Compound Events #24

We have talked about **Independent Events** and **Dependent Events**. For both of those, there was more than one trial of an experiment happening (one after another). For example, rolling a dice twice or picking two cards from a deck.

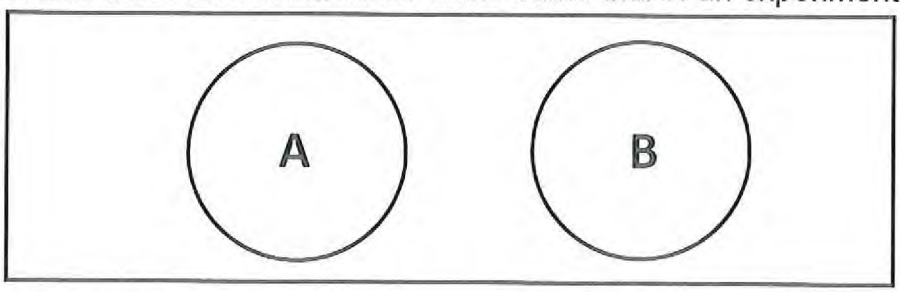
Example:
1. You pull 2 cards from a standard deck of 52 cards. What is the probability of picking an Ace, leaving it out of the deck and then picking a face card?

2. You roll a single fair dice twice. What is the probability of landing on an even number both times?

When we talk about **Compound Events**, we're talking about multiple things happening in the same trial of an experiment. Compound events can either be **Mutually Exclusive** events or **Inclusive** events.

Mutually Exclusive Events

events that cannot both occur in the same trial of an experiment



The probability of two mutually exclusive events A or B occurring is the sum of their individual probabilities.

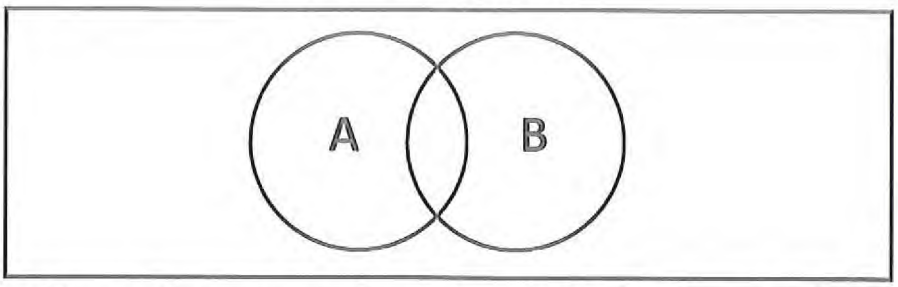
[We have been doing these types of problems since the first day! REMEMBER: It's acceptable for A to happen and it's acceptable for B to happen.]

Example:
3. When a number cube is rolled, find P(1 or 2).

4. A drink company applies one label to each bottle cap: "free drink", "free meal", or "try again". A bottle cap has a 1/10 probability of being labeled "free drink" and a 1/23 probability of being labeled "free meal". What is the probability that a bottle cap is labeled "free drink" or "free meal"?

Inclusive Events

events that can both occur in the same trial of an experiment/ have one or more outcomes in common



The probability of two inclusive events A or B occuring is the sum of their individual probabilities minus the probability of both occuring.

[Venn Diagrams allow for a great visual!]

Example:

5. You roll a number cube. Find P(even or prime).

6. You roll a single fair dice. Find the probability of rolling a 5 or an odd number.

For the following examples, state whether the events are mutually exclusive or inclusive and then find the probability. Complete these examples on a separate sheet of paper.

7. You roll a single fair dice. Find the probability of rolling a number less than 5 or an even number.

8. You roll a single fair dice. Find the probability of rolling an odd number or a 4.

9. You pull from a standard deck of 52 cards. Find the probability of pulling an Ace or a King.

10. You pull from a standard deck of 52 cards. Find the probability of pulling a Queen or a Face Card.

Compound Events #24

We have talked about **Independent Events** and **Dependent Events**. For both of those, there was more than one trial of an experiment happening (one after another). For example, rolling a dice twice or picking two cards from a deck.

Example:

1. You pull 2 cards from a standard deck of 52 cards. What is the probability of picking an Ace, leaving it out of the deck and then picking a face card?

$\frac{4}{52} \cdot \frac{12}{51} = \frac{48}{2652}$

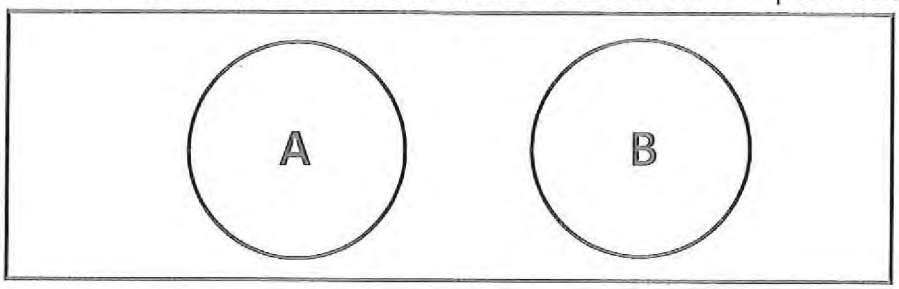
2. You roll a single fair dice twice. What is the probability of landing on an even number both times?

$\frac{3}{6} \cdot \frac{3}{6} = \frac{9}{36}$

When we talk about **Compound Events**, we're talking about multiple things happening in the same trial of an experiment. Compound events can either be **Mutually Exclusive** events or **Inclusive** events.

Mutually Exclusive Events

events that cannot both occur in the same trial of an experiment



The probability of two mutually exclusive events A or B occurring is the sum of their individual probabilities.

$P(A \cup B) = P(A) + P(B)$

[We have been doing these types of problems since the first day! REMEMBER: It's acceptable for A to happen and it's acceptable for B to happen.]

Example:

3. When a number cube is rolled, find P(1 or 2).

$P(1 \text{ or } 2) = P(1) + P(2) = \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$

4. A drink company applies one label to each bottle cap: "free drink", "free meal", or "try again". A bottle cap has a 1/10 probability of being labeled "free drink" and a 1/23 probability of being labeled "free meal". What is the probability that a bottle cap is labeled "free drink" or "free meal"?

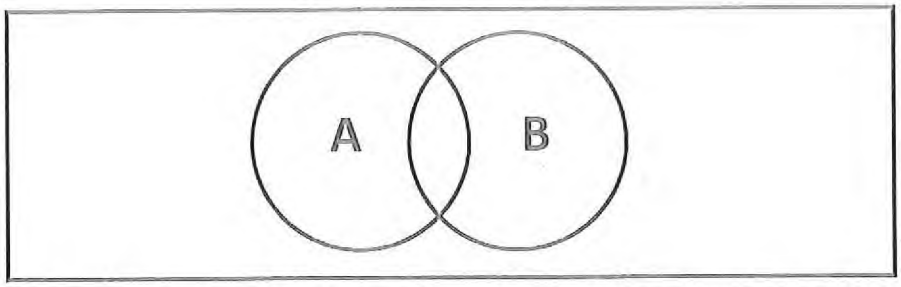
$P(\text{free drink or free meal}) = P(\text{free drink}) + P(\text{free meal})$

$= \frac{1}{10} + \frac{1}{23}$

$= \frac{33}{230}$

Inclusive Events

events that can both occur in the same trial of an experiment/ have one or more outcomes in common



The probability of two inclusive events A or B occuring is the sum of their individual probabilities minus the probability of both occuring.

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

[Venn Diagrams allow for a great visual!]

Example:

5. You roll a number cube. Find P(even or prime).

Even Prime

4 6 | 2 | 3 5

$P(\text{even}) + P(\text{prime}) - P(\text{even} \cap \text{prime})$

$\frac{3}{6} + \frac{3}{6} - \frac{1}{6}$

$\frac{5}{6}$

6. You roll a single fair dice. Find the probability of rolling a 5 or an odd number.

5 odd

2 4 6 | 5 | 1 3

$P(5) + P(\text{odd}) - P(5 \cap \text{odd})$

$\frac{1}{6} + \frac{3}{6} - \frac{1}{6}$

$\frac{3}{6}$

For the following examples, state whether the events are mutually exclusive or inclusive and then find the probability. Complete these examples on a separate sheet of paper.

7. You roll a single fair dice. Find the probability of rolling a number less than 5 or an even number.

8. You roll a single fair dice. Find the probability of rolling an odd number or a 4.

9. You pull from a standard deck of 52 cards. Find the probability of pulling an Ace or a King.

10. You pull from a standard deck of 52 cards. Find the probability of pulling a Queen or a Face Card.

7) P(less than 5 or even)

1 2 3 4 5 6

inclusive

P(less than 5) + P(even) − P(less than 5 ∩ even)

$\frac{4}{6} + \frac{3}{6} - \frac{2}{6}$

$\boxed{\frac{5}{6}}$

8) P(odd or 4)

1 2 3 4 5 6

mutually exclusive

P(odd) + P(4)

$\frac{3}{6} + \frac{1}{6}$

$\boxed{\frac{4}{6}}$

9) P(Ace or King)

mutually exclusive

P(Ace) + P(King)

$\frac{4}{52} + \frac{4}{52} = \frac{8}{52}$

10) P(Queen or Face card)

inclusive

P(Queen) + P(Face Card) − P(Queen ∩ Face card)

$\frac{4}{52} + \frac{12}{52} - \frac{4}{52} = \frac{12}{52}$