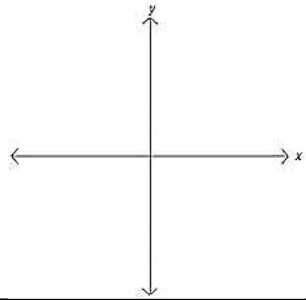
Algebra 2
Polynomials and End Behavior

Name:
Date: Period:

A graphing calculator or graphing app on a mobile device is required.

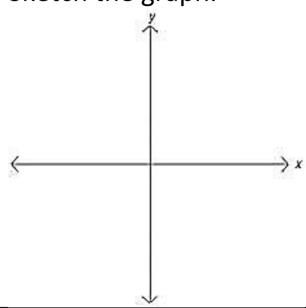
1. Graph $y = x^4$

Sketch the graph.



2. Graph $y = x^6$

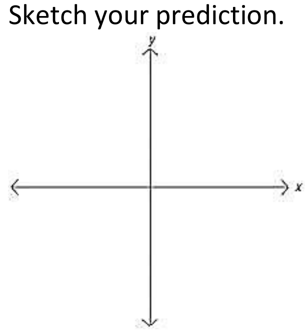
Sketch the graph.



3. WITHOUT graphing predict what the graph of $y = x^8$ looks like.

   After you graph your prediction, check it on a graphing calculator. Was your prediction correct?

Sketch your prediction.

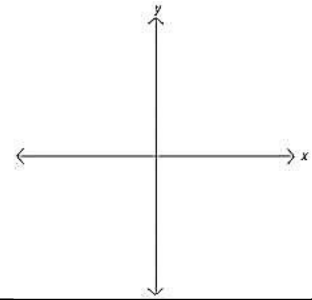


How are these equations similar?

How are the graphs similar?

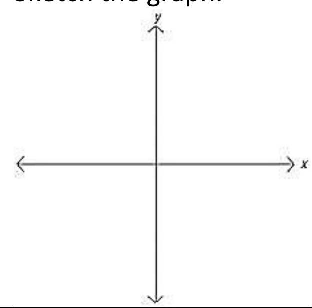
4. Graph $y = x^3$

Sketch the graph.



5. Graph $y = x^5$

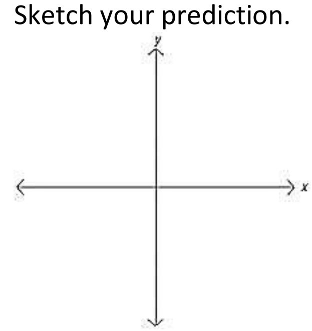
Sketch the graph.



6. WITHOUT graphing predict what the graph of $y = x^7$ looks like.

   After you graph your prediction, check it on a graphing calculator. Was your prediction correct?

Sketch your prediction.

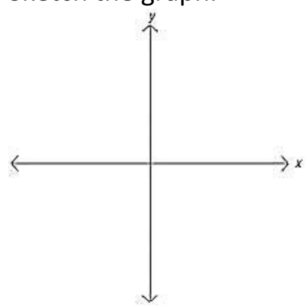


How are these equations similar?

How are the graphs similar?

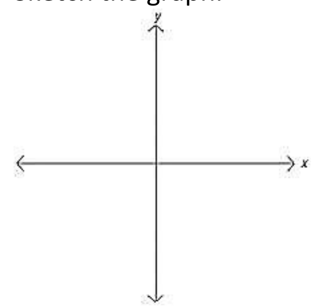
7. Graph $y = -x^4$

Sketch the graph.



8. Graph $y = -x^3$

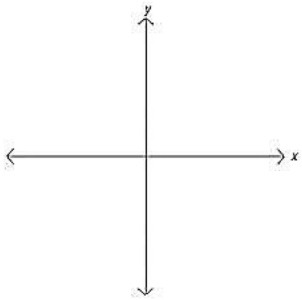
Sketch the graph.



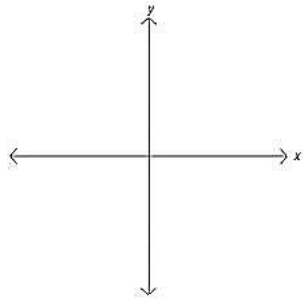
How does the negative change the graphs above?

9. Graph $y = 5x^6 - 3x^3 - 5x^2$ in the given windows.

[-2, 2] x [-4, 8]



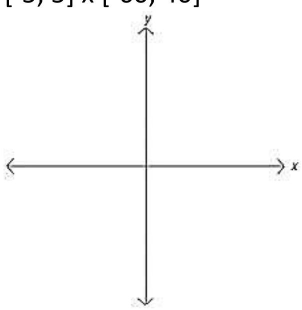
[-10, 10] x [-30000, 30000]



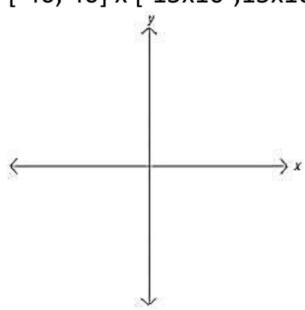
What does the graph look like now?

10. Graph $y = x^4 - 3x^3 - 6x^2$ in the given windows.

[-5, 5] x [-60, 40]



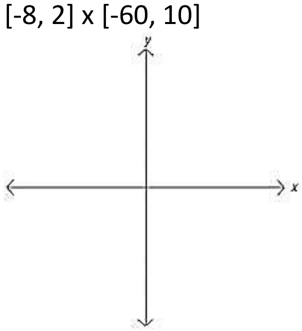
[-40, 40] x [-15x10^4,15x10^4]



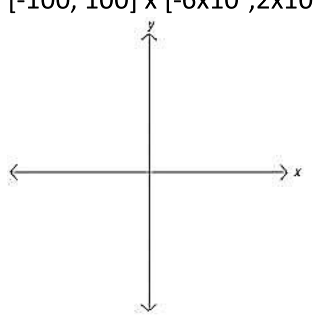
What does the graph look like now?

11. Graph $y = -\frac{1}{4}x^4 - 3x^3 - 10x^2$ in the given windows.

[-8, 2] x [-60, 10]



[-100, 100] x [-6x10^5,2x10^5]



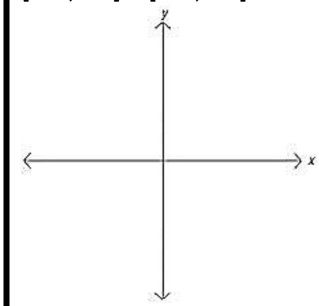
What does the graph look like now?

Compare the degree of each function above. What do they have in common?

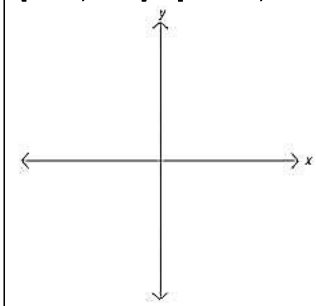
Compare the graphs in the BIG window. Are there any patterns between the degree and these graphs?

12. Graph $y = x^3 - 3x^2 - 6x$ in the given windows.

[-10, 10] x [-20, 10]



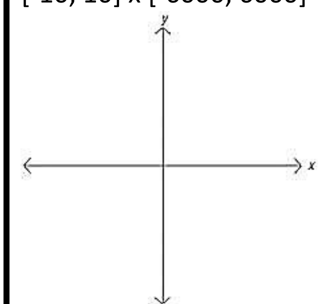
[-100, 100] x [-3x10^5,3x10^5]



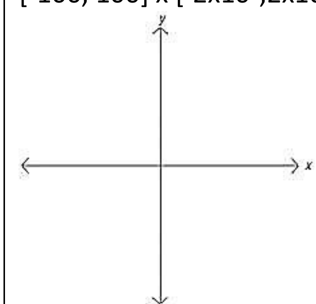
What does the graph look like now?

13. Graph $y = \frac{1}{2}x^7 + 3x^6 - 100x^2 - 50.$

[-10, 10] x [-6000, 6000]



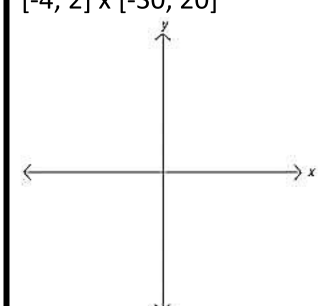
[-100, 100] x [-2x10^9,2x10^9]



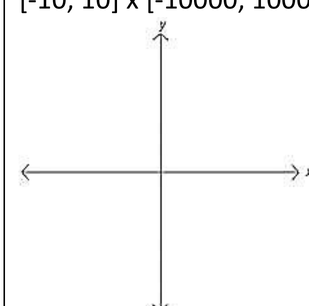
What does the graph look like now?

14. Graph $y = -\frac{1}{4}x^5 - x^4 - 3x^3 - 10x^2 + 4.$

[-4, 2] x [-30, 20]



[-10, 10] x [-10000, 10000]



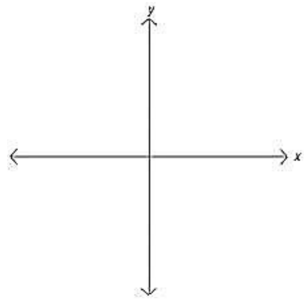
What does the graph look like now?

Compare the degree of each function above. What do they have in common?

Compare the graphs in the BIG window. Are there any patterns between the degree and these graphs?

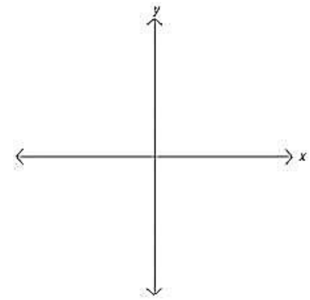
Predict what the graph of each function will look like in a BIG window.

15. $y = -\frac{1}{2}x^6 - 25x^3 - 120.$ Sketch your prediction.



After you graph your prediction, check it on a graphing calculator. Was your prediction correct?

16. $y = \frac{3}{8}x^3 + 2x^2 - 8x$ Sketch your prediction.



After you graph your prediction, check it on a graphing calculator. Was your prediction correct?

Can you make a prediction about what the graph looks like in a small window? Explain your reasoning.

Predicting what the graph looks like in a very big window gives us the idea of **End Behavior**. More specifically, end behavior is a description of what happens to a function as *x* gets really, really, really big (goes to ∞) and as *x* gets really, really, really small (goes to –∞).

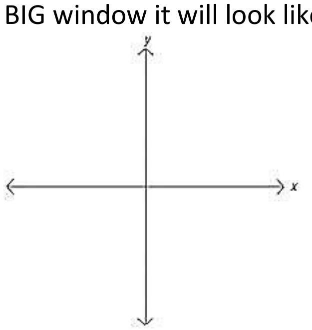
Here's a couple of things you need to know:

→ The end behavior of a polynomial is determined by its *degree* (highest exponent) and *leading coefficient* (number in front of the term with the highest exponent).

→ End behavior is usually indicated by drawing the positions of the arms of the graph, which may be pointed up or down.

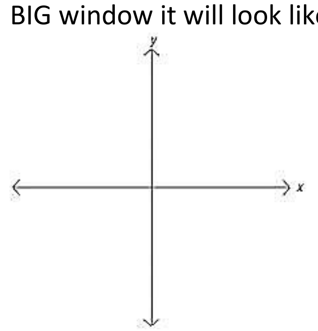
For example, the end behavior of the function in…

#15 is determined by the term $-\frac{1}{2}x^6$. This means that in a BIG window it will look like…



and can be indicated like this…

#16 is determined by the term $\frac{3}{8}x^3$. This means that in a BIG window it will look like…



and can be indicated like this…