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Sets

Activity 1: Venn Diagrams

What is a Venn Diagram? If you know what it is, use them to illustrate the all of the definitions from Definition 1.

Activity 2: Set Theory

Consider the sets $A = \{1, 2, 3, 4, 5\}$ and $B = \{2, 4, 6, 8, 10\}$ where $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$. Compute each of the following sets:

(a) $A \cup B$

(b) $A \cap B$

(c) A'

(d) B'

(e) $B - A$

(f) $A - B$

(g) $(A \cup B)'$

(h) $A' \cup B'$

(i) $(B - A') \cap (A \cap B)'$

Activity 3: Set Theory

Consider the sets $A = \{4, 5, 6, 7, 9, 13, 16\}$ and $B = \{3, 6, 9, 12, 15\}$ where the sample space S consists of all positive integers less than or equal to 16. Find the following:

(a) $A \cup B$

(b) $A \cap B$

(c) A'

(d) $(A \cap B)'$

Sample Space

Activity 4: Sample Space/Outcomes

List all possible outcomes for the following.

(a) Flipping a coin 4 times.

(b) Rolling 2 six-sided dice at the same time.

Activity 5: Events

Let S be the sample space of flipping a coin twice. Let A be the event "at least one head occurs" and B be the event "the second toss results in a tail." Express S, A and B using the H and T notation and find:

(a) $A \cup B$

(c) A'

(b) $A \cap B$

(d) $A - B$

Concept of Probability

Activity 6: Classical Probability

A ball is drawn at random from a box containing 6 red balls, 4 white balls, and 5 blue balls. Determine the probability that it is (a) red, (b) white, (c) blue, (d) not red, (e) red or white.

Activity 7: Frequency Approach

Pair up into a group of 2 (or 3) students. One student will flip a coin and the other will record the results.

(a) Flip a coin ten times. What is the empirical probability from your experiment?

(b) Flip a coin 20 times. What is the empirical probability from your experiment?

Axioms of Probability

Activity 8: Probability

Suppose A and B are two disjoint events in a sample space S and that $P(A) = .22$; $P(B) = .33$. Calculate the following probabilities.

(a) $P(A \cup B)$

(b) $P(A \cap B)$

(c) $P(A' \cup B)$

(d) $P(A' \cap B)$

(e) $P(A - B)$

Activity 9: Probability

Determine the probability for the following events.

(a) Roll a 7 or 11 from a pair of fair 6 sided dice.

(b) A non-defective television found next if out of 2,300 televisions already examined, 15 were defective.

(c) At least 1 tails appears in 5 tosses of a fair coin.

(d) The probability of drawing an ace or a club in a standard deck.

Conditional Probability

Activity 10: Conditional Probability

(a) Five marbles are picked at random out of a jar containing 10 red marbles, 15 white marbles, 20 blue marbles, 25 orange marbles, and 30 purple marbles. What is the probability of picking one of each color, assuming you pick a marble one at a time?

(b) Drawing a king and a spades cards for first two draws from a well-shuffled 52 card deck.