Model Matchup

Choose the model that fits each situation.

CCSS.Math.Content.HSS-ID.B.6a "Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models."

NAME _____ DATE _____

LINEAR

Use a linear model when equal input changes produce equal output changes. Its graph is a straight line.

A candle is 30 cm long and burns 2 cm each minute: $L = 30 - 2m$.

NONLINEAR

Use a nonlinear model when the change is not constant, such as repeated percent growth or a squared relationship. Its graph is not a straight line.

The volume of a sphere depends on its radius: $V = (4/3)\pi r^3$.

1 SORT

8 items

Circle the category that fits each situation, then choose one item from each category and explain what feature of the situation supports your choice.

1.	A taxi company charges $4 plus $2.50 for each mile.	LINEAR NONLINEAR
2.	A savings account balance grows by 5% each year.	LINEAR NONLINEAR
3.	A ball is launched straight up, and its height is measured over time, ignoring air resistance.	LINEAR NONLINEAR
4.	A tank starts with 50 L and gains 12 L each minute.	LINEAR NONLINEAR
5.	A phone plan charges $30 plus $8 for each gigabyte used.	LINEAR NONLINEAR
6.	A runner travels at a steady speed of 9 km per hour.	LINEAR NONLINEAR
7.	A cell culture triples every 4 hours.	LINEAR NONLINEAR
8.	The area of a square is found from its side length.	LINEAR NONLINEAR

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 for each category: one LINEAR situation and one NONLINEAR situation.

LINEAR _____

NONLINEAR _____

CHALLENGE

A video has 120 views on day 1, 240 views on day 2, and 480 views on day 3. Choose a category, write a function V(d) for the views on day d, and predict the views on day 5.

ANSWER KEY # Model Matchup

HIGH SCHOOL · HSS-ID.B.6a

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	A taxi company charges $4 plus $2.50 for each mile.	**LINEAR**	The total increases by the same $2.50 for every additional mile.
2	A savings account balance grows by 5% each year.	**NONLINEAR**	Each increase is a percent of the current balance, so the amount added changes.
3	A ball is launched straight up, and its height is measured over time, ignoring air resistance.	**NONLINEAR**	Height versus time follows a quadratic relationship.
4	A tank starts with 50 L and gains 12 L each minute.	**LINEAR**	The volume increases by a constant 12 L per minute.
5	A phone plan charges $30 plus $8 for each gigabyte used.	**LINEAR**	The cost increases by a constant $8 per gigabyte.
6	A runner travels at a steady speed of 9 km per hour.	**LINEAR**	Distance increases by a constant 9 km each hour.
7	A cell culture triples every 4 hours.	**NONLINEAR**	The amount is repeatedly multiplied by 3.
8	The area of a square is found from its side length.	**NONLINEAR**	Area equals side length squared, which is quadratic.

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 gym charges a $25 sign-up fee and $18 each month.
- **NONLINEAR**: A radioactive sample loses half its mass every 6 hours.

Challenge: NONLINEAR. V(d) = 120(2)^(d-1), so V(5) = 1,920 views.

Accept LINEAR explanations that identify a constant additive change. Accept NONLINEAR explanations that identify repeated multiplication, percent change, or a squared relationship.