Algebra II

Name_____

Solving Equations by Completing the Square when a ≠ 1

Period_____ Date_____

Sometimes the leading coefficient isn't 1, and you need to change that...

1.) $2x^2 + 8x = \frac{9}{2}$

$\frac{2}{2} \quad \frac{8}{2} \quad \frac{9}{2}$

$(\frac{4}{2})^2$ $x^2 + 4x = \frac{9}{4}$

$(2)^2$ $x^2 + 4x + 4 = \frac{9}{4} + \frac{4}{1} \cdot \frac{4}{4}$ $\frac{9}{4} + \frac{16}{4}$

4 $\sqrt{(x+2)^2} = \sqrt{\frac{25}{4}}$

$x + 2 = \pm\frac{5}{2}$

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

$-2 \quad -2$

$x = 1/2$

$x + 2 = -\frac{5}{2}$

$-2 \quad -2$

$x = -9/2$

2.) $3x^2 = 100 - 5x$

3.) $3x^2 - 11x - 4 = 0$

$+4 \quad +4$

$\frac{3x^2}{3} - \frac{11x}{3} = \frac{4}{3}$

$x^2 - \frac{11}{3}x = \frac{4}{3}$

$(\frac{-11}{2})^2$ $x^2 - \frac{11}{3}x + \frac{121}{36} = \frac{4}{3} + \frac{121}{36}$

$(-\frac{11}{6})^2$ $\sqrt{(x - \frac{11}{6})^2} = \sqrt{\frac{169}{36}}$

$\frac{121}{36}$ $x - \frac{11}{6} = \pm\frac{13}{6}$

4.) $3z^2 - 12z + 4 = 0$

$x - \frac{11}{6} = \frac{13}{6}$

$+\frac{11}{6} \quad +\frac{11}{6}$

$x = 24/6 = 4$

$x - \frac{11}{6} = -\frac{13}{6}$

$+\frac{11}{6} \quad +\frac{11}{6}$

$x = -\frac{2}{6} = -\frac{1}{3}$

Sometimes you don't know what to expect!

5.) $4x^2 - 12x = 72 + x^2$

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

$\frac{3x^2}{3} - \frac{12x}{3} = \frac{72}{3}$

$(\frac{-4}{2})^2$ $x^2 - 4x = 24$

$x^2 - 4x + 4 = 24 + 4$

$(-2)^2$ $\sqrt{(x-2)^2} = \sqrt{28}$

4 $\sqrt{4 \cdot 7}$

$(2\sqrt{7})$

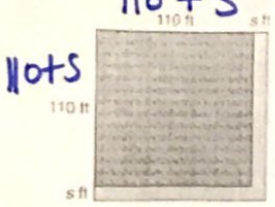
6.) $x^2 + x + 7 = 2x^2 + 7x + 2$

$x - 2 = \pm 2\sqrt{7}$

$+2 \quad +2$

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

7.) The Finneytown Athletic Association owns a large lot. On a portion of the lot, a square athletic field has been maintained. Each side of the field is 110 feet long. The association would like to equally expand two of the sides of the field for parking spaces so that the entire region has an area of 14,000 ft^2. What is the width of the parking strips being added?



$A = s^2$

$\sqrt{14000} = \sqrt{(110+s)^2}$

$\pm 118.32 = 110 + s$

$118.32 = 110 + s$

$-110 \quad -110$

$8.32 = s$

$-118.32 = 110 + s$

$-110 \quad -110$

$-228.32 = s$

8.32 ft

8.) The distance (s) an object travels can be computed when the initial speed (v_i), time elapsed (t), and the rate of constant acceleration (a) is known. The formula that relates these factors is $s = v_i t + \frac{1}{2}at^2$. If a car has an initial speed of 20 m/s and a constant acceleration of 2 m/s^2, determine the amount of time it takes to travel 145 m.

$S = V_i t + \frac{1}{2}at^2$

$145 = 20t + \frac{1}{2}(2)t^2$

$145 = 20t + t^2$

$145 = t^2 + 20t$

$\left(\frac{20}{2}\right)^2$

$(10)^2$

100

$100 + 145 = t^2 + 20t + 100$

$\sqrt{245} = \sqrt{(t+10)^2}$

$\pm 15.65 = t + 10$

$15.65 = t + 10$

$-10 \quad -10$

$5.65 = t$

$-15.65 = t + 10$

$-10 \quad -10$

$-25.65 = t$

5.65 sec