Notes: Solving Quadratic Equations by Factoring

"Riddle"

I am thinking of two numbers, a and b.
The product of my numbers is zero.
What do you know about my numbers?

If $a \cdot b = 0$

then $a = 0$ or $b = 0$ or both

PROPERTY OF ZERO

Ex. 1

a. $x(x-4)=0$

$\boxed{x=0}$ $\quad x-4=0$

$\boxed{x=4}$

$\{0, 4\}$

Solution
Set

b. $(x-4)(2x+5)=0$

$x-4=0 \quad\quad 2x+5=0$

$\boxed{x=4} \quad\quad \boxed{x=\dfrac{-5}{2}}$

$\left\{-\dfrac{5}{2}, 4\right\}$

Ex. 2

a. $m^2 - 10m = 0$

$m(m-10) = 0$

$m = 0 \qquad m - 10 = 0$

$\qquad\qquad m = 10$

$\{0, 10\}$

b. $9x^2 = 49$

$9x^2 - 49 = 0$

$(3x + 7)(3x - 7) = 0$

$3x + 7 = 0 \qquad 3x - 7 = 0$

$x = \dfrac{-7}{3} \qquad\quad x = \dfrac{7}{3}$

$\left\{ \pm \dfrac{7}{3} \right\}$

c. $y^2 + 6y = 0$

$y(y+6) = 0$

$y = 0 \quad y = -6$

$\{-6, 0\}$

d. $4b^2 - 8b - 5 = 0$

$(2b - 5)(2b + 1) = 0$

$b = \dfrac{5}{2} \qquad b = \dfrac{-1}{2}$

$\left\{ -\dfrac{1}{2}, \dfrac{5}{2} \right\}$

e. $x^2 + 2x = 63$

$x^2 + 2x - 63 = 0$

$(x+9)(x-7) = 0$

$x = -9 \qquad x = 7$

$\{-9, 7\}$

f. $-3r^2 = 7r + 4$

$0 = 3r^2 + 7r + 4$

$(3r + 4)(r + 1) = 0$

$r = -\dfrac{4}{3} \qquad r = -1$

$\left\{-\dfrac{4}{3}, -1\right\}$

$$\star \quad (x-6)(x+2) = 48$$

$$x^2 - 4x - 12 = 48$$

$$x^2 - 4x - 60 = 0$$

$$(x - 10)(x + 6) = 0$$

$$x = 10 \qquad x = -6$$

$$\{-6, 10\}$$

Ex. 3 Find the zeros of the functions.

a. $f(x) = x^2 - 4x - 21$

Zeros:

$\{-3, 7\}$

$$x^2 - 4x - 21 = 0$$
$$(x - 7)(x + 3) = 0$$
$$x = 7 \qquad x = -3$$

b. $g(x) = 9x^2 - 4$

Zeros:

$\{\pm \frac{2}{3}\}$

$$9x^2 - 4 = 0$$
$$(3x + 2)(3x - 2) = 0$$

$$x = -\frac{2}{3} \qquad x = \frac{2}{3}$$