Do the Numbers Make Sense and Measuring

Checking to make sure the numbers make sense

This is a crucial part of being a consumer. This topic goes hand in hand with our discussion of ethics in Chapter 7, so we'll offer one more example here as one more reason why you need to ask the right questions....

A.R.M. Allergy Relief Medicine switched to "new formula maximum strength."

Old formula had 37.5 mg of active ingredient.

New formula had only 25 mg.

FDA limited dosage to 25 mg.

Company complied by lowering its dosage, and called the new tablet "maximum strength" because it contained the federal maximum dosage.

Percent Change

$$\text{percent change} = \frac{\text{current-previous}}{\text{previous}} \text{x}100$$

A positive result is read as a "percent increase"

Notice we can have a negative percent change here, which we read as a "percent decrease"

We cannot have larger than a 100% decrease!!!!

Example

In 1987, the states spent collectively $10.6 billion on corrections (prisons and jails). In 2008, the states collectively spent $44 billion. Calculate the percent change from 1987 to 2008.

Measurement

We **MEASURE** a property of a person or thing when we assign a number to represent the property

We often use an **INSTRUMENT** to make a measurement. We may have a choice of the **UNITS** we use to record the measurements.

The results of a measurement is a numerical **VARIABLE** that takes different values for people or things that differ in whatever we are measuring.

Suppose we want to measure the length of a bed. Find the variable, instrument, measurement, and unit of measure.

A. 72 inches
B. Tape Measure
C. Inches
D. Length of the bad

What would the instrument be in this study?
What is the unit of measure?
What is the variable?
What is an example of a measurement?

Suppose we want to measure the readiness of a student for college. Identify what the exam, point, score on the exam, and a recorded score of 1500 points is.
The exam itself is the

A. Measurement
B. Unit of measure
C. Instrument
D. Variable

"point" is the?
"Score" (college readiness) is the?
If we record an exam score of 1500 points, this is a?

Measuring length with a tape measure is concrete and precisely defined
Measuring other variables is not so clear cut

- College readiness
- Fatalities from a car accident

Some questions you should ask

1. Exactly how is the variable defined?
2. Is the variable a valid way to describe the property of interest?
3. How accurate are the measurements?

For instance, the Bureau of Labor Statistics (BLS) reports unemployment every month
People who are not available for work not counted

- Retirees, students, stay-at-home moms, etc…

Being unemployed requires

- The person must first be in the labor force
- Must be available for work and looking for work

On strike, but expect to return – you are employed
Not working and haven't looked for work for two weeks – you are not in the labor force
So people who are not working but are too discouraged to seek employment are not counted as unemployed

A variable is a **VALID** measure of a property if it is relevant or appropriate as a representation of that property
Often a **RATE** (a fraction or percentage) at which something occurs is a more valid measure than a simple **COUNT** of occurrences

Example
If we use a count for highway deaths, and notice an increase from year to year, we would report that deaths have increased, so it would appear highways are more unsafe. The Fatal Accident Reporting System reported 40,716 deaths in 1994 and 42,642 deaths in 2006

- But number of licensed drivers increased from approximately 160 million to 203 million
- More people drive more miles
- Could be more deaths even if the roads are safer

Count is not a valid measure of highway safety.
Rather than a count, we could use a rate, like number of deaths per mile driven

A measurement of a property has **PREDICITVE VALIDITY** if it can be used to predict success on tasks that are related to the property measured.
Example: Do SAT scores have predictive validity? What do we use SAT scores for?

Accuracy
Is your bathroom scale accurate?
If your scale weighs 3 pounds too high, then

Suppose your scale reads 3 pounds too high b/c its aim is off, but this morning it sticks and weighs you ½ pound lighter, then

Yipee, you jump off and back on the scale to see the ½ lb weight loss again, but this time it sticks to *add* ¼ lb