LESSON MAKER PRO

Numbers Tell Stories

Interpret numbers in models of change.

HIGH SCHOOL · MT.PLUS.ALG.MOD.2

MT.PLUS.ALG.MOD.2 "Interpret the coefficients in a polynomial, exponential, logarithmic, and trigonometric model in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities."

NAME _____ DATE _____

READ THE MODEL

A number in a model has meaning only when you connect it to the input and output. Try an easy input, then compare outputs to describe a change. Include units in your interpretation.

WORKED EXAMPLE

The table shows two values of $V(t)=11(4)^t$, where V is video views and t is hours after posting. What do 11 and 4 mean?

t (hours)	V(t) (views)
0	11
1	44

1. At $t=0$, $V(0)=11(4)^0=11$.
2. From hour 0 to hour 1, the count is multiplied by $44/11=4$.

Answer: The model starts at 11 views and predicts 4 times as many views each hour.

PRACTICE 4 problems

1 A clip's total views after x days are modeled by $P(x)=20x^2+6x+15$. What does 15 mean?

ANSWER _____

2 The number of teams signed up after t weeks is $S(t)=9(2)^t$. What does 2 mean?

ANSWER _____

3 Predicted visits are $L(x)=18+6\log_2(x)$, where x is the number of shares. What does 6 mean?

ANSWER _____

4 A temperature model in °C is $T(t)=14+5\sin(2\pi t/12)$. What does 5 mean?

ANSWER _____

APPLY IT Show your work

1 Tribal speakers will share language revitalization projects at a community-led Montana Indigenous Peoples' Day event. The model $R(w)=24(2)^w$ predicts RSVPs w weeks after registration opens. What do 24 and 2 mean?

WORK SPACE

ANSWER _____

2 A Bozeman bike club models hours of daylight with $D(m)=12+3\sin(2\pi m/12)$, where m is months after March. Interpret 12 outside the sine, 3, and 12 inside the sine.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A site models visits with $L(x)=25+8\log_2(x)$, where x is the number of shares. A student says each extra share adds 8 visits. Explain the error and find the predicted change from 2 to 8 shares.

WORK SPACE AND ANSWER

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A clip's total views after x days are modeled by $P(x)=20x^2+6x+15$. What does 15 mean?	**The clip has 15 views at day 0.**
2	The number of teams signed up after t weeks is $S(t)=9(2)^t$. What does 2 mean?	**The number of teams doubles each week.**
3	Predicted visits are $L(x)=18+6\log_2(x)$, where x is the number of shares. What does 6 mean?	**Each doubling of shares adds 6 predicted visits.**
4	A temperature model in °C is $T(t)=14+5\sin(2\pi t/12)$. What does 5 mean?	**The temperature varies 5°C above and below the model's middle value.**

PART 2 · APPLY IT

1. **There are 24 RSVPs when registration opens, and the predicted number doubles each week.** $R(0)=24$. Increasing w by 1 multiplies $R(w)$ by 2.
2. **The middle daylight length is 12 hours. Daylight varies 3 hours above and below that value, and the pattern repeats every 12 months.** The constant gives the middle value, and the number multiplying sine gives the distance from it. The input to sine completes a full cycle when m increases by 12.

CHALLENGE

The 8 applies to each doubling of shares, not each additional share. From 2 to 8 shares is two doublings, so the model predicts 16 more visits.

Accept equivalent wording that includes the input interval and output units. For the challenge, $41-33=8$ is incorrect because $L(2)=33$ and $L(8)=49$.