

GRAPHING POLYNOMIALS

End Behaviors

Number of Turns

STANDARDS

MCC9-12.F.IF.7

Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

MCC9-12.F.IF.7c

Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.

ESSENTIAL QUESTIONS

1. How can the degree and sign of the leading coefficient of a polynomial function be used to determine the end behavior of that function?
2. How can the degree and sign of the leading coefficient of a polynomial function be used to determine the number of turns of that function?

IDENTIFY THE LEADING COEFFICIENT

IDENTIFY THE DEGREE OF THE POLYNOMIAL

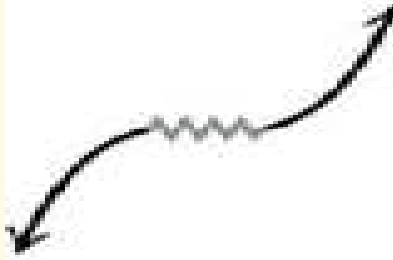
GRAPHING POLYNOMIALS –END BEHAVIOR

- Using the degree and the leading coefficient, you can predict the shape of any polynomial.

Leading coefficient is positive			
Degree is even			
			
As $x \rightarrow -\infty$, $y \rightarrow \infty$ As $x \rightarrow \infty$, $y \rightarrow \infty$			

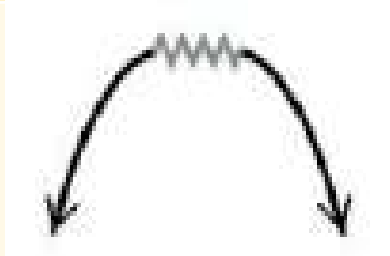
GRAPHING POLYNOMIALS –END BEHAVIOR

- Using the degree and the leading coefficient, you can predict the shape of any polynomial.

Leading coefficient is positive			
Degree is even	Degree is odd		
			
As $x \rightarrow -\infty$, $y \rightarrow \infty$ As $x \rightarrow \infty$, $y \rightarrow \infty$	As $x \rightarrow -\infty$, $y \rightarrow -\infty$ As $x \rightarrow \infty$, $y \rightarrow \infty$		

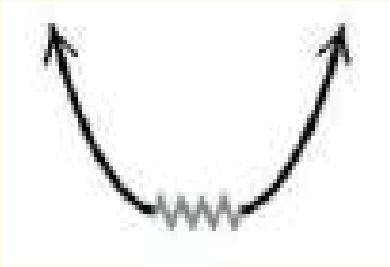
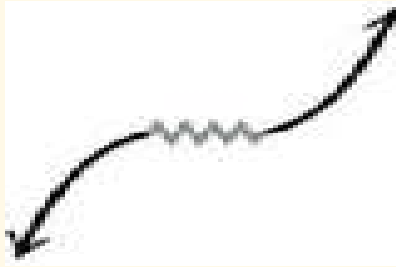
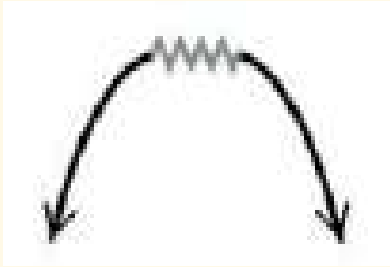
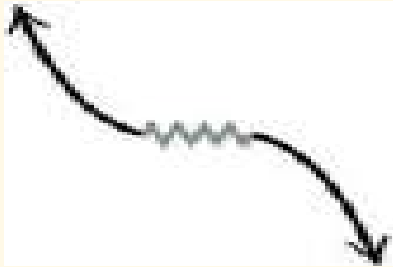
GRAPHING POLYNOMIALS –END BEHAVIOR

- Using the degree and the leading coefficient, you can predict the shape of any polynomial.

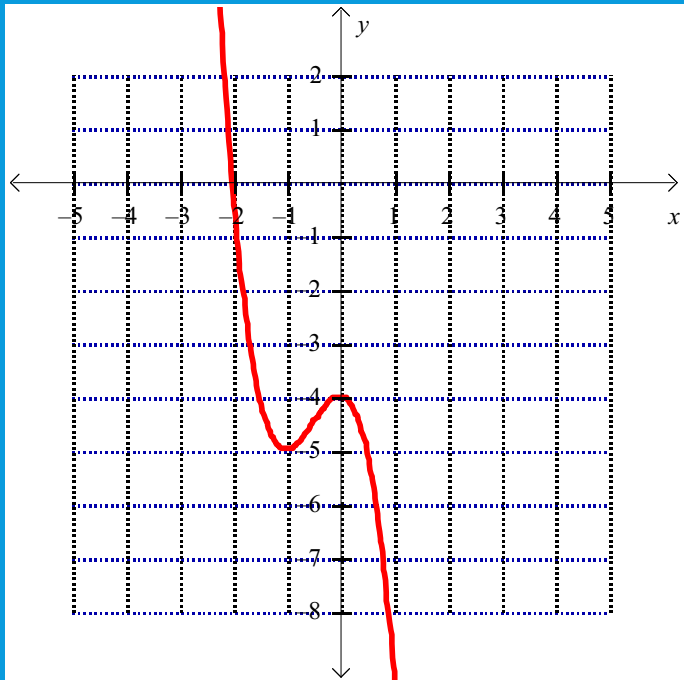
Leading coefficient is positive		Leading coefficient is negative	
Degree is even	Degree is odd	Degree is even	
			
As $x \rightarrow -\infty$, $y \rightarrow \infty$ As $x \rightarrow \infty$, $y \rightarrow \infty$	As $x \rightarrow -\infty$, $y \rightarrow -\infty$ As $x \rightarrow \infty$, $y \rightarrow \infty$	As $x \rightarrow -\infty$, $y \rightarrow -\infty$ As $x \rightarrow \infty$, $y \rightarrow -\infty$	

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WHICH POLYNOMIAL IS REPRESENT BY THE GRAPH BELOW?



a) $2x^3 - 3x^2 - 4$

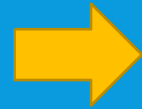
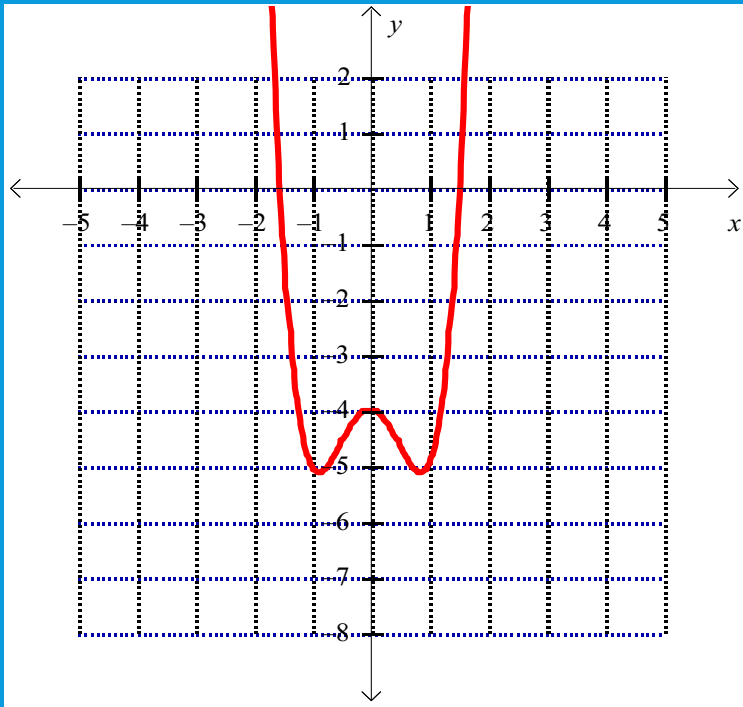


b) $-2x^3 + 3x^2 - 4$

c) $2x^4 - 3x^2 - 4$

d) $-2x^4 + 3x^2 - 4$

WHICH POLYNOMIAL IS REPRESENT BY THE GRAPH BELOW?



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

The following polynomial has which shape?

$$f(x) = -4x^7 - 6x^5 + 4x^3 - 2x^2 - 3x + 4$$

degree: odd
leading coefficient: negative

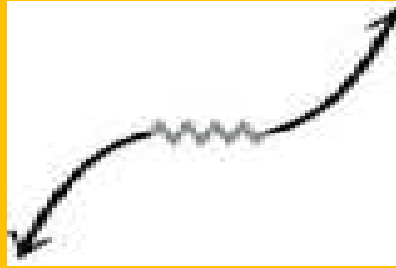


a.



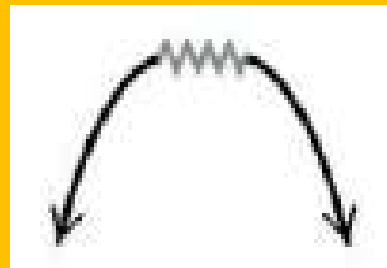
As $x \rightarrow -\infty$, $y \rightarrow \infty$
As $x \rightarrow \infty$, $y \rightarrow \infty$

b.



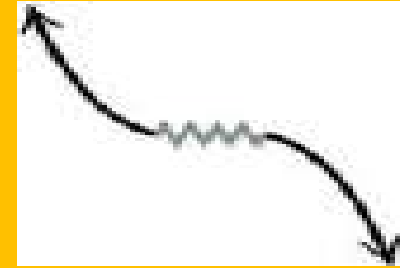
As $x \rightarrow -\infty$, $y \rightarrow -\infty$
As $x \rightarrow \infty$, $y \rightarrow \infty$

c.



As $x \rightarrow -\infty$, $y \rightarrow -\infty$
As $x \rightarrow \infty$, $y \rightarrow -\infty$

d.



As $x \rightarrow -\infty$, $y \rightarrow \infty$
As $x \rightarrow \infty$, $y \rightarrow -\infty$

The following polynomial has which shape?

$$f(x) = 4x^8 - 6x^6 + 4x^3 - 2x^2 - 3x + 4$$



degree: even

leading coefficient: positive

a.



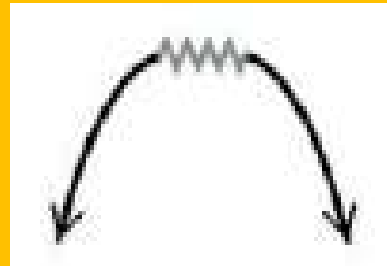
As $x \rightarrow -\infty$, $y \rightarrow \infty$
As $x \rightarrow \infty$, $y \rightarrow \infty$

b.



As $x \rightarrow -\infty$, $y \rightarrow -\infty$
As $x \rightarrow \infty$, $y \rightarrow \infty$

c.



As $x \rightarrow -\infty$, $y \rightarrow -\infty$
As $x \rightarrow \infty$, $y \rightarrow -\infty$

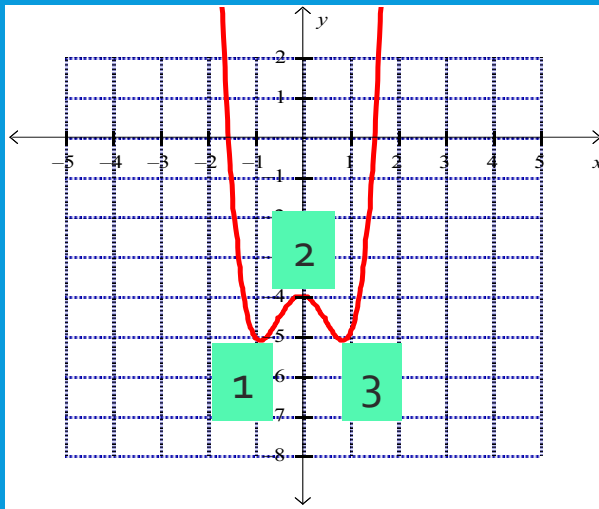
d.



As $x \rightarrow -\infty$, $y \rightarrow \infty$
As $x \rightarrow \infty$, $y \rightarrow -\infty$

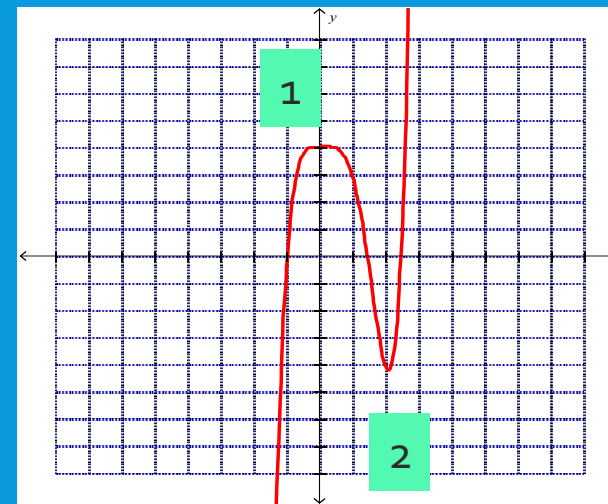
NUMBER OF TURNS

The graph of a polynomial will have at most its degree minus 1 turns.



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

This is a polynomial with a degree of 4. It has three turns.



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

This is a polynomial with a degree of 5. It has only two turns.

HOMework

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Graphing Polynomial Functions:
Basic Shape