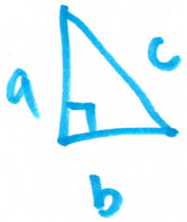
Pythagorean Theorem:



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

for "Right Triangles"

Ex1) $a = 5, \quad b = 9, \quad c = ?$

$$25 + 81 = c^2$$

$$\sqrt{106} = \sqrt{c^2}$$

$$\boxed{c = \sqrt{106}}$$

~~2 53~~

Ex2) $a = 10, \quad c = 12, \quad b = ?$

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

$$100 + b^2 = 144$$

$$-100 \qquad\qquad -100$$

$$\sqrt{b^2} = \sqrt{44} = \boxed{2\sqrt{11}}$$

4 11

2 2

Always need to simplify the $\sqrt{\ }$.

Ex 3) Given $a = 5$, $b = 12$, $c = 13$, determine whether the given sides form a Right Triangle.

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

$$\underbrace{25 + 144}_{169} \stackrel{?}{=} 169$$

$$169 \stackrel{\checkmark}{=} 169$$

Yes

Distance Formula:

Given: (x_1, y_1) and (x_2, y_2)

The Distance between 2 points:

$$D = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$$

Ex 4) Given $(\overset{x_1}{2}, \overset{y_1}{5})$ and $(\overset{x_2}{-3}, \overset{y_2}{7})$

Find the distance.

$$D = \sqrt{(\underset{y_2}{\boxed{7}} - \underset{y_1}{\boxed{5}})^2 + (\underset{x_2}{\boxed{-3}} - \underset{x_1}{\boxed{2}})^2}$$

$$= \sqrt{2^2 + (-5)^2}$$

$$= \sqrt{4 + 25}$$

$$\boxed{D = \sqrt{29}}$$

Midpoint Formula:

Given: (x_1, y_1) and (x_2, y_2)

Midpoint: $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

Ex5) $(-2, 3)$ and $(-6, 5)$

$x_1 \quad y_1 \qquad x_2 \quad y_2$

$$M = \left(\frac{-2+-6}{2}, \frac{3+5}{2}\right) = \left(\frac{-8}{2}, \frac{8}{2}\right) = \boxed{(-4, 4)}$$

Simplify Rational Expressions:

$x=1$, $+=-2$

Ex6) $$\frac{m^2-2m+1}{2m^2-m-1} = \frac{(m-1)\cancel{(m-1)}}{(2m+1)\cancel{(m-1)}} = \boxed{\frac{m-1}{2m+1}}$$

$$\begin{array}{ccc} \rightarrow(2 & \times & 1) \\ \rightarrow(1 & & -1) \end{array}$$

$1 + -2 = -1$

Ex7) $$\frac{x^2+6x+8}{2x^2+9x+4} \cdot \frac{2x^2-x-1}{x^2-3x+2}$$

$$= \frac{\cancel{(x+4)}(x+2)}{\cancel{(x+4)}\cancel{(2x+1)}} \cdot \frac{\cancel{(2x+1)}\cancel{(x-1)}}{\cancel{(x-1)}(x-2)} = \boxed{\frac{x+2}{x-2}}$$

2 4

$$\begin{array}{ccc} \rightarrow(1 & \times & 4) \\ \rightarrow(2 & & 1) \end{array}$$

$8 + 1 = 9$