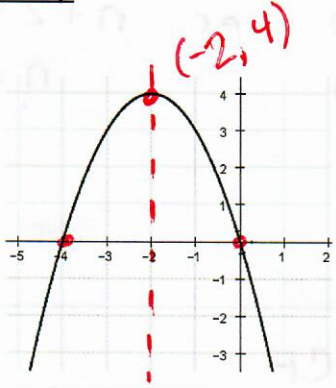
ALG I - §9-4 NOTES

Algebra I Notes

9.4 Solving Quadratic Equations

Objective: To solve quadratic equations by factoring.

Warm-Up

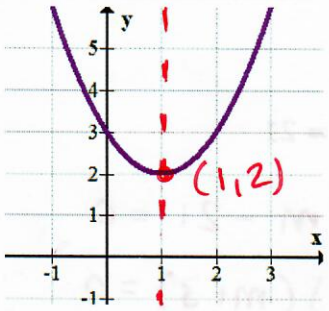
a. 

Axis of Symmetry: $x = -2$

Vertex: $(-2, 4)$

# of Solutions: 2

Solutions: $x = -4$; $x = 0$

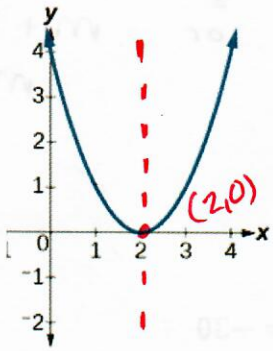
b. 

Axis of Symmetry: $x = 1$

Vertex: $(1, 2)$

# of Solutions: 0

Solutions: No solution

c. 

Axis of Symmetry: $x = 2$

Vertex: $(2, 0)$

# of Solutions: 1

Solutions: $x = 2$

d. Solve $2x^2 - 50 = 0$

$2x^2 = 50$

$\sqrt{x^2} = \sqrt{25}$

$x = \pm 5$

ZERO PRODUCT PROPERTY

For any real numbers a and b, if $a \cdot b = 0$, then $a = 0$ *or* $b = 0$.

$ab = 0$
$a = 0$ or $b = 0$

Example 1 Use the Zero-Product Property to solve each equation.

a. $(4x + 5)(x - 3) = 0$

$4x + 5 = 0$ or $x - 3 = 0$

$4x = -5$ $\quad x = 3$

$x = -\frac{5}{4}$

b. $5n(n + 2) = 0$

$5n = 0$ or $n + 2 = 0$

$n = 0$ $\quad n = -2$

#1 RULE OF FACTORING: Factor out GCF

Example 2 Solve each by factoring.

No GCF

a. $x^2 + 4x - 32 = 0$

$(x + 8)(x - 4) = 0$

$x + 8 = 0$ or $x - 4 = 0$

$x = -8$ $\quad x = 4$

No GCF

b. $m^2 - 4m = 21$

$m^2 - 4m - 21 = 0$

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

$m - 7 = 0$ or $m + 3 = 0$

$m = 7$ $\quad m = -3$

Example 3 Solve each by factoring.

GCF = x

a. $x^3 - 10x^2 + 24x = 0$

$x(x^2 - 10x + 24) = 0$

$x(x - 6)(x - 4) = 0$

$x = 0$ $\quad x - 6 = 0$ $\quad x - 4 = 0$

$x = 6$ $\quad x = 4$

GCF = 3

b. $3a^2 + 33a = -30$

$3a^2 + 33a + 30 = 0$

$3(a^2 + 11a + 10) = 0$

$3(a + 10)(a + 1) = 0$

$a + 10 = 0$ or $a + 1 = 0$

$a = -10$ $\quad a = -1$

Example 4 Solve each by factoring.

a. $3x^2 + 4x - 15 = 0$

NO GCF

$3x \cdot 1x$ $\quad$ $1 \cdot 15$, $3 \cdot 5$

$(3x-5)(x+3)=0$

$3x-5=0$ or $x+3=0$

$3x=5$ $\quad$ $x=-3$

$x=\frac{5}{3}$

b. $2n^2 = 13n + 7$

NO GCF

$2n^2-13n-7=0$

$2n \cdot 1n$ $\quad$ $1 \cdot 7$

$(2n+1)(n-7)=0$

$2n+1=0$ or $n-7=0$

$2n=-1$ $\quad$ $n=7$

$n=-\frac{1}{2}$

c. $4m^2 - 8m = -3$

NO GCF

$4m^2-8m+3=0$

$4m \cdot 1m$, $2m \cdot 2m$ $\quad$ $1 \cdot 3$

$(2m-1)(2m-3)=0$

$-2m$, $-6m$

$2m-1=0$ or $2m-3=0$

$2m=1$ $\quad$ $2m=3$

$m=\frac{1}{2}$ $\quad$ $m=\frac{3}{2}$

NO GCF

d. $8p^2 - 14p + 3 = 0$

$8p \cdot 1p$, $4p \cdot 2p$ $\quad$ $1 \cdot 3$

$(4p-1)(2p-3)=0$

$-2p$, $-12p$

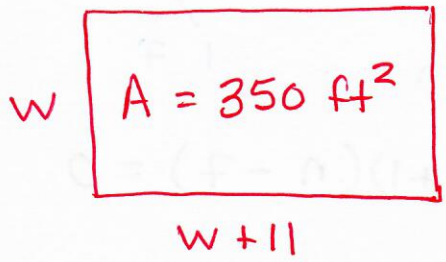
$4p-1=0$ or $2p-3=0$

$4p=1$ $\quad$ $2p=3$

$p=\frac{1}{4}$ $\quad$ $p=\frac{3}{2}$

Example 5 **Application Problem**

The area of a rectangular garden is 350 ft^2. The length of the garden is 11 feet longer than the width. What are the dimensions of the garden?



$A = l\,w$

$350 = (w+11)(w)$

$350 = w^2 + 11w$

$0 = w^2 + 11w - 350$

25 14

350 → 35 10 → 7 5 5 2

$0 = (w + 25)(w - 14)$

$+25w$

$-14w$

$w + 25 = 0$ or $w - 14 = 0$

$w = -25$ $w = 14$

length of rectangle can't be negative

So, $w + 11 = 14 + 11$

$= 25$ ft

The length of the rectangle is 25 ft, and the width is 14 ft