After watching the video, *Representing Data Carefully*, complete the following problems.

1. Over a 12-month period, the assets of a business are approximated by $y = \dfrac{x^3}{125} - \dfrac{x}{2} + 10$,

    where x is the number of months since the start of last year, and y is measured in tens of thousands of dollars.

    Using your graphing technology, graph the business assets over the interval $0 \le x \le 12$. Experiment with different y-ranges. Try $0 \le y \le 100$. Try $5 \le y \le 20$. Try others!

    a. What would be a good y-range to use to emphasize that the business triumphed over adversity?
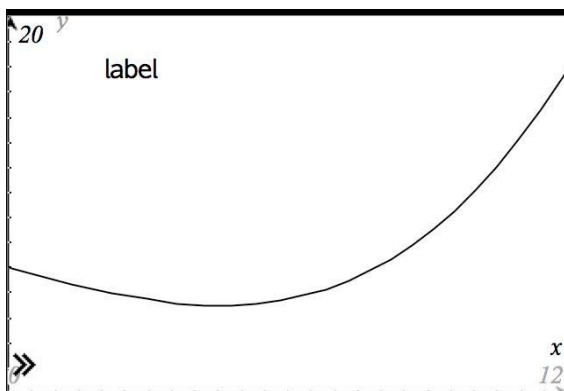
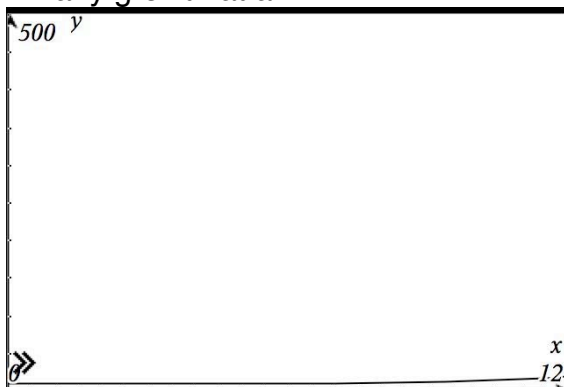   The range from $5 \le y \le 20$ shows the decline and then the return to increasing assets.

    b. What would be a good y-range to use to give the impression of slow, relatively steady growth?

   The range from $0 \le y \le 100$ does not show a visible decline but demonstrates slow growth.

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c. What would be a good y-range to use to give the impression of a company with barely any growth at all?

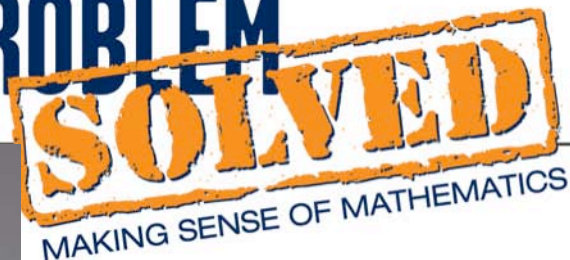The range from $0 \le y \le 500$ looks at the change from "far away" and shows relatively little change.

d. What would be a good x-range and y-range to give the impression of quick, steady growth?

By cropping the window, a highlighted segment of rapid growth is shown.

$5 \le x \le 12$
$8 \le y \le 20$

MAKING SENSE OF MATHEMATICS
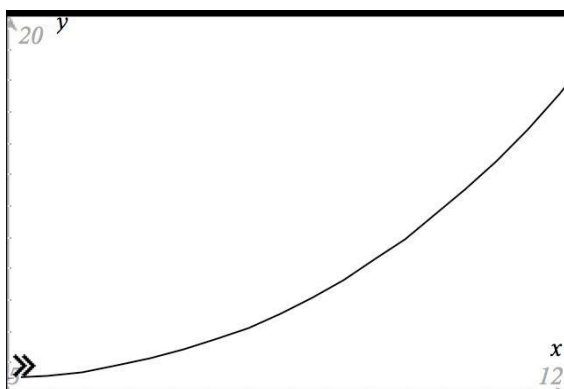
2. Fill in the following table of values for various businesses. Recall that the percent change in value is given by $\dfrac{\text{new value} - \text{old value}}{\text{old value}} \times 100$.

Company name	Value in 2010	Value in 2011	Change in value	Percent change in value
Montgolfier Brothers	$150,000	$200,000	$50,000	33.3%
Blanchard & Jeffries	$10,000	$60,000	$50,000	500%
Piccard Explorers	$1,000,000	$1,050,000	$50,000	5%
Kittenger Parachutes	$50,000	$100,000	$50,000	100%

Which company is the most successful, or are they all equally successful? Justify your answer.
Each company had the same change in value and an argument can be made that they are equally successful. Using percentages, Blanchard & Jeffries has the largest percent change and could arguably be the most successful company.

3. You are deciding between two automobiles. One of them costs $22,195. Another, slightly nicer model costs $23,195.

a. Make an argument that the nicer model is significantly more expensive.

The nicer car costs $1000 more, and $1000 is a lot of money.

b. Make an argument that the nicer model is not significantly more expensive.

The nicer car is only 4.5 % more expensive, which isn't very much.

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4. Shown below is a bar graph of a salesperson's income over ten years:

Income level
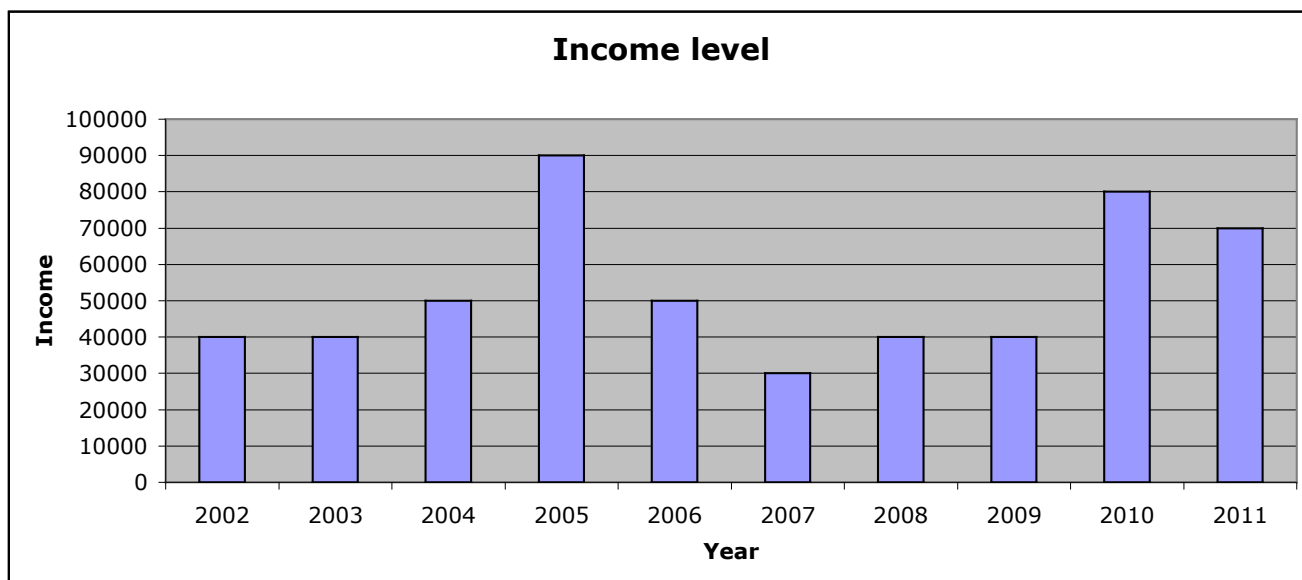
a. Compute the mean, median, and mode.
   Mean is $53,000; median is $45,000; mode is $40,000.

b. Which number will the salesperson mention in conversation with her supervisor?
   Since a salesperson's income frequently depends on overall sales, the salesperson would most likely use $53,000.

c. Which number will the salesperson mention in conversations with an IRS auditor?
   Since taxes may be based on sales averages, the sales person would most likely use $40,000 or $45,000.

d. In your opinion, which number is the most accurate representation of how the salesperson did over the last ten years?
   The mean considers all values and "spreads" the variance in income levels across all years. The median reflects the middle value. The advantage of the median is that it is not affected by outliers or extreme values. The mode represents four different years out of the ten years given, which is 40% or nearly half of the time.

   Answers will vary.