LESSON MAKER PRO

Patterns in Motion

Connect exponential tables, equations, situations, and graphs.

HIGH SCHOOL · MT.CORE.ALG.EXP.4

MT.CORE.ALG.EXP.4 "Represent exponential functions using tables, graphs, equations, and verbal situations; using technology strategically. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities."

NAME _____ **DATE** _____

THE BIG IDEA

In an exponential pattern, each step of 1 in x multiplies y by the same factor. Use $y = a(b^x)$, where a is the value at x = 0 and b is the factor.

WORKED EXAMPLE

Write an equation for the table.

SAMPLE PATTERN

x	y
0	5
1	15
2	45

1. At x = 0, a = 5.
2. Divide consecutive values: 15/5 = 3 and 45/15 = 3.
3. Use a = 5 and b = 3 in $y = a(b^x)$.

Answer: $y = 5(3^x)$

PRACTICE 4 problems

1 An exponential pattern has y = 10 at x = 0 and y = 20 at x = 1. Write its equation.

ANSWER _____

2 For $y = 18((1/3)^x)$, find y when x = 2.

ANSWER _____

3 A channel starts with 7 subscribers. The number triples each week. Write a model for the number after x weeks.

ANSWER _____

4 For $y = 24((1/2)^x)$, list the points you would plot at x = 1 and x = 2.

ANSWER _____

APPLY IT Show your work

1 A student group at a Montana tribal college shares an invitation to a community language event. The table shows total online reposts after x days. Write a model and predict the total on day 3.

INVITATION REPOSTS

Days, x	Reposts, y
0	6
1	12
2	24

ANSWER _____

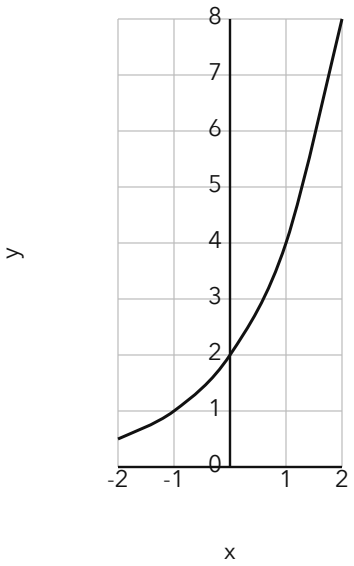
2 A student volunteer sends 64 digital invitations to a Montana community powwow. Half remain unread after each day. Write a model for the unread invitations after x days, then find how many remain unread after 3 days.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Use the graph to write an exponential equation and find y when x = 3. Explain how the graph shows the factor.



WORK SPACE AND ANSWER

Patterns in Motion

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	An exponential pattern has y = 10 at x = 0 and y = 20 at x = 1. Write its equation.	**$y = 10(2^x)$**
2	For $y = 18((1/3)^x)$, find y when x = 2.	**2**
3	A channel starts with 7 subscribers. The number triples each week. Write a model for the number after x weeks.	**$y = 7(3^x)$**
4	For $y = 24((1/2)^x)$, list the points you would plot at x = 1 and x = 2.	**(1, 12) and (2, 6)**

PART 2 · APPLY IT

1. **$y = 6(2^x)$; 48 reposts on day 3** The initial value is 6, and the reposts double each day. Substitute x = 3 to get $6(2^3) = 48$.
2. **$y = 64((1/2)^x)$; 8 unread invitations after 3 days** Use 64 as the initial value and 1/2 as the daily factor. At x = 3, $64(1/2)^3 = 8$.

CHALLENGE

$y = 2(2^x)$; y = 16 when x = 3. The y-values double each time x increases by 1, so the factor is 2.

Accept equivalent exponential notation and equivalent explanations of the constant factor. For the challenge, the graph's y-intercept is 2.