Unit 8
Lesson 4
Exclusive and Inclusive Events

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Math 2 – Honors

Unit 8 – Probability

Lesson 4 → Exclusive & Inclusive Events

Name_____

Date_____ Pd_____

➤ **Mutually Exclusive Events:** two or more events that **cannot** occur at the same time.

$$3/6 + 1/6 = 4/6 = 66\%$$

- Suppose you are rolling a die. What is the probability that you roll an odd number or you roll a 2? _____

- Can these both occur at the same time? Why or why not? No, not possible

- The probability of two mutually **exclusive** events occurring at the same time, P(A and B), is ___0___.

- To find the probability of one of two **mutually exclusive** events occurring, use the following formula:

$$P(A \text{ or } B) = P(A) + P(B) \qquad P(A \cup B) = P(A) \text{ or } P(B)$$

Examples:

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Examples:

1. If you randomly chose one of the integers 1 – 10, what is the probability of choosing either an odd number or an even number?

   A) Are these mutually exclusive events? Why or why not? _Yes, can't have odd or even_

   B) Complete the following statement: P(odd or even) = P(_odd_) + P(_even_)

   C) Now fill in with numbers: P(odd or even) = _5/10_ + _5/10_ = _1_

   D) Does this answer make sense? _yes, always have odd or even_

2. Two fair dice are rolled. What is the probability of getting a sum less than 7 or a sum equal to 10? Are these events mutually exclusive? **yes**

Sometimes using a table of outcomes is useful. Complete the following table using the **sums** of two dice:

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

A) P(getting a sum less than 7 OR sum of 10) = P($15/36$) + P($3/36$)

8   B) Now fill in with numbers: P(getting a sum less than 7 OR sum of 10) = $18/36 = 1/2 = 50\%$

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➢ **Mutually Inclusive Events:** two or more events that **can** occur at the same time.

- Suppose you are rolling a six-sided die. What is the probability that you roll an odd number or a number less than 4? B A
- Can these both occur at the same time? If so, when? _Yes, 1, 3_

- To find the probability of one of two **mutually inclusive** events occurring, use the following formula:

$$P(A \text{ or } B) = P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

- Calculate the probability of the above experiment use the rule: _____

Examples: $1, 2, 3, 4, 5, 6$

$$A: \frac{3}{6} + B: \frac{3}{6} - \frac{2}{6} = \frac{4}{6} = \frac{2}{3}$$

$$\approx 67\%$$

Examples:

1. What is the probability of choosing a card from a deck of cards that is a club OR a ten?

                                                    A   B

$P(choosing\ a\ club\ or\ a\ ten) = \dfrac{13}{52} + \dfrac{4}{52} - \dfrac{1}{52} \quad \dfrac{16}{52} = 4/13$

2. What is the probability of choosing a number from 1 to 10 that is less than 5 OR odd?

                                                          A   B

$\dfrac{4}{10} + \dfrac{5}{10} - \dfrac{2}{10} = 7/10$

3. A bag contains 26 tiles with a letter on each, one tile for each lett...

3. A bag contains 26 tiles with a letter on each, one tile for each letter of the alphabet. What is the probability of reaching into the bag and randomly choosing a tile with one of the first 10 letters of the alphabet on it OR randomly choosing a tile with a vowel on it?

A B C D E
F G H I J K
L M N O P
Q R S T U
V W X Y Z

$$\frac{10}{26} + \frac{5}{26} - \frac{3}{26} = \frac{12}{26} = 6/13$$

4. A bag contains 26 tiles with a letter on each, one tile for each letter of the alphabet. What is the probability of reaching into the bag and randomly choosing a tile with one of the last 5 letters of the alphabet on it OR randomly choosing a tile with a vowel on it?

$$\frac{5}{26} + \frac{5}{26} - \frac{0}{26} = \frac{10}{26} = 5/13$$

HW: 20-21