3.6 - Polynomials of the Form ax^2+bx+c

November 25, 2019 8:30 AM

Expand: $(3d+4)(4d+2) = (3d)(4d) + (3d)(2) + (4)(4d) + (4)(2)$

coefficients

$$= 12d^2 + \underbrace{6d + 16d}_{\text{combine}} + 8$$

$$= 12d^2 + 22d + 8$$

Ex: Expand $(-2g+8)(7-3g)$

	$-2g$	8
7	$(-2g)(7) = -14g$	$(8)(7) = 56$
$-3g$	$(-2g)(-3g) = 6g^2$	$(8)(-3g) = -24g$

$$6g^2 \underbrace{-14g - 24g}_{\text{combine}} + 56$$

$$= 6g^2 - 38g + 56$$

For $\overset{\text{"a" value}}{6}g^2 - \overset{b}{38}g + \overset{c}{56}$,

Notice how we cannot factor the "a" value out of the other terms, yet we know it's factorable since we started with it's factors.

Another example: $4x^2 + 20x + 9$

↳ can't factor a 4 out of every term.... :(

When we factor trinomials that look like this, the resulting binomial factors will be in the form:

$$(ax+b)(cx+d)$$

may have coefficients!

★ The Decomposition Method: ★

Ex: Factor $4x^2 + 20x + 9$

As we know, we can't factor a 4 out of every term ☹ ∴ we use decomp.

① Find your "ac" value. (ie. $ax^2 + bx + c$)

$a \cdot c$

In our case, $4x^2 + 20x + 9$

$a = 4$, $c = 9$, so $ac = (4)(9) = 36$

② Find 2 numbers which multiply to the "ac" value and add to the "b" value:

$\underline{2} + \underline{18} = 20 \rightarrow$ "b"

$\underline{2} \times \underline{18} = 36 \rightarrow$ "ac"

③ Decompose the b value in to these 2 numbers:

$$4x^2 + 20x + 9$$
$$= 4x^2 + 2x + 18x + 9$$

④ Divide the polynomial in half, and factor:

$$4x^2 + 2x + 18x + 9$$

$18x + 9$

$$4x^2+2x \qquad 18x+9$$

$$=2x(2x+1) \qquad =9(2x+1)$$

5. Combine the common factor, and make the last factor from the 2 remaining terms.

$$2x(2x+1) \qquad 9(2x+1)$$

Notice how each side has $(2x+1)$:

$$4x^2+20x+9 = (2x+1)(2x+9)$$

Ex: Factor $3s^2-13s-10$

ac value:

$a=3$
$c=-10$ } $ac=(3)(-10)=-30$

$2 + -15 = -13$
$2 \times -15 = -30$

$$3s^2-13s-10$$

$$=3s^2+2s-15s-10$$

$$3s^2+2s \qquad -15s-10$$

$$=s(3s+2) \qquad -5(3s+2)$$

$$\therefore 3s^2-13s-10 = (3s+2)(s-5)$$

HW: Pg. 177, #5, 6, 8, 10, 12, 13, $\boxed{18/19}$