MAY 30, 2016

UNIT 9: PROBABILITY AND STATISTICS

9.1: PROBABILITY IN SOCIETY

M. MALTBY INGERSOLL AND T. SULLIVAN
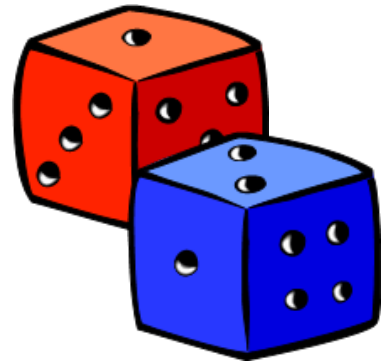*MATH 9*

WHAT'S THE POINT OF TODAY'S LESSON?

We will begin working on the Math 9 Specific Curriculum Outcome (SCO) "Statistics and Probability 5" OR "SP5" which states:

"Demonstrate an understanding of the role of probability in society."

Please turn to page 422 in *MMS9*:

"What You'll Learn" & "Why It's Important"

Probability is the likelihood that an event will occur.

We will study two types of probability:

1. Theoretical Probability
2. Experimental Probability

We will also take "subjective judgment" into account in this lesson and consider how it can influence a person's decision despite probability calculations.
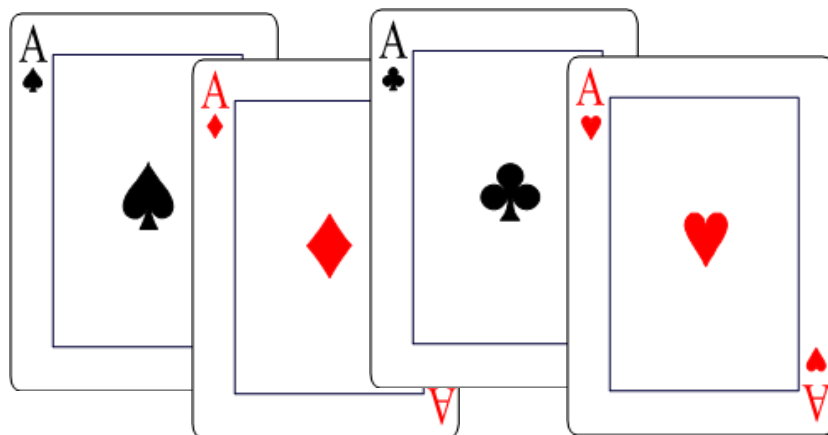
THEORETICAL PROBABILITY - what "SHOULD" happen; this is calculated in the following way:

Theoretical Probability = # of favorable outcomes
                                   # of possible outcomes

EXPERIMENTAL PROBABILITY - what "DID" happen; this is calculated based on experimental results in the following way:

Experimental Probability = # of favorable outcomes
total # of outcomes

EXAMPLE:

What is the <u>THEORETICAL</u> probability of spinning green on the spinner?

Theoretical Probability of spinning green $=$ $\dfrac{\text{\# of favorable outcomes}}{\text{\# of possible outcomes}}$

$= \dfrac{1}{4}$

Let's see what the <u>EXPERIMENTAL</u> probability of spinning green is. Let's spin it 4 times:

GREEN	RED	YELLOW	BLUE
	I I	I I	

Experimental Probability of spinning green $= \dfrac{\text{\# of favorable outcomes}}{\text{total \# of outcome}}$

$= \dfrac{0}{4}$
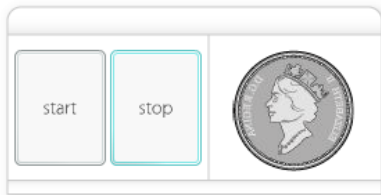
Do the two calculations match?

Subjective Judgment:

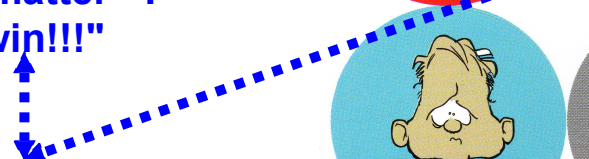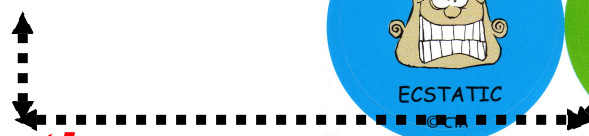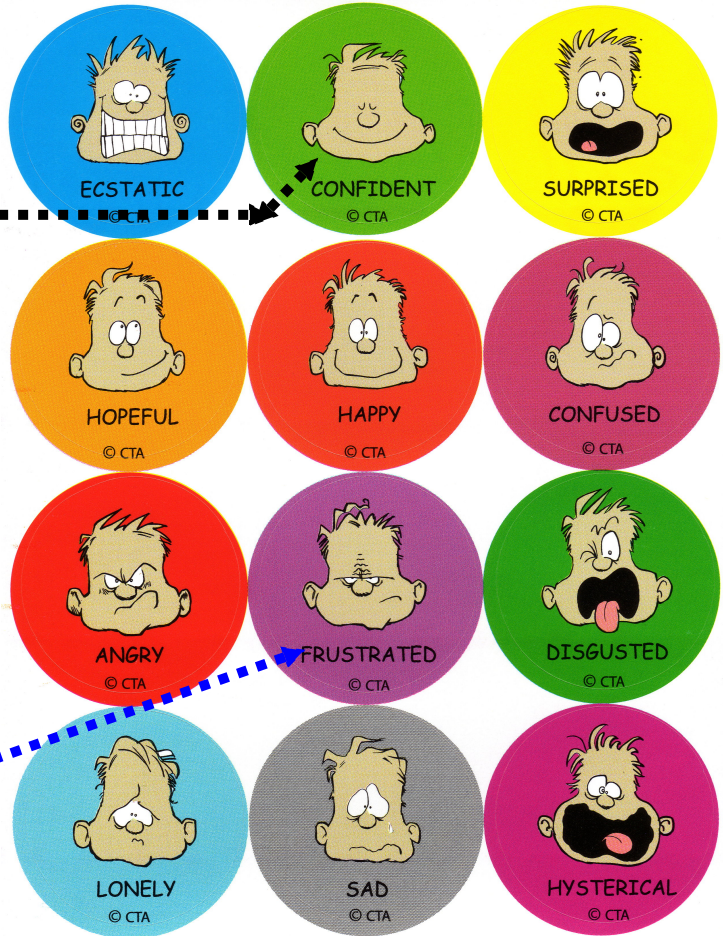**To determine the probability of an event based on how you "FEEL".**

ECSTATIC
© CTA

CONFIDENT
© CTA

SURPRISED
© CTA

HOPEFUL
© CTA

HAPPY
© CTA

CONFUSED
© CTA

ANGRY
© CTA

FRUSTRATED
© CTA

DISGUSTED
© CTA

LONELY
© CTA

SAD
© CTA

HYSTERICAL
© CTA

WHAT WOULD THEY SAY?

"It will be heads for sure! I always win!!!"

Subjective Judgment

"It doesn't matter - I NEVER win!!!"

ECSTATIC © CTA	CONFIDENT © CTA	SURPRISED © CTA
HOPEFUL © CTA	HAPPY © CTA	CONFUSED © CTA
ANGRY © CTA	FRUSTRATED © CTA	DISGUSTED © CTA
LONELY © CTA	SAD © CTA	HYSTERICAL © CTA

start | stop

EXAMPLE:

It is Jack's experience that 4 out of 5 times the prize in the cereal box is found at the bottom of the box, so Jack opens the bottom of the cereal box to find his prize.

Explain if Jack's decision is based on theoretical probability, experimental probability, subjective judgment or any combination of these.

His past EXPERIENCE is that the prize is at the bottom, so his decision is based on EXPERIMENTAL PROBABILITY .

Two friends are rolling a die. After 8 rolls, a 4 was rolled 7 times.

Amith predicts the next roll will most likely NOT be a 4 since each number has an equal chance of being rolled.

Maria decides the die is unfair since 7 out of 8 rolls revealed a 4.

Explain if Amith's and Maria's decisions are based on theoretical probability, experimental probability, subjective judgment or any combination of these.

In THEORY, Amith knows that each number has a 1/6 chance of being rolled, so his decision is based on THEORETICAL PROBABILITY .

Based on the EXPERIMENT, Maria felt the die must be UNFAIR, so her decision is based on both EXPERIMENTAL PROBABILITY & SUBJECTIVE JUDGMENT.

**In past baseball games,
Alice made 2 hits for every 5 times
she went up to bat.**

In the next game, suppose Alice goes up to bat. What is the probability that she will get a hit? What assumptions are you making?

⭐ **Probability = 2 out of 5**

$$\frac{2}{5} = 0.4 \text{ or } 40\%$$

⭐ **The next team she plays will have an _equal skill level_ as the teams she has played before.**

For each assumption, explain how the predicted outcomes might change if the assumption changes.

⭐ **If the next team has a _higher skill level_, then she will probably _NOT_ get 2 out of 5 hits.**

⭐ **If the next team has a _lower skill level_, then she will probably get _MORE_ than 2 out of 5 hits.**

Using Probability to Support Opposing Views:

Jon wants to learn how to snowboard but does not want to take lessons. His mother insists that Jon take lessons. Jon and his mother find an article that claims...

68% of snowboarding injuries occur during beginner lessons

Explain how both Jon and his mother can use this statistic to support their opinions.

Mother:

Lessons are important because beginners are prone to accidents.

Son:

I shouldn't take lessons because so many people get injured during lessons

CONCEPT REINFORCEMENT:

MMS9:

PAGE 427: #3 TO #6

PAGE 428: #8 TO #10

PAGE 429: #17