LESSON MAKER PRO

On the Curve?

Compare a model with real counts and possible values.

HIGH SCHOOL · MT.CORE.ALG.MOD.1.b

MT.CORE.ALG.MOD.1.b "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: Understanding that there are contexts where..."

NAME _____ DATE _____

TEST THE MODEL

A function predicts y from x. Substitute x to test an observed point. For a count taken at full hours or days, check only whole-number x-values.

WORKED EXAMPLE

A model predicts downloads with y = 13x + 17. The table shows an actual count. Is it on the model?

ACTUAL DOWNLOADS

Hour, x	Downloads, y
7	110

1. Substitute x = 7: y = 13(7) + 17.
2. The model predicts 108 downloads.
3. The actual count, 110, differs from 108.

Answer: No. The actual count is 2 above the model.

PRACTICE 4 problems

1 For y = 3x + 4, decide whether (2, 10) is on the model.

ANSWER _____

2 For $y = x^2 + 3$, decide whether (4, 20) is on the model.

ANSWER _____

3 For $y = 2^x$, decide whether (3, 9) is on the model.

ANSWER _____

4 A club models earnings as y = 6x + 4 dollars for x tickets sold. Can it earn exactly $19? Explain.

ANSWER _____

APPLY IT Show your work

1 A youth group in Browning, on the Blackfeet Reservation, models movie night sign-ups with $y = 8x + 12$, where x is days after posting. Use the table. Is the actual count on the model? How far off is it?

ACTUAL SIGN-UPS

Day, x	Sign-ups, y
4	47

ANSWER _____

2 At a Missoula community gaming night, a post starts with 3 shares. A model doubles the total each full hour: $y = 3(2^x)$. Could the model predict exactly 20 shares at the end of an hour? Explain.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A school fundraiser models profit as $y = -x^2 + 10x$ dollars for x snack packs sold, with $0 \le x \le 10$. After selling 4 packs, organizers recorded $23 profit. Is that observation on the model? Could the model ever predict $26 profit? Explain.

WORK SPACE AND ANSWER

On the Curve?

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For $y = 3x + 4$, decide whether (2, 10) is on the model.	**Yes. 3(2) + 4 = 10.**
2	For $y = x^2 + 3$, decide whether (4, 20) is on the model.	**No. The model gives 19.**
3	For $y = 2^x$, decide whether (3, 9) is on the model.	**No. The model gives 8.**
4	A club models earnings as $y = 6x + 4$ dollars for x tickets sold. Can it earn exactly \$19? Explain.	**No. Earning \$19 would require selling 2.5 tickets.**

PART 2 · APPLY IT

1. **No. The actual count is 3 above the model.** At $x = 4$, the model predicts $8(4) + 12 = 44$ sign-ups. The actual count is 47.
2. **No. The model predicts 12 shares after 2 hours and 24 after 3 hours, so it skips 20.** Only nonnegative whole numbers of hours count. The predicted totals double from 12 to 24, never equaling 20.

CHALLENGE

The observation is not on the model: at $x = 4$, it predicts \$24. The model cannot predict \$26 because its greatest value is \$25 at $x = 5$.

Accept equivalent explanations that compare observed values with predictions. For ticket sales and full-hour counts, students must use whole-number inputs.