

Lesson 5.3: Day 2: Can you get a pair of Aces or a pair of Kings?



Rules of the game. Five cards total: two aces and three Kings. The player chooses their first card and records the results, and then chooses their second card (without replacement) and records the result. **The player wins if they get a pair of Aces or a pair of Kings.**

1. Choose one person who is the dealer and one who is the player. Play the game 10 times.

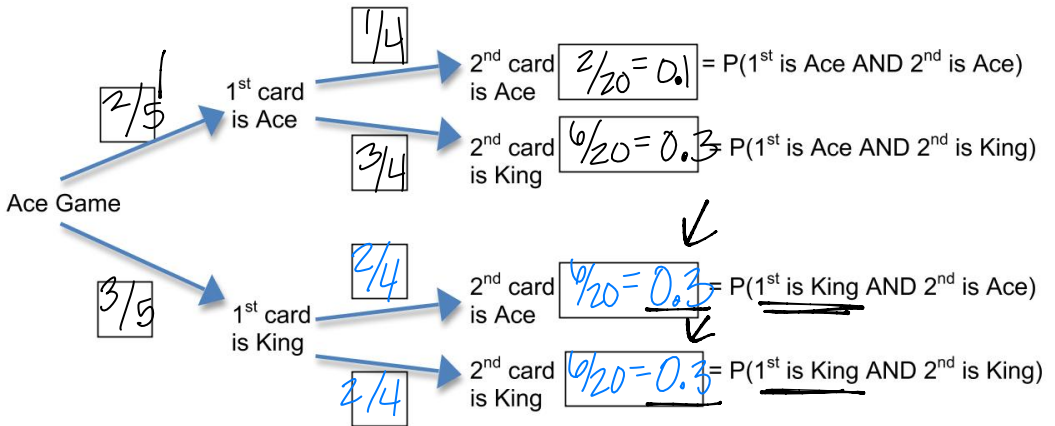
First card									
Second card									
Winner?									

Based on your 10 games, what is the probability of winning this game? $\frac{5}{10}$

2. Go to the front of room to record the number of wins in 10 games. $\frac{5}{10} \frac{2}{10} \frac{3}{10} \frac{10}{30}$

Based on the whole class data, what is the probability of winning this game? $\frac{10}{30}$

3. Let's try to use a Tree Diagram to calculate the theoretical probability. Fill in the blank boxes with the correct probabilities.



4. Find the theoretical probability of winning the game. $P(2A \text{ OR } 2K) = 0.1 + 0.3 = 0.4$

5. What is the probability that the 1st card was a King, given that the person won the game?

$$P(1^{st} K | \text{won}) = \frac{0.3}{0.4} = 0.75$$

Lesson 5.3: Day 2: Conditional Probability and Independence

Big Ideas:

Multiplication
 $P(A \cap B) = P(A) \cdot P(B|A)$
 *If B indep \rightarrow
 $P(B) = P(B|A)$
 $P(A \cap B) = P(A) \cdot P(B)$

$P(\text{at least 1}) = 1 - P(\text{none})$

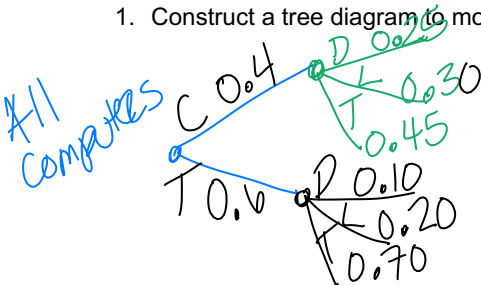
Tree diagram

*label
 *Find all probs

Check Your Understanding:

A computer company makes desktop, laptop, and tablet computers at factories in two states: California and Texas. The California factory produces 40% of the company's computers and the Texas factory makes the rest. Of the computers made in California, 25% are desktops, 30% are laptops, and the rest are tablets. Of those made in Texas, 10% are desktops, 20% are laptops, and the rest are tablets. All computers are first shipped to a distribution center in Missouri before being sent out to stores. Suppose we select a computer at random from the distribution center and observe where it was made and whether it is a desktop, laptop, or tablet.

1. Construct a tree diagram to model this chance process.



$P(C \cap D) = 0.1$
 $P(C \cap L) = 0.12$
 $P(C \cap T) = 0.18$
 $P(T \cap D) = 0.06$
 $P(T \cap L) = 0.12$
 $P(T \cap T) = 0.42 = 1$

2. Find the probability that the computer is a tablet.

$P(\text{Tablet}) = 0.18 + 0.42 = 0.60$

3. If we select 4 computers at random from the distribution center (with replacement) what is the probability that at least 1 of the computers is a tablet computer?

$P(\text{at least 1 tablet}) = 1 - P(\text{not tablet})$
 $1 - 0.4^4 = 0.9744$

4. Given that a tablet computer is selected, what is the probability that it was made in California?

$P(C | T) = \frac{0.18}{0.6} = 0.3$

\swarrow C & T
 \nwarrow Tablet