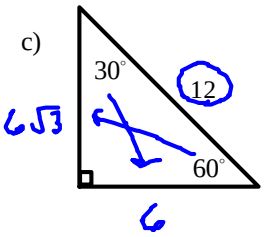




$$\frac{x\sqrt{3}}{\sqrt{3}} = \frac{5\sqrt{3}}{\sqrt{3}}$$

$x = 5$

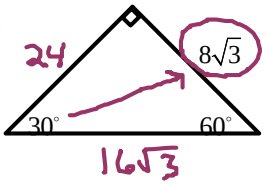
c)

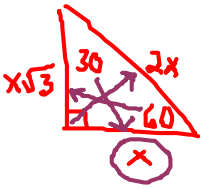


$$\frac{2x}{2} = \frac{12}{2}$$

$x = 6$

d)





$x = 8\sqrt{3}$

$x\sqrt{3}$

$8\sqrt{3} \cdot \sqrt{3}$

$8\sqrt{9}$

$8 \cdot 3$

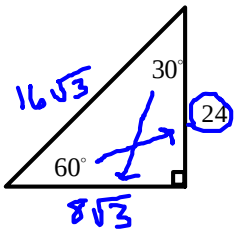
24

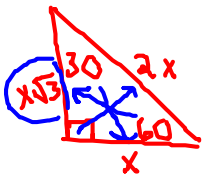
$2x$

$2 \cdot 8\sqrt{3}$

$16\sqrt{3}$

e)





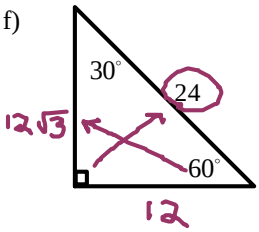
$$\frac{x\sqrt{3}}{\sqrt{3}} = \frac{24}{\sqrt{3}}$$

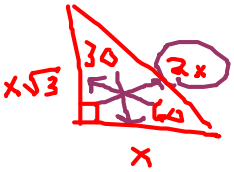
$$x = \frac{24}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{24\sqrt{3}}{3}$$

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

$$2x$$
$$2 \cdot 8\sqrt{3}$$
$$16\sqrt{3}$$

f)



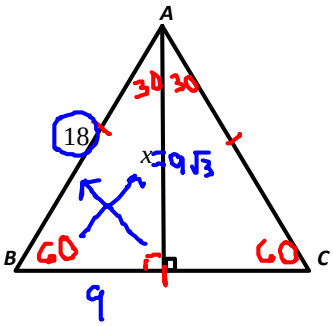


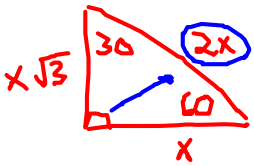
$$\frac{2x}{2} = \frac{24}{2}$$

$$x = 12$$

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

g) *ABC* is an equilateral triangle.



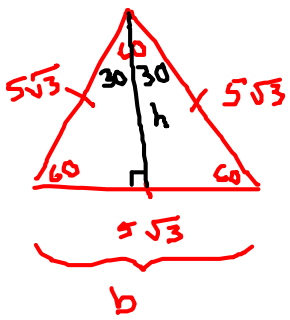


$$\frac{2x}{2} = \frac{18}{2}$$

$$x = 9$$

$$\boxed{9\sqrt{3}}$$

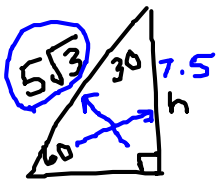
3. Find the area of an equilateral triangle if each side is $5\sqrt{3}$ centimeters.

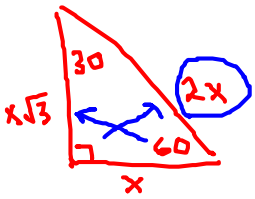


$A = \frac{1}{2} b \cdot h$

$b = 5\sqrt{3} \quad h = 7.5$

$A = \frac{1}{2}\left(\frac{5\sqrt{3}}{1}\right)\left(\frac{7.5}{1}\right) = \boxed{\frac{37.5\sqrt{3}}{2}\ cm^2}$





$\frac{2x}{2} = \frac{5\sqrt{3}}{2}$

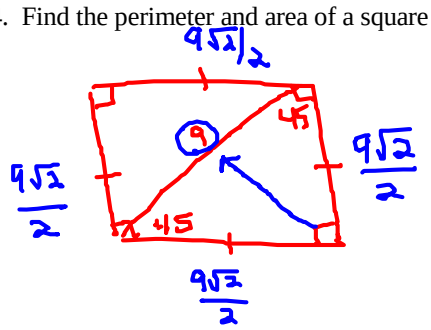
$x = \frac{5\sqrt{3}}{2}$

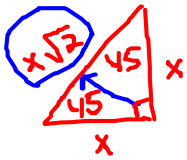
$x\sqrt{3}$

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

$\frac{5\sqrt{9}}{2} = \frac{5 \cdot 3}{2} = 7.5$

4. Find the perimeter and area of a square if the diagonal is 9 meters.





$\frac{x\sqrt{2}}{\sqrt{2}} = \frac{9}{\sqrt{2}}$

$x = \frac{9}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{9\sqrt{2}}{\sqrt{4}}$

$x = \frac{9\sqrt{2}}{2}$

$P = 4 \cdot s$

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

$P = \frac{\cancel{4}^{2}}{\cancel{2}_{1}} \cdot \frac{9\sqrt{2}}{1}$

$\boxed{P = 18\sqrt{2}\ m}$

$A = s^2$

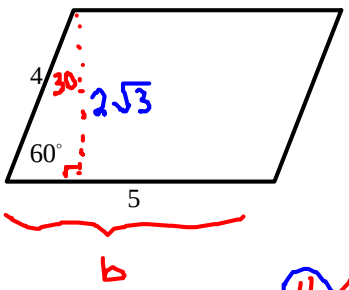
$A = \left(\frac{9\sqrt{2}}{2}\right)\left(\frac{9\sqrt{2}}{2}\right)$

$A = \frac{81\sqrt{4}}{4}$

$A = \frac{81 \cdot 2}{4} = \frac{162}{4}$

$\boxed{A = 40.5\ m^2}$

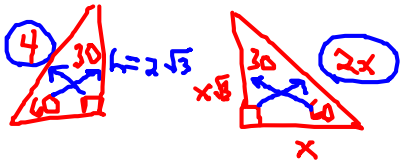
5. Find the area of the parallelogram.



$A = b \cdot h$

$b = 5 \quad h = 2\sqrt{3}$

$A = (5)(2\sqrt{3}) = \boxed{10\sqrt{3} \text{ un}^2}$



$\frac{\cancel{2}x}{\cancel{2}} = \frac{4}{2}$

$x = 2$

$x\sqrt{3}$

$2\sqrt{3}$