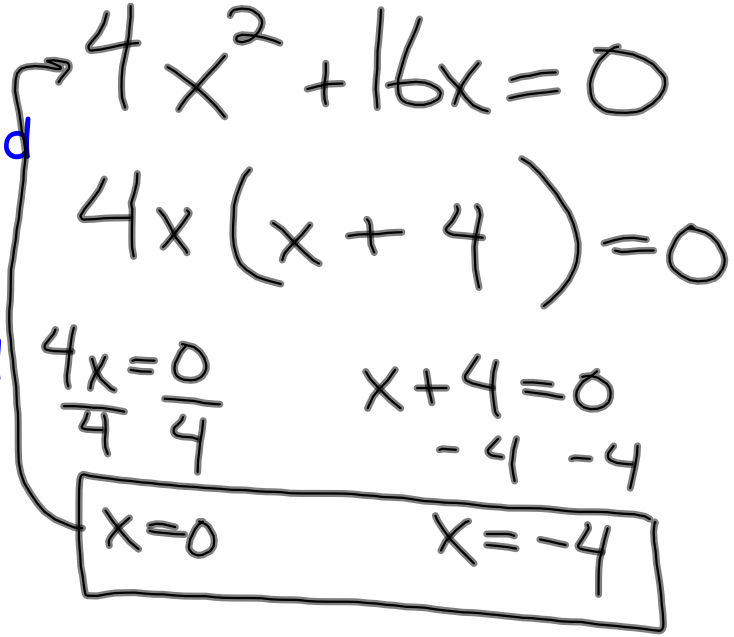
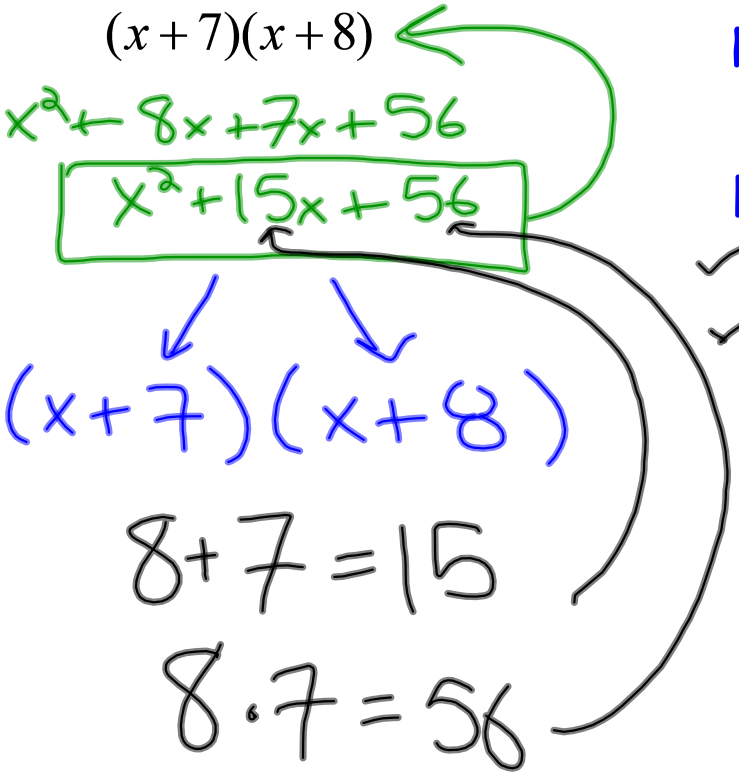
# GCF and Solving Polynomial Practice:

p. 578, 27-38

1. Factor out the GCF (variable and constant)
2. Set each factor = 0
3. Solve each sub-equation to find the solutions



# Factoring $x^2 + bx + c$: $\longrightarrow (x+p)(x+q)$




Reverse-multiply polynomials

Find p and q so that:

- ✓ p + q = b
- ✓ pq = c

# How to factor:

$x^2 + 7x + 12$ (7 = b, 12 = c)

| p | q | p + q | p · q |
|---|---|---|---|
| 1 | 12 | 13 | 12 |
| 2 | 6 | 8 | 12 |
| 3 | 4 | 7 | 12 |
| | | | |
| | | | |

b c

Find all the factors (p and q) of c

See which factors work:

p + q = b

pq = c

$(x+3)(x+4) = x^2 + 4x + 3x + 12$

$= x^2 + 7x + 12$

12

# How to know the signs of *p* and *q*:

| $b$ | $c$ | $p$ | $q$ | $p+q$ | $pq$ |
|---|---|---|---|---|---|
| + | + | + | + | + | + |
| ? | − | − | + | ? | − |
| ? | − | + | − | ? | − |
| − | + | − | − | − | + |

Use the signs of b and c to determine the signs of p and q

$x^2 - 7x + 12$ $(x-3)(x-4)$

$x^2 + x - 12$ $(x+4)(x-3)$

$x^2 - x - 12$ $(x+3)(x-4)$

$x^2 + 7x + 12$ $(x+3)(x+4)$

b c

**Factor the trinomial.**

**1.** $x^2 + 8x + 7$

$(x+7)(x+1)$

**2.** $b^2 - 7b + 10$

$(b-2)(b-5)$

$-1 \quad -10$
$-2 \quad -5$

**3.** $w^2 - 12w - 13$

$(w+1)(w-13)$

$1 \quad -13$

**4.** $p^2 + 10p + 25$

$(p+5)(p+5)$

$1 \quad 25$
$5 \quad 5$

**5.** $m^2 - 10m + 24$

$(m-6)(m-4)$

$-1 \quad -24$
$-2 \quad -12$
$-3 \quad -8$
$-4 \quad -6$

**6.** $y^2 - 5y - 24$

$(y+3)(y-8)$

$1 \quad -24$
$2 \quad -12$
$3 \quad -8$
$4 \quad -6$

# Solve a polynomial equation: $ax^2+bx+c=0$

$$x(x+17)=-60$$

$x^2+17x=-60$

$+60 \quad +60$

$x^2+17x+60=0$

$(x+5)(x+12)=0$

1. Rearrange the equation so that it is equal to 0
2. Factor the resulting polynomial
3. Use the zero-products property

| | |
|---|---|
| 1 | 60 |
| 2 | 30 |
| 3 | 20 |
| 4 | 16 |
| 5 | 12 |
| 6 | 10 |

$x+5=0$ or $x+12=0$

$x=-5$ or $x=-12$

**28.** $n(n + 6) = 7$

$n^2+6n=7$

$-7 \quad -7$

$n^2+6n+-7=0$

$(n + 7)(n - 1)$

$-1 \quad 7$

$n+7=0 \quad n-1=0$

$n=-7$ or $n=1$

**29.** $s^2 + -3(s + 2) = 4$

$s^2+-3s+-6=4$

$-4 \quad -4$

$s^2+-3s+-10=0$

$(s+2)(s-5)$

$s^2+-5s+2s+-10$

$1 \quad -10$

$\rightarrow 2 \quad -5$

$s+2=0 \quad s-5=0$

$s=-2$ or $s=5$

**30.** $d^2 + 18(d + 4) = -9$

$d^2+18d+72=-9$

$+9 \quad +9$

$d^2+18d+81=0$

$(d+9)(d+9)$

$1 \quad 81$

$3 \quad 27$

$\rightarrow 9 \quad 9$

$d+9=0$

$d=-9$

# What does a solution to a polynomial look like?

$x^2 - 5x + 6 = 0$

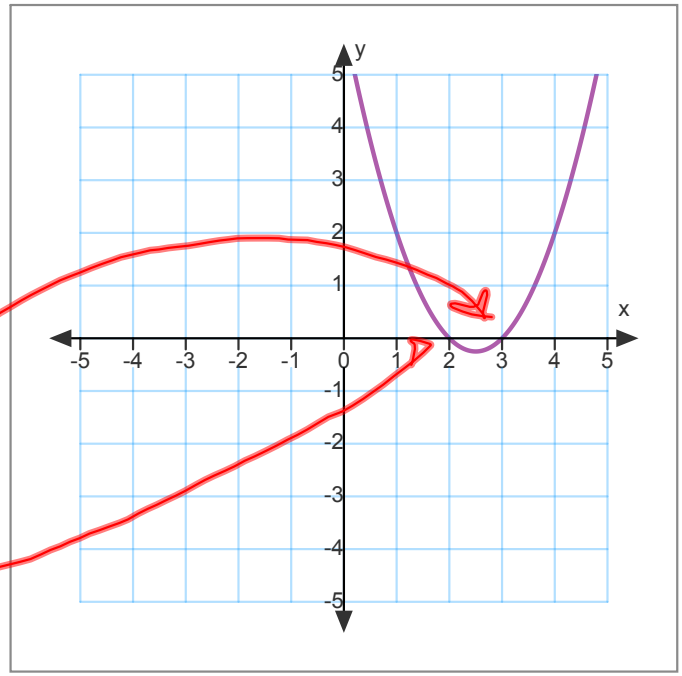
$(x-2)(x-3)$

1 6

2 3

$x-2=0$ $x-3=0$

$x=2$ or $x=3$



# Finding "zeros" of a polynomial function:

$$f(x) = x^2 - 5x - 36$$

$y = x^2 - 5x - 36$

$0 = x^2 - 5x - 36$

$0 = (x + 4)(x - 9)$

1 -36
2 -18
3 -12
4 -9
6 -6

$x + 4 = 0$ $x - 9 = 0$

$x = -4$ or $x = 9$

"f(x)" means y

To solve a polynomial means to find where y = 0 (in other words, find the x-intercept)

So: set f(x) = 0, then solve the resulting equation

**22.** $f(x) = x^2 + 11x + 28$

$-4, -7$

**23.** $g(x) = x^2 + 11x - 12$

$-12, 1$

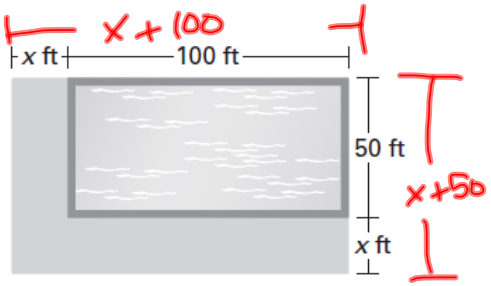
**24.** $h(x) = x^2 + 3x - 18$

$-6, 3$

**Patio Area** A community center is building a patio area along two sides of its pool. The pool is rectangular with a width of 50 feet and a length of 100 feet. The patio area will have the same width on each side of the pool.

**a.** Write a polynomial that represents the combined area of the pool and the patio area.

**b.** The combined area of the pool and patio area should be 8400 square feet. How wide should the patio area be?




$x^2 + bx + c = 0$

$(x+100)(x+50)$

$x^2 + 50x + 100x + 5000$

$x^2 + 150x + 5000 = 8400$

$-8400 \quad -8400$

$x^2 + 150x + {}^{-}3400 = 0$

$(x+170)(x-20)$

$x = -170$ $\quad$ $x = 20$

| | |
|---|---|
| 1 | 3400 |
| 200 | 17 |
| 100 | 34 |
| 40 | 85 |
| -20 | +170 |

$$40 \overline{)3400}\ 85$$

320

200

# Homework:

p. 586, 20-28 all; 31-41 odd; 59, 60