

Previously:

Add polynomials $(2x^2 - 7) +$
 $3x^2 - 10x + 4$ $(x^2 - 3x + 4)$

Multiply polynomials $(2x - 7)(x + 2)$
 $2x^2 - 3x - 14$

Factor out GCF $2x^2 + 4x$
 $2x(x + 2)$

Solve factored polynomials
 $(x + 2)(2x - 4) = 0$

$x + 2 = 0$ $2x - 4 = 0$

$x = -2$ or $x = 2$

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

$$\begin{array}{l} (x+7)(x+8) \\ x^2 + 8x + 7x + 56 \\ x^2 + 15x + 56 \end{array}$$

Reverse-multiply polynomials

Find p and q so that:

$$p + q = b$$

$$pq = c$$

$$(x+p)(x+q)$$

$$x^2 + \boxed{q \cdot x + p \cdot x} + pq$$

$$x^2 + \underline{(p+q)}x + \underline{pq}$$

How to factor: $x^2 + bx + c \rightarrow (x+p)(x+q)$

$$x^2 + 7x + 12$$

Find all the factors (p and q) of c

p	q	p+q (b)	pq (c)
1	12	13	12
2	6	8	12
3	4	7	12

See which factors work:

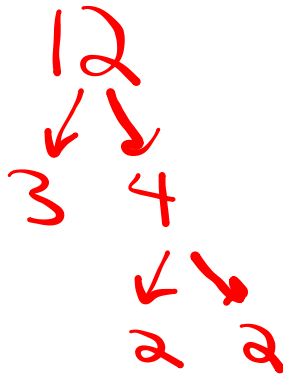
$$p + q = b$$

$$pq = c$$

$$(x+3)(x+4)$$

$$x^2 + 4x + 3x + 12$$

$$x^2 + 7x + 12$$



How to know the signs of p and q :

$$x^2 + bx + c \rightarrow (x+p)(x+q)$$

$b (p+q)$	$c (pq)$	p	q
+	+	+	+
-	+	-	-
-	-	opposite	
+	-	opposite	

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

$$-x^2 + 2x + 1$$

$$-1(x^2 - 2x - 1)$$

$$x^2 + 2x + 3$$

$$x^2 - 6x + 11$$

$$x^2 - 4x - 7$$

$$x^2 + 3x - 4$$

$$\left. \begin{array}{l} x^2 - 6x + 11 \\ x^2 - 4x - 7 \\ x^2 + 3x - 4 \end{array} \right\} (x + \quad)(x - \quad)$$

Factor the trinomial.

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

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

p	q	b(p+q)	c(p·q)
1	7	8	7

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

$$(x+5)^2$$

p	q	b(p+q)	c(p·q)
1	5	10	25

$$(x+5)(x+5)$$

$x^2 - 7x + 10$

2. ~~$b^2 - 7b + 10$~~
 $(x-2)(x-5)$

p	q	b(p+q)	c(p·q)
1	-5	-4	-5

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

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

1	-13	-12	-13
-1	13	12	-13

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

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

1	24	25	24
2	12	14	24
3	8	11	24
4	6	10	24

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

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

1	24	23	
1	-24		
2	12	10	
2	-12		
-3	8	5	-24
3	-8	-5	-24
4	6	2	
4	-6		

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

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

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

$+60 \quad +60$

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

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

$$x + 5 = 0 \text{ or } x + 12 = 0$$

$$x = -5 \text{ or } x = -12$$

→ Simplify and rearrange the equation so that it is in the format shown above

$$x^2 + bx + c = 0$$

Factor the resulting polynomial

$$(x + p)(x + q)$$

Use the zero-products property

$$x + p = 0 \quad x + q = 0$$

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

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

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

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

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

$$\boxed{n = -7 \text{ or } n = 1}$$

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

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

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

$$(s+2)(s-5) = 0$$

$$\begin{array}{l} s+2=0 \quad s-5=0 \\ \boxed{s=-2 \text{ or } s=5} \end{array}$$

$$5, -2$$

$$-2, 5$$

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

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

$$+9 \quad +9$$

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

$$(d+9)(d+9) = 0$$

$$d+9=0$$

$$d = -9$$

What does a solution to a polynomial look like?

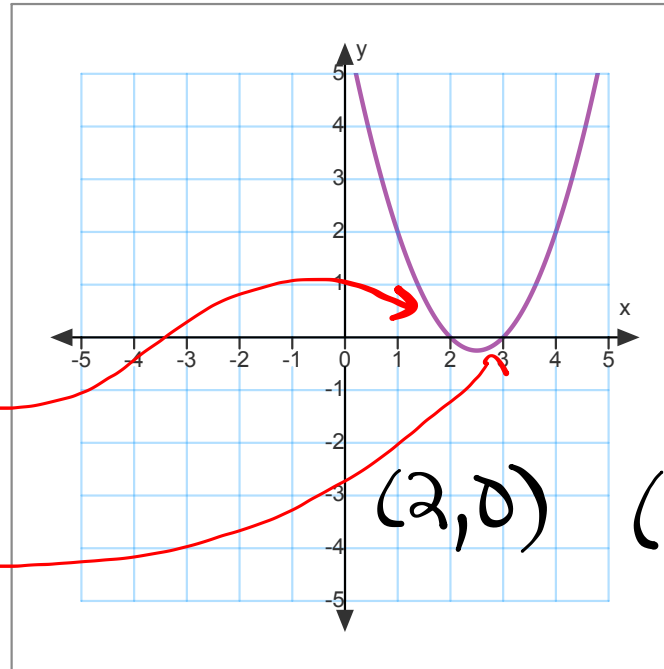
$$x^2 - 5x + 6 = 0$$

$$(x-2)(x-3) = 0$$

$$x-2=0 \quad x-3=0$$

$$x=2 \text{ or } x=3$$

zeros =
Solution =
x-intercepts =
where it crosses the x axis



Finding "zeros" of a polynomial function:

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

"f(x)" means y

$$\begin{array}{r} 1 \ 36 \\ 2 \ 18 \\ 3 \ 12 \\ 4 \ 9 \\ 6 \ 6 \end{array}$$

1. put it in

$x^2 + bx + c = 0$ format

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

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

2. factor

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

3. solve (use ZPP)

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

$$x=-4 \text{ or } x=9$$

So: set $f(x) = 0$, then solve the resulting equation (THIS IS WHAT WE JUST DID!!)

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

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

$$(x+4)(x+7)$$

$$x = -4 \quad x = -7$$

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

$$x^2 + 11x - 12 = 0$$

$$(x+12)(x-1) = 0$$

$$x+12=0 \quad x-1=0$$

$$x = -12 \text{ or } x = 1$$

$$(-12, 0) \text{ or } (1, 0)$$

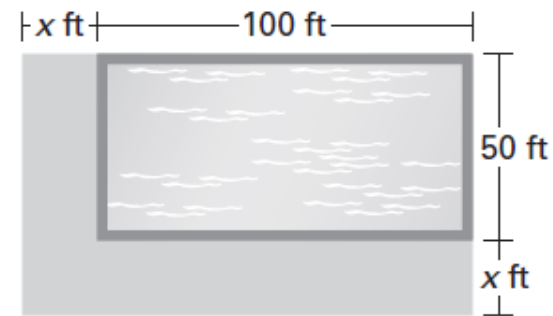
$$-12, 1$$

$$1, -12$$

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

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?



Homework:

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