

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## **PROBABILITY & STATISTICS**

*Calendar of Chapter: See the 'Homework' link on the webpage*

### **What You'll Learn:**

*8.5 & 8.6: Probability Pts 1&2* –probability basics & simple probability calculations

*8.1/8.2 Part A* – difference between population & sample, & different sampling methods

*8.1/8.2 Part B* – how to conveniently collect unbiased, useful data

*8.4: Misleading Graphs* – how data can be presented creatively to support different points of view

What is the definition of '**probability**'?

What is a **survey**?

## 8.5 - Probability – Part 1

Focus: To learn what probability is, and how it's calculated.

### Warmup:

- i) TACO BELL!
- ii) After research & discuss define the term 'probability' in your own words? Be ready to share with the class.

Ex1 – Find the probability of each:  
a) Having a coin land on heads after flipping  
b) Rolling a die and getting a six

What are three ways you can represent a probability mathematically?  
How can you represent it in a diagram?

### Theoretical Probability

Using our examples above, how can we write a mathematical formula for probability?

Ex2 – Answer the following in fraction, decimal, & percent, and in a tree diagram:  
a) When rolling a die, what is the probability of rolling a 5 OR a 6?  
b) What about a 4 OR 5 OR 6?  
c) When flipping a coin, what is the probability of it landing on heads OR tails?

**Diagram:**

**Theoretical Probability:**

Ex3 – (a) Flip the coin 6 times and record the result of each flip:  
b) Do your results equal the theoretical probability of flipping heads?  
c) Would your result happen every time?

Flip #	1	2	3	4	5	6
Result						

**Experimental Probability**

How can experimental probability become more accurate?

Ex 4 – (a) If you asked 8 people in Canada what colour their hair was, and 6 said blond, what would the experimental probability be?  
b) Could we conclude that probability is accurate for Canada?  
c) How could we improve the accuracy?  
d) What other factors in the survey matter?

**Back to Theoretical:**

Ex5 – If you flipped a coin & then rolled a die, what is the probability of getting ‘tails’ and then getting a ‘five’?

a) Draw a tree diagram  
b) Find the probability as fraction, decimal, and %.  
c) Write the **sample space** for all possible outcomes (this is the denominator of your fraction).

**Experimental Probability:**

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Ex 6 – Suppose you roll a six-sided die, and then a four-sided die. What is the probability of rolling a 5 OR 6, and then a 3 OR 4? Use the **sample space** for assistance.

Ex 7 – Solve the TACO BELL problem:  
**a) How many possible different combos are there?**  
b) What is the probability of having a combo with a burrito & NOT Dr. Pepper?

## 8.6 - Probability Part 2

Focus: To understand subjective probability and learn probability notation.

### Warmup:

Estimate the probability that it will rain sometime in the next two days.

Explain what you based your probability on.

What assumptions did you make to help you decide on a probability?

### Subjective Probability (Subjective Judgement)

Ex1 – Classify each as theoretical, experimental, or subjective probability:  
a) Jon scored 42 baskets out of 50 attempts, so made 84% if shots  
b) Jane thinks her team has a 60% chance to win  
c) Ben says there is a 1 in 6 chance he can roll a 4 with a die.

Sometimes, prior experimental probability is used to come up with subjective probability.

Ex2 – Joe scored 2 goals on 6 shots in hockey. How many goals will he score today if he gets 3 shots?

**Subjective Probability:** an estimated probability that describes a person's belief in an event. It can be based on prior experimental probability, educated guesses, prior experience, beliefs, and/or bias.

Mathematicians love to abbreviate.

Ex3 – (a) ‘the probability of rolling a 5 or 6’ can be written as:

b) We can also write the ‘probability of not rolling a 5 or 6’ like this:

What is the relationship between the two probabilities above?

Ex4 – Look at the picture of the door. What questions come to mind?

Ex5 – If you rolled a die and then flipped a coin, find each without a diagram:

a)  $P(6 \text{ and heads})$

b)  $P(1-3 \text{ and tails})$

Ex6 – Suppose you flipped cards in a deck. What’s the probability of flipping:

a) two hearts?

b) a 4 and then a 7?

c) three straight aces?

d) a 9 and 10 in any order

## 8.1/8.2 Part A - Populations & Samples

Focus: To learn the differences, advantages, and disadvantages of populations and samples.

**Warmup:** If you wanted to find out what the most popular social media site amongst students at school, how would you go about it?

What is a **survey**?

What is a **sample**?

What is a **population**?

What is a **census**?

What are the advantages & disadvantages of using a **sample** vs. using a **population** for a survey?

Ex1 – Would you use a sample or do a census to find out the most popular cell phone brand in our class?

Ex2 – Write a scenario where a sample would be the best choice.

	Advantages	Disadvantages
Sample		
Population (Census)		

*Be ready to share with the class.*

What are different  
**'Sampling Methods'**?  
(How do we decide  
who to ask in the  
school about social  
media?)

What are the  
advantages/disadvant  
of each sampling  
method?

Ex1 – If you wanted to  
see how many  
teenagers in Victoria  
liked country music:  
a) What would be your  
population?  
b) Would you do a  
census? Explain.  
c) How would you  
sample the population?  
What, specifically,  
would you do? Explain.  
d) How many people  
do you think is enough  
to get a **representative**  
sample?

e) What would your  
question be so that it  
was unbiased?  
f) Write a question that  
would be biased.



**For each scenario, explain any problem(s) and the effect it could/would have on results.**

Ex1

a) Jim asks 20 teens at Mayfair if they like the mall. 18 say 'yes'. He concludes 90% of teens in Vic like the mall.

a)

b) A survey is conducted to find out the level of school spirit. A random sample is polled right after the school wins the Provincial Soccer Championship.

b)

c) Mike wants to ask every teenager in Toronto if they want a skate park downtown.

c)

d) Jane does survey downtown, asking people if they have ever shoplifted.

d)

e) Thomas wants to ask a random sample of people how much income they make, and how much they spend on Xmas presents.

e)

f) Carmen asks people 'You wouldn't ever throw out recyclables, would you?'

f)

Ex2 – Craft a question for students in your grade that is neutral (non-biased).

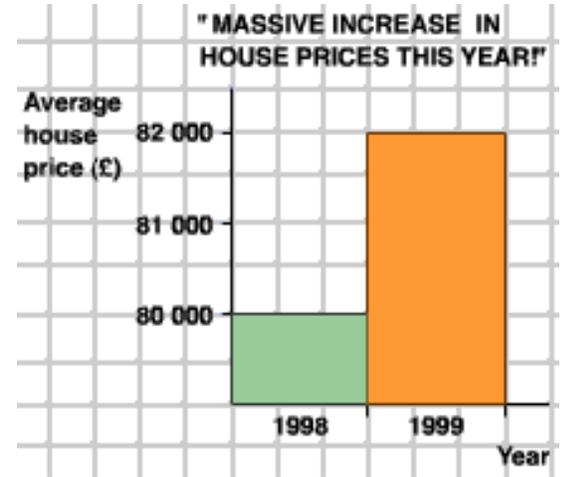
## 8.4 - Misleading Graphs

Focus: To recognize and understand graphs that have misleading traits.

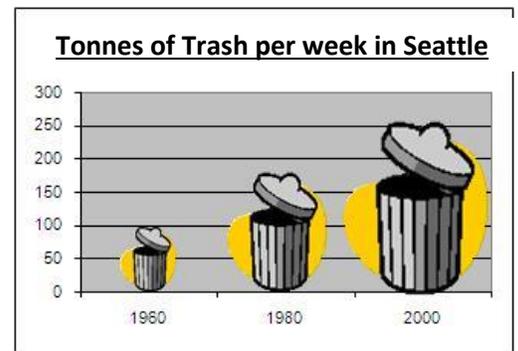
### Warmup:

A real estate agent is trying to convince a family to sell their house. He shows them this bar graph.

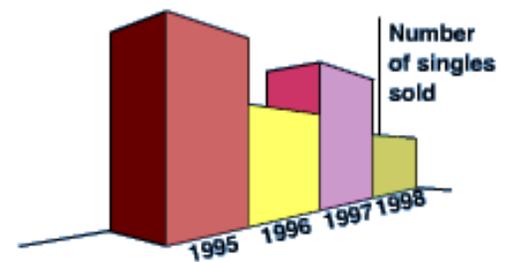
- Can you describe anything **misleading** about the graph?
- Why might the agent use the graph the way it is?
- Is the agent being dishonest by using this graph?
- How could the graph be fixed so that it's more accurate looking?



Ex1 – A group of social activists are lobbying for cities to increase their recycling efforts. They use this graph to support their cause. What is **misleading** about the graph?



Ex2 – The British rock band Oasis insists 1995 was their best year, and show this bar graph as support. What is **misleading** about the graph?



Describe different ways that graphs can be made to look misleading.

Why would somebody construct a graph that is misleading?

Would you consider this unethical?

What do we, as citizens have to be wary of whenever we use data and/or graphs to help us form opinions?

Ex3 – Suppose you want to bring attention to poverty in our city and you get an advertising spot online. Use the information provided to make a **misleading graph** that will support your cause so that people may take notice.

Number of people in poverty in Victoria 4 years ago: 95 000  
2 years ago: 94 000  
this year: 96 500

