MEA 2013-2014
Teacher: Claudia Valle
Start Date:

Course: Math Models A
Student: _____
Completed Date:

Unit 1: Probability and Statistics

Objectives: Students will develop a hypothesis, collect data using appropriate methods to minimize bias and error, analyze the data, and display the data using various representations.

Essential Questions: What are some real-life situations that you would need to use probability or statistics?

TEKS Standards: M.1.A, M1.B, M.1.C, M.2.A, M2.B, M.2.C, M.2.D, M.3.A, M.3.B, M.3.C, M.4.A, M.4.B

Mathematical Models with Applications

(1) The student uses a variety of strategies and approaches to solve both routine and non-routine problems. The student is expected to:

(A) compare and analyze various methods for solving a real-life problem;

(B) use multiple approaches (algebraic, graphical, and geometric methods) to solve problems from a variety of disciplines; and

(C) select a method to solve a problem, defend the method, and justify the reasonableness of the results.

(2) The student uses graphical and numerical techniques to study patterns and analyze data. The student is expected to:

(A) interpret information from various graphs, including line graphs, bar graphs, circle graphs, histograms, scatterplots, line plots, stem and leaf plots, and box and whisker plots to draw conclusions from the data;

(B) analyze numerical data using measures of central tendency, variability, and correlation in order to make inferences;

(C) analyze graphs from journals, newspapers, and other sources to determine the validity of stated arguments; and

(D) use regression methods available through technology to describe various models for data such as linear, quadratic, exponential, etc., select the most appropriate model, and use the model to interpret information.

(3) The student develops and implements a plan for collecting and analyzing data (qualitative and quantitative) in order to make decisions. The student is expected to:

(A) formulate a meaningful question, determine the data needed to answer the question, gather the appropriate data, analyze the data, and draw reasonable conclusions;

(B) communicate methods used, analyses conducted, and conclusions drawn for a data-analysis project by written report, visual display, oral report, or multi-media presentation; and

(C) determine the appropriateness of a model for making predictions from a given set of data.

(4) The student uses probability models to describe everyday situations involving chance. The student is expected to:

(A) compare theoretical and empirical probability; and

(B) use experiments to determine the reasonableness of a theoretical model such as binomial, geometric, etc.

Turn In:

Assignment #	Activity	TEKS
1	Organizing and Describing Data	M.1.A, M1.B, M.1.C, M.2.A
2	Frequency and Histograms	M.1.A, M1.B, M.1.C, M.2.A
3	Data Distributions	M.1.A, M1.B, M.1.C, M.2.B
4	Misleading Graphs and Statistics	M.1.A, M1.B, M.1.C, M.2.C
5	Looking at Probability	M.1.A, M1.B, M.1.C, M.4.A, M.4.B
6	Statistics Project	M.1.A, M1.B, M.1.C, M.2.A, M2.B, M.2.C, M.2.D, M.3.A, M.3.B, M.3.C
7	Unit 1 Test	M.1.A, M1.B, M.1.C, M.2.A, M2.B, M.2.C, M.2.D, M.3.A, M.3.B, M.3.C, M.4.A, M.4.B

Name _____ Date _____ Class _____

LESSON 10-1

Review for Mastery

Organizing and Describing Data

If data:	Then use:
is organized into categories	bar graph/double bar graph
changes over a period of time	line graph/double line graph
compares categories to whole set	circle graph

Use the data at right to make a graph. Explain why you chose that type of graph.

Because the data compares categories (the ingredients) to a whole set (the recipe), a circle graph is best.

Recipe for Bubbles	
Ingredient	**Cups**
bubble soap	8
dishwashing liquid	1
glycerin	1
water	10

Step 1: Total the number of cups.

$8 + 1 + 1 + 10 = 20$

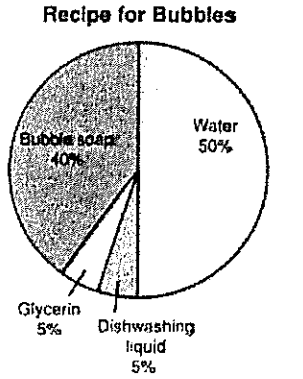
Step 2: Calculate the percent of each ingredient.

- bubble soap: $\frac{8}{20} = 40\%$
- glycerin: $\frac{1}{20} = 5\%$
- dishwashing liquid: $\frac{1}{20} = 5\%$
- water: $\frac{10}{20} = 50\%$

Step 3: Find the angle measure for each sector of the graph.

- bubble soap: 40% (360°) = 144°
- glycerin: 5% (360°) = 18°
- dishwashing liquid: 5% (360°) = 18°
- water: 50% (360°) = 180°

Use a compass and protractor to draw the graph.



Write *bar, double-bar, line, double-line,* or *circle* to indicate the type of graph that would best display the data described.

1. math scores of one student over the school year _____
2. attendance at an exercise class by age group, as it relates to total attendance _____
3. number of animals seen at a farm _____
4. A store owner uses an entire wall to display toys as shown in the table. Use the data to make a graph. Then explain why you chose that type of graph.

Toys for Sale	
Toy	**Shelves**
games	10
puzzles	5
dolls	3
trains	2

Name _____ Date _____ Class _____

LESSON 10-1

Review for Mastery

Organizing and Describing Data continued

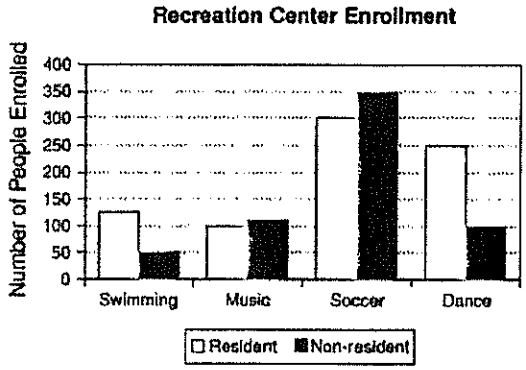
Comparisons between two groups can be made easily on a double-bar graph.

Which class shows the greatest difference between residents and non-residents?

Dance — *Compare bars for each class. Choose the bars with the greatest difference.*

How many more people were enrolled in soccer than dance?

300 — *Find total for soccer: 350 + 300 = 650. Find total for dance: 100 + 250 = 350. Subtract: 650 – 350 = 300.*



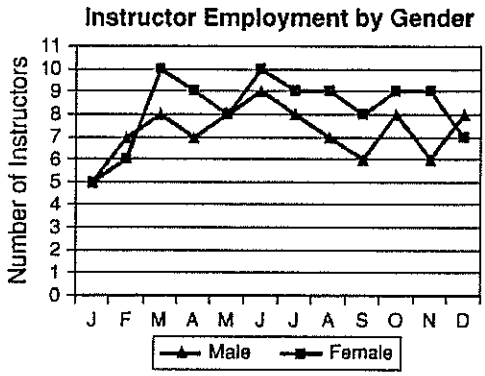
With a double-line graph, you can easily see how groups change over time.

During which month(s) were the number of male instructors equal to the number of female instructors?

May — *Look for where the data points overlap.*

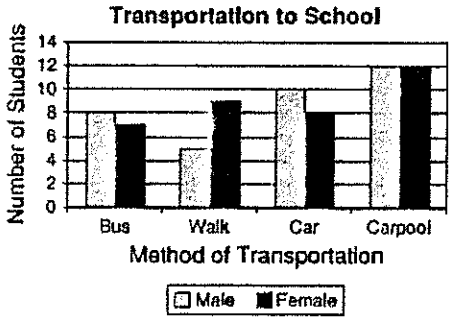
Between what two consecutive months did the number of female instructors increase the most?

February to March — *Look at female data points only. Find the steepest positive slope.*



Use the bar graph for 5–7.

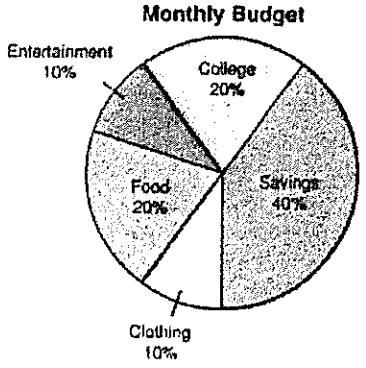
5. Which method of transportation is used by most students? _____
6. How many more girls than boys walk to school? _____
7. How many boys go by car or ride in a carpool? _____



Use the circle graph for 8–10.

8. Which category accounts for the highest percentage of the monthly budget? _____
9. Which categories account for the smallest percentages of the monthly budget? _____
10. If the budget is $500, how much is spent on food?

_____



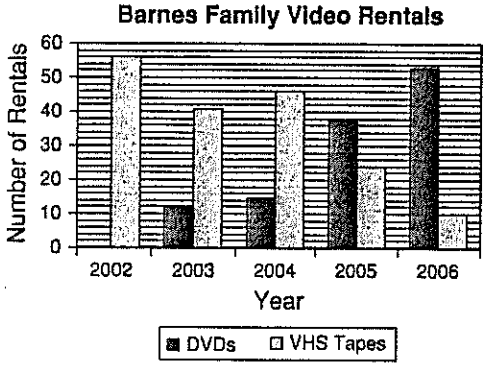
Name _____ Date _____ Class _____

LESSON 10-1

Practice B

Organizing and Describing Data

Look at the double bar graph.



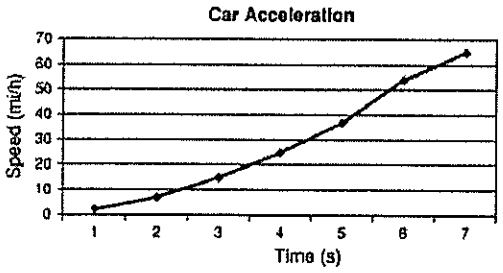
1. Which was the first year that the Barnes rented more DVDs than VHS tapes?

   _____

2. About how many videos did the Barnes family rent in all in 2003?

   _____

Look at the line graph.



3. During which time interval did the car's speed increase the least?

   _____

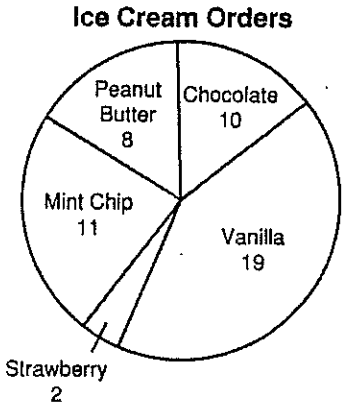
4. Describe how the speed changed over time.

   _____

   _____

   _____

Look at the circle graph.



5. There were 5 times the number of orders for _____ as there were for strawberry.
6. What percent of the orders for ice cream were for mint chip or vanilla? _____
7. The table shows the number of customers who pumped 4 types of fuel at a gas station in a given time period. Use the given data to make a graph. Explain why you chose that type of graph.

87 Octane	89 Octane	93 Octane	Diesel
12	1	5	2

_____

Name _____ Date _____ Class _____

LESSON 10-2

Review for Mastery

Frequency and Histograms

A **stem-and-leaf plot** arranges data by dividing each data value into two parts: a leaf (the last digit), and a stem (the digit or digits other than the last digit).

The amount of money collected by each student for the drama club is shown below. Use the data to make a stem-and-leaf plot.

55, 82, 90, 113, 100, 90, 93, 68, 66, 108, 116, 56, 85, 89, 102, 103

Step 1: List the stems.

The least value is 55, the greatest value is 116. List stems from 5 to 11. Do not omit any stems.

Step 2: List the leaves.

For each stem, write the ones digit from least to greatest.

Step 3: Write a key explaining one value.

Stems	Leaves
5	5 6
6	6 8
7	
8	2 5 9
9	0 0 3
10	0 2 3 8
11	3 6

Key: 8|2 means 82

The test scores from two different math classes are shown below. Use the data to make a back-to-back stem-and-leaf plot.

Class A: 50, 68, 95, 80, 92, 100, 98, 85, 82, 81
Class B: 75, 81, 100, 63, 52, 94, 100, 100, 87, 99

Step 1: List the stems.

The lowest value is 50, the highest value is 100. List stems from 5 to 10. Do not omit any stems.

Step 2: List the leaves.

For each stem, write the ones digit from least to greatest.

Step 3: Write a key explaining one value from each side.

Leaves (Class A)	Stems	Leaves (Class B)
	5	2
8	6	3
	7	5
5 2 1 0	8	1 7
8 5 2	9	4 9
0	10	0 0 0

Key: |8|1 means 81
5|9| means 95

1. The daily low temperatures in degrees Fahrenheit in a town in the Northeast are given below. Use the data to make a back-to-back stem-and-leaf plot.

Daily Low Temperatures (°F)					
40	56	50	60	62	63
49	48	49	40	36	59
57	52	53	42	44	39

Daily High Temperatures (°F)					
70	84	71	73	71	70
73	78	76	65	65	67
66	76	69	70	70	58

Low Temp		High Temp

Name _____ Date _____ Class _____

LESSON 10-2

Review for Mastery

Frequency and Histograms continued

The ages of people visiting a water park during a certain time period are given below. Use the data to make a frequency table with intervals. Then make a histogram.

5, 12, 22, 15, 17, 13, 25, 34, 7, 9, 12, 32, 12, 15, 18

Step 1: Find the difference between the greatest and least values.

Least: 5 Greatest: 34

$34 - 5 = 29$

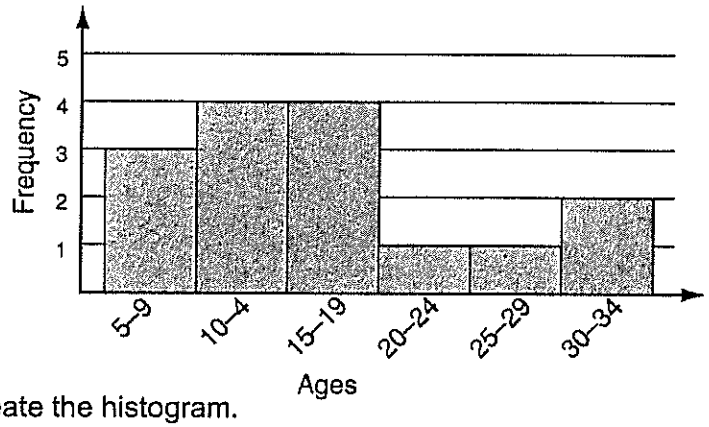
Step 2: Use the difference to decide on intervals. ⇨

Try different widths for your intervals to determine the number of bars in the histogram.

Finding the Interval		
If width of interval is:	Then divide:	The number of intervals is:
10	$\frac{29}{10} = 2.9$	3 (too few)
3	$\frac{29}{3} \approx 9.7$	10 (too many)
5	$\frac{29}{5} = 5.8$	6 (good)

Step 3: Create the frequency table.

Ages of Visitors	
Age	Frequency
5 - 9	3
10 - 14	4
15 - 19	4
20 - 24	1
25 - 29	1
30 - 34	2

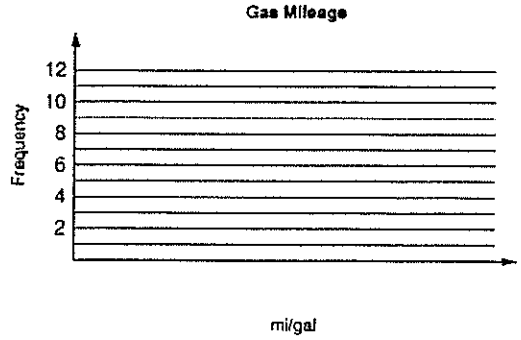


Step 4: Use the frequency table to create the histogram. Draw each bar to the corresponding frequency.

2. The estimated miles per gallon for selected cars are shown in the table. Use the data to make a frequency table with intervals. Then make a histogram.

26	28	32	33	26	15	21
35	17	18	25	29	30	26
27	30	24	25	24	32	25
19	22	32	25	31	28	23
27	23	24	20	38	44	18

Car Gas Mileage	
mi/gal	Frequency



Name _____ Date _____ Class _____

LESSON 10-2

Practice A

Frequency and Histograms

1. The number of rushing yards completed by a running back on a professional football team in each of the 16 regular season games is given. Use the data to make a stem-and-leaf plot with a title and a key.

Rushing Yards							
43	52	98	96	74	32	73	54
57	48	65	78	72	83	54	68

stem	leaves

2. The test scores for two Algebra classes are shown in the stem-and-leaf plot.

Period 5					Period 3			
4	2	0	0	5	3			
	6	5	2	6	8	9		
7	7	4	2	7	2	9	9	
		8	3	8	4	4	4	
	9	3	1	9	1	3	3	6
				10	0	0		

Key: |6|8 means 68
3|8| means 83

   a. How many students scored 100? _____

   b. How many students in Period 5 scored greater than 80? _____

   c. What was the lowest score in Period 3? _____

   d. Which Period had more scores?

      How many more? _____

3. The number of calls per day to a fire and rescue service for three weeks is given below. Use the data to complete the frequency table.

Calls for Service										
5	17	2	12	0	6	3	8	15	1	4
19	16	8	2	11	13	18	3	10	6	

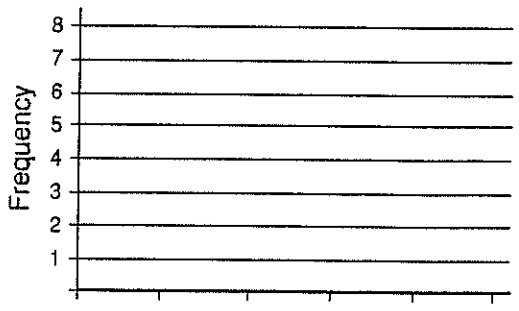
Fire and Rescue Service	
Number of Calls	**Frequency**
0 - 3	
4 - 7	
8 - 11	
12 - 15	
16 - 19	

4. Use the frequency table in Exercise 3 to make a histogram with a title and axis labels.

5. Which intervals have the same frequency?

_____

Fire and Rescue Service



Name _____ Date _____ Class _____

LESSON 10-3

Review for Mastery

Data Distributions

Consider the data set {2, 6, 4, 2, 1}.

The **mean** of the data set is the average of the data set. Add all the numbers and divide by the number of numbers.

$$\frac{2+6+4+2+1}{5}=\frac{15}{5}=3$$

The mean is 3.

The **median** of the data set is the middle number when the numbers are listed in order.

1, 2, **2**, 4, 6

The median is 2.

If there are two middle numbers, the median is the average of those numbers.

The **mode** is the number that occurs most often.

1, **2**, **2**, 4, 6

The mode is 2.

There can be more than one mode, or there can be no mode.

The **range** is the difference between the greatest and least numbers.

1, 2, 2, 4, **6**

6 – 1 = 5

The range is 5.

Find the mean, median, mode, and range of each data set.

1. 8, 2, 3, 4, 3

mean: $\frac{\square+\square+\square+\square+\square}{5}=\frac{\square}{5}=\square$ mode: _____

median: _____ range: _____

2. 4, 5, 7, 4, 5, 8

mean: _____ mode: _____

median: _____ range: _____

3. 12, 8, 16, 4

mean: _____ mode: _____

median: _____ range: _____

Name _____ Date _____ Class _____

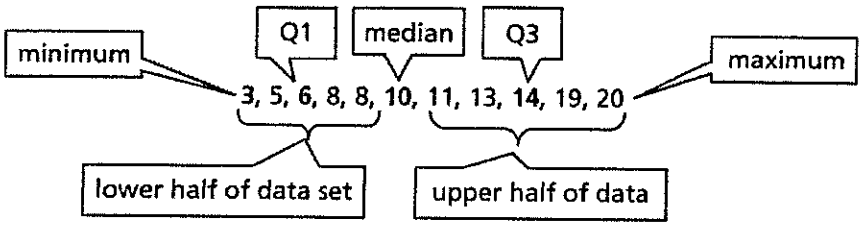
LESSON 10-3

Review for Mastery

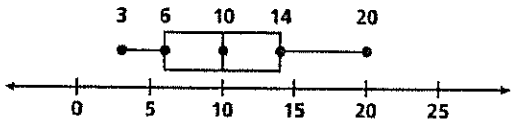
Data Distributions (continued)

Consider the data set {3, 5, 6, 8, 8, 10, 11, 13, 14, 19, 20}.

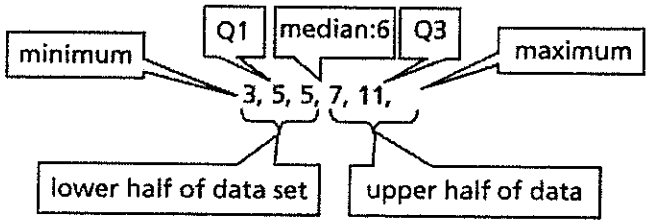
To make a **box-and-whisker plot**, first identify the median, which divides the data into two halves. Then identify the **first quartile**, Q1, the median of the lower half, and the **third quartile**, Q3, the median of the upper half. Last, identify the minimum (lowest) and maximum (greatest) numbers.



Plot the five numbers above a number line. Draw a box so the sides go through Q1 and Q3. Draw a line through the median. Connect the box to the minimum and maximum.



When there is an even number of numbers, the two middles numbers are included in the upper and lower halves of the data set.



Consider the data set {9, 11, 18, 21, 18, 14, 5}.

4. Write the data in order: _____
5. Minimum: _____, Q1: ____, Median: ____, Q3: ____, Maximum: ____
6. Draw the box-and-whisker plot.

Consider the data set {7, 5, 2, 14, 9, 15}.

7. Write the data in order: _____
8. Minimum: _____, Q1: ____, Median: ____, Q3: ____, Maximum: ____
9. Draw the box-and-whisker plot.

Name _____ Date _____ Class _____

LESSON 10-3

Practice A

Data Distributions

Find the mean, median, mode, and range of each data set.

1. 7, 19, 25, 9, 10

   Order the numbers: _____, _____, _____, _____, _____

   mean: $\frac{\square+\square+\square+\square+\square}{\square} = \_\_\_\_$ median: _____

   mode: _____ range: _____ – _____ = _____

2. 5, 3, 3, 5, 2, 5, 5

   Order the numbers: _____, _____, _____, _____, _____, _____, _____

   mean: _____ median: _____

   mode: _____ range: _____

3. 8, 12, 17, 12, 9, 8

   mean: _____ median: _____

   mode: _____ range: _____

Identify the outlier in each data set, and determine how the outlier affects the mean, median, mode, and range of the data.

4. 7, 11, 29, 3, 10

   _____

   _____

5. 52, 39, 11, 44

   _____

   _____

6. Mr. Bernard drove 46, 4, 64, 50, and 56 miles on his last five trips. For each question, choose the mean, median, or mode, and give its value.

   a. Which value describes Mr. Bernard's average driving distance? _____

   b. Which value would Mr. Bernard tell his boss to convince him that he spends too much time on the road? Explain.

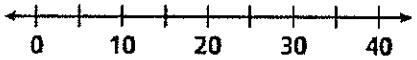
   _____

7. Use the data to make a box-and-whisker plot. 18, 22, 10, 22, 30, 8, 33, 15, 14

   a. Order the data: _____

   b. Min: _____, Q1_____, Med: _____,

      Q3: _____, Max: _____

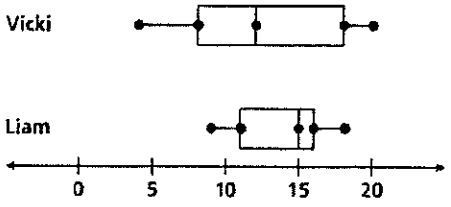


The quiz scores of two students are shown in the box-and-whisker plots.

8. Who has the higher median score? _____

9. Who has the highest score? _____

10. Who has the most consistent scores? _____



Name _____ Date _____ Class _____

LESSON 10-4

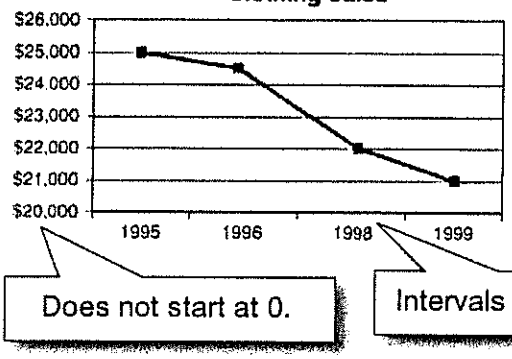
Review for Mastery

Misleading Graphs and Statistics

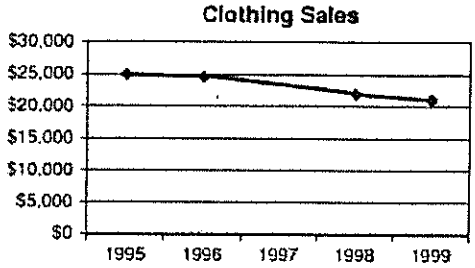
Graphs can be used to mislead people.

Bar Graphs and Line Graphs: If the vertical scale does not start at 0, the difference between categories or time intervals can look larger than it is. If the horizontal scale is not at equal intervals, the rate of change can look steeper than it is.

Misleading Graph

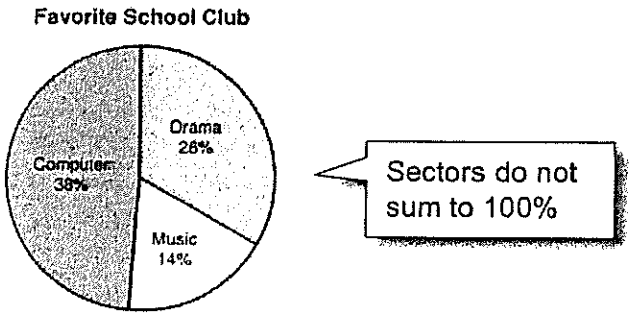


Corrected Graph

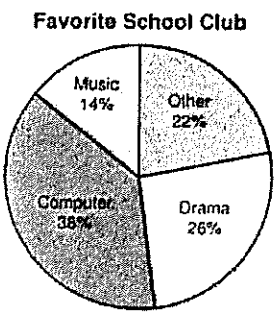


Circle Graphs: If the sections in a circle graph do not sum to 100%, sections will appear larger than they actually are.

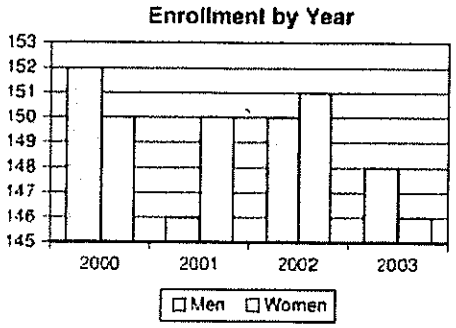
Misleading Graph



Corrected Graph



1. The graph shows the number of men and women who have enrolled in a school.



   a. Explain why the graph is misleading.

   _____

   _____

   b. What might someone believe because of the graph?

   _____

   _____

   c. Who might want to use this graph? _____

   _____

Name _____ Date _____ Class _____

LESSON 10-4

Review for Mastery

Misleading Graphs and Statistics continued

Statistics can be misleading because of the way the data is collected or because of the way the results are reported.

- A sample is biased if it only surveys a certain group of people.
- A sample is biased if it is too small.
- Statistics can mislead if the measures used are not a good representation of the data.

A researcher surveys kindergarteners and asks if they have too much homework. Explain why the following statement is misleading: "Only 5% of students in West Branch School District think they have too much homework."

The sample is biased because students in kindergarten tend to have little or no homework. Students from other grades, who get more homework, were not surveyed.

A researcher asks 2 people whether they approve of the way their town is being run. Explain why the following statement is misleading: "50% of townspeople are unhappy with local government."

This sample is biased because only 2 people were surveyed. The sample size is too small.

A car dealership is selling 5 cars at the following prices: $12,000, $13,000, $15,000, $55,000, and $13,000. Explain why the following statement made by a competitor is misleading: "The car dealership sells cars at an average price of $21,600."

This statistic is misleading because most of the cars are less than $21,600.

The mean is not a good descriptor of this data set because it has an outlier.

2. Houses on Main Street sold for the following amounts: $175,000, $182,000, $178,000, and $389,000. Explain why the following statement is misleading: "Houses on Main Street are selling for an average of $231,000."

_____

_____

3. A researcher is contacting people by e-mail to see what proportion of them use a computer every day. Explain why the following statement is misleading: "85% of people use a computer every day."

_____

_____

4. A researcher asks 5 students if they think the cost of school lunches is too high. Explain why the following statement is misleading: "Four-fifths of all students think school lunches are too expensive."

_____

Name _____ Date _____ Class _____

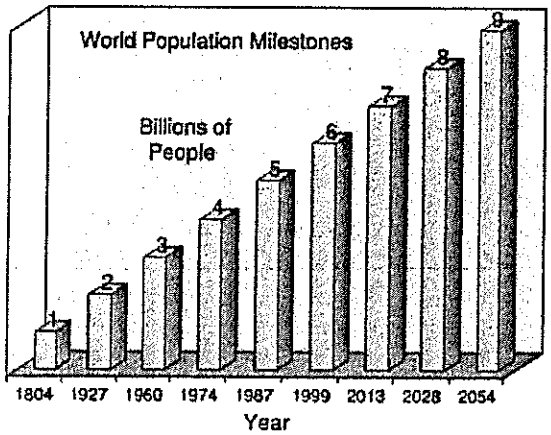
LESSON 10-4

Problem Solving

Misleading Graphs and Statistics

Analyze these misleading graphs.

1. This graph shows the years in which the world population reached, or is projected to reach, integer multiples of 1 billion people.



a. Explain why the graph is misleading.

_____

_____

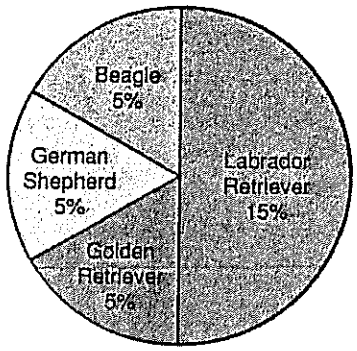
b. What might someone believe because of the graph?

_____

_____

2. This graph shows dog registrations with the American Kennel Club.

Dog Breeds Registered with the American Kennel Club, 2004



a. Explain why the graph is misleading.

_____

_____

b. Who might want to use this graph, and why?

_____

_____

Use the graph to select the best answer.

3. The graph is misleading because of which scale(s)?

A horizontal only C both

B vertical only D neither

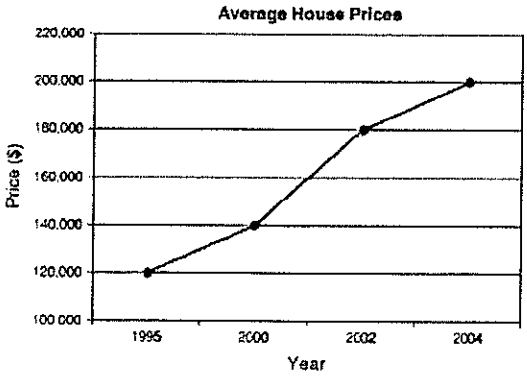
4. Which statement is certainly true?

F The average house price increased every year between 1995 and 2004.

G The average house prices have increased $80,000 between 1995 and 2004.

H The average house price in 2001 was about $160,000.

J None of the above.



Notes

Looking at Probability KEY

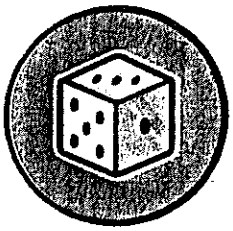
Simple Probability

Probability is a numerical description of how likely an event is to occur. It is determined by the ratio of the number of desired outcomes to the total number of outcomes in the sample space.

Probability of an event occurring is always from 0 to 1.

- If the event cannot occur, the probability is 0.
- If the event is certain to occur, the probability is 1.
- All other probabilities are fractions or decimals between 0 and 1.

Sample



When rolling a fair, six-sided number cube:

1. What is the possible sample space?
   {1, 2, 3, 4, 5, 6}

2. How many total outcomes are possible?
   6 possible outcomes

3. What is the probability of rolling a 3? Only a 3 desired so one desired outcome

$$\frac{\text{1 desired outcome}}{\text{6 possible outcomes}} = \frac{1}{6} \text{ or } 0.167$$

4. What is the probability of rolling an odd number? Either a 1, 3, or 5 so three desired outcomes

$$\frac{\text{3 desired outcomes}}{\text{6 possible outcomes}} = \frac{3}{6} = \frac{1}{2} \text{ or } 0.5$$

5. What is the probability of rolling a 9? No "9" on the number cube

$$\frac{\text{0 desired outcomes}}{\text{6 possible outcomes}} = \frac{0}{6} = 0$$

6. What is the probability of rolling 1, 2, 3, 4, 5, or 6? All six are desired outcomes

$$\frac{\text{6 desired outcomes}}{\text{6 possible outcomes}} = \frac{6}{6} = 1$$

Notes

Looking at Probability KEY

Compound Probability

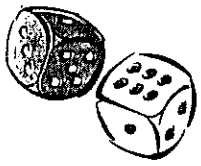
If an event is comprised of a sequence of simple events, it is called a compound event.

To find the probability of a compound event you multiply the probabilities of the simple events.

$$P(A \text{ and } B) = P(A) \bullet P(B)$$

Compound events can be independent or dependent.

- If the outcome of the first event does not affect the outcome of the second event the compound event is independent.
- If the outcome of the first event does affect the outcome of the second event the compound event is dependent.



Sample

When rolling two fair, six-sided number cubes:

7. How many simple events will occur? What are they?
   Two simple events, rolling the dark red number cube and rolling the white number cube

8. Is the outcome of the second event affected by the outcome of the first event?
   The outcome of the roll of the second cube is not affected by the outcome of the first cube.

9. Would the probability of rolling a 3 on the first number cube and a 6 on the second number cube be an independent or dependent compound event?
   The compound event would be independent.

10. What is the probability of rolling a 3 on the first number cube and a 6 on the second number cube?
    P(rolling 3 on first number cube and rolling 6 on the second number cube) =
    $\frac{1}{6} \bullet \frac{1}{6} = \frac{1}{36}$ or 0.028

Sample

Drawing 3 marbles, one at a time without replacement, from a bag that contains 10 red marbles, 4 blue marbles, 5 green marbles, and 1 clear marble:

11. How many simple events will occur? What are they?
    Three simple events, each draw of the marbles

12. Is the outcome of the second event affected by the outcome of the first event?
    The outcome of the second draw is affected by the outcome of the first draw.

13. Would the probability of drawing a red, then a blue, then a clear be an independent or dependent compound event? What is the probability? Dependent
    P(1st draw red, 2nd draw blue, 3rd draw clear) = $\frac{10}{20} \bullet \frac{4}{19} \bullet \frac{1}{18} = \frac{1}{171} = 0.006$

Notes

Looking at Probability KEY

Theoretical and Empirical (Experimental) Probability

Theoretical probability predicts what will occur in a given event, whereas empirical (experimental) probability will vary depending on occurrence of events in a situation or experiment.

The Law of Large Numbers states that as the number of trials increases, the empirical probability should approach the value of the theoretical probability.

Sample

A six-sided number cube is rolled 50 times with the following results:

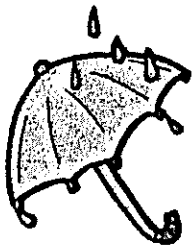
Number Rolled	Frequency
1	8
2	6
3	9
4	10
5	9
6	8

Number Rolled	Theoretical Probability	Empirical Probability
1	$\frac{1}{6} = 0.17$	$\frac{8}{50} = 0.16$
2	$\frac{1}{6} = 0.17$	$\frac{6}{50} = 0.12$
3	$\frac{1}{6} = 0.17$	$\frac{9}{50} = 0.18$
4	$\frac{1}{6} = 0.17$	$\frac{10}{50} = 0.20$
5	$\frac{1}{6} = 0.17$	$\frac{9}{50} = 0.18$
6	$\frac{1}{6} = 0.17$	$\frac{8}{50} = 0.16$

14. How do the theoretical and empirical probabilities compare?
Answers will vary. Sample: Although the probabilities are close, they are not exactly the same. As more samples (over 50) are taken, the closer they will become.

Predictions with Probability

Theoretical or empirical probability can be used to make predictions. If you know the probability of the event occurring and the total number of trials, proportions can be used to predict the number of desired outcomes.



Sample

15. In a tire manufacturing plant 150 tires were inspected. Of these tires 5 were found to be defective. Based on this information, predict the number of defective tires out of a daily production of 3,000 tires.

$$\frac{\text{defective}}{\text{total inspected}} = \frac{\text{defective}}{\text{total produced}} \text{ therefore } \frac{5}{150} = \frac{x}{3000} \qquad x = 100 \text{ defective tires}$$

16. Weather statistics show that in the month of April, rain showers occur on average 12 days. If the pattern continues, how many rainy days can be expected from April 1 through April 15?

$$\frac{\text{rainy days}}{\text{days in month}} = \frac{\text{rainy days}}{\text{days from 4/1-4/15}} \text{ therefore } \frac{12}{30} = \frac{x}{15} \qquad x = 6 \text{ rainy days}$$

Probability Practice

Complete problems on separate paper, showing all work.

1. Shari rolls a fair, six-sided number cube with numbers 1 through 6 on the faces. What is the probability of Shari rolling a number greater than 3?

2. A circular spinner is divided evenly into four colors, red, blue, green, and yellow. If a six-sided number cube is tossed and the spinner is spun, what is the probability of getting a number greater than 3 and the color blue?

3. Bill draws a marble from a bag containing 8 purple marbles and 12 yellow marbles. When he draws a marble from the bag, he does not replace it in the bag. What is the probability of Bill drawing a purple marble and then a blue marble?

4. According to the weather man on Channel 5, there is a 45% chance of rain. What is the probability it will rain? What is the probability that it will not rain?

5. Meredith rolled a 2 six times out of thirty rolls. From her experimental results, how many times should she expect to roll a 2 on the next 500 rolls of the same number cube?

6. A red chip, a blue chip, a white chip, a yellow chip, and a green chip are placed in a cup.
   a. What is the probability of randomly drawing a red chip four times in a row if the chips are replaced after each draw?

   b. What is the probability of randomly drawing a red chip first, a blue chip second, a white chip third, and a green chip fourth, if the chips are not replaced after each draw?

7. Rani is allergic to blueberries or cranberries. A box of 30 assorted muffins contains 8 blueberry muffins, 8 cranberry muffins, 4 combination blueberry/cranberry muffins, and 10 chocolate chip muffins. What is the probability that a muffin chosen at random would be safe for Rani to eat?

8. Rilie is playing a tile game that consists of two sets of tiles. The first set contains tiles on which are written all the letters of the alphabet, except A and B. The second set contains tiles on which are written all the digits 0 through 9. If Rilie draws one letter tile and one number tile, what is the probability that she will draw a letter in her name and an even number?

Probability Practice

9. Janice spins a circular spinner that is divided into four equal sections labeled A, B, C, and D.
   a. What is the theoretical probability of landing in section A? Section B? Section C? Section D?

   b. Janice tested the spinner for fairness by completing sixty trials. She listed the results in a table.

Section	Frequency
A	12
B	18
C	16
D	14

   c. What is the empirical probability of landing in section A? Section B? Section C? Section D?

   d. If Janice made her decision by comparing the theoretical and empirical probability, what did she conclude? Explain.

10. Brook Hills High School is planning an end-of-the-year school trip. A random survey of 200 students at the school was conducted to determine the preferred destination. In the survey, 110 students said they would like to go to a coastal location. If Madison High School has 2,400 students, what is the best prediction of how many students at the school would prefer going to a coastal location on the school trip?

11. The Hillsboro High School baseball team has won 8 games and lost 4. What is the best prediction of the number of games the team would have to play in order to win 12 games?

Statistics Project Rubric

Component	Possible Points	Awarded Points	Comments
Hypothesis	10		
Data collection plan	10		
Table of data	10		
Draft of hard copy report	10		
Final report	20		
Displays for presentation	20		
Oral presentation 5 – 10 minutes	20		

PROJECT GRADE	

Testing a Hypothesis by Data Collection and Analysis

Part I

1. Determine a hypothesis that requires univariate or bivariate data collection and analysis to test. Have the hypothesis approved by the teacher before proceeding. (10 points)
2. Develop a plan for collecting data to test the approved hypothesis by a proper sampling or experimental method. Have the data collection plan approved by the teacher before proceeding. (10 points)
3. Collect data according to the approved plan. At least twenty data values must be collected. Organize data into a table. Turn in a copy of the data table to the teacher before proceeding. (10 points)

Part II

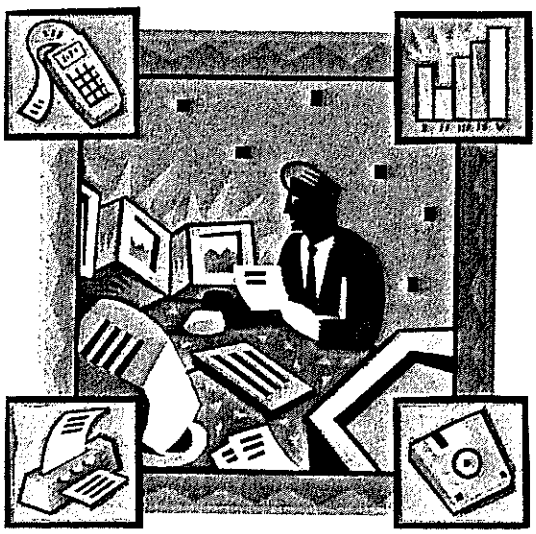
4. Analyze the data graphically and numerically as appropriate for the type of data collected. Use the results to determine the validity of the hypothesis, and identify any changes that would need to be made to the hypothesis for future data analysis. Also identify any problems that may have occurred with the data collection and analysis.
5. Organize all materials and results into a hard copy report. The report should include the data collection plan, tables, graphs, numerical analysis, predictions, and final conclusions. Write a rough draft of the report and submit it to the teacher before completing the final version of the report. (10 points). The final hard copy report should be typed and in a professional format. (20 points)

Part III

6. Create a display of the data for use in the oral presentation. This could include charts, PowerPoints, handouts, etc. (20 points)

Part IV

7. Give a 5 – 10 minute oral presentation of all aspects of your project. Use the display models to support your results and conclusions. (20 points)



Possible Statistics Project Topics

Univariate – Categorical

- Colors of candies
- Colors of cars
- Types of TVs
- Types of jobs
- Favorite types of music
- Favorite sport
- Favorite subject
- Favorite food
- Childhood diseases contracted
- Number of foreign countries visited

Univariate – Numerical

- Lengths of cars
- Raisins per box
- Heights of individuals
- Hours watching TV/playing
- Hours studying
- Hours working
- Soft drinks consumed in a week
- Weights of backpacks
- Number of siblings
- Number of TVs in homes
- Length of time on music CDs
- Length of time on movie DVDs

Bivariate – Numerical

- Weight of vehicles versus length of vehicles
- Cost of vehicles versus size
- Cost of buildings versus size in square feet
- Height versus length of face
- Calories versus fat in various food sources
- Calories versus carbohydrates in various food sources
- Number of family members versus number of TVs
- Weights of books versus number of pages
- Temperature versus time of day
- Number of hours of daylight versus time of year
- School absences versus month
- Time to run versus distance

Data can also be collected from two populations and compared. For univariate data heights of individuals, boys and girls can be compared. For bivariate data weight of vehicles versus length of vehicles, cars and trucks can be compared.