

Lesson 5: Connections between Representations

- Let's look at the relationship of verbal descriptions, equations, tables, and graphs.

5.1: Math Talk: Evaluating Expressions

Evaluate mentally:

$$6,400 - 400x \text{ when } x \text{ is } 0$$

$$6,400 - 400x \text{ when } x \text{ is } 2$$

$$6,400 \cdot \left(\frac{1}{10}\right)^x \text{ when } x \text{ is } 0$$

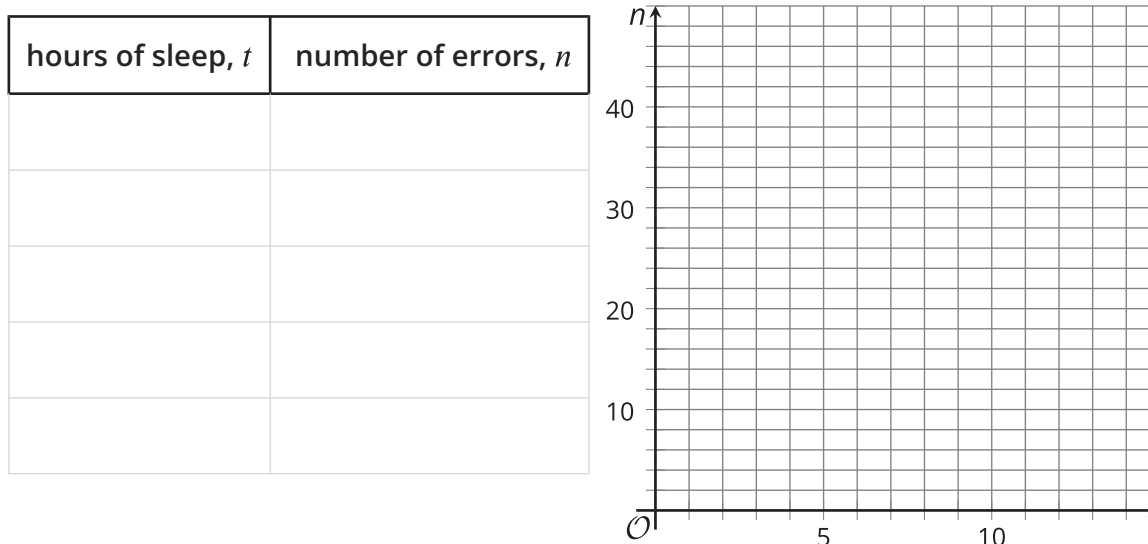
$$6,400 \cdot \left(\frac{1}{10}\right)^x \text{ when } x \text{ is } 2$$

5.2: A Good Night's Sleep

Is more sleep associated with better brain performance? A researcher collected data to determine if there was an association between hours of sleep and ability to solve problems. She administered a specially designed problem solving task to a group of volunteers, and for each volunteer, recorded the number of hours slept the night before and the number of errors made on the task.

The equation $n = 40 - 4t$ models the relationship between t , the time in hours a student slept the night before, and n , the number of errors the student made in the problem-solving task.

1. Use the equation to find the coordinates of 5 data points on a graph representing the model. Organize the coordinates in the table.
2. Create a graph that represents the model.

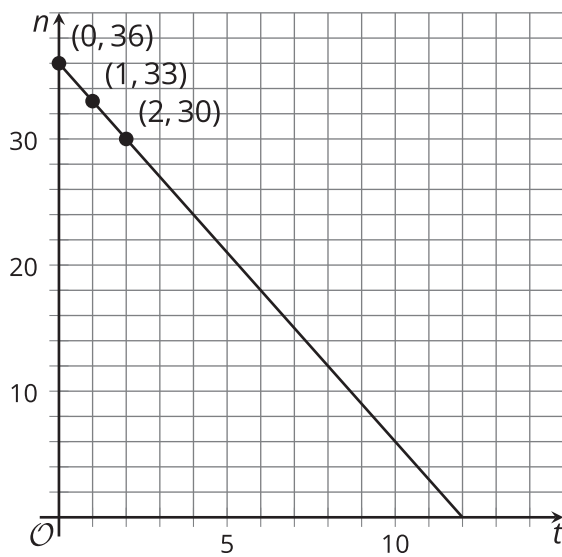


3. In the equation $n = 40 - 4t$, what does the 40 mean in this situation? Where can you see it on the graph?
4. In the equation $n = 40 - 4t$, what does the -4 mean in this situation? Where can you see it on the graph?
5. How many errors would you expect a person to make who had slept 3.5 hours the night before?

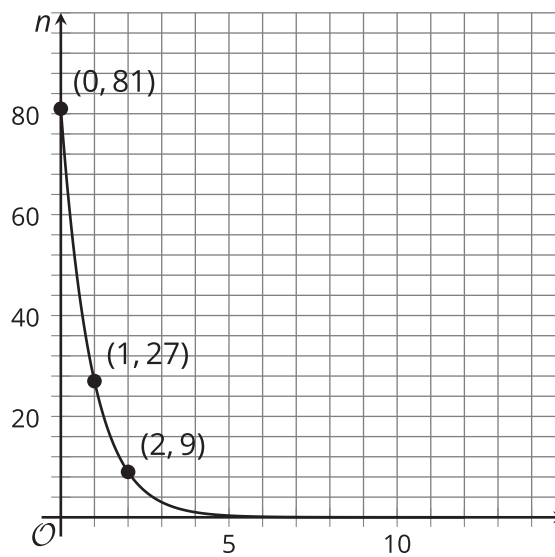
5.3: What's My Equation?

The sleep researcher repeated the study on two more groups of volunteers, collecting different data. Here are graphs representing the equations that model the different sets of data:

A



B



- Write an equation for Model A. Be prepared to explain how you know. Explain what the numbers mean in your equation.
- Model B is exponential.
 - How many errors did participants make with 0 hours of sleep?
 - How many errors with 1 hour of sleep?
 - What fraction of the errors from 0 hours of sleep is that?
- Complete the table for Model B for 3, 4, and 5 hours of sleep.

t	0	1	2	3	4	5
n	81	27	9			

- Which is an equation for Model B? If you get stuck, test some points!

$$n = 81 - 3t$$

$$n = 81 - \frac{1}{3}t$$

$$n = 81 \cdot (3)^t$$

$$n = 81 \cdot \left(\frac{1}{3}\right)^t$$