Lab Framework

Text: Cord

Unit number and title: 20 Working with Probability

   Short Description: Use the popular game, Texas Hold'Em, to get students to explore and calculate probability.

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Lab Title
Can you win at Texas Hold'Em?

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan
- **Lab Objective**
  Calculate compound events and theoretical probability
- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)
  Find the probability of a simple event and count the number of combinations.
  Unit 4 - Using Graphs, Charts and Tables
  Unit 15 - Using Formulas to Solve Problems
- **Vocabulary**
  - Ante – each player's initial contribution to the pot to play this round
  - Bet – place a value on the outcome of the game
  - Call – pay the last bet to continue playing the game
  - Fold – the player folds their cards and quits playing this round
  - Raise – increases the amount of the last bet
- **Materials List**
  Deck of cards for each student with the jokers removed. (Note: casinos will give teachers used decks for free.)
  One copy of Student Instructions per team
  One copy of Lab Data Collection per student.
- **GLEs (State Standards) addressed**
  Math: 1.1.6, 1.4.1-2,
  Reading: 1.3.2, 2.1.4, 3.2.2
  Writing: 2.4.1
- **Leadership Skills**
  1.3, 1.4, 2.1, 2.6, 3.4
- **Set-up information**
  Make student copies of instructions and lab, arrange tables
- **Lab organization**
  Divide students into groups of four players. Designate the youngest student as the dealer. This lab will take one 55-minute period.
- **Teacher Assessment of student learning**
  Check answers of individual example
- **Summary of learning** (to be finished after student completes lab)
  discuss real world application of probability to weather, outcome of a horse race, etc. Ask teams to brainstorm applications.

- **Optional activities**

  Writing – ask students to write an instruction sheet to teach another student how to calculate the probability of getting a higher number in a game of War.

Washington Applied Math Council

https://wa-appliedmath.org/

LAB TITLE: **Can You Win at Texas Hold'Em?**
STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**

  Texas Hold'Em is a popular game that uses strategic and math analysis. The objective is not to win every hand but when and how much to bet, raise, call or fold to win overall. Can you calculate the probability of other players hands based on the visible cards?

- **Grouping instructions and roles**

  Texas Hold'Em is usually played with 9 – 10 players. However, we will play a "short-handed" game with four real players and one imaginary player. The youngest player will be the dealer.

  The dealer deals every player two cards that are their "hole" cards to be held in their hand for their use only. *Record the value of your cards in the table. Complete the calculations.*

- **Procedures** – steps to follow/instructions

  The two players to the left of the dealer make "big" and "small blind" bets. A big blind bet is equal to the minimum bet. A small blind bet is equal to half of the big blind bet. Betting continues around the table with each player choosing to ante, bet, call, fold, or raise the bet.
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  The dealer then "burns", or moves the next card to the bottom of the deck and deals three "community cards" that are placed face-up in the center of the table. All community cards may be used with a player's hole cards to create a winning hand. *Record the value of the three community cards in the table. Complete the calculations.*

  After another round of betting, the dealer burns another card and flips another card, the turn card, face-up on the table. *Record the value of the three community cards in the table. Complete the calculations.*

  After another round of betting, the dealer burns one more card and flips the final card, the river card, face-up on the table. Players may use any of the five community cards, plus their two hole cards, to make the best five-card hand to win all of the bets. *Record the value of the three community cards in the table. Complete the calculations.*

- **Outcome instructions**

  Players may use any of the five community cards, plus their two hole cards, to make the best five-card hand to win all of the bets.

- **Assessment instructions** (peer-teacher)

  Every student submits their completed Lab Data Collection worksheet to your teacher. Show all work.

Lab Data Collection

Student: _____ **Date:** _____ **Period:** _____

Lab Title: Can You Win at Texas Hold'Em?   **Unit:** 20 Working with Probabilities

Criteria: Write the problem/objective in statement form

Data Collection: Record the collected data	Calculations: Calculate the probability of getting the hand below with the next card(s). If you already have the hand listed, note that in the correct cell. *Show all work!*		
First deal	One pair	Three of a kind	Two pair
Hole cards ____, ____	*Example: Chance of getting a pair with the deal of three cards*		
Second deal			
Community cards ____, ____, ____			
Third deal			
Community card ____			
Fourth deal			
Community card ____			

How did your calculated probabilities compare to the actual result of the deals?

	One pair	Three of a kind	Two pairs
Theoretical probability			
Actual results (observed probability)			

Do you see a pattern to the theoretical probabilities? *(higher/lower with each card, about twice as much, …)*

Are the results repeatable? (*Did the other players get the same actual results?*)