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#### **Analyzing Key Features of Graphs**

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Objectives:

-Compare linear/nonlinear equations -Describe important "key features" of graphs

# ONE IMPORTANT THING TO NOTICE...

Did any of your graphs turn out to NOT BE FUNCTIONS?

Why do you think this happened???

### OKAY, NOW LOOK BACK AT YOUR FUNCTION GRAPHS...

Look at the ones that are linear and the ones that are nonlinear

What do you think made them linear or nonlinear? Come up with some *conjectures*.

Let's explore what the graphs of different functions look like...

https://www.desmos.com/calculator

### COPY:

Linear Equations No exponent on the variable!!! None of these other things: → Nonlinear Equations Exponents other than 1 Variable inside a square roots Variable in a denominator Variable inside an absolute value

## WHITEBOARDS!

Today, you are NOT getting the regular whiteboards, you are getting the GRAPHING SHEETS.

Regular answers can go on the back. Graphs will go on the coordinate plane.

# LINEAR OR NONLINEAR? f(x) = 4x + 3Linear

LINEAR OR NONLINEAR?

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

**Nonlinear** 

LINEAR OR NONLINEAR? X

$$f(x) = \frac{x}{5} + 4$$

# Linear

LINEAR OR NONLINEAR?  $f(x) = \frac{6}{2}$ 

$$f(x) = \frac{6}{x} - 2$$

Nonlinear

LINEAR OR  
NONLINEAR?  
$$f(x) = x^3 + 4x - 3$$
  
Nonlinear



LINEAR OR  
NONLINEAR?  
$$f(x) = 5x - 2x$$
  
Linear

LINEAR OR  
NONLINEAR?  
$$f(x) = -\frac{3}{4}x + \frac{1}{7}$$
  
Linear

LINEAR OR NONLINEAR?

$$f(x) = 4\sqrt{x} - 3$$

# Nonlinear

LINEAR OR  
NONLINEAR?  
$$f(x) = |2x + 10|$$
  
Nonlinear

LINEAR OR  
NONLINEAR?  
$$f(x) = 6$$
  
Linear



LINEAR OR  
NONLINEAR?  
$$f(x) = 2x^3 - \sqrt{x} + |x - 4| + \frac{3}{x}$$
  
Nonlinear

LINEAR OR  
NONLINEAR?  
$$y = 3x + \sqrt{2}$$
  
Linear



# **KEY FEATURES OF GRAPHS**

Increasing: Where the y-values go up (from left to right)

Decreasing: Where the y-values go down (from left to right)

<u>X-intercept:</u> Where the graph crosses the x-axis <u>Y-intercept:</u> Where the graph crosses the y-axis <u>Slope:</u> How steep the graph is













### DRAW A GRAPH WITH THE FOLLOWING CHARACTERISTICS:

x and y-intercepts are both zero

Always decreasing

Slope doesn't change

### DRAW A GRAPH WITH THE FOLLOWING CHARACTERISTICS:

Always increasing

The slope changes



# WHICH OF THESE ARE POSSIBLE?

- A) A graph that is increasing only, which has an x-intercept of -4 and a y-intercept of 6.
- B) A graph that is increasing, then decreasing, has xintercepts of 5 and -5, and a y-intercept of -9.
- C) A graph that is increasing, then decreasing, then increasing again, that has x-intercepts of -8, 2, and 7, and a y-intercept of 4.

# HOMEWORK

Key Features Half-Sheet