Warm-Up

Complement Rule

$P(A)^C$ or $P(\sim A) = 1 - P(A)$

1) If the chance of rain today is 60%, then the chance of no rain today is...

40%

2) Find the probability of not rolling a 5 on a die

$\frac{5}{6}$

Mar 10-2:05 PM

Questions on Homework?

Mar 10-2:12 PM

2.3: Mutually Exclusive Outcomes

Learning Targets

- I can compute probabilities using Venn Diagrams and formulas
- I understand when two outcomes are mutually exclusive
- I understand the concepts of unions and intersections as they are related to probability

Mar 10-2:13 PM

100 people were asked if they like pizza and how they feel about thin crust and pepperonis.

-34 of them like thin crust

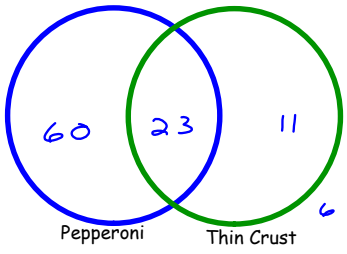
-83 like pepperoni

-23 like both thin crust and pepperoni

Draw a Venn Diagram representing this situation. Don't forget to include the number of people who didn't like either pepperonis or thin crust pizza

Mar 10-2:16 PM

Pizza Preferences



$P(P \cap TC)$? $\frac{23}{100} = 23\%$

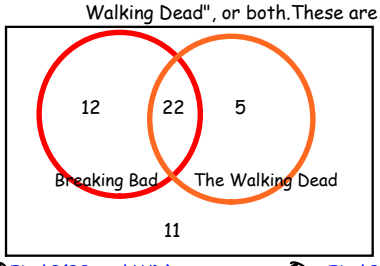
$P(P \cup TC)$? $\frac{94}{100} = 94\%$

$P[\sim(P \cup TC)]$? $\frac{6}{100} = 6\%$

6

Mar 10-2:28 PM

50 people were asked if they like "Breaking Bad", "The Walking Dead", or both. These are the results:



1) Find P(BB and WD) $\frac{22}{50}$ 44%

2) Find P(WD) $\frac{27}{50}$

3) Find P(not BB) $\frac{11}{50} = \frac{8}{25}$

4) Find P(BB or WD) $\frac{39}{50}$

Mar 10-2:35 PM

For any two outcomes, A and B, they are **mutually exclusive** (or disjoint) when they cannot happen at the same time.

Examples:

- picking 1 letter from the alphabet and getting a vowel and getting one of the letters j,k,l,m,n
- rolling a dice once and getting an even number and an odd number $P(\text{even or odd}) = \frac{1}{2} + \frac{1}{2} = 1$
- picking one number between 1 and 10 and getting a number less than 5 and a number greater than 7

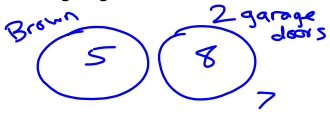
If two outcomes, A and B, are mutually exclusive, then

$P(A \text{ and } B) = P(A \cap B) = 0$ and the

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

Mar 10-2:45 PM

Example: There are 20 houses on the block. 5 of them are brown and 8 of them have 2 garage doors. None of the houses were brown and had 2 garage doors.



P(A house is brown and has 2 garage doors)?

0

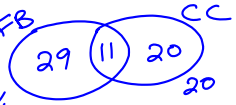
P(A house is brown or has 2 garage doors)?

$\frac{5}{20} + \frac{8}{20} = \frac{13}{20}$

Mar 10-2:59 PM

In a survey of 80 high schoolers, 40 play Flappy Bird regularly, 31 play Candy Crush regularly, and 11 play both. Find the probability that a random person in this study would play Flappy Bird or Candy Crush.

Venn Diagram Method:



$P(FB \text{ or } CC) = \frac{60}{80} = \frac{3}{4} = 75\%$

Formula Method:

If 2 outcomes are **not** mutually exlusive, then

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

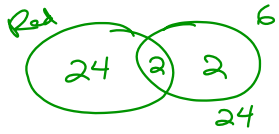
$P(FB \text{ or } CC) = P(FB) + P(CC) - P(\text{overlap})$

$= \frac{40}{80} + \frac{31}{80} - \frac{11}{80}$

$= \frac{60}{80} = \frac{3}{4} = 75\%$

Mar 10-3:02 PM

If you draw one card out of a standard deck of cards, what are the chances that it will be either a red or a 6?



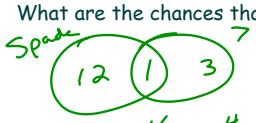
$P(\text{Red or 6}) = \frac{28}{52} = \frac{7}{13}$

$P(R \text{ or } 6) = P(R) + P(6) - P(\text{both})$

$= \frac{26}{52} + \frac{4}{52} - \frac{2}{52}$

$= \frac{28}{52}$

What are the chances that it will be either a spade or a 7?



$\frac{16}{52} = \frac{4}{13}$

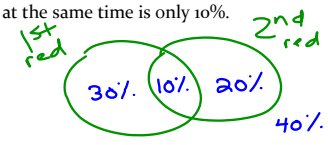
$P(\text{spades}) + P(7) - P(\text{both})$

$\frac{13}{52} + \frac{4}{52} - \frac{1}{52}$

$= \frac{16}{52} = \frac{4}{13}$

Mar 10-3:14 PM

Suppose that your city street has 2 traffic lights. The chance that the first light is red is 40% and the chance that the second light is red is 30% City officials set them so that they chance of them being red at the same time is only 10%.



What is the probability that the first light or the second light is red?

60%

What is the probability that neither light is red?

$\frac{2}{5} = 40\%$

What is the probability that exactly one of the lights is red?

50%

Mar 10-3:05 PM

Assignment:

2.3: 1-5, 8-16

Learning Targets

- I can compute probabilities using Venn Diagrams and formulas
- I understand when two outcomes are mutually exclusive
- I understand the concepts of unions and intersections as they are related to probability

Mar 10-2:13 PM