

Addition and Subtraction: Combine the **terms** that are alike in each expression (simplify).

1. $2 + x + 5$

2. $13 - 2y - 5 + 6y$

3. $3x + 4y + 12 - 7y + 6 + 4x - 2 + 13y$

4. $7 + 3x^2 + 3 + 2x^2$

5. $x^2 - 2 + 5x^2 + 15$

6. $-4 + 7 + y^2 - 3x^2 + 22 - 5y^2$

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

8) $y^3 + x^3 + y^3 + x^3$

9) $(14x + 5) + (10x + 5)$

10) $(19x^2 + 12x + 12) + (7x^2 + 10x + 13)$

11) $(6x + 14) - (9x + 5)$

Multiplication: Simplify by distributing the **monomial** with the **binomial**. Draw **arrows** to indicate all terms have been distributed.

12) $3(x + 5)$

13) $2y(y - 2)$

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

Simplify by distributing the **monomial** with the **trinomial**. Draw arrows to indicate that all terms have been distributed.

$$(5)(3x^2 + 2x + 6) = 5 \cdot 3x^2 + 5 \cdot 2x + 5 \cdot 6 = 15x^2 + 10x + 30$$

15) $(-3x)(-4x^2 - 10x + 12)$

16) $(-2x)(11x^3 - 10x^2 + 4x + 6)$

How do we do this?

$$u = a + b$$

$$(a + b)(c + d)$$

$$(x + 2)(x + 6)$$

Simplify by distributing the **binomial** with another **binomial**. Draw arrows to indicate that all terms have been distributed.

$$(x+2)(x+6) = x \cdot x + x \cdot 6 + 2 \cdot x + 2 \cdot 6 = x^2 + 6x + 2x + 12 = x^2 + 8x + 12$$

16) $(9x + 7)(6x + 4)$

17) $(6x + 3)(-5x + 2)$

18) $(16x - 19)(8x - 8)$

Based on what you know about multiplying polynomials using the distributive property. Discover on your own how to simplify by distributing the binomial with the trinomial. **Draw arrows** to indicate that all terms have been distributed.

19) $(2x - 3)(4x^2 + x - 6)$

Write in your own words the definition or provide an example of the following terms based on the information from this task. Each vocabulary word can be found underlined throughout the task.

20) Term -

21) Polynomial -

22) Monomial -

23) Binomial -

24) Trinomial -

A polynomial can have constants, variables and exponents, but never division by a variable.

constants (like 3, -20, or $\frac{1}{2}$)

variables (like x and y)

exponents (like the 2 in y^2), but only 0, 1, 2, 3, ... etc are allowed

... not division by a variable (so something like $2/x$ is right out)

Polynomial or Not?

exponents: 0, 1, 2, ...

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

terms

A Polynomial

$$3xy^{-2}$$

$$\frac{2}{x+2}$$

Not Polynomials

Expand

$$(x + 4)^2$$

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

Learning Check

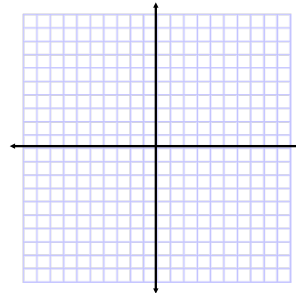
Students can...

simplify the following expressions:

1. $(x+4)(x-2)$ 2. $(x+1)(2x^2 + 2x - 1)$

3. $(2x+4)^2$

Quadratic



$f(x) = x^2$

X	Y

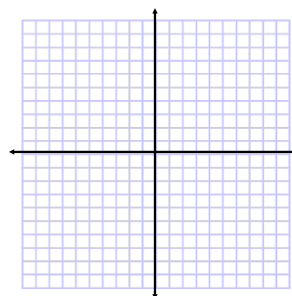
Vertex: _____

Ends: _____

How many times does a quadratic cross the x-axis?

y-axis?

Cubic



$f(x) = x^3$

X	Y

Inflection point:

Ends:

How many times does a Cubic cross the x-axis?

y-axis?

Quadratic (cont.)

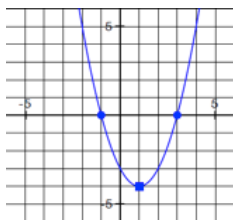
Graphing Form: $f(x) = a(x - h)^n + k$

(h, k) Quadratic: Vertex
Cubic: inflection point

What do you notice about the signs of (h,k)?

x's lie!

What is the vertex of the following quadratic?



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

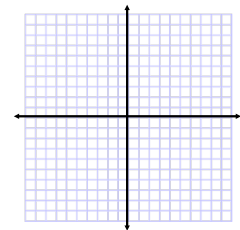
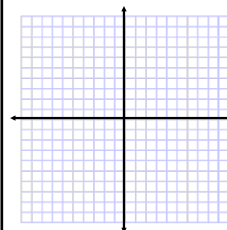
Vertex: _____

Vertex: _____

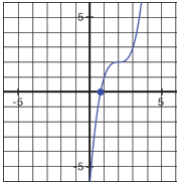
Find the vertex and graph.

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

$$g(x) = (x + 4)^2 - 2$$



What is the inflection point of the following cubic?



$$f(x) = (x - 5)^3 + 7$$

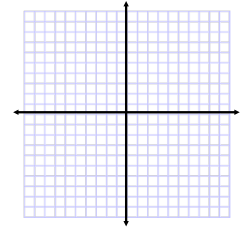
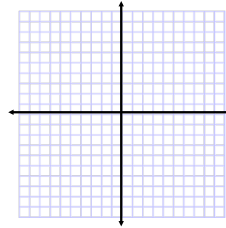
Inflection Point: _____

Inflection Point: _____

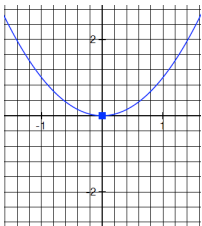
Find the inflection point and graph:

$$f(x) = (x - 5)^3 + 7$$

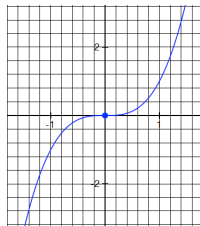
$$g(x) = (x + 3)^3 - 2$$



Symmetry



Even: symmetric about y-axis



Odd: symmetric about origin

Even, Odd, or Neither?

