## 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:

$6,​400−400x$  when $x$ is 0

$6,​400−400x$  when $x$ is 2

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

$6,​400⋅\left(\frac{1}{10}\right)^{x}$  when $x$ 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.

|  |  |
| --- | --- |
| * hours of sleep, $t$
 | * **number of errors,** $n$
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* 
1. In the equation $n=40−4t$, what does the 40 mean in this situation? Where can you see it on the graph?
2. In the equation $n=40−4t$, what does the -4 mean in this situation? Where can you see it on the graph?
3. 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



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

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

$n=81−3t$

$n=81−\frac{1}{3}t$

$n=81⋅\left(3\right)^{t}$

$n=81⋅\left(\frac{1}{3}\right)^{t}$



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