

## Who is the Fairest of Them All?

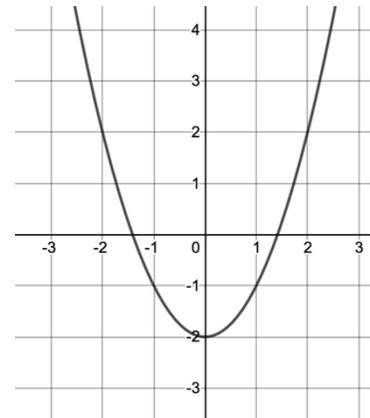


Symmetry in everyday language refers to a sense of harmonious and beautiful proportion and balance. There's even research says that we rate symmetric faces as being more attractive! Today we will investigate further what it means for functions to be symmetric and how we might predict the symmetry of a graph from its equation.

1. The graph of  $f(x) = x^2 - 2$  is below. What do you notice about the symmetry of  $f$ ?

2. Fill in the table of values for  $f(x)$ .

$x$	$f(x)$
-4	
-2	
0	
2	
4	



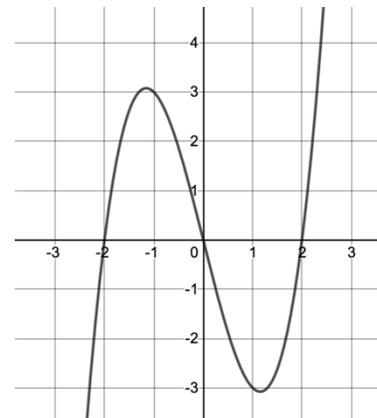
3. What patterns do you notice in the ordered pairs?

4. Given an equation of a function, how could you check if the function has y-axis symmetry without looking at a graph?

5. The graph of  $g(x) = x^3 - 4x$  is below. What do you notice about the symmetry of  $g$ ?

6. Fill in the table of values.

$x$	$g(x)$
-4	
-1	
0	
1	
4	



7. What patterns do you notice in the ordered pairs?

8. Given an equation of a function, how could you check if the function is symmetric across the origin without looking at a graph?

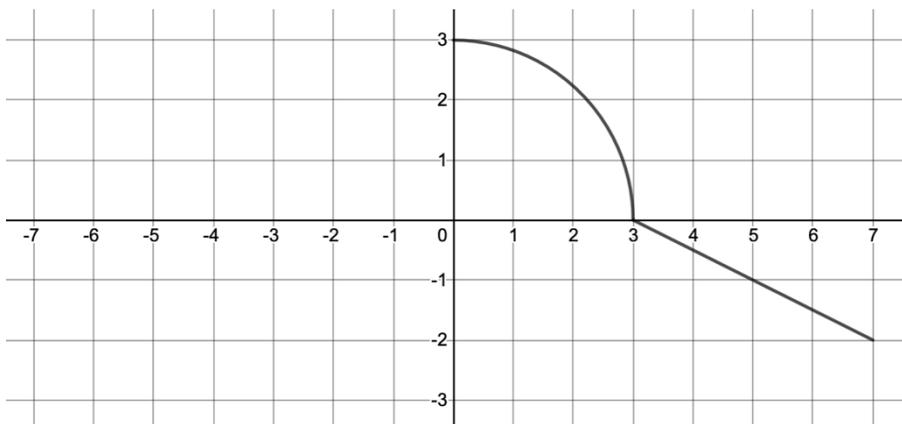
9. How symmetric is Anne Hathaway's face? (See photo above). How can you tell?

## Lesson 2.3 – Even and Odd Functions

QuickNotes

### Check Your Understanding

1. Half of the graph of an *odd* function is shown below. Sketch the other half of the function.



2. If  $(3, -18)$  is on the graph of an *even* function, what other point is guaranteed to be on the graph?
3. Is  $y = x^5 + x^3 + 3$  an even function, an odd function, or neither? Prove your answer algebraically.
4. True or false: If the statement is true, explain *why* it must be true using the definitions of even and odd functions. If it is false, provide a counterexample.
  - a. All even functions go through the origin.
  - b. If each term in a polynomial function has an even exponent, the function is even.