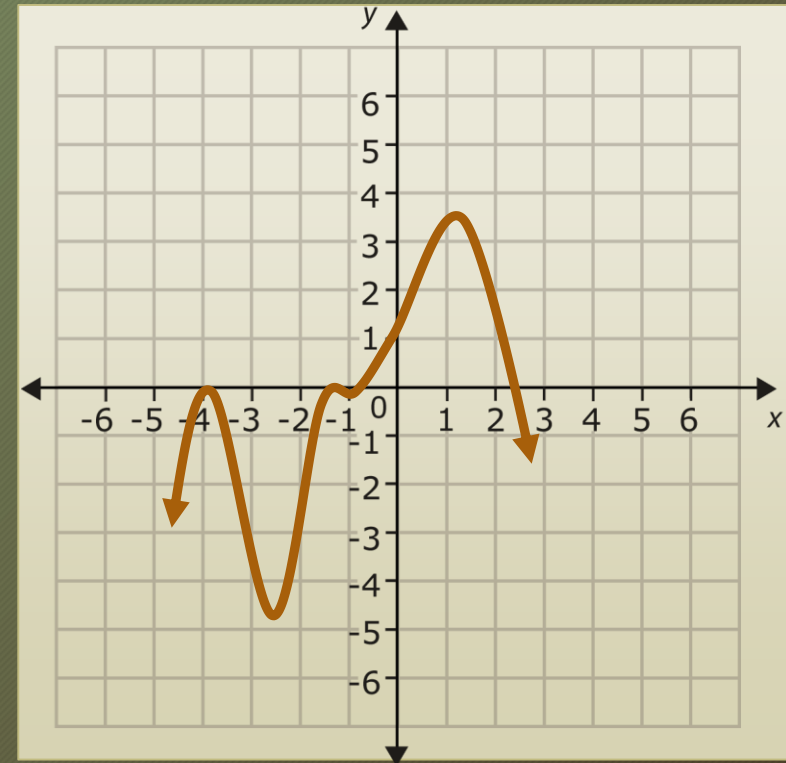


Polynomial Equations and Functions



Warm Up: What do you remember?

1. Factor: $12r^3 - 9r^2 + 4r - 3$
2. If the factors of a polynomial are $(3k^2 + 1)(4k - 3)$, what are the roots?
3. A) Name the solutions to the graph at the right:
B) Name the degree for the graph at the right:
C) Name the multiplicity of each zero:
4. Name the translation for the following function:
$$f(x) = -2(x - 3)^3 - 4$$
5. Name the y intercept of the following function:
$$f(x) = 12x^4 - x^3 + 2x + 5$$



Evaluate, simplify, and factor polynomial expressions

- Evaluate: plug in a number and simplify the expression

$$f(3) = 2r^3 + 5r^2 - r - 3$$

- Simplify: Do whatever operations you can. Do not make up your own rules. However you simplify you must follow the rules in math.

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

- Factor: This is the opposite of simplifying. You are finding what multiplies to get the original problem. Often this will be done by grouping for a polynomial.

1. $f(r) = 12r^3 - 9r^2 + 4r - 3$

Find minimum/maximum values, domain/range of functions.

Minimum: lowest point on a curve

Maximum: highest point on a curve

These can be relative or absolute.

Relative - talking about a specific section of the graph

Absolute - talking about over the whole graph

Domain - x values of a graph (how far left to how far right)

Range - y values of a graph (how low to how high)

Zeroes, X - intercepts, Solutions, Roots

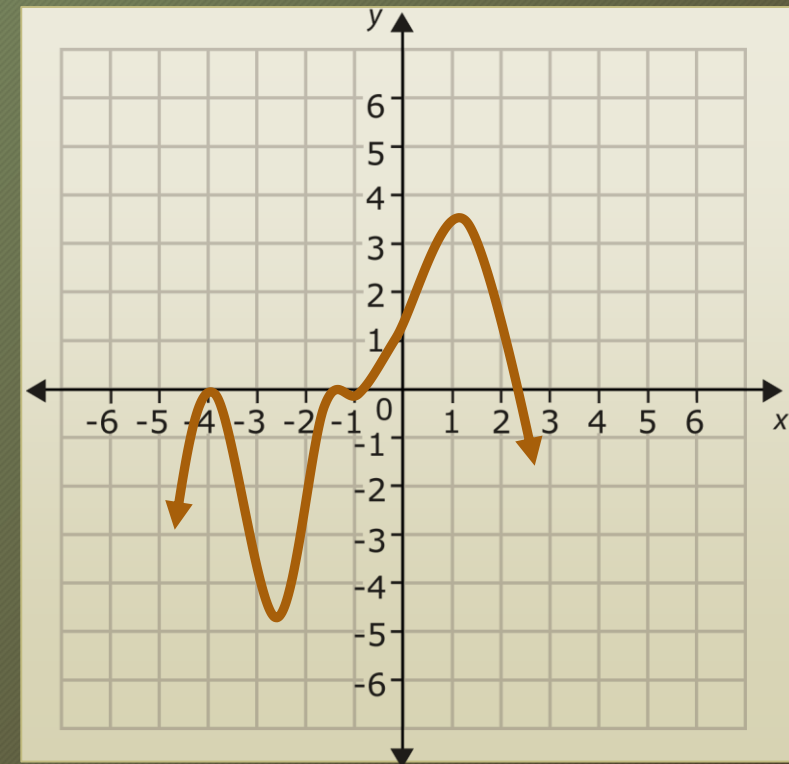
These all mean the same thing!

2. If the factors of a polynomial are $(3k^2 + 1)(4k - 3)$, what are the roots?

Multiplicity occurs when you have repeat solutions (2 cause a bounce, 3 flattens and goes through)

Degree: add up all of the x-intercepts including their multiplicity

3. A) Name the solutions to the graph at the right:
B) Name the degree for the graph at the right:
C) Name the multiplicity of each zero:



Translations for Quadratics and Cubics

$$f(x) = a(x - h)^2 + k$$

Vertex: (h, k)

Horizontal translation: opposite of h

Vertical translation: k

If a is negative it reflects over the x axis

If a is between 0 and 1 or 0 and -1 it is a stretch (makes it fat)

If a is greater than 1 or less than -1 it's a skew (makes it skinny)

$$f(x) = a(x - h)^3 + k$$

inflection point: (h, k)

4. Name the translation for the following function:

$$f(x) = -2(x - 3)^3 - 4$$

Y-intercept, Degree, and Number of Turns

Y-intercept: where it crosses the y-axis on a graph or what the value is when $x = 0$ in an equation.

5. Name the y intercept of the following function:

$$f(x) = 12x^4 - x^3 + 2x + 5$$

Degree: When looking at the equation it's the highest exponent

Number of turns = degree - 1

Calculator Tricks

Put the function into the $y =$ part on your calculator

To find the Maximum/Minimum:

2nd Trace (calc)

Choose Maximum or Minimum

Move spider man to the left side of your max/min press ENTER

Move spider man to the right side of your max/min press ENTER ENTER

To find the x-intercepts:

2nd Trace (calc)

Choose zero

Move spider man to the left side of your x-int press ENTER

Move spider man to the right side of your x-int press ENTER ENTER

Practice Problems:

Simplify:

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

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

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

4. $(x + 2)^2$

5. Evaluate the previous problems at $x = 6$

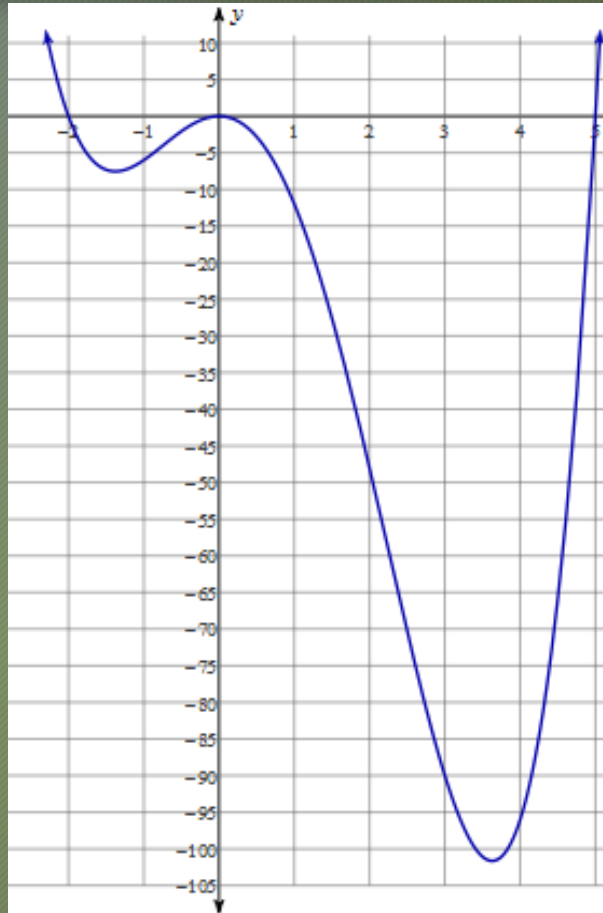
6. Factor: $x^2 - 4x - 12$

7. Factor: $54x^2 + 108x + 48$

8. Factor: $12x^3 - 9x^2 - 16x + 12$

...and these

9. Given the graph at the right:
 - a. Name the degree
 - b. Name all relative maximums
 - c. Name all relative minimums
 - d. Name the absolute maximum
 - e. Name the absolute minimum
 - f. Name the roots and their multiplicities



10. Given the equation:

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

Describe the translation from the parent graph, make sure to include vertex/inflection point, reflections and stretch/skew.

11. What is the y-intercept of the equation above?

12. Use your calculator to find the max/min and zeroes of the following equation:

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