

Algebra 2      5.3

Evaluate polynomial functions

Identify general shapes of polynomial function graphs

parent graph

degree

Quiz 5.1-5.2

coefficient

leading coefficient

function notation

end behavior

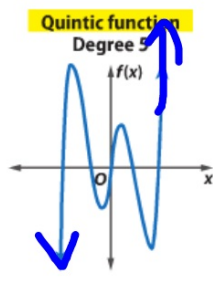
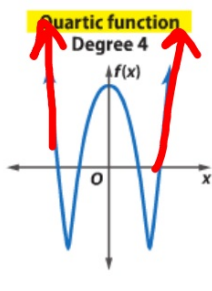
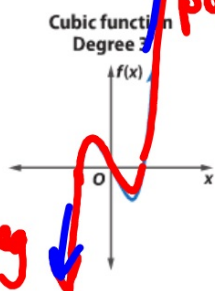
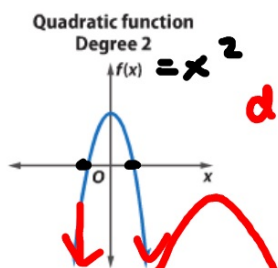
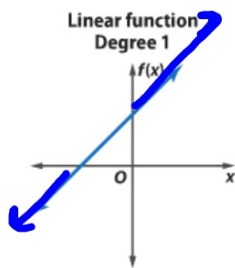
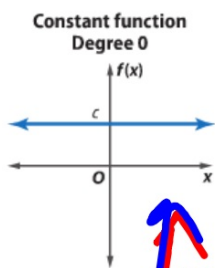
even function

odd function

activity: graph matching

Kroon says

**2 Graphs of Polynomial Functions** The general shapes of the graphs of several polynomial functions show the *maximum* number of times the graph of each function may intersect the  $x$ -axis. This is the same number as the degree of the polynomial.



p. 324

$d = \text{degree}$   
 $d - 1$  # crossing points  $x$ -int  
 # max/min (turning points)  
**AT MOST**  
 end behavior

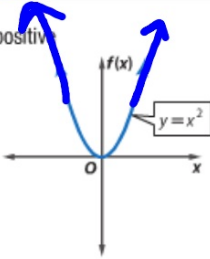
degree even  
 ↑↑      ↓↓  
 degree odd  
 ↓↑      ↑↓

Kroon says...  
degree  
end behavior

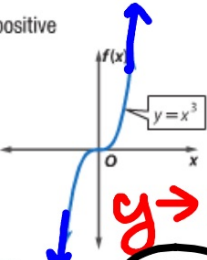
even vs odd

**Key Concept** End Behavior of a Polynomial Function

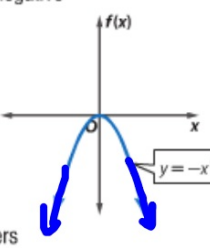
**Degree:** even  $x^2$   
**Leading Coefficient:** positive  
**End Behavior:**  
 $f(x) \rightarrow +\infty$   
 as  $x \rightarrow -\infty$   
 $f(x) \rightarrow +\infty$   
 as  $x \rightarrow +\infty$   
 Domain: all real numbers  
 Range: all real numbers  $\geq$  minimum



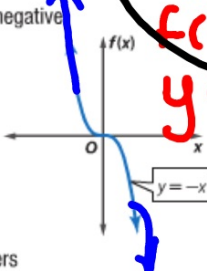
**Degree:** odd  
**Leading Coefficient:** positive  
**End Behavior:**  
 $f(x) \rightarrow -\infty$   
 as  $x \rightarrow -\infty$   
 $f(x) \rightarrow +\infty$   
 as  $x \rightarrow +\infty$   
 Domain: all real numbers  
 Range: all real numbers



**Degree:** even  
**Leading Coefficient:** negative  
**End Behavior:**  
 $f(x) \rightarrow -\infty$   
 as  $x \rightarrow -\infty$   
 $f(x) \rightarrow -\infty$   
 as  $x \rightarrow +\infty$   
 Domain: all real numbers  
 Range: all real numbers  $\leq$  maximum



**Degree:** odd  
**Leading Coefficient:** negative  
**End Behavior:**  
 $f(x) \rightarrow +\infty$   
 as  $x \rightarrow -\infty$   
 $f(x) \rightarrow -\infty$   
 as  $x \rightarrow +\infty$   
 Domain: all real numbers  
 Range: all real numbers



$y \rightarrow \infty$  if  $x \rightarrow \infty$   
 $y \rightarrow -\infty$  if  $x \rightarrow -\infty$

Not have to know the code:  
 $y$  does this..... when  $x$  does this....

$y$  up/down if right  
 if left

$x \rightarrow \infty$   
 $x \rightarrow -\infty$

**Example 4** Graphs of Polynomial Functions

PT

For each graph,

- describe the end behavior,
- determine whether it represents an odd-degree or an even-degree polynomial function, and
- state the number of real zeros.

a.   
 b.

a.

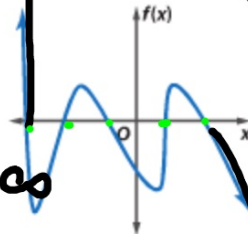


even  
2 real zeros

down → rt  
 $f(x) \rightarrow -\infty$  if  $x \rightarrow \infty$

down → left  
 $f(x) \rightarrow -\infty$  if  $x \rightarrow -\infty$

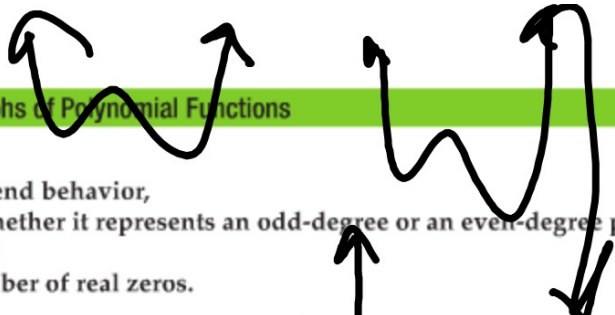
b.



down - right  
 $f(x) \rightarrow -\infty$  if  $x \rightarrow \infty$

up - left  
 $f(x) \rightarrow \infty$  if  $x \rightarrow -\infty$

say it first... then translate (code)  
"y does this..."  
"when x does this..."

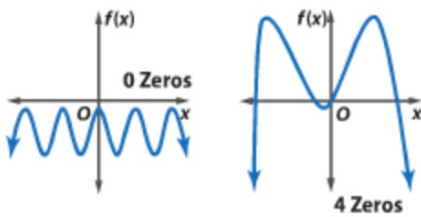


matching activity

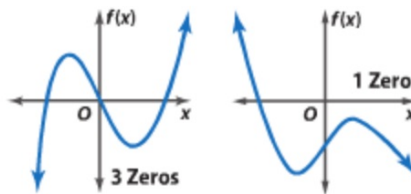
**KeyConcept** Zeros of Even- and Odd-Degree Functions

Odd-degree functions will always have an odd number of real zeros. Even-degree functions will always have an even number of real zeros or no real zeros at all.

Even-Degree Polynomials



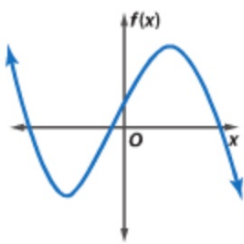
Odd-Degree Polynomials





► **Guided** Practice

4A.



4B.

