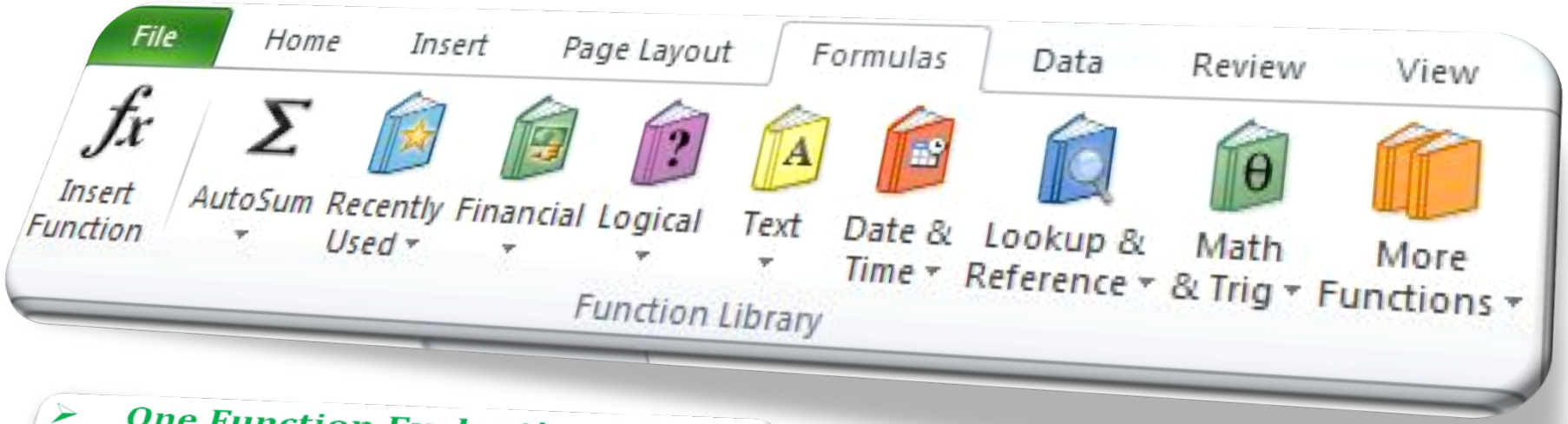


- One Function Evaluation Where Inputs Are Limited To Single Data Values (3-4 Numeric Inputs)
- One Function Evaluation Where Inputs Include Vectors of Data (aka "Excel Arrays")
- Composition of Multiple Functions Where Evaluation Requires Applying A Sequence Of Excel Formulas

BUSINESS STATISTICS

FINANCIAL FUNCTIONS

Functions Overview

(Extracted From CA Common Core Standards)

Interpreting Functions

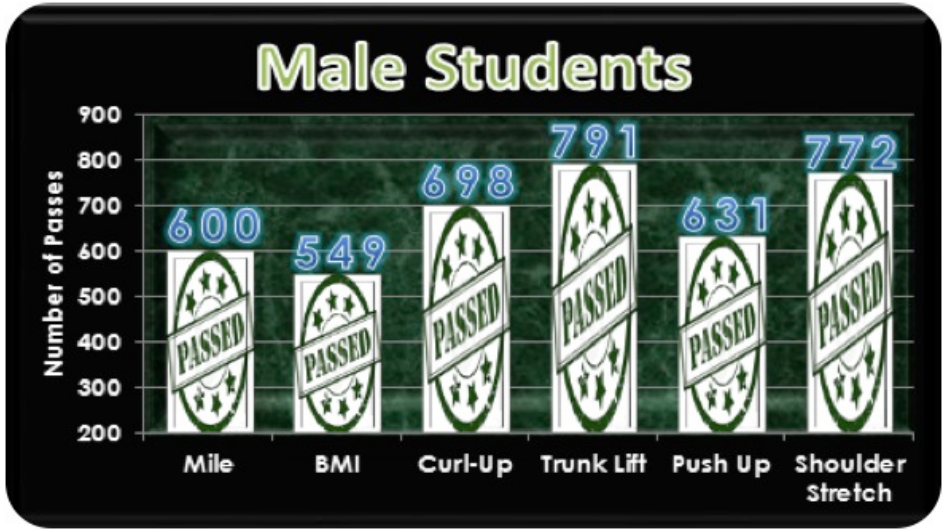
- Understand the concept of a function and use function notation
- Interpret functions that arise in applications in terms of the context
- Analyze functions using different representations

Building Functions

- Build a function that models a relationship between two quantities
- Build new functions from existing functions

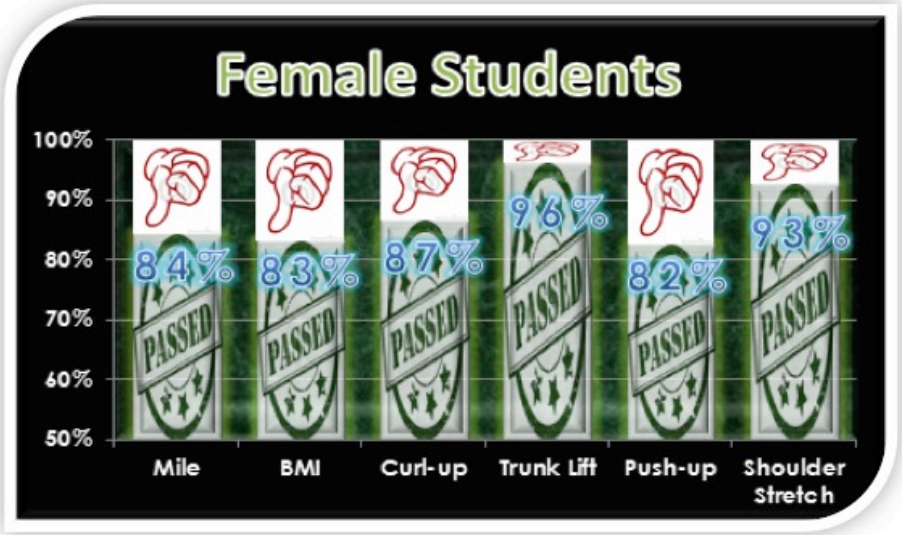
Linear, Quadratic, and Exponential Models

- Construct and compare linear, quadratic, and exponential models and solve problems
- Interpret expressions for functions in terms of the situation they model



QUANTITATIVE Variables

CATEGORICAL Variables



BUSINESS STATISTICS

UNIVARIATE DATA ANALYSIS

Interpreting Categorical and Quantitative Data

(Extracted From CA Common Core Standards)

- **Summarize, represent, and interpret data on a single count or measurement variable**

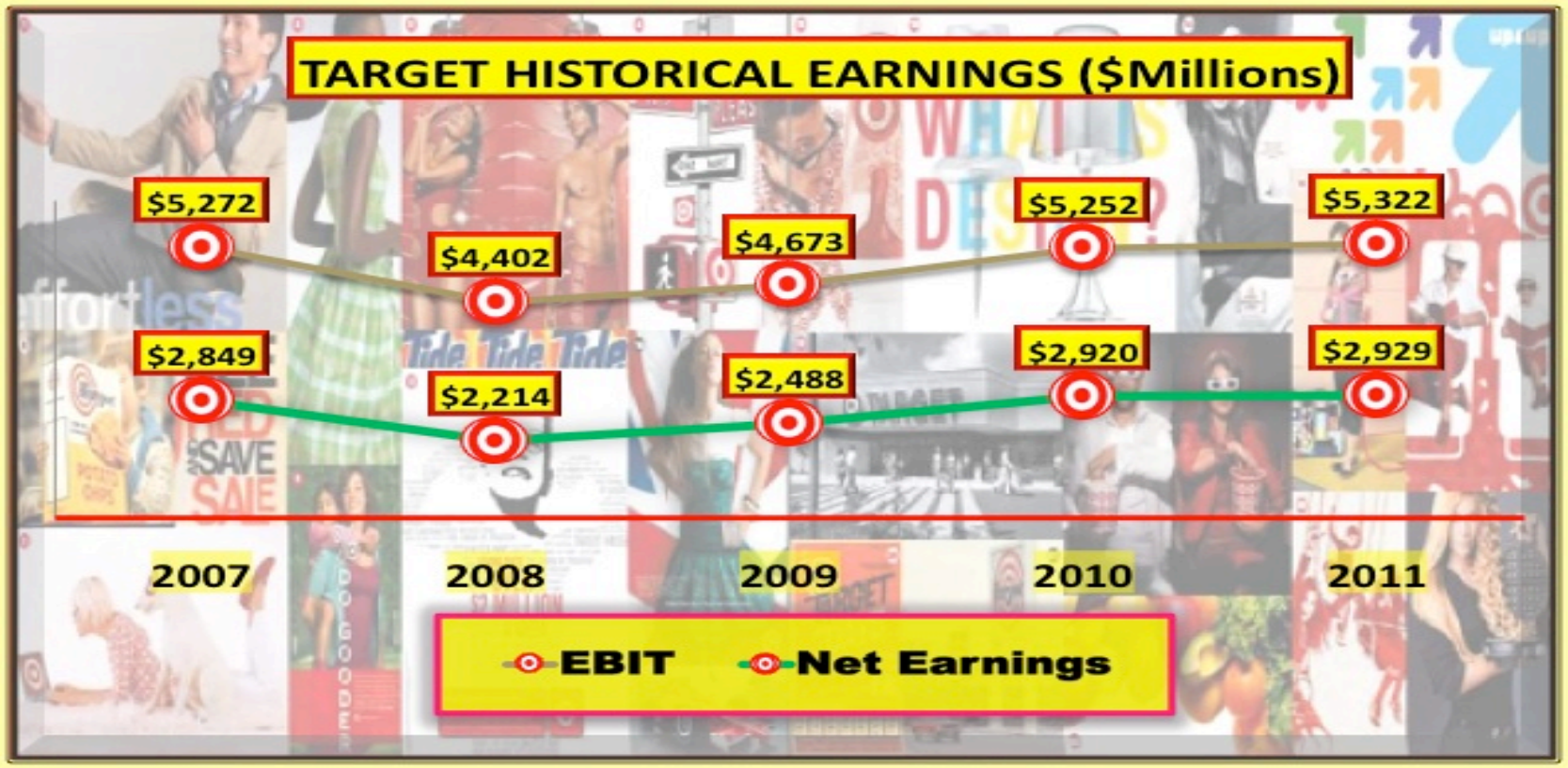
Summarize, Represent, and Interpret Data on a Single Count or Measurement Variable

1. Represent data with plots on the real number line (dot plots, histograms, and box plots).

2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (inter-quartile range, standard deviation) of two or more different data sets.

3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.



BUSINESS STATISTICS

BIVARIATE DATA ANALYSIS

Interpreting Categorical and Quantitative Data

(Extracted From CA Common Core Standards)

• Summarize, represent, and interpret data on two categorical and quantitative variables
• Interpret linear models

Summarize, Represent, and Interpret Data on Two Categorical and Quantitative Variables

1. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.

2. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

    a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.*

    b. Informally assess the fit of a function by plotting and analyzing residuals.

    c. Fit a linear function for a scatter plot that suggests a linear association.

BUSINESS STATISTICS

PROBABILITY

Rules of Probability

(Extracted From CA Common Core Standards)

- **Use the rules of probability to compute probabilities of compound events in a uniform probability model**

Use the rules of probability to compute probabilities of compound events in a uniform probability model

6. Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A*, and interpret the answer in terms of the model.

7. Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.

8. (+) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model.

9. (+) Use permutations and combinations to compute probabilities of compound events and solve problems.

Conditional Probability

(Extracted From CA Common Core Standards)

• Understand independence and conditional probability and use them to interpret data

Understand Independence and Conditional Probability and Use Them to Interpret Data

1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").

2. Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent.

3. Understand the conditional probability of *A* given *B* as *P*(*A* and *B*)/*P*(*B*), and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as the probability of *A*, and the conditional probability of *B* given *A* is the same as the probability of *B*.

4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*

5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*

Using Probability to Make Decisions

(Extracted From CA Common Core Standards)

• Calculate expected values and use them to solve problems
• Use probability to evaluate outcomes of decisions

Calculate expected values and use them to solve problems

1. (+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.

2. (+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

3. (+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. *For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.*

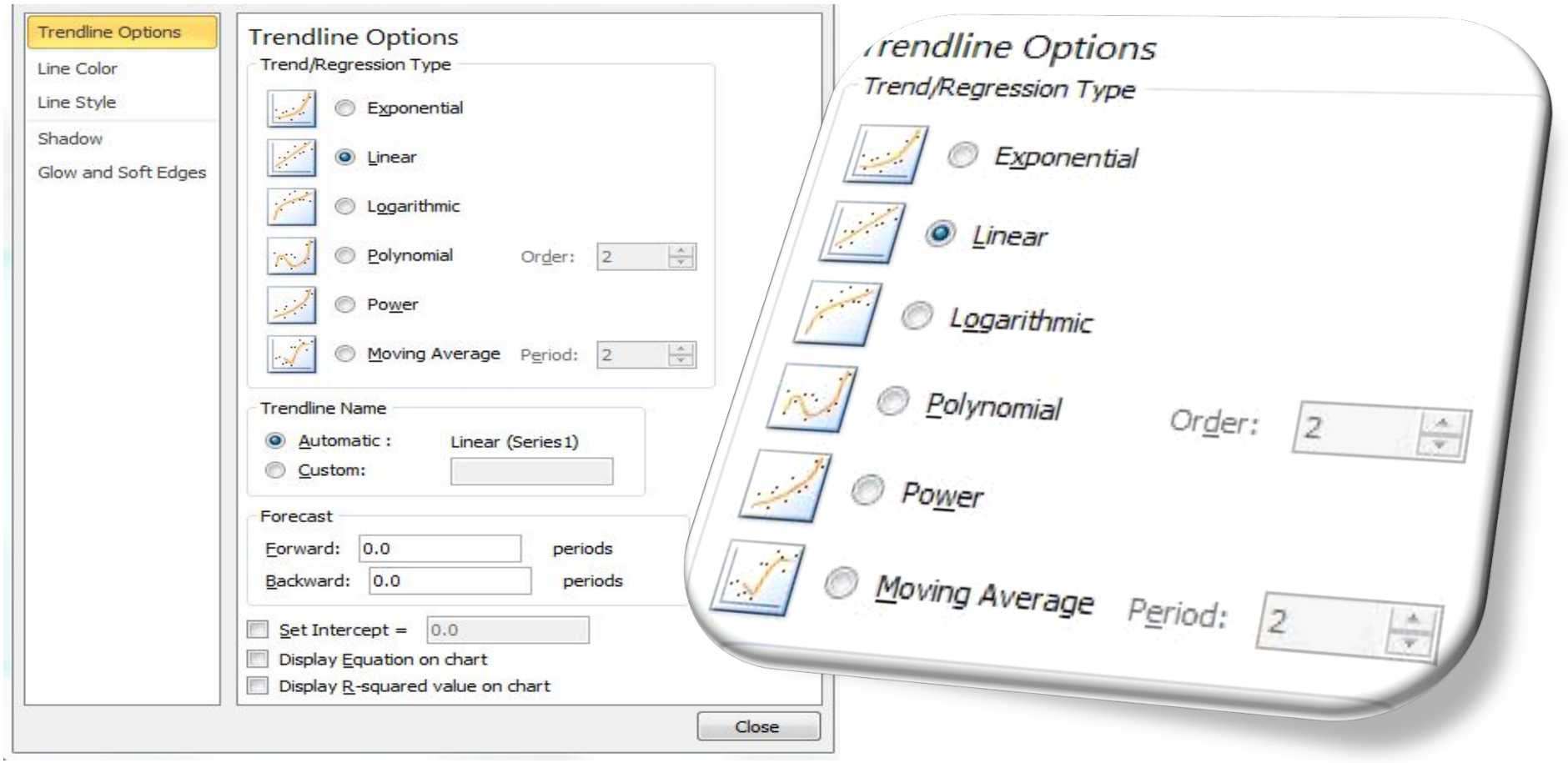
4. (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. *For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?*

Use probability to evaluate outcomes of decisions

5. (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.
    a. Find the expected payoff for a game of chance. *For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.*
    b. Evaluate and compare strategies on the basis of expected values. *For example, compare a high deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.*

6. (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).

7. (+) Analyze decisions and strategies using probability concepts (e.g. product testing, medical testing, pulling a hockey goalie at the end of a game).



BUSINESS STATISTICS

MATHEMATICAL MODELING

Mathematics | High School—Modeling

(Extracted From CA Common Core Standards)

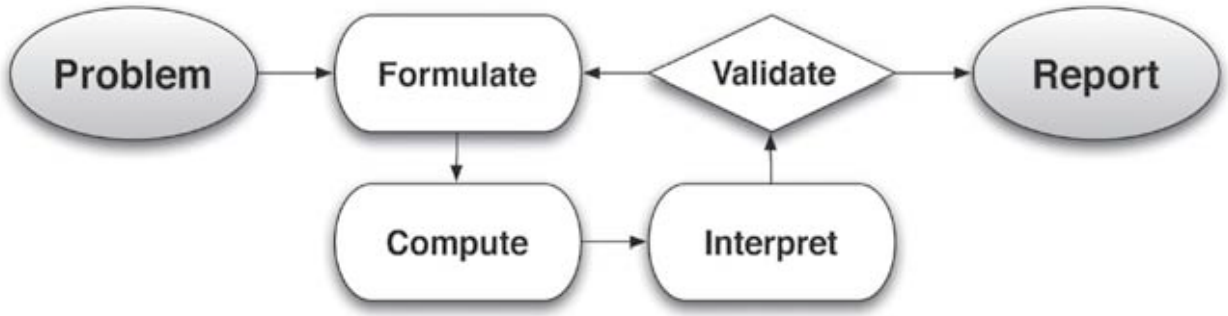
Modeling links classroom mathematics and statistics to everyday life, work, and decision-making. Modeling is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decisions. Quantities and their relationships in physical, economic, public policy, social, and everyday situations can be modeled using mathematical and statistical methods. When making mathematical models, technology is valuable for varying assumptions, exploring consequences, and comparing predictions with data. A model can be very simple, such as writing total cost as a product of unit price and number bought, or using a geometric shape to describe a physical object like a coin. Even such simple models involve making choices. It is up to us whether to model a coin as a three-dimensional cylinder, or whether a two-dimensional disk works well enough for our purposes. Other situations—modeling a delivery route, a production schedule, or a comparison of loan amortizations—need more elaborate models that use other tools from the mathematical sciences. Real-world situations are not organized and labeled for analysis; formulating tractable models, representing such models, and analyzing them is appropriately a creative process.

Like every such process, this depends on acquired expertise as well as creativity. Some examples of such situations might include:

- Estimating how much water and food is needed for emergency relief in a devastated city of 3 million people, and how it might be distributed.
- Planning a table tennis tournament for 7 players at a club with 4 tables, where each player plays against each other player.
- Designing the layout of the stalls in a school fair so as to raise as much money as possible.
- Analyzing stopping distance for a car.
- Modeling savings account balance, bacterial colony growth, or investment growth.
- Engaging in critical path analysis, e.g., applied to turnaround of an aircraft at an airport.
- Analyzing risk in situations such as extreme sports, pandemics, and terrorism.
- Relating population statistics to individual predictions.

In situations like these, the models devised depend on a number of factors: How precise an answer do we want or need? What aspects of the situation do we most need to understand, control, or optimize? What resources of time and tools do we have? The range of models that we can create and analyze is also constrained by the limitations of our mathematical, statistical, and technical skills, and our ability to recognize significant variables and relationships among them. Diagrams of various kinds, spreadsheets and other technology, and algebra are powerful tools for understanding and solving problems drawn from different types of real-world situations.

One of the insights provided by mathematical modeling is that essentially the same mathematical or statistical structure can sometimes model seemingly different situations. Models can also shed light on the mathematical structures themselves, for example, as when a model of bacterial growth makes more vivid the explosive growth of the exponential function. The basic modeling cycle is summarized in the diagram. It involves (1) identifying variables in the situation and selecting those that represent essential features, (2) formulating a model by creating and selecting geometric, graphical, tabular, algebraic, or statistical representations that describe relationships between the variables, (3) analyzing and performing operations on these relationships to draw conclusions, (4) interpreting the results of the mathematics in terms of the original situation, (5) validating the conclusions by comparing them with the situation, and then either improving the model or, if it is acceptable, (6) reporting on the conclusions and the reasoning behind them. Choices, assumptions, and approximations are present throughout this cycle.

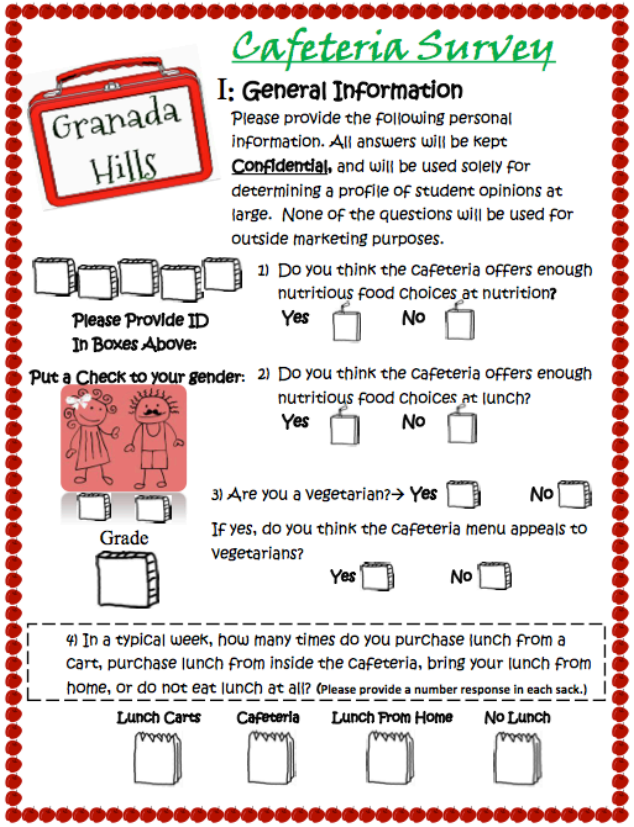


In descriptive modeling, a model simply describes the phenomena or summarizes them in a compact form. Graphs of observations are a familiar descriptive model— for example, graphs of global temperature and atmospheric CO2 over time.

Analytic modeling seeks to explain data on the basis of deeper theoretical ideas, albeit with parameters that are empirically based; for example, exponential growth of bacterial colonies (until cut-off mechanisms such as pollution or starvation intervene) follows from a constant reproduction rate. Functions are an important tool for analyzing such problems.

Graphing utilities, spreadsheets, computer algebra systems, and dynamic geometry software are powerful tools that can be used to model purely mathematical phenomena (e.g., the behavior of polynomials) as well as physical phenomena.

Modeling Standards *Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematicalmodels is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol* (⋆).



Cafeteria Survey

Granada Hills

I: General Information

Please provide the following personal information. All answers will be kept **Confidential**, and will be used solely for determining a profile of student opinions at large. None of the questions will be used for outside marketing purposes.

Please Provide ID In Boxes Above:

Put a Check to your gender:

Grade

1) Do you think the cafeteria offers enough nutritious food choices at nutrition? Yes ☐ No ☐

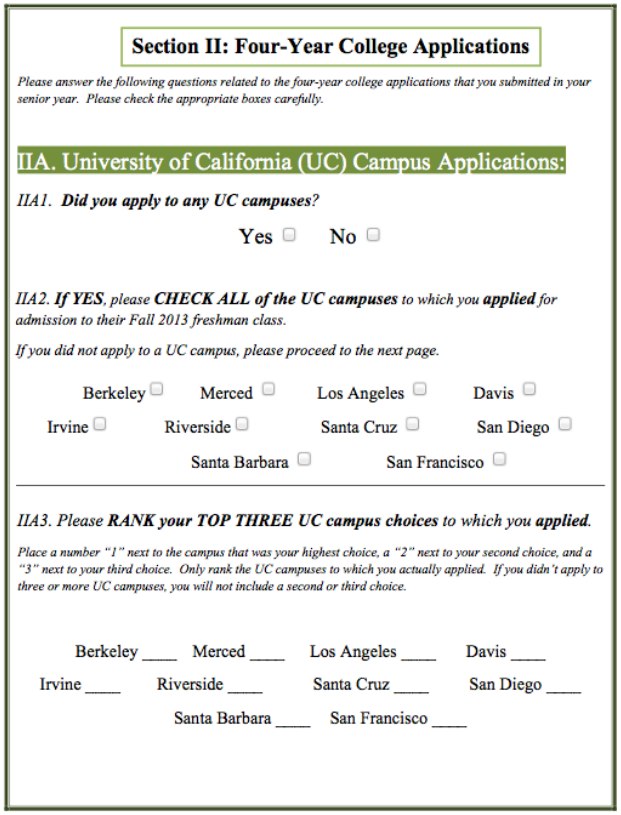
2) Do you think the cafeteria offers enough nutritious food choices at lunch? Yes ☐ No ☐

3) Are you a vegetarian? → Yes ☐ No ☐

If yes, do you think the cafeteria menu appeals to vegetarians? Yes ☐ No ☐

4) In a typical week, how many times do you purchase lunch from a cart, purchase lunch from inside the cafeteria, bring your lunch from home, or do not eat lunch at all? (Please provide a number response in each sack.)

Lunch Carts ____ Cafeteria ____ Lunch From Home ____ No Lunch ____



Section II: Four-Year College Applications

Please answer the following questions related to the four-year college applications that you submitted in your senior year. Please check the appropriate boxes carefully.

IIA. University of California (UC) Campus Applications:

IIA1. ***Did you apply to any UC campuses?***

Yes ☐ No ☐

IIA2. ***If YES****, please* ***CHECK ALL of the UC campuses*** *to which you* ***applied*** *for admission to their Fall 2013 freshman class.*

If you did not apply to a UC campus, please proceed to the next page.

Berkeley ☐ Merced ☐ Los Angeles ☐ Davis ☐

Irvine ☐ Riverside ☐ Santa Cruz ☐ San Diego ☐

Santa Barbara ☐ San Francisco ☐

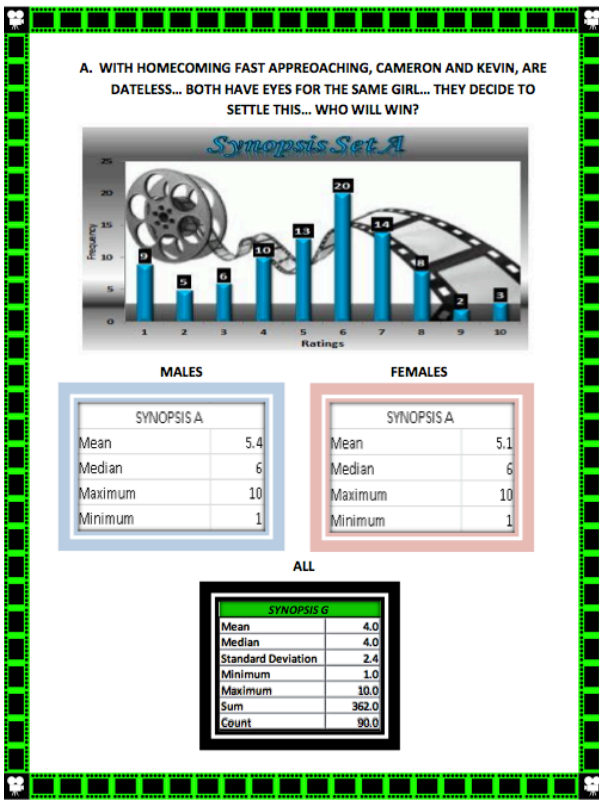
IIA3. Please ***RANK your TOP THREE UC campus choices*** *to which you* ***applied.***

Place a number "1" next to the campus that was your highest choice, a "2" next to your second choice, and a "3" next to your third choice. Only rank the UC campuses to which you actually applied. If you didn't apply to three or more UC campuses, you will not include a second or third choice.

Berkeley ____ Merced ____ Los Angeles ____ Davis ____

Irvine ____ Riverside ____ Santa Cruz ____ San Diego ____

Santa Barbara ____ San Francisco ____



A. WITH HOMECOMING FAST APPREOACHING, CAMERON AND KEVIN, ARE DATELESS... BOTH HAVE EYES FOR THE SAME GIRL... THEY DECIDE TO SETTLE THIS... WHO WILL WIN?

MALES

SYNOPSIS A	
Mean	5.4
Median	6
Maximum	10
Minimum	1

FEMALES

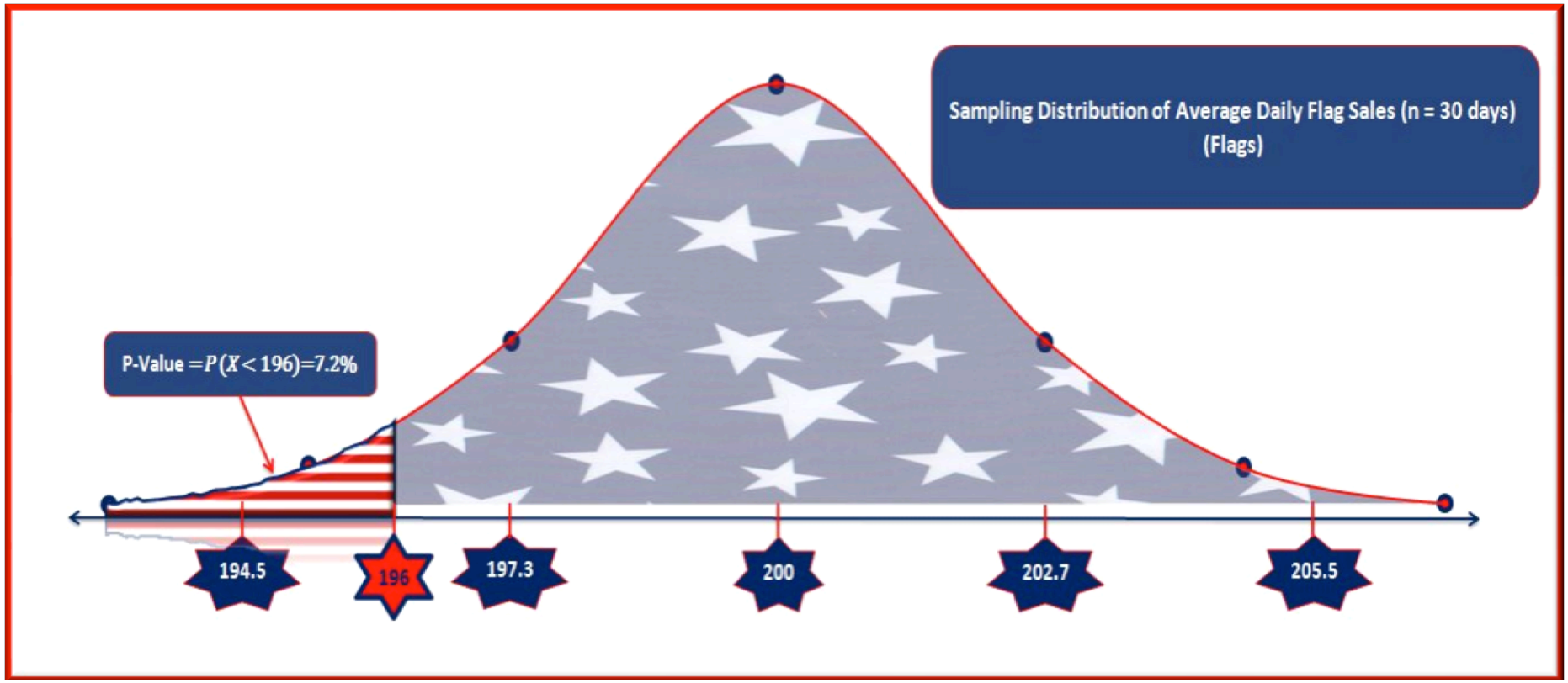
SYNOPSIS A	
Mean	5.1
Median	6
Maximum	10
Minimum	1

ALL

SYNOPSIS G	
Mean	4.0
Median	4.0
Standard Deviation	2.4
Minimum	1.0
Maximum	10.0
Sum	362.0
Count	90.0

BUSINESS STATISTICS

OBSERVATIONAL STUDY DESIGN



BUSINESS STATISTICS

INFERENCE PROCEDURES

Making Inferences and Justifying Conclusions

- **Understand and evaluate random processes underlying statistical experiments**
- **Make inferences and justify conclusions from sample surveys, experiments and observational studies**

Make inferences and justify conclusions from sample surveys, experiments, and observational studies

1. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

2. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

3. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

4. Evaluate reports based on data.