



Unit 8 Lesson 2a: Intro to Probabilities



Learning Targets:

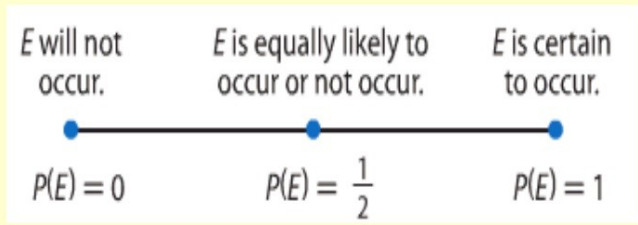
I can determine if I should ADD or MULTIPLY to determine probabilities.

I can determine if an event is mutually exclusive or not mutually exclusive vs. independent or dependent.

I can determine probabilities of simple events.

Probability is a measure of the chance that a given event E will occur. The probability $P(E)$ is a ratio between **0** and **1**.

(fraction or decimal between 0 and 1)



$P(E)$ symbol for probability
what you are looking for / finding prob. of

Simple Event: has a single outcome (ie: rolling a sum of 8 using a pair of die)

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

what we are finding



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Probabilities with Cards

- A standard deck of cards has:
 - 52 Cards in 13 values and 4 suits
 - Suits are **Spades**, **Clubs**, **Diamonds** and **Hearts**
 - Each suit has 13 card values:
2-10, 3 "face cards" Jack, Queen, King (J, Q, K) and and Ace (A)



Determine the probability of the following:

$$P(\text{diamond}) = \frac{13}{52} = \frac{1}{4}$$

$$P(\text{King}) = \frac{4}{52} = \frac{1}{13} \rightarrow \text{K in each of 4 suits}$$

$$P(\text{facecard}) = \frac{12}{52} = \frac{3}{13} \rightarrow \text{Jack, Queen, King in all 4 suits}$$

$$P(\text{black}) = \frac{26}{52} = \frac{1}{2} \rightarrow \text{all 13 cards each in Spade + Club}$$

$$P(\text{five}) = \frac{4}{52} = \frac{1}{13} \rightarrow \text{each suit}$$



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d.e 2

Probabilities with Dice

- Rolling ONE dice
 - 6 possible outcomes
- Rolling TWO Die
 - 36 total possible outcomes

die

	1	2	3	4	5	6
1	(1,1) ²	(1,2) ³	(1,3)	(1,4) ⁵	(1,5)	(1,6)
2	(2,1) ³	(2,2) ⁴	(2,3) ⁵	(2,4)	(2,5)	(2,6)
3	(3,1)	(3,2) ⁵	(3,3)	(3,4)	(3,5)	(3,6)
4	(4,1) ⁵	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)
5	(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)
6	(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6) ¹²

$$P(\text{doubles}) = \frac{6}{36} = \frac{1}{6}$$

ex: 4,4

$$P(\text{sum of 7}) = \frac{6}{36} = \frac{1}{6}$$

$$P(\text{sum} < 3) = \frac{1}{36}$$

$$P(\text{sum of 13}) = \frac{0}{36} = 0$$

$$P(\text{sum of 5}) = \frac{4}{36} = \frac{1}{9}$$

$$P(\text{sum} > 1) = \frac{36}{36} = 1$$

all sums are bigger than 1

