M-PC Pre-Calculus 9/27

$$2a - 9(a+6) = 6(a+3) - 4a$$

$$2a - 9a - 54 = 6a + 18 - 4a$$

$$-7a - 54 = 2a + 18$$
$$-2a \qquad -2a$$

$$-9a - 54 = 18$$
$$+54 \quad +54$$

$$\frac{-9a}{-9} = \frac{72}{-9}$$

$$\boxed{a = -8}$$

$$4\left(\frac{c}{4} - 2c\right) = \left(\frac{5}{4} - \frac{c}{2}\right)4$$

$$\frac{\cancel{4}c}{\cancel{4}} - 8c = \frac{5 \cdot \cancel{4}}{\cancel{4}} - \frac{\cancel{4}^{2}c}{\cancel{2}}$$

$$c - 8c = 5 - 2c$$

$$-7c = 5 - 2c$$
$$+2c \qquad +2c$$

$$\frac{-5c}{-5} = \frac{5}{-5}$$

$$\boxed{c = -1}$$

$$x^2 = 12 - x$$
$$-12 + x \quad -12 + x$$

"Factor"

Looking for zeros, roots

bigger diff

$$x^2 + x - 12 = 0$$

$$\underline{-3} * \underline{4} = -12$$

$$\underline{-3} + \underline{4} = 1$$

$$(x-3)(x+4) = 0$$

$$x - 3 = 0 \qquad x + 4 = 0$$
$$+3 \; +3 \qquad -4 \; -4$$

$$\boxed{x = 3} \qquad \boxed{x = -4}$$

bigger diff

$$x^2 - 4x - 45 = 0$$

$$\underline{-9} * \underline{5} = -45$$

$$\underline{-9} + \underline{5} = -4$$

$$(x-9)(x+5) = 0$$

$$x - 9 = 0 \qquad x + 5 = 0$$
$$+9 \; +9 \qquad -5 \; -5$$

$$\boxed{x = 9} \qquad \boxed{x = -5}$$

$x^2 - 9 = 0$ difference of squares

$\sqrt{x^2}$ $\sqrt{9}$

$(x+3)(x-3) = 0$

$x+3=0$ $\quad$ $x-3=0$

$-3 \quad -3$ $\quad$ $+3 \quad +3$

$x=-3$ $\quad$ $x=3$

$\boxed{x = \pm 3}$

$x^2 - 9 = 0$

$+9 \quad +9$

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

$\boxed{x = \pm 3}$

$3t^2 - 48 = 0$

$+48 \quad +48$

$\frac{3t^2}{3} = \frac{48}{3}$

$\sqrt{t^2} = \sqrt{16}$

$\boxed{t = \pm 4}$

$3t^2 - 48 = 0$

$3(t^2 - 16) = 0$

$3(t+4)(t-4) = 0$

$\boxed{t = \pm 4}$

$9p^2 = 12p - 4$

$-12p + 4 \quad -12p + 4$

$9p^2 - 12p + 4 = 0$

$-12p$

	$3p$	-2
$3p$	$9p^2$	$-6p$
-2	$-6p$	4

$(3p-2)(3p-2) = 0$

$3p - 2 = 0$ $\quad$ $3p - 2 = 0$

$+2 \quad +2$ $\quad$ $+2 \quad +2$

$\frac{3p}{3} = \frac{2}{3}$ $\quad$ $\frac{3p}{3} = \frac{2}{3}$

$p = \frac{2}{3}$ $\quad$ $\boxed{p = \frac{2}{3}}$

$\frac{9}{1 \cdot 9}$ $\quad$ $\frac{4}{1 \cdot 4}$

$3 \cdot 3$ $\quad$ $2 \cdot 2$

Quadratic Formula

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$a = 9 \quad b = -12 \quad c = 4$

$ax^2 + bx + c = 0$

$9x^2 - 12x + 4 = 0$

$$\frac{-(-12) \pm \sqrt{(-12)^2 - 4(9)(4)}}{2(9)}$$

$$\frac{12 \pm \sqrt{144 - 144}}{18} = \frac{12 \pm \sqrt{0}}{18} = \frac{12 \div 6}{18 \div 6}$$

$\boxed{\frac{2}{3}}$

$b^2 - 4ac$ discriminant

$\oplus$ > 0 2 solutions/zeros

$= 0$ 1 solution/zero

< 0 0 real solutions/zeros

$x^2 - 3x - 4 = 0$

$a = 1 \quad b = -3 \quad c = -4$

$$\frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-4)}}{2(1)}$$

$$\frac{3 \pm \sqrt{9 + 16}}{2}$$

$$\frac{3 \pm \sqrt{25}}{2} = \frac{3 \pm 5}{2}$$

$$\frac{3+5}{2} \qquad \frac{3-5}{2}$$

$$\frac{8}{2} = 4 \qquad \frac{-2}{2} = -1$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$ discriminant

$\sqrt{-64} = \sqrt{-1}\sqrt{64}$

$(i)(\pm 8)$

$\sqrt{-64} = \pm 8i$

$x^2 - 2x + 17 = 0$

$a = 1 \quad b = -2 \quad c = 17$

$$\frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(17)}}{2(1)}$$

$$\frac{2 \pm \sqrt{4 - 68}}{2} = \frac{2 \pm \sqrt{-64}}{2}$$

$$\frac{2 \pm 8i}{2} = 1 \pm 4i$$

Completing the Square

1.) 2020 it

2.) Factor out "a" terms

3.) $\left(\frac{b}{2}\right)^2$

$x^2 + 8x - 2 = 0$

$(x^2 + 8x) - 2 = 0$

$b = 8 \qquad \left(\frac{8}{2}\right)^2 = (4)^2 = 16$

$(x^2 + 8x) - 2 = 0$

$+16 \qquad -16$

$(x^2 + 8x + 16) - 2 - 16 = 0$

$\sqrt{x^2} \qquad \sqrt{16}$

$(x+4)^2 - 18 = 0$

vertex form: $a(x-h)^2 + k$

vertex: (h, k)

$(x+4)^2 - 18 = 0$

vertex $(-4, -18)$

$(x+4)^2 - 18 = 0$

$+18 \quad +18$

$\sqrt{(x+4)^2} = \sqrt{18}$

$\sqrt{18} = \sqrt{9}\sqrt{2}$

$3\sqrt{2}$

$x + 4 = \pm\sqrt{18}$

$x + 4 = \pm 3\sqrt{2}$

$-4 \qquad -4$

$x = \pm 3\sqrt{2} - 4$