LESSON MAKER PRO

Beyond the Curve

Use a model, then check it against real counts.

HIGH SCHOOL · MT.PLUS.ALG.MOD.1.b

MT.PLUS.ALG.MOD.1.b "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: Understanding that there..."

NAME _____ DATE _____

MODEL AND REALITY

When a quantity changes by the same factor each time period, use $y = a(b)^x$. Here, a is the starting amount and b is the factor. A real count may differ from the model, and a count of people must be a whole number.

WORKED EXAMPLE

A stream gains viewers at a steady factor each hour. Use the table to predict the number of viewers at hour 2.

STREAM VIEWERS

Hour	Viewers
0	7
1	21

1. Find the factor: 21/7 = 3.
2. Write the model: $y = 7(3)^x$.
3. At hour 2: $y = 7(3)^2 = 63$.

Answer: 63 viewers

PRACTICE 4 problems

1 A video gets 5 shares in hour 0. Shares per hour double. Write a model for shares in hour x.

ANSWER _____

2 A club has 96 stickers. Half remain after each day. How many does the model predict after 4 days?

ANSWER _____

3 A model predicts $4(2)^x$ signups on day x. On day 4, there are 70 signups. What did the model predict, and is the actual point on its curve?

ANSWER _____

4 A model predicts $6(2)^x$ visits on day x. Find x when it predicts 96 visits.

ANSWER _____

APPLY IT Show your work

1 At a Montana market led by Indigenous artists, a booth tracks orders each hour. Use the table to predict orders in hour 3 if they keep doubling. The booth gets 67 orders that hour. Is the actual point on the model curve?

BOOTH ORDERS

Hour	Orders
0	8
1	16

ANSWER _____

2 A school esports stream has 48 viewers now. A model halves the count each hour. What does it predict in 5 hours? Can the actual viewer count equal that prediction?

WORK SPACE

ANSWER _____

CHALLENGE One step up

An app has 9 active users on day 0 and models doubling each day. Find the first whole-number day it predicts at least 100 users. If it actually has 100 users that day, explain why the actual point is not on the curve.

WORK SPACE AND ANSWER

Beyond the Curve

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A video gets 5 shares in hour 0. Shares per hour double. Write a model for shares in hour x.	**$y = 5(2)^x$**
2	A club has 96 stickers. Half remain after each day. How many does the model predict after 4 days?	**6 stickers**
3	A model predicts $4(2)^x$ signups on day x. On day 4, there are 70 signups. What did the model predict, and is the actual point on its curve?	**64 signups; no.**
4	A model predicts $6(2)^x$ visits on day x. Find x when it predicts 96 visits.	**x = 4**

PART 2 · APPLY IT

1. **64 orders; no.** The model is $y = 8(2)^x$, so it predicts $8(2)^3 = 64$ orders. The actual count, 67, differs.
2. **1.5 viewers; no, a viewer count must be a whole number.** Compute $48(1/2)^5 = 48/32 = 1.5$. The model's prediction is not a possible count of people.

CHALLENGE

Day 4. The model predicts 72 users on day 3 and 144 on day 4, so day 4 is the first day at or above 100. An actual count of 100 differs from the day 4 prediction.

Accept equivalent exponential forms. For points off the curve, students should compare the actual count with the prediction at the same time.