Warm - up

On the Boards...

Tell me 'everything' you know about ...

$$(2, 9) \quad (-4, -6)$$
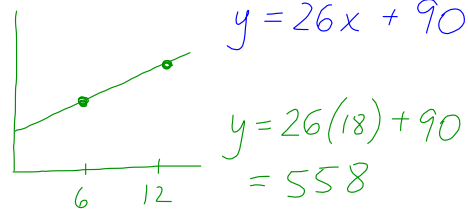
slope $\dfrac{5}{2}$

midpoint

$y = \dfrac{5}{2}x + 4$

distance

Snow Queen Snow Removal charged \$402 for 12 snow removals one winter and charged \$246 for 6 snow removals another winter. Snow Queen's rates have remained the same price for the last seven years.

What would Snow Queen charge if it snows 18 times this winter?

x	y
6	246
12	402
18	558

+6,)+156
+6,)+156

$y = 26x + 90$

$y = 26(18) + 90$
$= 558$

6   12

Adding, Subtracting and Multiplying Polynomials

Learning Goals
- Simplify polynomial expressions by adding and subtracting

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Polynomial - is an algebraic expression in the form

$$a_o + a_1x + a_2x^2 + a_3x^3 + ... + a_nx^n$$

coefficients

last term

ex. $5x^2 + 2x + 1$

Adding and Subtracting Polynomials

Rule - add or subtract like terms only

Like Terms - terms with the same variable and exponent

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ex. $5x + 2x$

$= 7x$

$5a + 7b + 3a$

$= 8a + 7b$

$5a^2 + 2a + 3a^2 - 5a$

$= 8a^2 - 3a$

Multiplying Polynomials

Rule - use the distributive property

Distributive Property - multiply each term in one polynomial with all the terms in the other polynomial

ex. rainbow, FOIL

ex. $(3x)(5x)$

$$= 15x^2$$

$(3x)(5x+1)$

$$= 15x^2 + 3x$$

Simplify   **On the Boards...**

$x + 2x$ $3x$

$2x(3x)$ $6x^2$

$2x + 3x^2 + 4x$ $6x + 3x^2$

$2x + 3x^2 + 7x^3 - 5x^2$ $2x - 2x^2 + 7x^3$

$2xy + 2x^2 + 3yx - 7y^2$ $5xy + 2x^2 - 7y^2$

Ans

Evaluate

x^2 when $x = -1$

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

$x^3 + x^2$ when $x = -1$

$$x^3 + x^2 = (-1)^3 + (-1)^2$$
$$= -1 + 1$$
$$= 0$$

Expand and Simplify   On the Boards...

$(3x+2)(5x+1)$ $2(3x-1)^2$

$$= 15x^2 + 3x + 10x + 2$$ $$= 2(3x-1)(3x-1)$$
$$= 15x^2 + 13x + 2$$ $$= 2(9x^2 - 3x - 3x + 1)$$
$$= 18x^2 - 12x + 2$$

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

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

On the Boards...

Change in Area

A rectangle is three times as long as it is wide. If the width is increased by 1 and the length is decreased by 1, which rectangle has the larger area and by how much?

$3w$

w ⬚

$3w-1$

⬚ $w+1$

$A_1 = \ell w$
$\quad = 3w(w)$
$\quad = 3w^2$

$A_2 = \ell w$
$\quad = (3w-1)(w+1)$
$\quad = 3w^2 + 2w - 1$
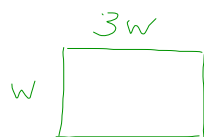
Difference $\quad 2w-1$

$2w - 1 = 0 \qquad w = \frac{1}{2} \quad$ same

$2w - 1 > 0 \qquad w > \frac{1}{2} \quad A_2$

$2w - 1 < 0 \qquad w < \frac{1}{2} \quad A_1$

$w > 0$

Seatwork

Handout

MCR 3U   **2.1 Adding and Subtracting Polynomials**
                 2.2 Multiplying Polynomials

Some worked examples …

1. Simplify by "collecting like terms"

a) $x + 2x$ b) $2x + 3x^2 + 4x$ c) $2x + 3x + 7x^2 + 2x^2$ d) $2xy + 2x^2 + 3xy$

2. Expand and Simplify

a) $(3x)(2x)$ b) $2(x - 2)$ c) $2x(x - 2) - 3(x^2 - x)$ d) $5(x - 3) - (-2x - 3)$

3. Expand and Simplify Binomials $(x - 2)(x + 3)$

Method #1 "FOIL"   Method #2 "boxes"

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

4. Expand and Simplify … $(x - 2)(x^2 + 2x + 3)$

Method #1 Distributive Law   Method #2 "boxes"

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

Some practice for you …

1. Expand and Simplify

a) $(-3x^2 - x + 1) + (x^2 + 2x - 1)$ b) $(x^4 - 2x^3 - 3) - (2x^4 + 4x^3 + 2x - 1)$

c) $3(x^2 + 4x - 2) - 3(x^2 - 5x)$ d) $3x(4x - 2) - (x^2 - 5x)$

2. Expand and Simplify

a) $(x + 3)(x - 10)$ b) $(x + 1)^2$ c) $(2x + 1)(3x - 2)$

3. Expand and Simplify …

a) $(x - 2)(x^2 - 2x + 3)$ b) $(2 - 5y)(3 - 2y + y^2)$

4. Expand and Simplify $2(x - 3)(x + 3) - 4(x - 1)^2$

MCR 3U   **2.1 Adding and Subtracting Polynomials**
         2.2 Multiplying Polynomials   *Answers*

Some worked examples …

1. Simplify by "collecting like terms"

a) $x + 2x$ b) $2x + 3x^2 + 4x$ c) $2x + 3x + 7x^2 + 2x^2$ d) $2xy + 2x^2 + 3xy$

$= 3x$ $= 3x^2 + 6x$ $= 9x^2 + 5x$ $= 2x^2 + 5xy$

2. Expand and Simplify

a) $(3x)(2x)$ b) $2(x - 2)$ c) $2x(x - 2) - 3(x^2 - x)$ d) $5(x - 3) - (-2x - 3)$

$= 6x^2$ $= 2x - 4$ $= 2x^2 - 4x - 3x^2 + 3x$ $5x - 15 + 2x + 3$
                                          $= -x^2 - x$ $= 7x - 12$

3. Expand and Simplify Binomials $(x - 2)(x + 3)$

Method #1 "FOIL"   Method #2 "boxes"

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

	x	-2
x	x^2	$-2x$
$+3$	$3x$	-6

$= x^2 + 3x - 2x - 6$
$= x^2 + x - 6$ $= x^2 + x - 6$

4. Expand and Simplify … $(x - 2)(x^2 + 2x + 3)$

Method #1 Distributive Law   Method #2 "boxes"

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

	x^2	$2x$	3
x	x^3	$2x^2$	$3x$
-2	$-2x^2$	$-4x$	-6

$= x^3 + 2x^2 + 3x - 2x^2 - 4x - 6$
$= x^3 + 0x^2 - 1x - 6$ $= x^3 - x - 6$
$= x^3 - x - 6$

MCR 3U

Some practice for you …

1. Expand and Simplify

a) $(-3x^2 - x + 1) + (x^2 + 2x - 1)$ b) $(x^4 - 2x^3 - 3) - (2x^4 + 4x^3 + 2x - 1)$

$-2x^2 + x$ $-x^4 - 6x^3 - 2x - 2$

c) $3(x^2 + 4x - 2) - 3(x^2 - 5x)$ d) $3x(4x - 2) - (x^2 - 5x)$

$27x - 6$ $11x^2 - x$

2. Expand and Simplify

a) $(x + 3)(x - 10)$ b) $(x + 1)^2$ c) $(2x + 1)(3x - 2)$

$x^2 - 7x - 30$ $x^2 + 2x + 1$ $6x^2 - x - 2$

3. Expand and Simplify …

a) $(x - 2)(x^2 - 2x + 3)$ b) $(2 - 5y)(3 - 2y + y^2)$

$x^3 - 4x^2 + 7x - 6$ $-5y^3 + 12y^2 - 19y + 6$

4. Expand and Simplify $2(x - 3)(x + 3) - 4(x - 1)^2$

$-2x^2 + 8x - 22$

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