

Function Type Detectives

Use patterns, equations, and graph shapes to classify functions.

HIGH SCHOOL • MA.912.F.1.1

MA.912.F.1.1 "Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it."

NAME _____

DATE _____

SPOT THE PATTERN

Use an equation's structure or a graph's shape to name a function type. Linear functions have a constant rate of change, exponential functions multiply by a constant factor, quadratic functions have constant second differences, and absolute value functions make a V-shaped graph. In a table, compare outputs only when the inputs increase by equal amounts.

WORKED EXAMPLE

Determine the type of $f(x)=17x-19$.

1. The variable x has a power of one.
2. The equation fits the form $mx+b$.
3. Functions in this form have a constant rate of change.

Answer: Linear function

PRACTICE 6 problems

- 1** Determine the type of $y=-4x+9$.

ANSWER _____

- 2** Determine the type of $y=5(3)^x$.

ANSWER _____

- 3** Determine the type of $y=x^2-6$.

ANSWER _____

- 4** A graph is V-shaped, has a vertex at $(-7, 4)$, and opens upward. Determine the function type.

ANSWER _____

- 5** The table shows x : -5, -3, -1, 1 and y : 14, 10, 6, 2. What function type could represent the table?

ANSWER _____

- 6** The table shows x : -4, -2, 0, 2 and y : 3, 6, 12, 24. What function type could represent the table?

ANSWER _____

APPLY IT Show your work

- 1** A student's short video has these views after each day it is shared. Days: 2, 3, 4, 5. Views: 9, 27, 81, 243. What function type could model views as a function of days? Explain using the pattern.

WORK SPACE

ANSWER _____

- 2** A student band sells digital tracks for \$4 each and has already earned \$30 from preorders. Its total earnings are $E(x)=4x+30$, where x is the number of tracks sold. Identify the function type and tell why.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

The table shows x : -6, -4, -2, 0 and y : 30, 16, 10, 12. Could the table represent a linear, exponential, or quadratic function? Select one type and explain using first and second differences.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Determine the type of $y = -4x + 9$.	Linear function
2	Determine the type of $y = 5(3)^x$.	Exponential function
3	Determine the type of $y = x^2 - 6$.	Quadratic function
4	A graph is V-shaped, has a vertex at $(-7, 4)$, and opens upward. Determine the function type.	Absolute value function
5	The table shows x : -5, -3, -1, 1 and y : 14, 10, 6, 2. What function type could represent the table?	Linear function
6	The table shows x : -4, -2, 0, 2 and y : 3, 6, 12, 24. What function type could represent the table?	Exponential function

PART 2 • APPLY IT

- Exponential function. The number of views is multiplied by 3 each day.** Each output is found by multiplying the previous output by 3. A constant multiplication factor indicates an exponential function.
- Linear function. Each additional track increases earnings by \$4.** The equation has the form $mx + b$. The earnings change by the same amount for every additional track.

CHALLENGE

Quadratic function. The first differences are -14, -6, and 2, which are not constant. The second differences are 8 and 8, so they are constant.

Accept equivalent labels such as linear, exponential, quadratic, and absolute value. For table and context items, accept correct reasoning based on constant differences, constant factors, or constant second differences.