Déjà Vu, It's Algebra 2!

Lesson 25

Representing Functions & Interpreting Graphs

A good hotel manager knows that the number of rooms that guests will rent depends on the price. The hotel's revenue depends on both the price and the number of rooms rented.

How can the manager best go about charging a price that will MAXIMIZE his revenue??

He starts with analyzing data, then makes a graph, then writes a mathematical model (or equation.)

In mathematics, we use the rule of three to represent functions.

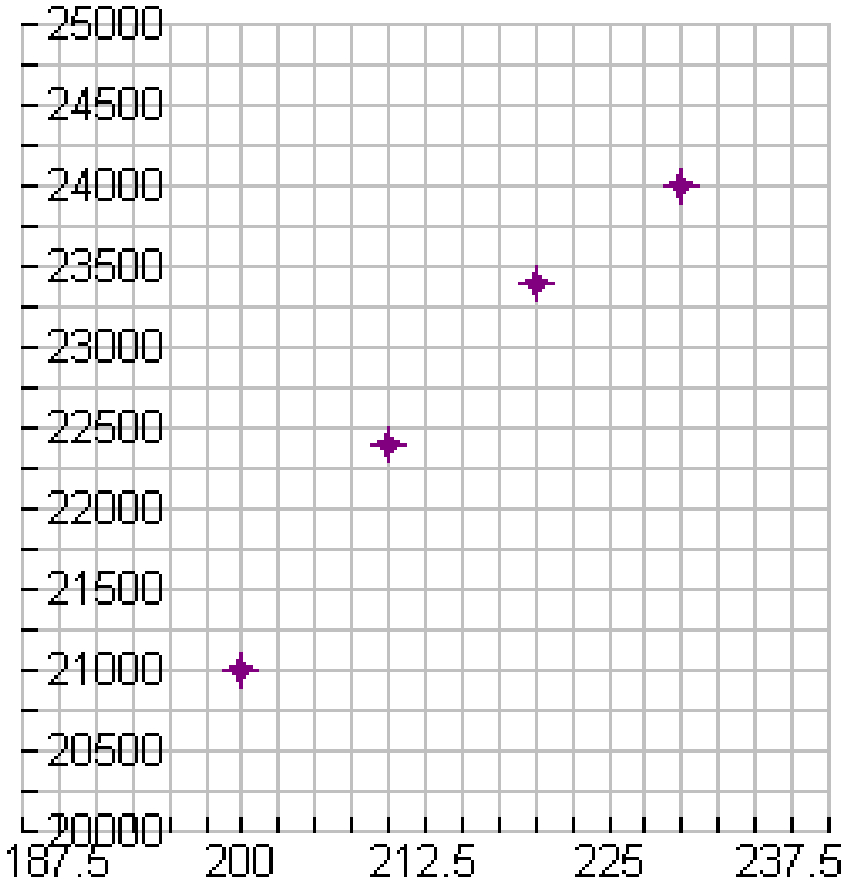
1. Numerically
2. Graphically
3. Algebraically

Example:

The following table shows the hotel's average nightly revenue based on room price:

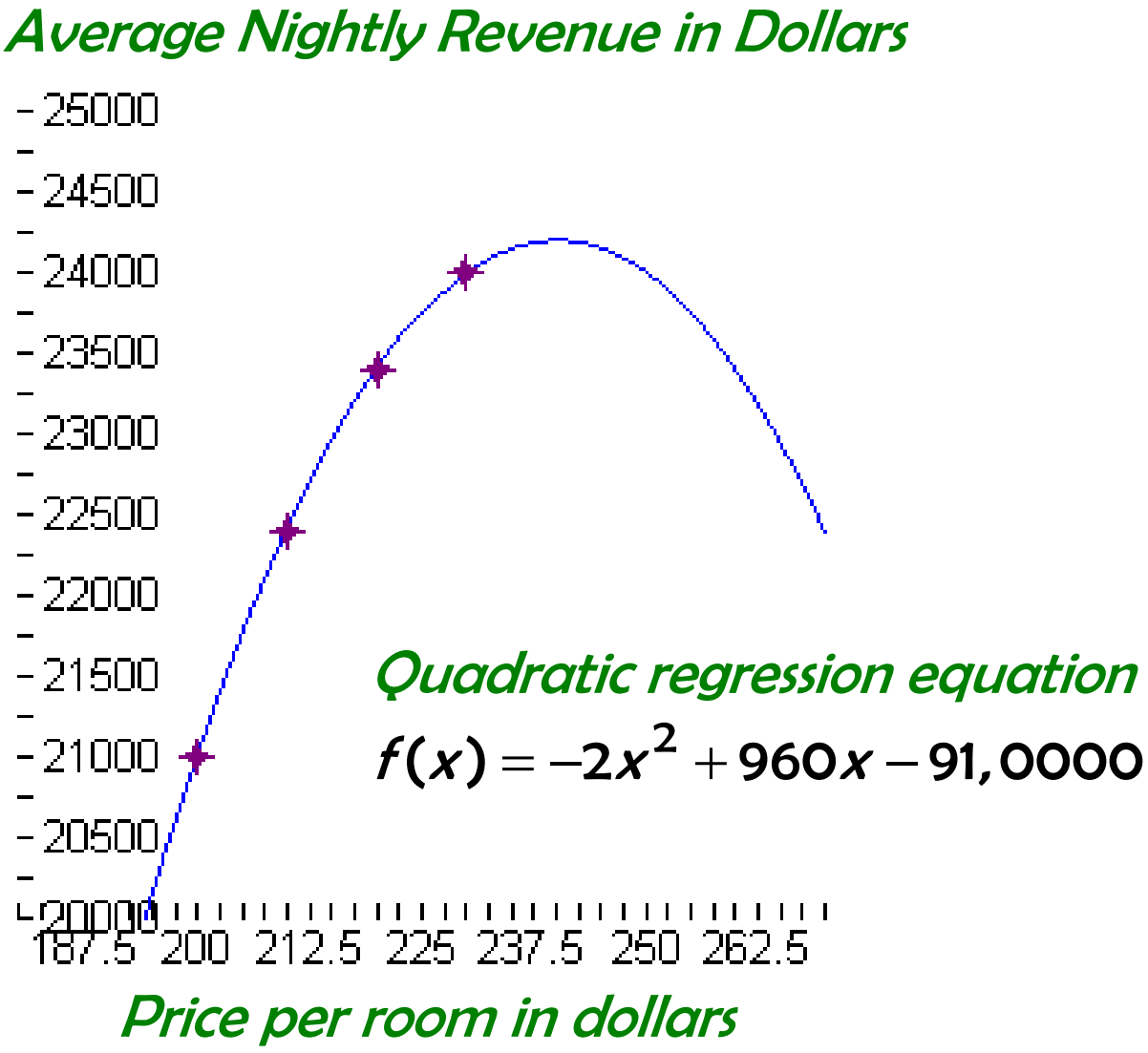
Price per room ($)	Revenue ($)
200	21,000
210	22,400
220	23,400
230	24,000

Average Nightly Revenue in Dollars



Price per room in dollars

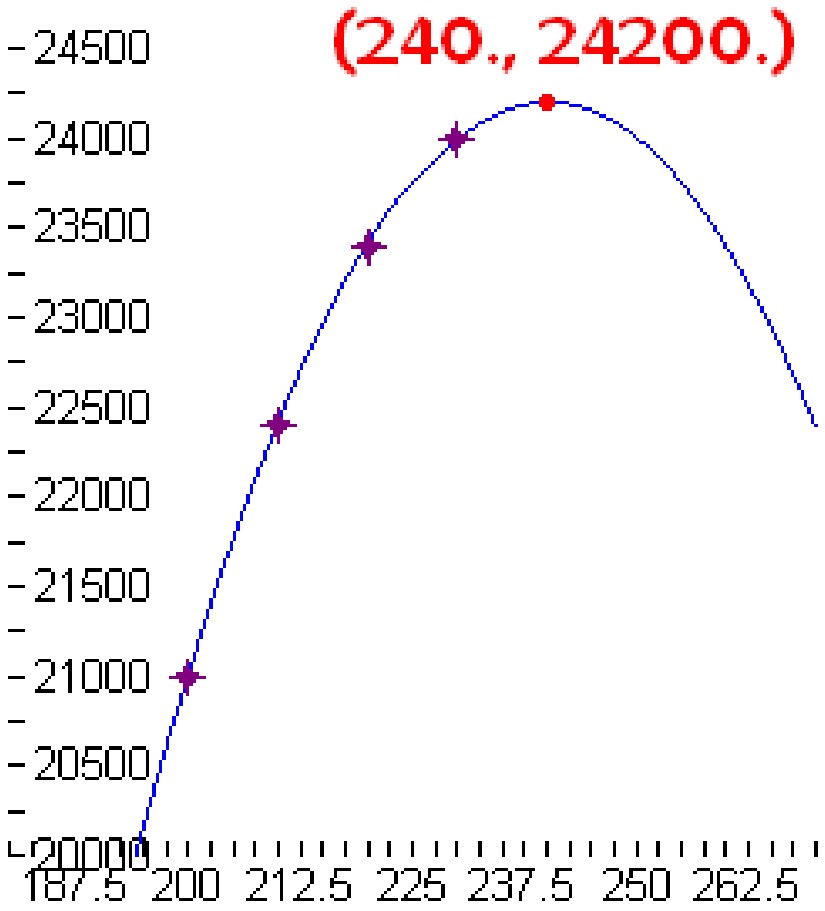
Once we plot the points from our empirical/observed data, we look for a pattern. We can then let our calculators find a regression equation for our data.



Quadratic regression equation

$$f(x) = -2x^2 + 960x - 91,0000$$

The maximum revenue is obtained at the vertex



So the hotel manager can maximize his revenue by charging $240 per room per night, which would bring in the maximum amount of $24,200 nightly.

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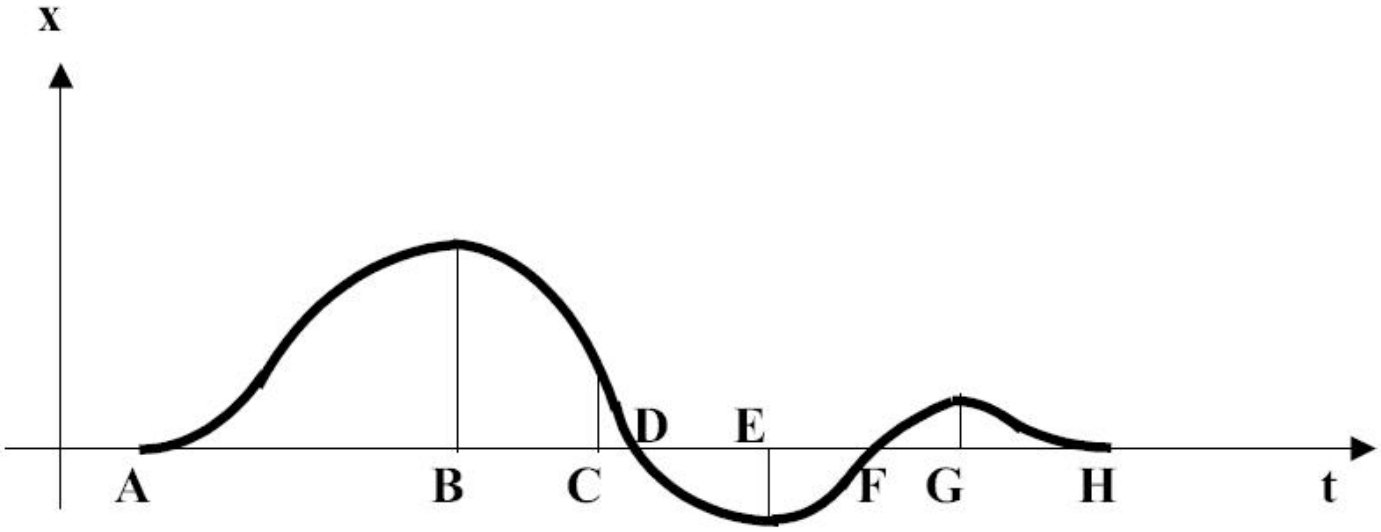
Being able to read and interpret data and graphs is an important skill.

Let's take a look at a single graph in several different ways!



Scenario 1: Cross-section of the Great Wall of China

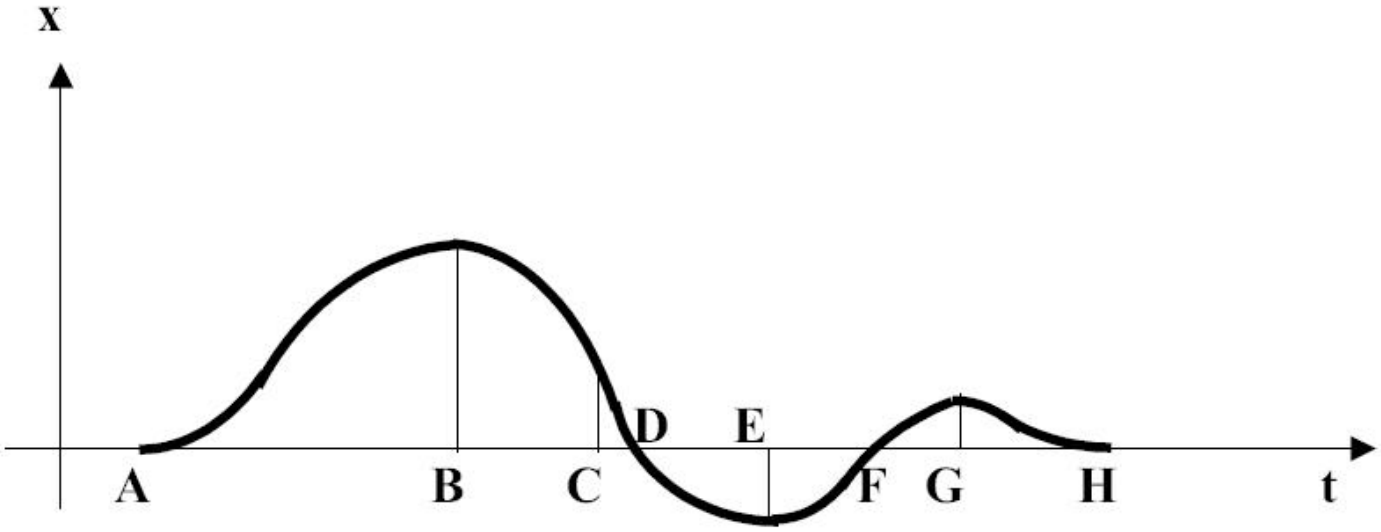
Let's say the graph is a cross-section of the Great Wall. Both the *x* and *y* axes represent distances, although the scale is likely different. Here, x is the distance along the ground, while *y* is the height of the wall along the countryside.

Q1: Where is the highest point?

Q2: Where is the wall the steepest?

Q3: If a river flowed across this landscape, through which point would it flow?

Q4: From where do you get the best photo opportunity?



Scenario 2: Position of a Cyclist through France

In this case, the graph is not a literal picture. The *x* axis represents time. The *y* axis represents the cyclist's distance along a North-South straight road. The graph gives the position of cyclist as he rides up and down this perfectly straight, perfectly flat road. Although the graph curves around, the cyclist does not.

Q1: If the cyclist starts at the Arc de Triomph at time A and finishes back there at time H, how many times does he run through the Arc?

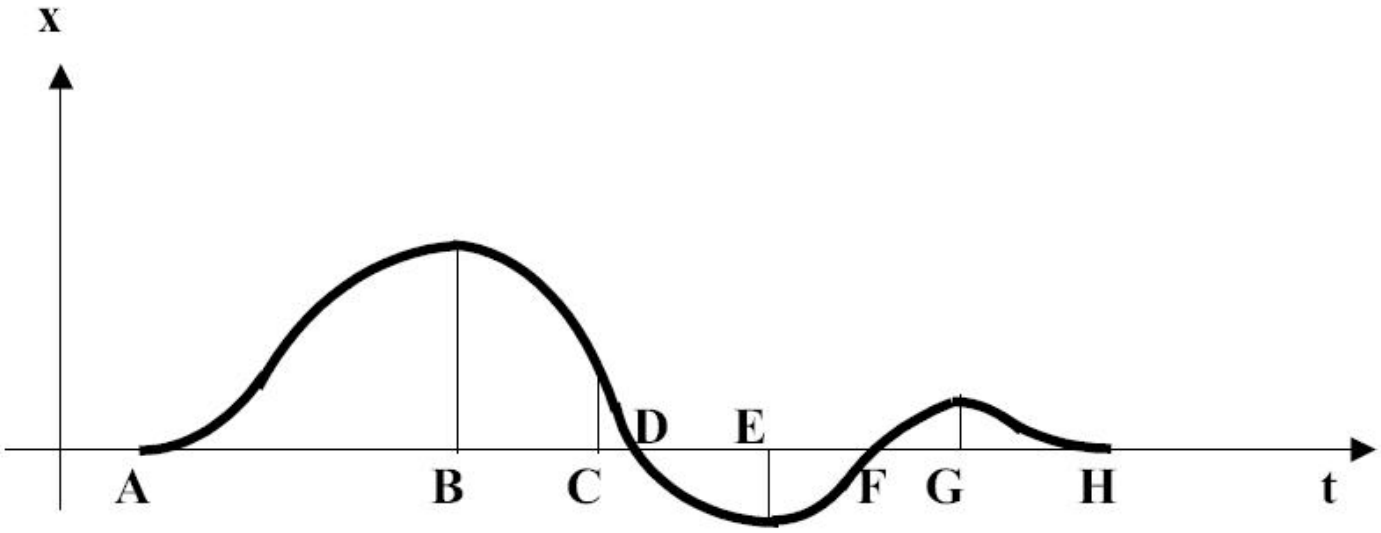
Q2: How many times does he turn around?

Q2: At what point is he riding the fastest?

Q3: Does he spend more time North or South of the Arc?

Q4: At what point did he realize it was dinner time?

Déjà RE-Vu



Scenario 3:
Velocity of a Roman Gladiator in the Coliseum

The *x* axis still represents time. The *y* axis represents his velocity in feet per second. Positive velocity means the Gladiator is charging. Negative velocity means he is retreating.

Q1: When is he moving the fastest?

Q2: How many times does he turn around?

Q3: At what point is he furthest away from his starting point?

Q4: Where does the lion come in?

Math is everywhere!

References:

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Clip Art:
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