Change Pattern Detectives

Sort situations by how their values change.

CCSS.Math.Content.HSF-LE.A.1 "Distinguish between situations that can be modeled with linear functions and with exponential functions."

NAME _____ DATE _____

LINEAR CHANGE

In equal input intervals, the output changes by the same added or subtracted amount. A starting value may be included.

A recipe uses 3 cups of rice for one batch, plus 2 more cups for every additional batch.

EXPONENTIAL CHANGE

In equal input intervals, the output is multiplied by the same factor. The factor can show growth or decay.

A photo file begins at 64 megabytes and becomes one-half its size after every compression.

1 SORT

8 items

For each situation, circle LINEAR or FACTOR, then choose two situations and explain whether equal intervals use the same added amount or the same multiplier.

1.	A club collects 40 cans in its first week and 40 more cans each week after that.	LINEAR FACTOR
2.	A jar has 6 coins, and 6 coins are added every Monday.	LINEAR FACTOR
3.	A rumor reaches twice as many people each hour.	LINEAR FACTOR
4.	A tank drains 9 gallons each minute.	LINEAR FACTOR
5.	A phone's value is 80% of its previous value each year.	LINEAR FACTOR
6.	A colony of yeast quadruples every 3 hours.	LINEAR FACTOR
7.	A taxi fare starts at $4 and rises $2 per mile.	LINEAR FACTOR
8.	A medicine dose leaves 70% of its amount in the body every 6 hours.	LINEAR FACTOR

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 situation with LINEAR change and one new situation with FACTOR change.

LINEAR _____

FACTOR _____

CHALLENGE

Write an equation for a quantity that starts at 18 when x = 0 and adds 5 for each 1-unit increase in x, then write an equation for a quantity that starts at 18 when x = 0 and is multiplied by 5 for each 1-unit increase in x.

ANSWER KEY

Change Pattern Detectives

HIGH SCHOOL · HSF-LE.A.1

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	A club collects 40 cans in its first week and 40 more cans each week after that.	**LINEAR**	The total increases by 40 cans each week.
2	A jar has 6 coins, and 6 coins are added every Monday.	**LINEAR**	The number of coins increases by 6 each week.
3	A rumor reaches twice as many people each hour.	**FACTOR**	The number of people is multiplied by 2 each hour.
4	A tank drains 9 gallons each minute.	**LINEAR**	The amount of water decreases by 9 gallons each minute.
5	A phone's value is 80% of its previous value each year.	**FACTOR**	The value is multiplied by 0.80 each year.
6	A colony of yeast quadruples every 3 hours.	**FACTOR**	The colony size is multiplied by 4 every 3 hours.
7	A taxi fare starts at $4 and rises $2 per mile.	**LINEAR**	The fare increases by $2 for each mile after the initial fee.
8	A medicine dose leaves 70% of its amount in the body every 6 hours.	**FACTOR**	The amount is multiplied by 0.70 every 6 hours.

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**: A streaming service charges $11 per month plus $2 for each movie rental.
- **FACTOR**: A $200 investment is worth 1.04 times as much after each year.

Challenge: Challenge: Linear: $y = 18 + 5x$. Exponential: $y = 18(5)^x$.

Accept equivalent descriptions that identify a constant additive change for LINEAR or a constant multiplicative factor for FACTOR. In Part 2, students should name the repeated amount or factor for each selected situation.