8A – Basic Probability

- Vocabulary, Formulas, Theories:
 - **Outcome**: the possible result of a situation or experiment.
 - Event: a single or a group outcome.
 - Sample Space: the set of all possible outcomes.
 - **Probability**: the numerical value from 0 to 1 that measures the likelihood of an event.

You can write the probability of an event as a ratio, decimal, or percent.

	equa	ally likely	to occur	
impossil	ble	or not occur		certain
0	- less like	ely 0.5	more likely	→ 1

 Experimental Probability: measures the likelihood that the event occurs based on the actual results of an experiment.

 $P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$

- Theoretical Probability: describes the likelihood of an event based on mathematical reasoning.
- **Independent events**: events that have no effect on the outcome of each other. If two events, A and B, are said to be independent, they follow this formula:

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

• **Dependent Events**: events that affect the outcome of each other.

Watch the following video to understand the basic vocabulary of probability. It reviews the definition of a sample space, elements (or sample points), and outcomes.

Video #1 - "Probability - Sample Space, Sample Points, Events" - Don't Memorise (1:45)

EX1) Identify the sample space and list the outcomes of that sample space.

- a) Flip a coin
- b) Pick a shirt out of a drawer that has 2 blue shirts, 1 red shirt, and 4 green shirts.
- c) Pick a card out of a standard deck of cards.

► Video #2 - "Theoretical and Experimental Probability" - Derek Ganz (7:11) EX2) Considering a standard six sided number cube is used, find the theoretical probability of each outcome: a) P(rolling a 5) b) P(rolling a 6) c) P(rolling an even number) d) P(rolling a multiple of 3) EX3) You roll a standard six sided number cube 10 times. The results are 6, 4, 6, 1, 5, 2, 4, 2, 6, 6. Find the experimental probability of each outcome: a) P(rolling a 5) b) P(rolling a 6) c) P(rolling an even number) d) P(rolling a 3) e) For 50 rolls of the number cube, predict the number of rolls that will result in an odd number based on the experimental probability. EX4) Are the outcomes of each trial independent or dependent events? a) Choose a number tile from 12 tiles. Then spin a spinner. b) Pick one card from a set of 15 sequentially numbered cards. Then, without replacing the card, pick another card. EX5) A factory foreman determines that on any given day there is a 15% change that Machine A will malfunction, a 45% chance that Machine B will malfunction, and a 6.75% chance that both machines will malfunction. Are the events "Machine A malfunctions" and "Machine B malfunctions" independent events? Explain.

10 Queen Kina Jack Ace 10 з Jack Queen Kina Ace 5 9 10 Jack Queen King Ace 3 ۰ A 10 Jack Queen King з Ace ÷

✤ Extra Resources: