LESSON MAKER PRO

Find the Pattern

Choose a function that fits every value.

HIGH SCHOOL · MT.CORE.ALG.MOD.1.a

MT.CORE.ALG.MOD.1.a "Model situations in context, with linear, quadratic, and exponential functions. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by: Determining if a set of data is best modeled..."

NAME _____ DATE _____

CHECK EVERY STEP

When x increases by equal amounts, check how y changes. Constant first differences mean linear, constant second differences mean quadratic, and constant ratios mean exponential. If none is constant, choose none.

WORKED EXAMPLE

A club records stickers made after several work sessions. Which model fits the data?

STICKERS MADE

Sessions, x	Stickers, y
4	41
6	54
8	69
10	86

1. The x-values increase by 2 each time.
2. The first differences in y are 13, 15, and 17.
3. The second differences are 2 and 2.

Answer: Quadratic, because the second differences are constant.

PRACTICE 4 problems

1 For x = 0, 1, 2, 3, the y-values are 7, 12, 17, 22. Which model fits exactly? Explain.

ANSWER _____

2 For x = 0, 1, 2, 3, the y-values are 4, 9, 16, 25. Which model fits exactly? Explain.

ANSWER _____

3 For x = 0, 1, 2, 3, the y-values are 3, 6, 12, 24. Which model fits exactly? Explain.

ANSWER _____

4 For x = 0, 1, 2, 3, the y-values are 2, 5, 10, 18. Which model fits exactly? Explain.

ANSWER _____

APPLY IT Show your work

1 At a Montana Indigenous student art fair, a booth tracks the cups it sells each hour. Choose a model that fits exactly, predict sales in hour 5, and explain.

CUPS SOLD EACH HOUR

Hour	Cups sold
1	10
2	20
3	40
4	80

ANSWER _____

2 A Billings skate club pays $14 to set up a poster order, plus $3 per poster. Choose a model for the total cost, find the cost of 6 posters, and explain.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A youth group has 2, 4, 8, and 15 sign-ups at the end of weeks 0, 1, 2, and 3. A classmate says the data are exponential because the first three values double. Does any model fit all four values exactly? Explain.

WORK SPACE AND ANSWER

ANSWER KEY

Find the Pattern

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For x = 0, 1, 2, 3, the y-values are 7, 12, 17, 22. Which model fits exactly? Explain.	**Linear. The first differences are all 5.**
2	For x = 0, 1, 2, 3, the y-values are 4, 9, 16, 25. Which model fits exactly? Explain.	**Quadratic. The first differences are 5, 7, and 9, so the second differences are both 2.**
3	For x = 0, 1, 2, 3, the y-values are 3, 6, 12, 24. Which model fits exactly? Explain.	**Exponential. Each y-value is twice the previous one.**
4	For x = 0, 1, 2, 3, the y-values are 2, 5, 10, 18. Which model fits exactly? Explain.	**None. The first differences are 3, 5, and 8; the second differences and ratios are not constant.**

PART 2 · APPLY IT

1. **Exponential; 160 cups in hour 5. Sales double each hour.** The constant ratio is 2. Multiply 80 by 2 to predict hour 5.
2. **Linear; $32 for 6 posters. The cost rises by $3 for each poster.** The fixed $14 fee and constant $3 per poster give a linear cost. Compute 14 + 3(6) = 32.

CHALLENGE

None fits all four exactly. The first differences are 2, 4, and 7, the second differences are 2 and 3, and the ratios are 2, 2, and 15/8.

Accept explanations using constant differences or ratios without listing every calculation. For the challenge, students must check the fourth value.