$=0$ x-intercepts roots zeros

Warm Up – Factor and Solve

1. $2x^2 - 3x = 14$

$2x^2 - 3x - 14 = 0$ $\quad ac = -28$ M, $b = -3$ A

$2x^2 - 7x + 4x - 14 = 0$

$x(2x-7) + 2(2x-7) = 0$

$(2x-7)(x+2) = 0$

$2x - 7 = 0 \quad x + 2 = 0$

$\boxed{x = 7/2 \quad x = -2}$

2. $3x^3 - 9x^2 - 54x = 0$

$3x(x^2 - 3x - 18) = 0$ (A, M)

$3x(x-6)(x+3) = 0$

$3x = 0 \quad x - 6 = 0 \quad x + 3 = 0$

$\boxed{x=0} \quad \boxed{x=6} \quad \boxed{x=-3}$

Factored Form Notes

Vertex Form – $y = a(x-h)^2 + k$

Standard Form – $y = ax^2 + bx + c$

Factored Form – $y = a(x-r_1)(x-r_2)$

go from root to factor

1. $x = 5$ root $\rightarrow$ $x - 5 = 0$ factor

2. $x = 3/4$ root $\rightarrow$ $4x = 3$, $4x - 3 = 0$ factor

Find the equation of the quadratic given the following information:

FF

1. Roots at $x = -3$ & $x = 4$ with a point at (-5,-9)

① plug in roots $\quad y = a(x+3)(x-4)$

② plug in pt. $\quad -9 = a(-5+3)(-5-4)$

③ solve! $\quad -9 = a(-2)(-9)$

$-9 = 18a$

$-1/2 = a$

$\boxed{y = -1/2(x+3)(x-4)}$

SF

2. Zeros at $x = 1$ & $x = -\frac{2}{3}$ with a point at (2,32)

$y = a(x-1)(3x+2)$ $\quad x = -2/3$

$32 = a(2-1)(6+2)$ $\quad 3x = -2$

$32 = a(1)(8)$ $\quad 3x + 2 = 0$

$32 = 8a$

$4 = a$

$y = 4(x-1)(3x+2)$

$y = 4(3x^2 + 2x - 3x - 2)$

$y = 4(3x^2 - x - 2)$

$\boxed{y = 12x^2 - 4x - 8}$

Word Problems!

3. The length of a rectangle is 5 inches more than twice a number. The width is 4 inches less than the same number. If the area of the rectangle is 15, find the number.

$\boxed{A = 15}$ $\quad x - 4$

$2x + 5$

$(2x+5)(x-4) = 15$

$2x^2 - 8x + 5x - 20 = 15$

$2x^2 - 3x - 35 = 0$

$2x^2 - 10x + 7x - 35 = 0$

$2x(x-5) + 7(x-5) = 0$

$(2x+7)(x-5) = 0$

$2x + 7 = 0 \quad x - 5 = 0$

$\cancel{x = -7/2} \quad \boxed{x = 5}$

4. The equation for a soccer ball kicked into the air is $f(x) = -2x^2 - 6x + 140$, after how many seconds does the ball hit the ground?

$0 = -2x^2 - 6x + 140$

$0 = -2(x^2 + 3x - 70)$

$0 = -2(x+10)(x-7)$

$\cancel{x = -10} \quad \boxed{x = 7}$

7 seconds