$\sqrt{c^2} = \sqrt{a^2+b^2}$

hyp $c = \sqrt{a^2+b^2}$

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

$-b^2 \quad -b^2$

$\sqrt{a^2} = \sqrt{c^2-b^2}$

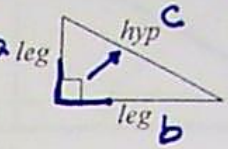
leg $a = \sqrt{c^2-b^2}$

9.4: The Pythagorean Theorem

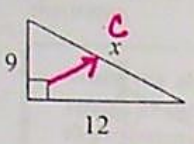
Used to find the missing length of a right triangle.

Formula: $leg^2 + leg^2 = hyp^2$

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



1. Set up an equation and solve for x:



$c = \sqrt{a^2+b^2}$

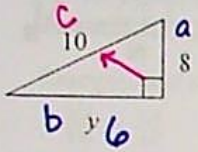
$c = \sqrt{9^2+12^2}$

$c = \sqrt{81+144}$

$c = \sqrt{225}$

$c = 15$

2. Set up an equation and solve for x:



$b = \sqrt{c^2-a^2}$

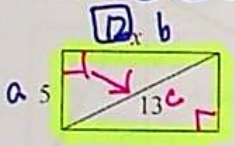
$b = \sqrt{10^2-8^2}$

$b = \sqrt{100-64}$

$b = \sqrt{36}$

$b = 6$

3. Find the perimeter of the rectangle shown.



$b = \sqrt{13^2-5^2}$

$b = \sqrt{169-25}$

$b = \sqrt{144}$

$b = 12$

$P = 2(l+w)$

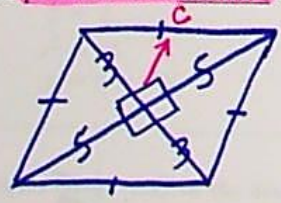
$= 2(12+5)$

$= 2(17)$

$= 34$

For questions 4-7, you will need to draw a diagram.

4. Find the perimeter of a rhombus whose diagonals are 6 and 10.



$3^2+5^2=c^2$

$9+25=c^2$

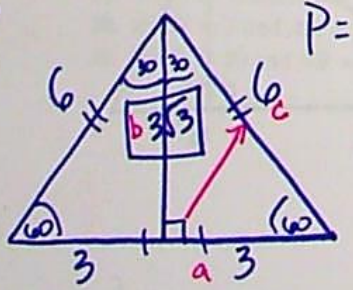
$\sqrt{34}=\sqrt{c^2}$

$\sqrt{34}=c$

$P = 4(5)$

$P = 4\sqrt{34}$

5. Find the length of the altitude of an equilateral triangle whose perimeter is 18.



$P = 18$

$\frac{18}{3}$

6

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

$3^2+b^2=6^2$

$b^2=6^2-3^2$

$b^2=36-9$

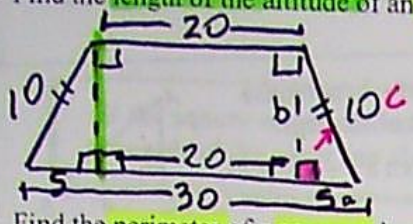
$b^2=27$

$\sqrt{b^2}=\sqrt{27}$

$b = 3\sqrt{3}$

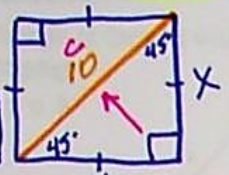
24

6. Find the length of the altitude of an isosceles trapezoid whose sides are 10, 30, 10, and 20.



$a^2+b^2=c^2$
$5^2+b^2=10^2$
$25+b^2=100-25$
$\sqrt{b^2}=\sqrt{75}$ $\quad 25\cdot 3$
$\boxed{b=5\sqrt{3}}$

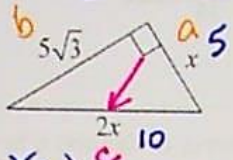
7. Find the perimeter of a square whose diagonal has length of 10.



$P=4x$
$4(5\sqrt{2})$
$\boxed{20\sqrt{2}}$

$a^2+b^2=c^2$
$1x^2+1x^2=10^2$
$\frac{2x^2}{2}=\frac{100}{2}$
$\sqrt{x^2}=\sqrt{50}$ $\quad 25\cdot 2$
$\boxed{x=5\sqrt{2}}$

8. Set up an equation and solve for x:



$a^2+b^2=c^2$
$x^2+(5\sqrt{3})^2=(2x)^2$
$x^2+(\sqrt{75})^2=4x^2$
$x^2+75=4x^2$
$-x^2 \quad -x^2$
$75=3x^2$

$(2x)(2x)$ c

$\frac{3x^2}{3}=\frac{75}{3}$
$\sqrt{x^2}=\sqrt{25}$
$\boxed{x=5}$

9. Classify the Δs whose sides are given as *acute*, *obtuse*, *right*, or not possible.

a. 8, 15, 17 c
b. 5, 7, 8 c
c. 9, 10, 19 c
d. 5, 8, 11 c

① a b c

$c^2=a^2+b^2$ right Δ
$c^2>a^2+b^2$ obtuse Δ
$c^2<a^2+b^2$ acute Δ

$\boxed{\begin{array}{l} a+b>c \\ b+c>a \\ a+c>b \end{array}}$

a) $8+15>17$ ✓
$15+17>8$ ✓
$8+17>15$ ✓

$17^2 \square 8^2+15^2$
$289 \square 64+225$
$289 = 289$ ✓

$\boxed{\text{R+ }\Delta}$

b) $5+7>8$ ✓
$7+8>5$ ✓
$5+8>7$ ✓

$8^2 \square 5^2+7^2$
$64 \square 25+49$
$64 < 74$

$\boxed{\text{Acute }\Delta}$

c) $9+10>19$ X
$19=19$

$\boxed{\begin{array}{c}\text{not} \\ \text{possible}\end{array}}$

d) $5+8>11$ ✓
$8+11>5$ ✓
$5+11>8$ ✓

$11^2 \square 5^2+8^2$
$121 \square 25+64$
$121 > 89$

$\boxed{\text{Obtuse }\Delta}$