Change Detectives

Sort patterns, prove two choices, and create your own.

F.LE.1a "Distinguish between situations that can be modeled with linear functions and with exponential functions. Verify that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over..."

NAME _____ DATE _____

LINEAR

A linear pattern adds or subtracts the same amount over each equal interval. Consecutive values have equal differences.

A comic collection starts with 12 books and gains 3 books each month: 12, 15, 18, 21.

EXPONENTIAL

An exponential pattern multiplies by the same factor over each equal interval. A factor greater than 1 makes values increase, while a factor between 0 and 1 makes them decrease.

A mold patch covers 2 square centimeters and quadruples in area each day: 2, 8, 32, 128.

1 SORT

8 items

Circle Linear or Exponential for each situation, then choose two items, one from each category, and explain your choices using equal differences or equal factors.

1.	1. A taxi charges $4 to start a ride, then $2 for each mile.	DIFFERENCE	FACTOR
2.	2. A bacteria colony triples in size every hour.	DIFFERENCE	FACTOR
3.	3. A sale price is 80% of the previous week's price each week.	DIFFERENCE	FACTOR
4.	4. A tank gains 7 liters of water each minute.	DIFFERENCE	FACTOR
5.	5. Each row in a theater has 2 more seats than the row before it.	DIFFERENCE	FACTOR
6.	6. A runner travels 5 kilometers each hour at a steady pace.	DIFFERENCE	FACTOR
7.	7. An account balance increases by 5% each year, with the increase added to the balance.	DIFFERENCE	FACTOR
8.	8. A drone descends 4 meters each second.	DIFFERENCE	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 real-world example of each category, Linear and Exponential, and give four values at equal intervals for each.

DIFFERENCE _____

FACTOR _____

CHALLENGE

Write two four-term sequences that both start 3, 6, one linear and one exponential, and state the equal difference or factor for each.

ANSWER KEY # Change Detectives

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	1. A taxi charges $4 to start a ride, then $2 for each mile.	**DIFFERENCE**	The fare increases by $2 for every mile.
2	2. A bacteria colony triples in size every hour.	**FACTOR**	The colony size is multiplied by 3 each hour.
3	3. A sale price is 80% of the previous week's price each week.	**FACTOR**	The price is multiplied by 0.8 each week.
4	4. A tank gains 7 liters of water each minute.	**DIFFERENCE**	The amount of water increases by 7 liters each minute.
5	5. Each row in a theater has 2 more seats than the row before it.	**DIFFERENCE**	The seat count increases by 2 for each new row.
6	6. A runner travels 5 kilometers each hour at a steady pace.	**DIFFERENCE**	The total distance increases by 5 kilometers each hour.
7	7. An account balance increases by 5% each year, with the increase added to the balance.	**FACTOR**	The balance is multiplied by 1.05 each year.
8	8. A drone descends 4 meters each second.	**DIFFERENCE**	The altitude decreases by 4 meters each second.

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)

- **DIFFERENCE**: Linear: A bus starts with 20 passengers and picks up 4 at each stop. The passenger counts are 20, 24, 28, 32.
- **FACTOR**: Exponential: A phone battery retains 90% of its charge each hour. The charge levels are 100%, 90%, 81%, 72.9%.

Challenge: Linear: 3, 6, 9, 12, with an equal difference of 3. Exponential: 3, 6, 12, 24, with an equal factor of 2.

For Part 2, a valid pair is item 1, which adds $2 per mile, and item 2, which multiplies by 3 each hour. In Part 3, check that each set of four values uses equal intervals and matches its stated category.