Function Family Sort

Sort functions, explain two choices, then create your own.

8A.AF.I "Functions that are members of the same family have distinguishing attributes (structure) common to all functions within that family."

NAME _____ DATE _____

LINEAR

In a linear function, x is multiplied by a number and may have a number added. It can be written as y = mx + c.

$y = 11x + 17$

EXPONENTIAL

In an exponential function, x is an exponent on a fixed positive base. It can be written as $y = a(b)^x$, where $a \neq 0$, $b > 0$, and $b \neq 1$.

$y = 19(6)^x$

1 SORT

8 items

For each function, circle LINEAR or EXPONENT, then pick two items and explain how you knew where each belongs.

1. $y = 2x + 7$ — LINEAR / EXPONENT

2. $y = 4(3)^x$ — LINEAR / EXPONENT

3. $y = -3(2)^x$ — LINEAR / EXPONENT

4. $y = -5x + 1$ — LINEAR / EXPONENT

5. $y = 9 - x/2$ — LINEAR / EXPONENT

6. $y = 3(x - 4)$ — LINEAR / EXPONENT

7. $y = 7(1/2)^x$ — LINEAR / EXPONENT

8. $y = (1/3)(4)^x$ — LINEAR / EXPONENT

2 PROVE IT

Explain your thinking

Pick two items from Part 1. For each one, tell how you knew where it belonged.

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

Write one new linear function and one new exponential function.

LINEAR _____

EXPONENT _____

CHALLENGE

Write a linear function that contains a power, then explain why it is not exponential.

ANSWER KEY # Function Family Sort

GRADE 8 · 8A.AF.I

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	$y = 2x + 7$	**LINEAR**	x is multiplied by 2 and is not an exponent.
2	$y = 4(3)^x$	**EXPONENT**	x is an exponent on the fixed base 3.
3	$y = -3(2)^x$	**EXPONENT**	x is an exponent on the fixed base 2; the negative coefficient is allowed.
4	$y = -5x + 1$	**LINEAR**	x is multiplied by -5 and is not an exponent.
5	$y = 9 - x/2$	**LINEAR**	This can be written as $y = (-1/2)x + 9$.
6	$y = 3(x - 4)$	**LINEAR**	Distributing gives $y = 3x - 12$.
7	$y = 7(1/2)^x$	**EXPONENT**	x is an exponent on the fixed base 1/2.
8	$y = (1/3)(4)^x$	**EXPONENT**	x is an exponent on the fixed base 4.

PART 2 · PROVE IT

Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **LINEAR**: $y = 12x - 7$
- **EXPONENT**: $y = 9(8)^x$

Challenge: $y = 4x + 3^2$. Since $3^2 = 9$, this is $y = 4x + 9$, so x is not an exponent.

For the two explanations, accept any correctly identified items with reasons based on whether x is an exponent. Other valid functions may be used in Part 3.