

Function Families for 200, Alex...

1.4

Recognizing Functions by Characteristics

LEARNING GOALS

In this lesson, you will:

- Recognize similar characteristics among function families.
- Recognize different characteristics among function families.
- Determine function types given certain characteristics.

Since the debut of television in the early 1950s, Americans have had a love/hate relationship with the game show. One of the original game shows that aired was *Name that Tune*. The game was played when two contestants were given a clue about a song. Then, one opponent would “bid” that the song could be named in a certain number of notes played. The other opponent could either beat the number of notes “bid” from the opponent, or they could tell their opponent to “name that tune!”

Do you like game shows? If so, what are your favorite game shows?

PROBLEM 1 Name That Function!



1. Use the characteristic(s) provided to choose the appropriate function family or families from the word box shown.

linear function family

exponential function family

quadratic function family

linear absolute value function family

- a. The graph of this function family:
- is a smooth curve.
- b. The graph of this function family:
- is made up of one or more straight lines.
- c. The graph of this function family:
- increases or decreases over the entire domain.
- d. The graph of this function family:
- has a maximum or a minimum.
2. A second characteristic has been added to the graphical description of each function. Name the possible function family or families given the graphical characteristics.
- a. The graph of this function family:
- has an absolute minimum or absolute maximum, and
 - is a smooth curve.
- b. The graph of this function family:
- either increases or decreases over the entire domain, and
 - is made up of a straight line.

- c. The graph of this function family:
- is a smooth curve, and
 - either increases or decreases over the entire domain.
- d. The graph of this function family:
- has either an absolute minimum or an absolute maximum
 - has symmetry, and
 - is made up of 2 straight lines



Each function family has certain graphical behaviors with some behaviors common among different function families. Notice, the more specific characteristics that are given, the more specifically you can Name that Function!

PROBLEM 2 Graph That Function!



1. Use the given characteristics to create an equation and sketch a graph. Use the equations given in the box as a guide. Then share your graph with your partner. Discuss similarities and differences between your graphs.

When creating your equation, use a , b , and c values that are any real numbers between -3 and 3 . Do not use any functions that were used previously in this chapter.

Linear function

$$f(x) = mx + b$$

Exponential function

$$f(x) = a \cdot b^x$$

Quadratic function

$$f(x) = ax^2 + bx + c$$

Linear Absolute Value Function

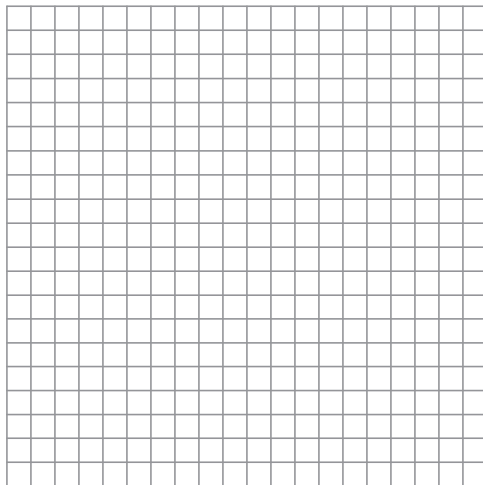
$$f(x) = a|x + b| + c$$

- a. Create an equation and sketch a graph that:

- is a function,
- is exponential,
- is continuous, and
- is decreasing.

Don't forget about the function family graphic organizers you created if you need some help.

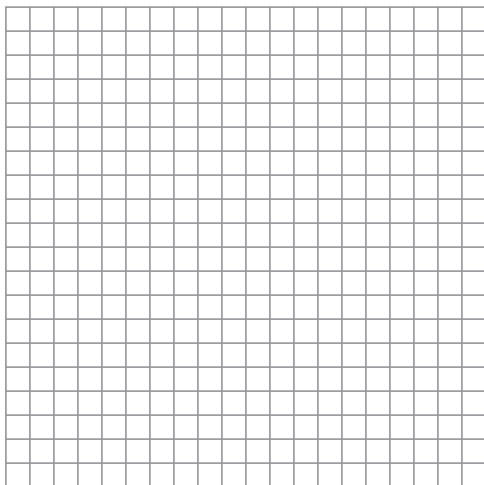
Equation: _____



b. Create an equation and sketch a graph that:

- has a minimum,
- is discrete, and
- is a linear absolute value function.

Equation: _____



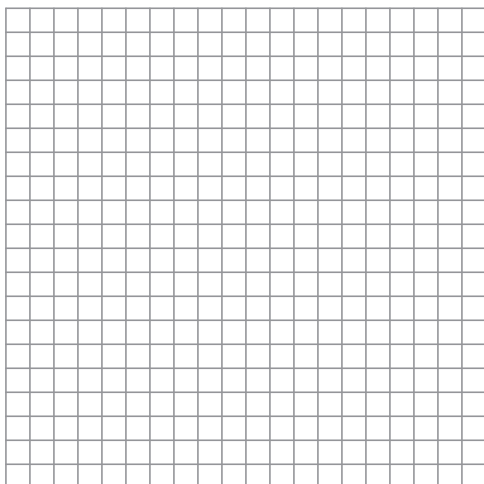
Is the domain the same or different for each function?



c. Create an equation and sketch a graph that:

- is linear,
- is discrete,
- is increasing, and
- is a function.

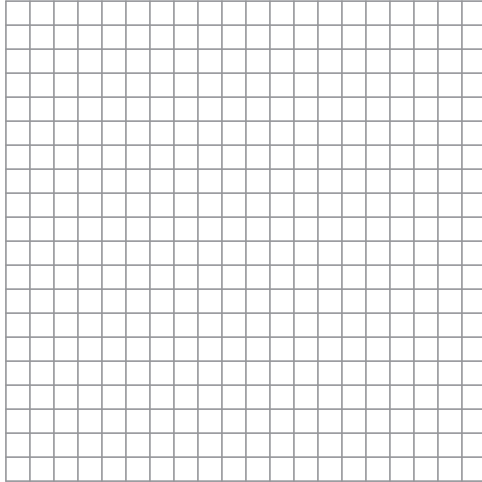
Equation: _____



d. Create an equation and sketch a graph that:

- is continuous,
- has a maximum,
- is a function, and
- is quadratic.

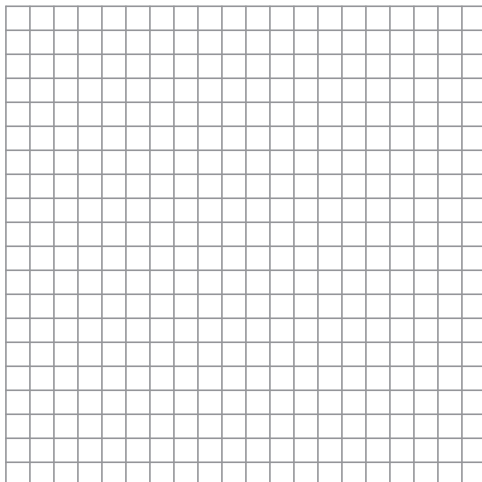
Equation: _____



e. Create an equation and sketch a graph that:

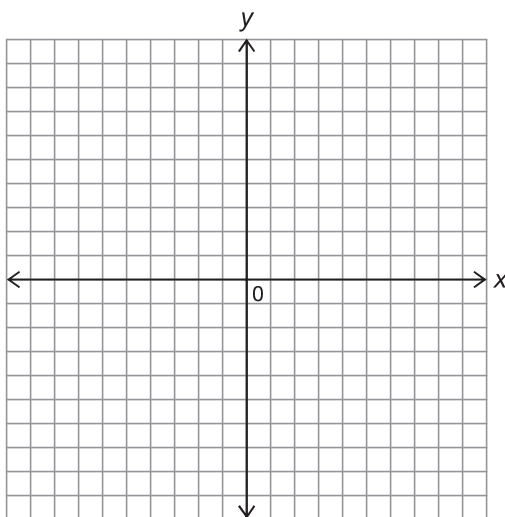
- is not a function,
- is continuous, and
- is a straight line.

Equation: _____





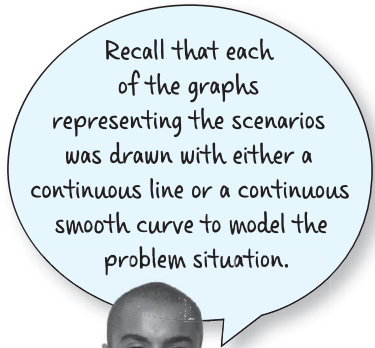
2. Create your own function. Describe certain characteristics of the function and see if your partner can sketch it. Then try to sketch your partner's function based on characteristics provided.



Talk the Talk

Throughout this chapter, you were introduced to five function families: linear, exponential, quadratic, linear absolute value, and linear piecewise. Let's revisit the first lesson in this chapter: *A Picture Is Worth a Thousand Words*. Each of the scenarios in this lesson represents one of these function families.

1. Describe how each scenario represents a function.



Recall that each of the graphs representing the scenarios was drawn with either a continuous line or a continuous smooth curve to model the problem situation.



2. Complete the table to describe each scenario.
 - a. Identify the appropriate function family.
 - b. Based on the problem situation, identify whether the graph of the function should be discrete or continuous.
 - c. Create a sketch of the mathematical model.
 - d. Identify the graphical behavior.



Scenario	Function Family	Domain of the Real-World Situation: Discrete or Continuous	Sketch of the Mathematical Model	Graphical Behavior	
				Absolute Minimum or Absolute Maximum	Increasing, Decreasing, Constant, or Combination
Something's Fishy					
Smart Phone, but Is It a Smart Deal?					
Can't Wait to Hit the Slopes!					
It's Magic					

Scenario	Function Family	Domain of the Real-World Situation: Discrete or Continuous	Sketch of the Mathematical Model	Graphical Behavior	
				Absolute Minimum or Absolute Maximum	Increasing, Decreasing, Constant, or Combination
Baton Twirling					
Music Club					
A Trip to School					
Jelly Bean Challenge					



Be prepared to share your solutions and methods.

