Statistics & Probability – Unit 7

Tentative TEST date_____

Reflect – previous TEST mark _____, Overall mark now_____.
Looking back, what can you improve upon?

Learning Goals/Success Criteria

Use the following checklist to help you determine what you know well and where you need additional review.

DAYS & Pages	Can you…	No, I cannot. I need to learn this.	I kind of get it. I don't get the right answers very often.	I get it. I could work on being more consistent.	Yes, I can. I have perfected this!
Day 1 Pg 2-4	Explain the difference between a population and a sample?	☐	☐	☐	☐
	Differentiate between and give examples of all sampling methods (simple random, stratified, cluster, convenience, voluntary, systematic)?	☐	☐	☐	☐
	Differentiate between and give examples of the types of bias (sampling, response, measurement, non-response)?	☐	☐	☐	☐
Day 2 Pg 5-7	Differentiate between and give examples of the types of data (categorical, continuous, discrete)?	☐	☐	☐	☐
	Collect and organize data a tally charts and frequency tables.	☐	☐	☐	☐
Day 3 Pg 8-10	Display data by constructing bar graphs, histograms, pie graphs and pictographs?	☐	☐	☐	☐
	Differentiate between and give examples of the types of distributions (symmetrical (normal, bimodal, uniform) and skewed (right or left))?	☐	☐	☐	☐
Day 4 Pg 11-13	Calculate the mean, median, mode and range by hand for a set of data?	☐	☐	☐	☐
	Calculate the standard deviation using technology for a set of data?	☐	☐	☐	☐
	Interpret and answer questions about data based on the measures of central tendency and spread?	☐	☐	☐	☐
Day 5 Pg 14-15	Solve problems using statistics?	☐	☐	☐	☐
Day 6 Pg 16-17	Calculate probability as a fraction, decimal or percent?	☐	☐	☐	☐
	Use tree diagrams to help answer probability questions?	☐	☐	☐	☐
Day 7 Pg 18-19	Design and carry out an experiment to determine the probability of an event occurring?	☐	☐	☐	☐
Day 8 Pg 20-21	Define probability and explain the difference between theoretical and experimental probability?	☐	☐	☐	☐
Day 9 Pg 22-24	Explain how statistics and probability are used in the media?	☐	☐	☐	☐
	Apply the considerations (misuse of language, distorted visuals, questionable sources) when statistics and probability are used in the media?	☐	☐	☐	☐
Day 10&11 Pg 25-30	REVIEW				

DAY 1 – Sampling Techniques

1. Check the appropriate sampling method for each scenario.

SCENARIO		SIMPLE RANDOM	STRATIFIED	CLUSTER	CONVENIENCE	VOLUNTARY	SYSTEMATIC
a.	John was carrying out a survey to find how far, on average, residents in his town travel to work. He asked all the people at his local railway station one Monday morning.						
b.	Hazel thinks that boys at her school get more pocket money than girls. There are 300 children at the school, 120 boys and 180 girls. In her survey she asks 24 boys and 36 girls.						
c.	To find out attitudes on abortion, an interviewer stopped people in a local shopping centre one weekday morning and asked shoppers their views.						
d.	Samantha wanted to find out how much people in Ontario were prepared to spend on holidays abroad. She asked people on the street where she lives.						
e.	Caroline believes that more people in Canada get married in church than in a registry office. She asks all the people attending a church service where they got married.						
f.	To investigate the statement 'children no longer do enough sports', all the children at one randomly selected school in were surveyed.						
g.	Glowalot, a light bulb manufacturer claimed that their light bulbs lasted for more than 200 hours. Gina thought it would be a good idea to test their claim by lighting all the bulbs produced in one month.						
h.	Larry decides to estimate the number of blades of grass in his lawn. He stands on the lawn and counts the blades of grass within 40cm of his feet.						
i.	A machine producing drawing pins is believed to be produce defective pins at a rate of 10%. Every 100^{th} pin was chosen to test.						
j.	To determine the most popular video game on the market, Jane surveyed the first 20 people entering a video game store.						
k.	A calculator manufacturer evaluates product quality by testing every 10^{th} calculator produced daily.						
l.	A radio station asks listeners to call in about whether they believe millions of dollars should be spend on a new golf course.						

2. What biases exist in each of the following scenarios?
    a. To decide whether improvements should be made to a local recreation centre, the staff surveys the first 50 people who arrive at the centre on Saturday morning.

    b. To find out how many hours the average person spends watching television, a company telephones every 25th person listed in their local telephone book.

    c. To see how most downtown business people get to work, a survey is taken between 12 noon and 1 pm on a downtown street corner.

3. A company wants to build a new shopping mall in Ajax. To get the reaction of local residents, the city council is distributing questionnaires through local grocery stores. The questionnaire asks, "Are you in favour of adding new stores to our community?" Results from the returned questionnaires will be used to help the council decide whether or not allow the mall to be built.
    a. Which sampling method was used?

    b. State the strengths and weaknesses of the city council's plan.

    c. Suggest a better way to gather the data.

4. Use a stratified random sample to determine the number of people from each group to be surveyed in each of the following.
    a. There are 30 girls and 20 boys in the ski club. 10 members of the club are to be surveyed to find out what trips to plan. How many girls and boys should be surveyed?

    b. A school has 260 grade 9s, 250 grade 10s, 220 grade 11s and 200 grade 12s. Determine how many from each grade would be included in a sample of 93 students.

DAY 2 – Collecting and Organizing One Variable Data

1. The size of your school is stated in several different ways. For each measurement, state if it is discrete, continuous or categorical.
    a. The height of the building _____
    b. The number of rooms _____
    c. The number of floors _____
    d. The sum of the areas on each floor in m^2 _____

2. Identify each variable as discrete, continuous or categorical.
    a. favourite TV show _____
    b. paint colour in bedroom _____
    c. English grade _____
    d. volume of an iPod _____
    e. age _____
    f. calories in a meal _____
    g. number of births last year _____
    h. monthly unemployment rate _____

3. The following is a list of ways to state the size of a book. Which variable can be continuous?
    - thickness of binding used
    - number of words
    - length of pages
    - number of pages

4. An emergency room technician assesses each patient that comes in. She records the following for each: blood pressure, age, gender, number of previous ER visits in the current year.
    a. Which of these variables are likely measured as continuous variables?

    b. Which are discrete?

5. Paul is determining whether or not his privately owned gas station will make it in his town. He asks automobile owners to name the station where they last bought gas. Is the variable that he is measuring discrete, continuous or categorical?

6. An English class had the following grades on a test (out of 100).

26 63 73 82 32 73 35 63 56 87 40 51 55 43
53 70 43 92 64 75 46 64 23 67 52 28 76 56
67

Create a frequency table to organize the data. Use the range to help you determine what the intervals should be.

INTERVAL	TALLY	FREQUENCY
Total		

7. The same class wrote a second test. These are their marks.

66 62 14 41 45 89 59 43 67 37 31 65 50 43
53 57 54 84 68 74 61 54 34 70 45 64 76 70
65

Create a frequency table to organize the data. Use the range to help you determine what the intervals should be.

INTERVAL	TALLY	FREQUENCY
Total		

8. Create a frequency table to record the number of times each of the vowels (a, e, i, o, and u) are used on page 4 (except cartoon and your answers). Calculate the percent of each vowel found on the page.

CLASS	TALLY	FREQUENCY	PERCENT
Total			

a. What is the most used vowel? _____

b. What is the least used vowel? _____

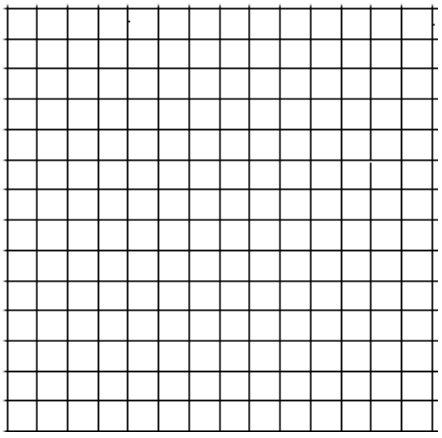
c. How many times would you expect the letter *e* to be found in 1200 word essay?

d. Why is knowing the relative frequency of letters useful: Why is it important in SCRABBLE or word puzzles or in the arrangement of keys on a keyboard?

DAY 3 – Displaying One Variable Data

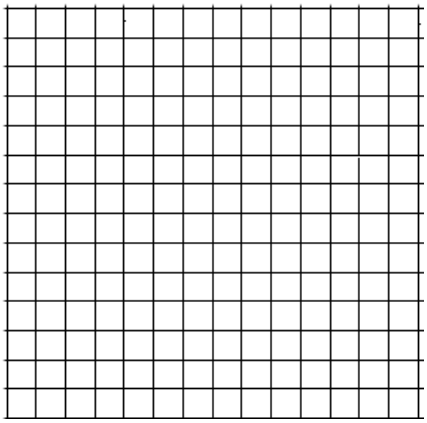
1. Create a bar graph to represent the distribution of people who preferred each candy type.

Type of Candy	Number of People
Fuzzy Peach	5
Fruit Gums	1
Sour Patch Kids	8
Swedish Berries	5



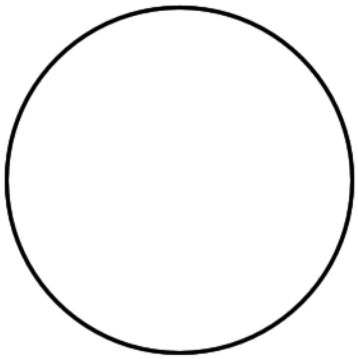
2. Complete the following table and create a histogram to represent the following distribution of grades: 43, 72, 91, 83, 42, 61, 72, 73, 81, 92, 64, 74, 68, 78, 80, 52, 79, 57, 85, 56

Grades	Tally	Frequency
40-49		
50-59		
60-69		
70-79		
80-89		
90-99		
Total		



3. Given the following monthly budget, create a pie graph.

Item	Cost ($)	Degrees in Circle
Rent	900	
Transportation	400	
Food	500	
Clothing	100	
Entertainment	200	
Total		



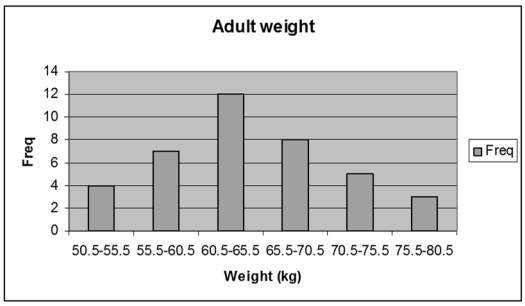
4. Create a pictogram to represent the following list of students in clubs using the legend that one stick man is equal to 25 people.

Football = 50 students
Band = 67 students
Soccer = 37 students
Musical Theatre = 52 students
Track = 35 students

Activity	Number of Participants
Football	
Band	
Soccer	
Musical Theatre	
Track	

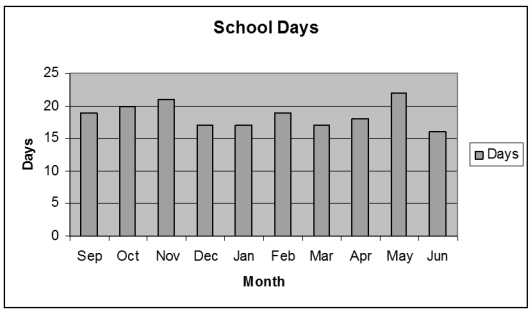
5. Circle the type of distribution each graph shows.

a.



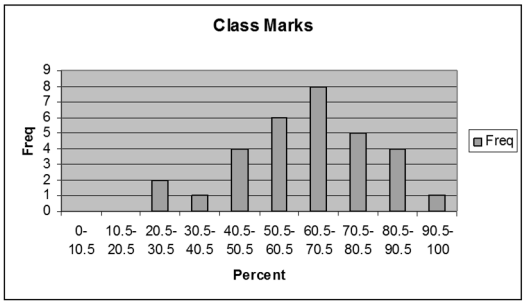
normal bimodal uniform left-skewed right-skewed

b.



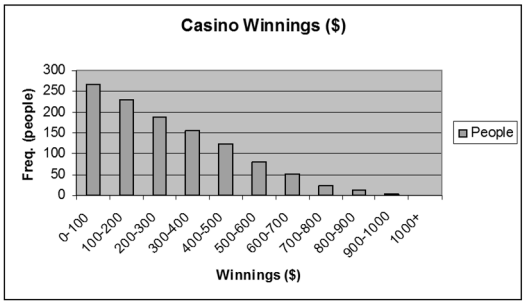
normal bimodal uniform left-skewed right-skewed

c.



normal bimodal uniform left-skewed right-skewed

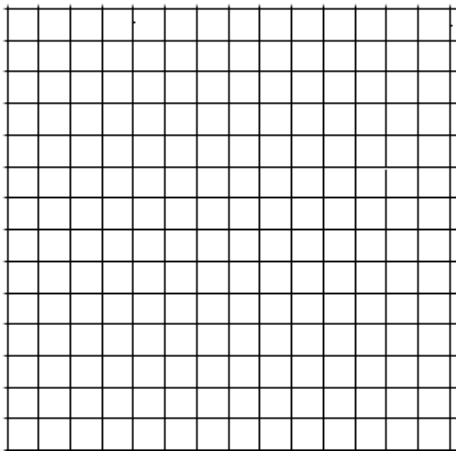
d.



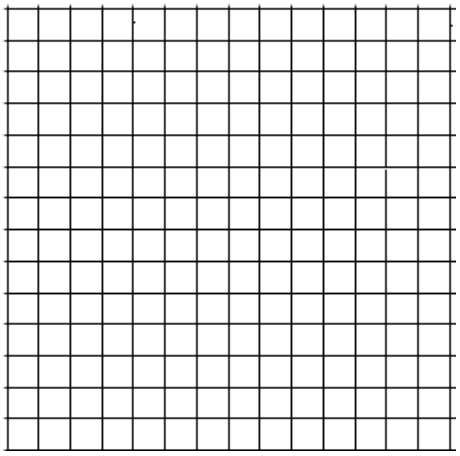
normal bimodal uniform left-skewed right-skewed

6. Create a histogram for the two sets of data in questions 6 and 7 on page 6.

TEST 1



TEST 2



Compare the two histograms created.

a. Which interval has the greatest frequency in each data set?

b. What percentage of the class got a level 4 (80% or better)?

c. What percentage of the class got a level R (below 50%)?

d. What are the similarities between the two graphs?

e. What are the differences between the two graphs?

f. What information do the differences indicate to the teacher?

DAY 4 – Measures of Central Tendency & Spread

1. Gabriel buys 8 DVDs at Discount Dan's DVD shop. Three cost $10.50, 2 cost $7.75, 1 cost $5.25 and 2 cost $3.50. Find the mean, median and mode of the costs of his DVDs.

2. The prizes in the local lottery were worth the following: 2 prizes of $1 000 000, 7 prizes of $350 000, and 10 prizes of $250. Find the mean, median and mode.

3. The hourly rates of employees of a supermarket are $9.25, $8.50, $22.50, $7.85, $8.85, $12.65, $10.85, and $11.50.
   a. Find the mean, median and mode.

   b. Which of your answers best represents the data? Why?

   c. Which of your answers would most misrepresent the data? Why?

4. The following marks were recorded.
   Suzy: 25, 36, 39, 87, 89, 94
   Ruiz: 45, 56, 88, 89, 92, 98
   a. Find the mean and median for each set of marks.

   b. What is the best measure of central tendency for Suzy, the mean or the median? Why?

   c. What is the best measure of central tendency for Ruiz, the mean or the median? Why?

5. State and explain whether each statement is based on the mean, median or mode.
   a. 0.2% of light bulbs are defective.

   b. The most popular search engine is Google.

   c. The average university grad earns $35 000 annually upon graduation.

   d. Most drinking and driving accidents occur on long weekends.

6. Find the range and standard deviation of the following set of numbers: 3, 10, 8, 20, 4, 4, 3, 8, 8, 8, 12.

7. A group of student landscapers are to keep track of their own weekly hours. They are listed below.
   44, 52, 43, 39, 42, 41, 38, 43, 46, 45, 44, 39, 40, 42, 45
   a. Find the range. Is this a useful tool for representing this data?

   b. Find the mean.

   c. Find the standard deviation.

   d. What can be said about the entry of 52 hours/week?

   e. Calculate the standard deviation again without the 52 hours/week entry.

8. The sale prices of the last 10 homes sold in 1985 were:
   $198 000, $185 000, $205 200, $225 300, $206 700, $201 850, $200 000, $189 000, $192 100, $200 400.

   a. What is the average sale price?

   b. What is the standard deviation?

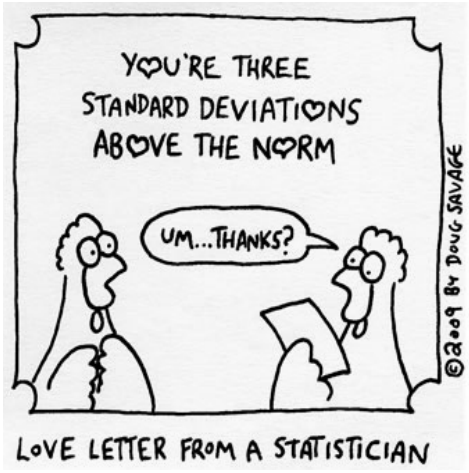
   c. Do you think that a price of $240 000 would be considered unusual? Why or why not?

9. The sales price of the last 10 homes sold in 2005 were:
   $345 500, $467 800, $289 000, $675 000, $398 500, $243 000, $899 950, $453 000, $239 000, $256 000.

   a. What is the average sales price?

   b. What is the standard deviation?

   c. Which year was more consistent? How do you know?



DAY 5 – Solve Problems Using Statistics

1. Compare the Canadian Housing Prices from 2002 and 2006. Be specific when giving conclusions.

CANADIAN HOUSING PRICES BY CITY ($)

CANADIAN CITY	2002	2006
Vancouver	301 473	508 435
Victoria	242 503	538 913
Calgary	198 350	367 033
Edmonton	150 165	254 240
Regina	100 751	137 022
Saskatoon	118 999	160 548
Ottawa	200 711	260 458
Toronto	275 975	358 035
Montreal	143 589	222 879
Fredericton	114 185	136 371
Saint John	104 052	127 586
Halifax	148 737	201 316

Sources: MLS and Remax

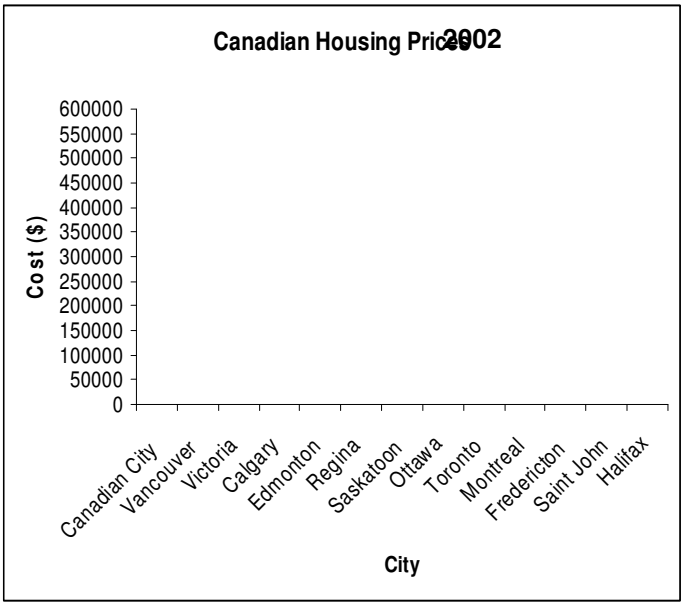
a. Find the measures of central tendency for each. State any conclusions found.

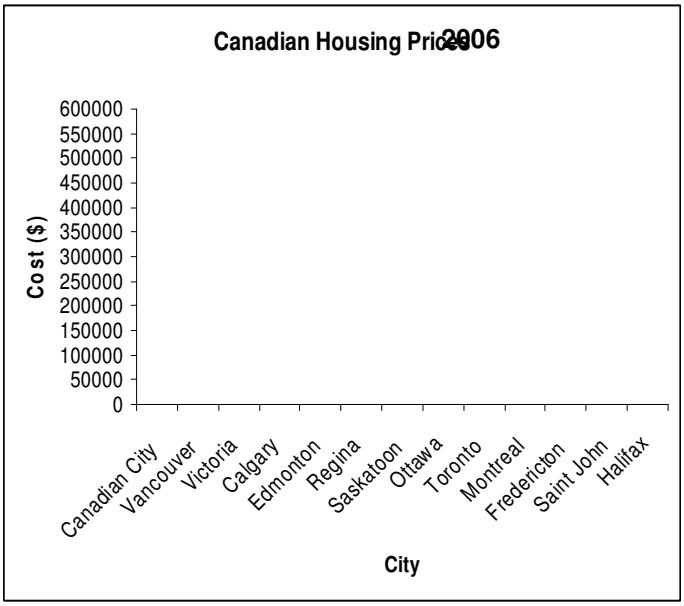
	2002 DATA	2006 DATA
Mean		
Median		
Mode		
Conclusions		

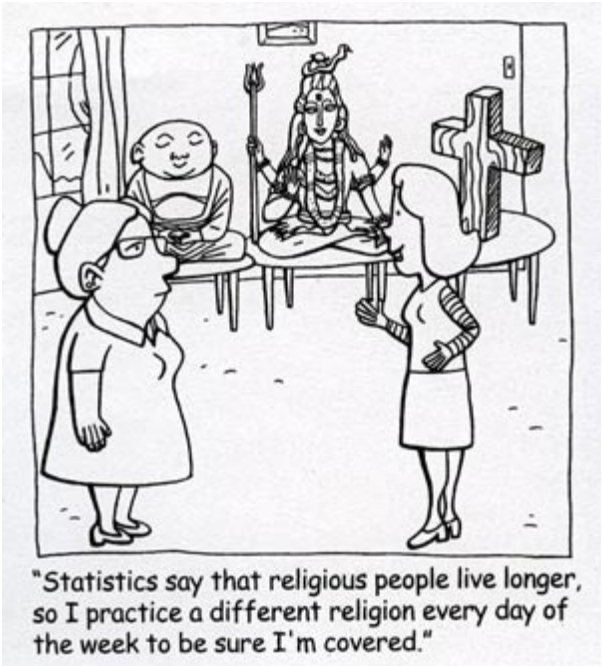
b. Find the measures of spread for each. State any conclusions found.

	2002 DATA	2006 DATA
Range		
Standard Deviation		
Conclusions		

c. Graph your data.







DAY 6 – Theoretical Probability

1. The LA Lakers are favoured to win over the Toronto Raptors. Based on previous games, the Lakers have a $^{7}/_{9}$ chance of winning.
    a. How many games is each team expected to win if 18 games were played?

    b. What are the chances of each team winning a single game? Express your answers as percentages.

2. The probability of it raining today is 40%. What is the probability of it <u>not</u> raining today?

3. Two students invent a game. Two players race pieces around a game board. They roll a die to determine how many spaces to move. They use a spinner to determine whether the player moves her or his own piece, the opponent's piece, or both pieces.
    a. Make a tree diagram to show the possible outcomes when the die is rolled and the spinner spun.

    b. Suppose you are playing the game. You roll the die and spin the pointer. Determine the probability of each event.

    i. You move only your own piece 6 spaces.

    ii. You move either or both pieces 3 spaces.

    iii. You move only your opponent's piece any number of spaces.

4. The chances of you winning a prize in the Cash for Cancer Lottery is 1 in 7.
   a. Express your chances of winning a prize as a percent.

   b. The Lottery sells a limited number of tickets (120,000). What are your chances of winning the grand prize of $1,000,000 if you purchased
      i. only one ticket? ii. 4 tickets? iii. 10 tickets?

5. A group of people are standing around talking when the topic of birthdays comes up. They are quite surprised when it turns out that two share the same birth month.
   a. What is the probability of a random person sharing the same birth month as you?

   b. Based on theoretical probability, how many people in the class should share the same birth month as you?

6. For each game of chance described,

	i. state the probability of winning	ii. whether you think the game is worth while (give reasons)
a. Bet $1. Toss a coin. If it shows a head, you win $2.		
b. Bet $1. Draw a card from a well-shuffled deck. If it shows a spade, you win $5.		
c. Bet $1. Draw a card from a well-shuffled deck. If it shows an ace, you win $10.		
d. Bet $1. Toss two coins. If they show heads, you win $3.		

DAY 7 – Experimental Probability

1. For each of the following situations, describe an experiment that could be used to make predictions. DON'T solve just DESCRIBE the experiment!
    a. What is the probability that the first-four people you ask will have a birthday in the Fall or Winter?

    b. You have five pairs of jeans in your closet. Your favourite pair are the Tommy Jeans which you tend to wear twice as often as the others. What is the probability that you will wear your Tommy Jeans the next time you were to wear jeans?

    c. A couple is expecting a child. The mother has blue eyes and the father has brown eyes. The gene for brown eyes is dominant (more likely 3/4), while the gene for blue eyes is recessive (less likely 1/4). What is the probability that the child's eyes are brown?

    d. The Go Train arrives at the station every 30 minutes. The train will stay there for 5 minutes for passengers to board before departing. Tonight you plan to take the Go Train into Toronto to see a concert. What is the probability that a train will be waiting when you arrive in the parking lot of the station?

2. Your final examination contains 20 True/False questions. Since you did not study for the test, you decide to guess on every question.
    a. What assumption do you make on about the probability of guessing the correct answer?

    b. Simulate your guessing by flipping a coin 50 times. Let Heads represent a correct answer and Tails represent an incorrect answer. Record your results in a table.

	TALLY	FREQUENCY
Heads		
Tails		

    c. Why flip the coin 50 times when there are only 20 questions on the exam?

    d. Estimate the probability that you will receive a score of 60% (12 correct) on this part of the Exam.

3. A newly married couple is planning to have a family consisting of 3 children. The couple wish to predict the number of boys and girls they will have.
    a. What assumption must you make about the probability of the babies gender?

    b. Roll a die 30 times to simulate the possible sex of the children. Let the even numbers be male and the odd numbers be female. Record your results.

	TALLY	**FREQUENCY**
Male		
Female		

    c. Use your results to predict the gender of the 3 children.

    d. What is the probability of the couples first-born child being male?

    e. What are the chances that the couple will be blessed with 3 little girls?

    f. What is the probability of the couple having <u>at least</u> two sons.

DAY 8 – Comparing Theoretical & Experimental Probabilities

1. Determine whether the game *Rock, Paper, Scissors* is fair when played by two people (players A and B).
   a. Create a tree diagram to determine all the possible outcomes. Label each possible outcome on the tree diagram as a win for player A, player B or a tie.

   b. How many outcomes are there?
   c. How many chances does player A have to win? What is the probability that player A will win any round?
   d. How many chances does player B have to win? What is the probability that player B will win any round?

   e. Is the game fair? Do both players have an equal probability of winning in any round?

   f. Conduct an experiment to test your findings. Conduct an experiment by playing *Rock, Paper, Scissors*. Complete 15 trials.

	TALLY	FREQUENCY
Player A Wins		
Player B Wins		
Tie		

   g. Based on the experiment, what is the probability of each player winning?

   h. Combine your data with 3 or 4 other groups. What is the probability of each player winning now?

   i. What do you notice about the relationship between experimental and theoretical probability as the number of trials increases?

2. Suppose that your final exam has 10 multiple choice questions, each with possible answers of A, B, C or D. Use a deck of cards to simulate the probability of passing this portion of the exam simply by guessing. Let diamonds represent the correct answer.
    a. For each trial,
        - draw 10 cards one after the other, **replacing** each card between drawings
        - record the number of diamonds (out of 10) drawn
        - note whether you passed or failed the trial
        - repeat the trial 19 more times.

Trial	# of Diamonds Drawn	Pass or Fail
1	/10	
2	/10	
3	/10	
4	/10	
5	/10	
6	/10	
7	/10	
8	/10	
9	/10	
10	/10	

Trial	# of Diamonds Drawn	Pass or Fail
11	/10	
12	/10	
13	/10	
14	/10	
15	/10	
16	/10	
17	/10	
18	/10	
19	/10	
20	/10	

b. Calculate the experimental probability of passing the test.

c. Given that the theoretical probability that you would pass is 7.8%, how close were you to this value?

d. Explain why your experiment may not have been exact.

DAY 9 – Statistics and Probability in the Media

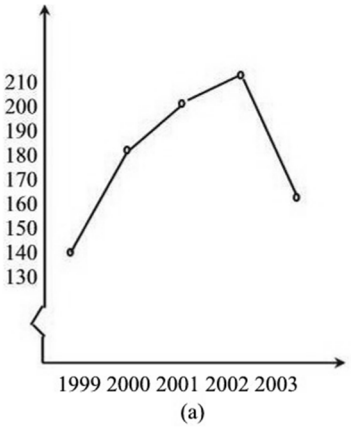
1. What is wrong with the information represented on this graph?

2. A survey was conducted to determine what food would be served at the French club party. Explain how the graph misrepresents the data.

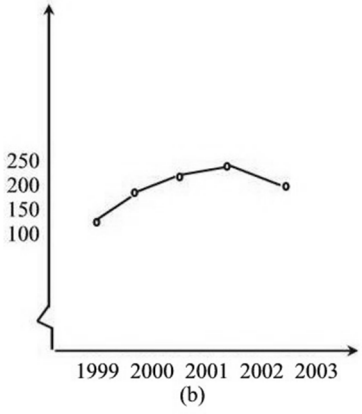
3. The number of graduates from a community college for the years 1999 through 2003 is given with the following data:

Year	1999	2000	2001	2002	2003
# of Graduates	140	180	200	210	160

Which graph best represents the data? Give reasons for your answer.



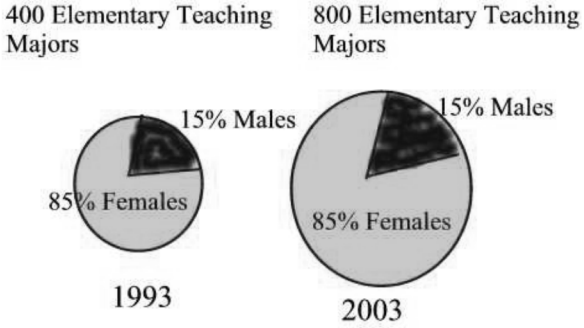
(a)



(b)

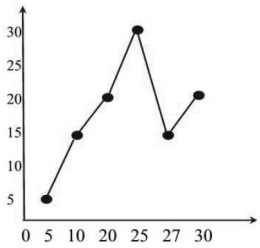
4. Jenny averaged 70 on her quizzes during the first part of the quarter and 80 on her quizzes during the second part of the quarter. When she found out that her final average for the quarter was not 75, she went to argue with her teacher. What could cause this discrepancy?

5. Suppose the following circle graphs are used to illustrate the fact that the number of elementary teaching majors at teachers' colleges has doubled between 1993 and 2003, while the percent of male elementary teaching majors has stayed the same. What is misleading about the way the graphs are constructed?

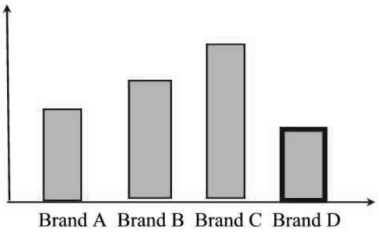


6. What is wrong with each of the following graphs?

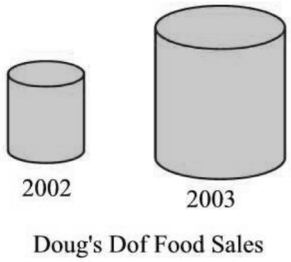
a.



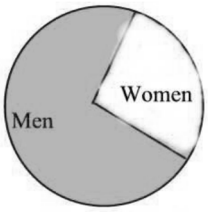
b.



7. Doug's Dog Food Company wanted to impress the public with the magnitude of the company's growth. Sales of Doug's Dog Food had doubled from 2002 to 2003, so the company displayed the following graph, in which the radius of the base and the height of the 2003 can are double those of the 2002 can. What does the graph really show with respect to the growth of the company?



8. Based on the pie graph, Ms McNulty claims that we can conclude that men are worse drivers than women. Can that conclusion be reached from the pictograph or do you need more information? If more information is needed, what would you need to know?

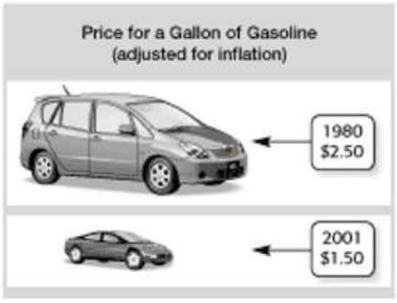


Drivers in Fatal Accident

9. Which graph could be used to indicate a greater decrease in the price of gasoline? Explain.

Graph A
Price for a Gallon of Gasoline (adjusted for inflation)

Graph B



REVIEW

1. Is each type of data categorical, continuous or discrete.
   a. A yes/no response on a questionnaire _____
   b. The fuel consumption rating of a vehicle _____
   c. The colour options for a new car _____
   d. A person's shoe size _____
   e. The type of transportation a person uses to get to work _____
   f. The distance a person travels to get to work _____

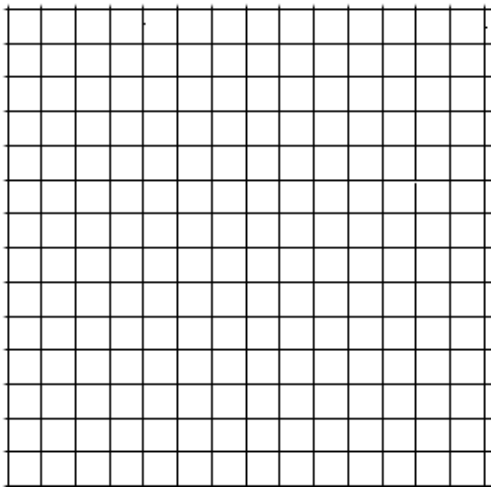
2. The following data set lists the heights of a sample of trees in a vacant lot.

Heights of trees in a woodlot (m)				
18.0	21.3	17.1	23.5	19.8
17.9	17.0	21.5	19.2	19.0
20.6	19.5	14.5	12.4	24.0
15.4	17.6	22.8	13.6	21.7

   a. Create a frequency table for the data.

HEIGHTS	TALLY	FREQUENCY

   b. Draw a histogram to display the data.



   c. Describe the distribution. (normal, uniform, right/left skewed)

3. These data show the geographic origins of international students at the University of Toronto in a recent year.

Region	Number of undergraduate students
Asia	2577
Americas	650
Europe	487
Middle East	359
Oceania and Africa	245

Graph the data. Explain how you decided which type of graph to draw.

4. Identify each population below, then recommend whether to collect data from a sample or the entire population. If you recommend a sample, suggest a sampling technique. Explain the reason for your suggestion.
   a. Surveying the residents of a condominium to determine their opinions about a proposed renovation

   b. Surveying students at your school to determine whether they would participate in a fundraiser for a local hospital

   c. Testing chocolate bars produced each day in a factory to check for peanut cross-contamination

5. A company wants to survey 500 of its employees about job satisfaction. The company employs 860 people in British Columbia, 1100 people in Ontario, and 560 people in New Brunswick. How many employees should be sampled in each province if a stratified sample is to be used?

6. Which question would you use on a questionnaire? Explain your choice.
    a. How do you get to school on a typical day? _____
    b. How do you usually travel to school(select one):
        walk ____ bike ____ car ____ public transit ____ other (please specify) ____

7. Calculate the mean, median, and mode heights for the tree data in question 2. Which measure do you think best represents the data? Explain your choice.

8. Lila had 10 members of a high school volleyball team and 10 people randomly selected from a shopping mall try serving a ball 10 times each. She counted the number of successful serves for each person. Lila calculated the mean and the standard deviation for each group. Which group do you think would have a greater standard deviation? Why?

9. A travel agent is gathering data to help a client plan a trip. He found data on the maximum temperatures in a few cities for one week during the previous year.

	North Bay	Vancouver	Halifax	Winnipeg
May 11	17°C	16°C	15°C	10°C
May 12	19°C	13°C	16°C	15°C
May 13	15°C	15°C	17°C	13°C
May 14	16°C	17°C	20°C	14°C
May 15	14°C	21°C	24°C	14°C
May 16	17°C	28°C	16°C	23°C
May 17	20°C	20°C	18°C	19°C
May 18	21°C	19°C	18°C	15°C

   a. Determine the measures of central tendency for North Bay.

   b. Determine the measures of spread (Range and Standard Deviation). for North Bay.

   c. Repeat parts a and b for each of the other cities. Use technology (TI calc or http://www.calculatorsoup.com/calculators/statistics/statistics.php)

   d. Which city has outlier data? Which measure of central tendency do you think best describes the average weather for that city? What measure is better for cities without any outlier data?

   e. What do the measures of spread tell about the temperatures? Explain the reason for your choice.

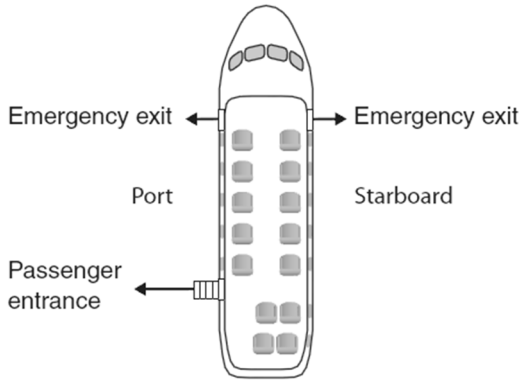
10. A page in a restaurant guide has ads for these types of restaurants: 7 Italian, 4 Asian, 2 Mexican, and 4 Indian. All the ads are the same size and they fill the page. Suppose you were to pick a restaurant by closing your eyes and pointing to the page.
    a. What type of restaurant are you most likely to pick? Explain your reasoning.

    b. What type of restaurant are you least likely to pick? Explain your reasoning.

    c. Which types of restaurants are you equally likely to pick? Explain your reasoning.

11. The seats in a small plane are arranged as shown at right. Suppose you are the first passenger to buy a ticket and are assigned a seat at random. Determine the probability that your seat satisfies each condition.
    a. It is a window seat.

    b. It is in the rear of the plane, behind the passenger entrance.



    c. It is on the port (left) side of the plane.

    d. It is in an emergency exit row.

12. A marble is drawn at random from a box containing 21 red, 17 green, 14 yellow, and 20 blue marbles. What is the probability of each event? Express your answers as decimals.
    a. Picking a blue marble
    b. Picking a purple marble
    c. Picking a green or yellow marble

13. Catherine is playing a board game that uses a die. On her next turn, she will win if she rolls a 6.
    a. What is the probability that Catherine will win the game on her next roll?

    b. Would your answer to part a change if you knew Catherine had rolled a 6 on each of her last 2 turns? Explain why or why not.

    c. Get a die. Roll it at least 20 times. What is the experimental probability of rolling a 6?

14. Answer each question. Identify the statistics or probability that helped you choose your answer. In addition, state whether there is any additional information that would help you make your decision in each case.