LESSON MAKER PRO

Pattern or Not?

Choose a function family from a data pattern.

HIGH SCHOOL · MT.PLUS.ALG.MOD.1.a

MT.PLUS.ALG.MOD.1.a "Model situations in context with polynomial, exponential, logarithmic, and trigonometric functions. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by: Determining if a set of..."

NAME _____ DATE _____

LOOK FOR A PATTERN

With evenly spaced inputs, constant differences or constant higher differences suggest a polynomial; a constant ratio suggests an exponential function. Equal output changes when positive inputs double suggest a logarithmic function. A repeating rise and fall suggests a trigonometric function; if no simple pattern fits, choose none.

WORKED EXAMPLE

Which function family best models the table?

x	y
10	45
11	54
12	67
13	84

1. First differences: 9, 13, 17.
2. Second differences: 4, 4.

Answer: Polynomial, because the second differences are constant.

PRACTICE 4 problems

1 Name the best family and give a number-based reason. x: 0, 1, 2, 3; y: 3, 6, 11, 18.

ANSWER _____

2 Name the best family and give a number-based reason. x: 0, 1, 2, 3; y: 2, 6, 18, 54.

ANSWER _____

3 Name the best family and give a number-based reason. x: 1, 2, 4, 8; y: 5, 7, 9, 11.

ANSWER _____

4 Name the best family and give a number-based reason. x: 0, 1, 2, 3, 4; y: 4, 7, 4, 1, 4.

ANSWER _____

APPLY IT Show your work

1 A student posts a clip from a Montana community event featuring Indigenous youth musicians. The table shows shares after each hour. Choose a function family and predict the shares at hour 4.

CLIP SHARES

Hour	Shares
0	3
1	6
2	12
3	24

ANSWER _____

2 A Montana tribal college club uses these estimated daylight hours to plan outdoor events. Choose a function family and predict the hours for the following April.

ESTIMATED DAYLIGHT HOURS

Month	Hours
January	9
April	12
July	15
October	12
January	9

ANSWER _____

CHALLENGE One step up

A student records views gained in six equal time periods: 8, 15, 11, 16, 9, 14. A classmate says the pattern is trigonometric because it goes up and down. Choose trigonometric or none. Explain why rising and falling alone is not enough.

WORK SPACE AND ANSWER

Pattern or Not?

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Name the best family and give a number-based reason. x: 0, 1, 2, 3; y: 3, 6, 11, 18.	**Polynomial; the first differences are 3, 5, 7, so the second differences are 2, 2.**
2	Name the best family and give a number-based reason. x: 0, 1, 2, 3; y: 2, 6, 18, 54.	**Exponential; each output is 3 times the previous output.**
3	Name the best family and give a number-based reason. x: 1, 2, 4, 8; y: 5, 7, 9, 11.	**Logarithmic; each time x doubles, y increases by 2.**
4	Name the best family and give a number-based reason. x: 0, 1, 2, 3, 4; y: 4, 7, 4, 1, 4.	**Trigonometric; the outputs rise and fall around 4, then return to 4.**

PART 2 · APPLY IT

1. **Exponential; 48 shares.** Shares double each hour, so multiply 24 by 2 to predict 48 shares at hour 4.
2. **Trigonometric; 12 hours.** The hours rise, fall, and return to the starting value over a year. If the seasonal pattern repeats, the following April has 12 hours.

CHALLENGE

None is the better choice from these data. The values rise and fall, but the highs and lows do not repeat in a clear cycle, so rising and falling alone does not support a trigonometric model.

Accept quadratic for polynomial in the worked example and problem 1. Accept other concise reasons that identify the relevant numerical pattern.