Translate Graphs of Polynomial Functions

Compare the function with the graph of $f(x) = x^3$.

1. $g(x) = x^3 + 4$

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

3. $h(x) = (x - 4)^3 + 2$

4. $f(x) = (x + 2)^3 + 1$

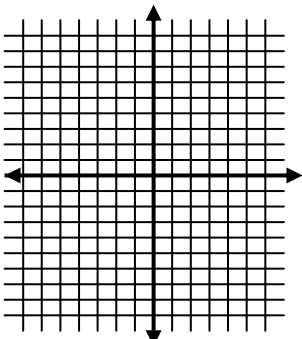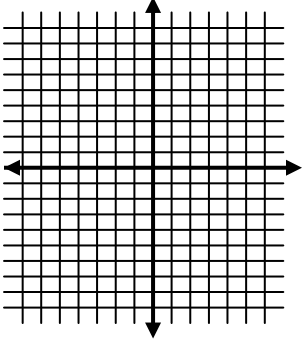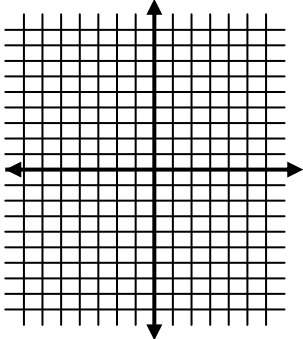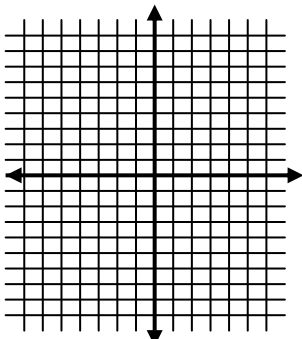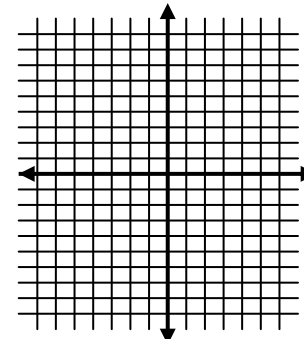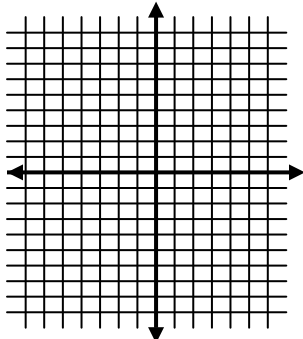Compare the function with the graph of $f(x) = x^4$.

1. $g(x) = x^4 + 3$

2. $f(x) = (x - 1)^4$

3. $h(x) = (x + 5)^4 - 2$

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

Name : _____

Do you Remember?...

x	f(x)
2	
1	
0	
-1	
-2	

Linear

Equation:

Domain:

Range:

x	f(x)
2	
1	
0	
-1	
-2	

Absolute Value

Equation:

Domain:

Range:

x	f(x)
2	
1	
0	
-1	
-2	

Quadratic

Equation:

Domain:

Range:

x	f(x)
2	
1	
0	
-1	
-2	

Cubic

Equation:

Domain:

Range:

x	f(x)

Square Root

Equation:

Domain:

Range:

x	f(x)

Rational

Equation:

Domain:

Range:

Full Name	
Time Frame	**6 weeks - Unit 5**
Unit Name	**Polynomials**
Learning Task/Topics/ Themes	**Simple Polynomial Translations of $f(x) = ax^n$**
Standards **and** Elements	**MM3A1 – Students will analyze graphs of polynomial functions of higher degree.** **a. Graph simple polynomial functions as translations of the function $f(x) = ax^n$.**
Lesson Essential Questions	How do you graph simple translations of the function $f(x) = ax^n$?
Activator	Use the graphic organizer, Basic Functions, to review the parent graphs from Math 1 and 2.
Vocabulary	Translation, Polynomial Function, Cubic, Quartic, Quintic
Work Session	Guided Practice – Polynomial Functions Translations Graphic Organizer Over Cubics, Quartics, and Quintics Student Independent Practice – Translate Polynomial Functions Worksheet
Summarizing/Closing/Formative Assessment	Think-Pair-Share Students create a translation of a graph written in function notation. Have students switch papers. Students tell the translation for one another's problem.

Polynomial Function
$f(x) = x^3$

Plot the points and sketch the graph below.

Complete the table of values.

x	f (x)
-2	
-1	
0	
1	
2	

Why is this called a cubic function?
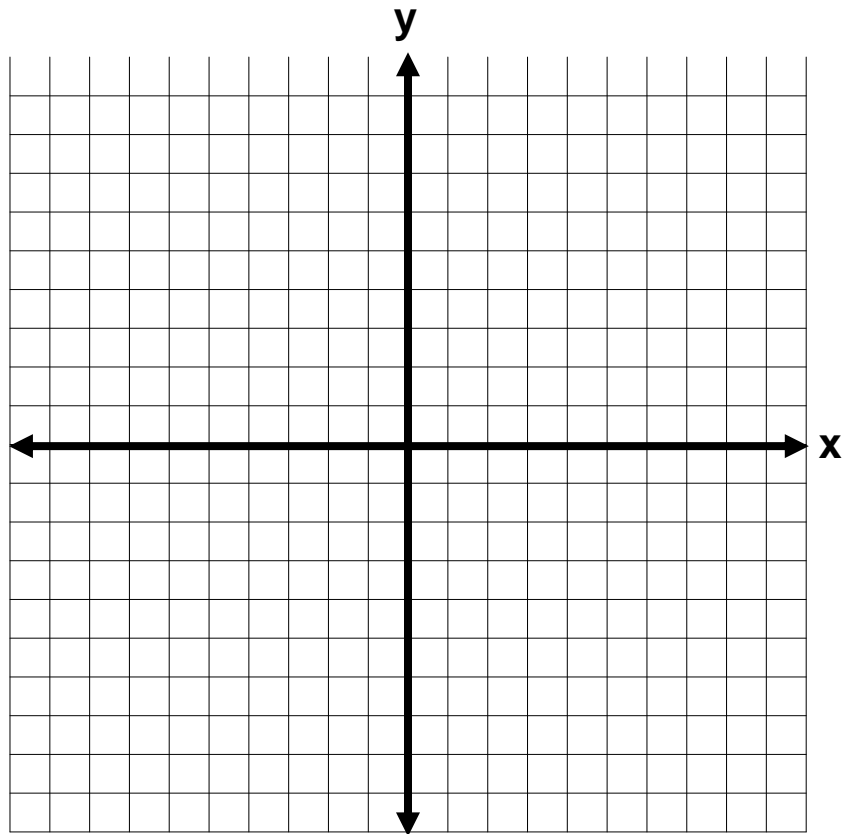
y

x

What is the x-intercept?

What is the y-intercept?

What is the domain?

What is the range?

How could this graph be shifted up or down?

Families Of Cubic Functions in the Form of $f(x) = x^3 + n$

Graph each of the following functions in different colors on the graph at the right.

$$f(x) = x^3 + 4$$

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

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

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

How are the graphs alike?	How are the graphs different?

How would the graph of $f(x) = x^3 - 3$ compare to the graph of $f(x) = x^3$?

How would the graph of $f(x) = x^3 + 4$ compare to the graph of $f(x) = x^3$?

How would the graph of $f(x) = (x - 2)^3$ compare to the graph of $f(x) = x^3$?

Polynomial Function $f(x) = x^4$

Plot the points and sketch the graph below.

Complete the table of values.

x	f (x)
-2	
-1	
0	
1	
2	
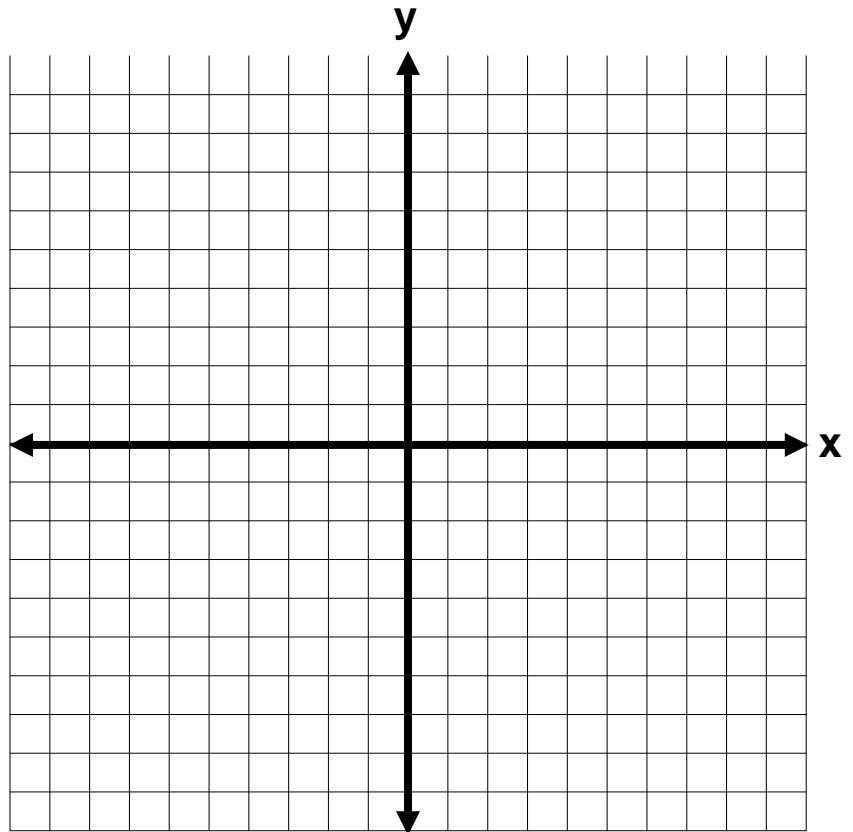
Why is this called a quartic function?

y

x

What is the x-intercept?

What is the y-intercept?

What is the domain?

What is the range?

How could this graph be shifted up or down?

Graph each of the following functions in different colors on the graph at the right.

$$f(x) = x^4 + 3$$

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

$$f(x) = (x - 1)^4$$

$$f(x) = (x + 2)^4$$
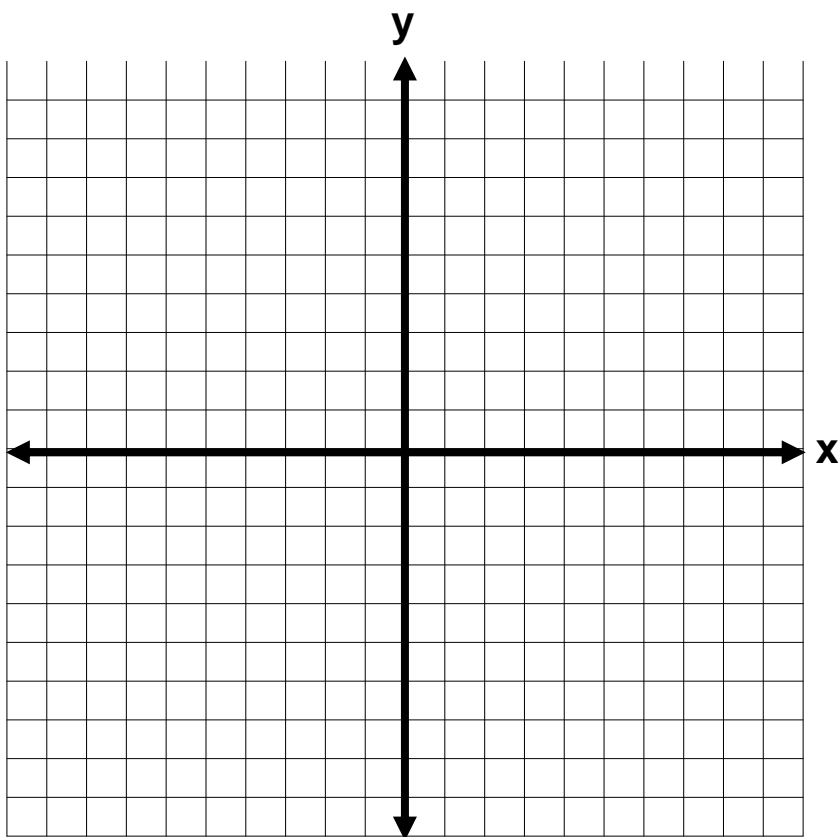
How are the graphs alike?	How are the graphs different?

How would the graph of $f(x) = x^4 - 2$ compare to the graph of $f(x) = x^4$

How would the graph of $f(x) = x^4 + 3$ compare to the graph of $f(x) = x^4$

How would the graph of $f(x) = (x - 5)^4$ compare to the graph of $f(x) = x^4$
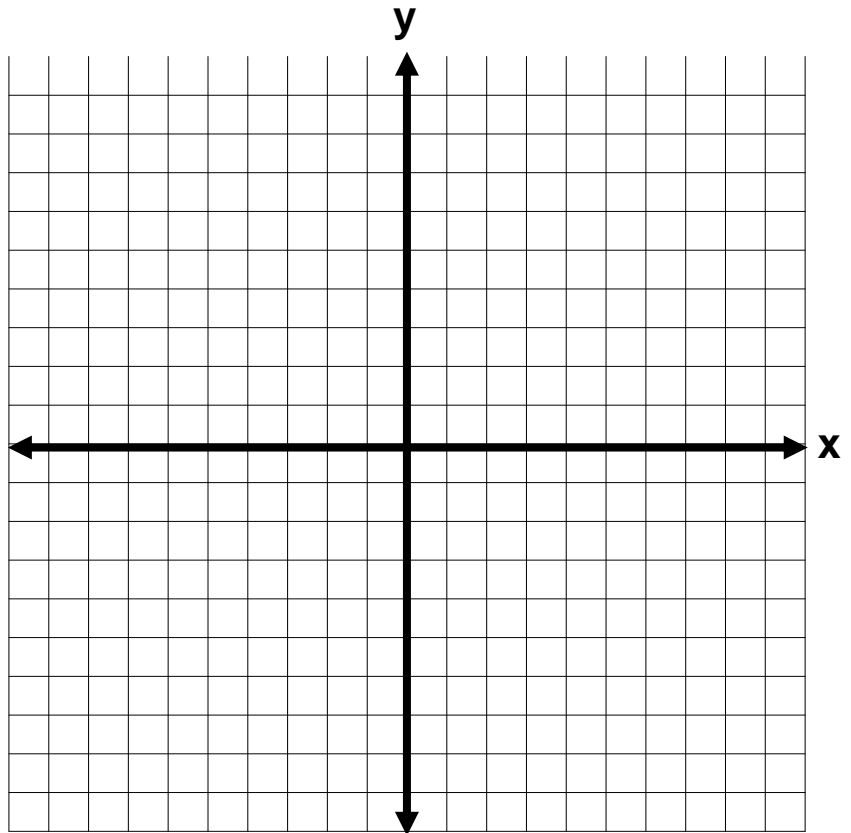
Polynomial Function $f(x) = x^5$

Plot the points and sketch the graph below.

Complete the table of values.

x	f (x)
-2	
-1	
0	
1	
2	

Why is this called a quintic function?

y

x

What is the x-intercept?

What is the y-intercept?

What is the domain?

What is the range?

How could this graph be shifted up or down?

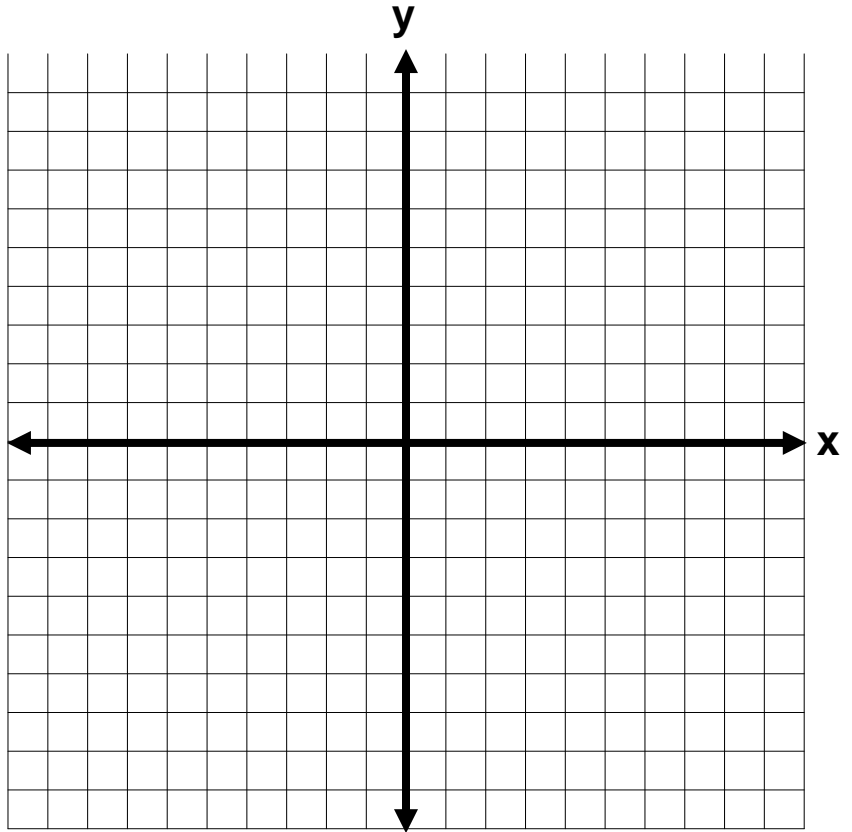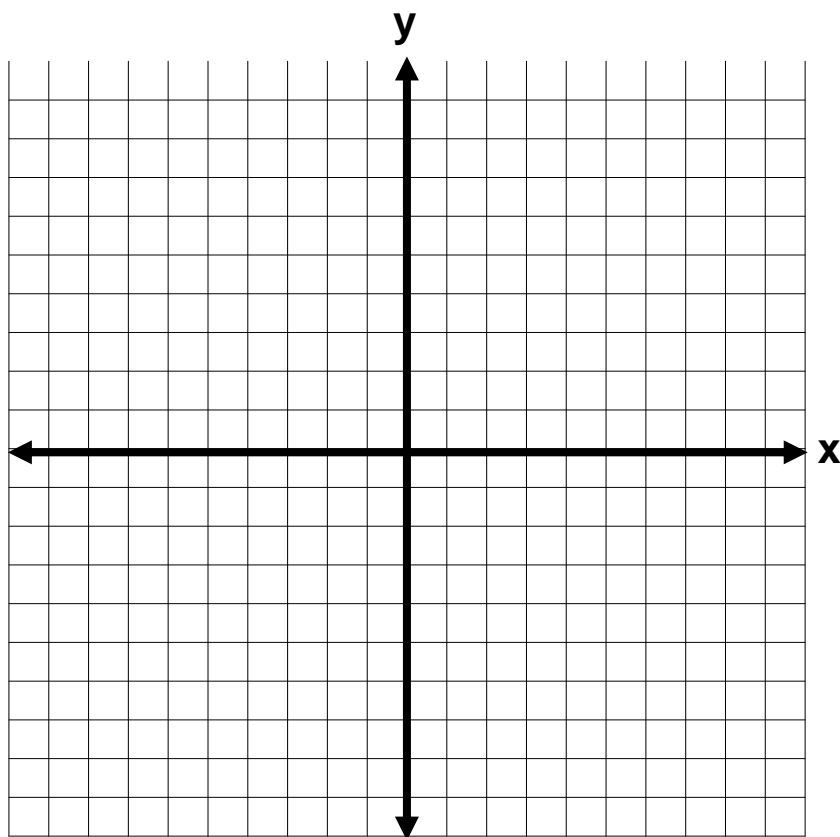## Families Of Quintic Functions in the Form of $f(x) = x^5 + n$

Graph each of the following functions in different colors on the graph at the right.

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

$$f(x) = x^5 + 2$$

$$f(x) = (x + 4)^5$$

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

y

x

How are the graphs alike?

How are the graphs different?

How would the graph of $f(x) = x^5 - 4$ compare to the graph of $f(x) = x^5$?

How would the graph of $f(x) = x^5 + 2$ compare to the graph of $f(x) = x^5$?

How would the graph of $f(x) = (x + 1)^5$ compare to the graph of $f(x) = x^5$?