

Warm Up:

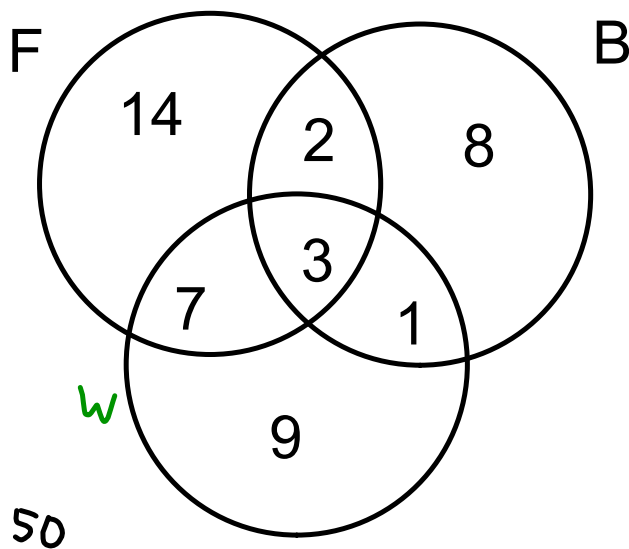
1. The probability of a student having an accident within 1 year of obtaining their driver's license is 0.67. What is its complement? What does it mean?

$$1 - 0.67$$

$$0.33$$

2. What is an example of a compound event?

A group of 50 students were asked if they played football (F), baseball (B), or wrestling (W)



What is the probability that a randomly chosen student plays:

football and wrestling?:

$$\frac{10}{50} = 0.2$$

all three sports?:

$$\frac{3}{50} = 0.06$$

none of the sports?:

$$\frac{6}{50} = 0.12$$

only one sport?:

$$\frac{31}{50} = 0.62$$

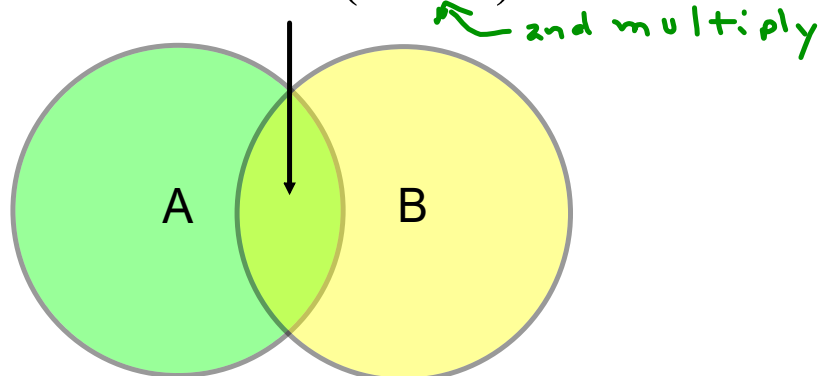
Learning Goal: Today I will learn how to find the probability of the intersection of 2 events.

Success Criteria: I am able to calculate probability for independent and dependent events.

Conditional Probability

AND: The Intersection of Events

Notation: $P(A \cap B)$



Multiply the probability of A by the probability of B

$$P(A \cap B) = P(A) \bullet P(B)$$

Independent Events

Independent events - one outcome has no effect on the other

$$P(A \cap B) = P(A) \cdot P(B)$$

Example: 7 marbles in a bag (4 green, 1 blue, 2 red)
Take one marble out and REPLACE it. Take another marble out.



$$P(\text{green} \cap \text{blue}) = \frac{4}{7} \cdot \frac{1}{7} = \frac{4}{49}$$

0.08 or 8%

$$P(\text{green} \cap \text{green}) = \frac{4}{7} \cdot \frac{4}{7} = \frac{16}{49}$$

0.33 or 33%

Dependent Events

Dependent events - one outcome effects the other

$$P(A \cap B) = P(A) \cdot P(B \text{ given } A)$$

Example: 7 marbles in a bag (4 green, 1 blue, 2 red) Take one marble out and DO NOT REPLACE it. Take another marble out.



$$P(\text{green} \cap \text{blue}) = \frac{4}{7} \cdot \frac{1}{6} = \frac{4}{42}$$

0.1070

$$P(\text{green} \cap \text{green}) = \frac{4}{7} \cdot \frac{3}{6} = \frac{12}{42}$$

0.2970

Determine if the event is independent or dependent:

1. You select and eat a chocolate from a box. You select and eat a second one. \mathcal{D}
2. You roll a die and choose a letter tile. \mathcal{I}
3. You roll a die 2 times. \mathcal{I}
4. You choose one winning Powerball number and then choose the second. \mathcal{D}

$$P(\text{you miss both buses}) = \frac{1}{2} \cdot \frac{3}{10} = \frac{3}{20}$$

Example

Essay Contest One freshman, 2 sophomores, 4 juniors, and 5 seniors receive top scores in a school essay contest. To choose which 2 students will read their essays at the town fair, 2 names are chosen at random from a hat. What is the probability that a junior and then a senior are chosen?

$$\frac{4}{12} \cdot \frac{5}{11} = \frac{20}{132} = 0.15 \text{ or } 15\%$$

$$P(\text{you miss both buses}) = \frac{1}{2} \cdot \frac{3}{10} = \frac{3}{20}$$

Example

The weather forecast predicts the morning and afternoon weather patterns using the table below.

1. What is the probability that it will rain this morning and be sunny this afternoon?

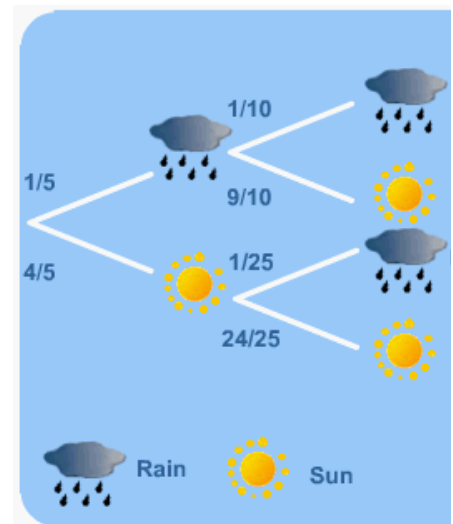
$$\frac{1}{5} \cdot \frac{9}{10} = \frac{9}{50} = 0.18$$

18%

2. What is the probability it will be sunny all day?

$$\frac{4}{5} \cdot \frac{24}{25} = \frac{96}{125}$$

0.77 or 77%



$$P(\text{you miss both buses}) = \frac{1}{2} \cdot \frac{3}{10} = \frac{3}{20}$$

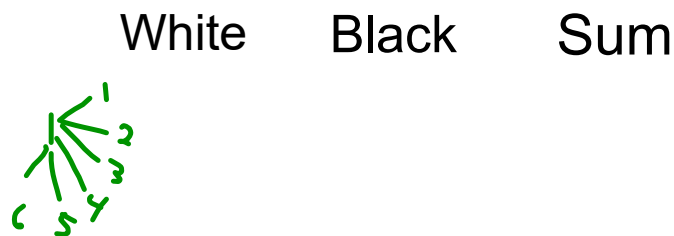
You have a white 6 sided die and a black 6 sided die.

1. What is $P(\text{sum } 9)$? $\frac{4}{36} = 0.11$

2. What is $P(\text{sum } 11 \text{ or } 6)$? $\frac{2}{36} + \frac{5}{36}$

3. What is $P(\text{sum } 1)$? $\frac{7}{36} = 0.19$

Need to build a chart



	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

$$P(\text{sum } 7) = \frac{6}{36} = 0.17$$

For a fundraiser, a class sells 150 raffle tickets for a mall gift certificate and 200 raffle tickets for a booklet of movie passes. You buy 5 tickets for each prize. What is the probability that you win both prizes?

$$\frac{5}{350} \cdot \frac{4}{349} = \frac{20}{122150} = 0.00016$$

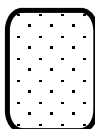
Find the probability of drawing the given cards from a standard deck of 52 cards with replacement.

a. A club then a spade $\frac{1}{16}$

$$\frac{13}{52} \cdot \frac{13}{52}$$

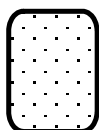
b. A face card, then a 6 $\frac{3}{169}$

c. A queen, then an ace

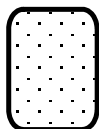


Find the probability of drawing the given cards from a standard deck of 52 cards without replacement.

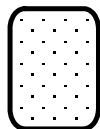
a. A club then a spade



b. A face card, then a 6



c. A queen, then an ace



What is the approximate probability of drawing 3 consecutive hearts from a standard deck of 52 cards without replacement?

- a. 0.0122 b. 0.0129 c. 0.0156 d. 0.0166

Closure: Today I learned how to find probability for independent and dependent events.

