The Game of SET  
Day 1 Activity  
Discrete Math - 2015

What is the game of SET?


Each card contains four features: color (red, purple or green), shape (oval, squiggle or diamond), number (one, two or three) and shading (solid, striped or outlined). A SET is three cards where each feature, when looked at individually, is either all the same OR all different.

The dealer shuffles the cards and lays 12 cards face up on the table. The first to see a SET, calls out ‘SET’ and picks up the three cards that make the SET. The winner has the most SETs when the cards are gone.

Some questions to consider:

1) If there are four features, and each feature has three options, (and all combinations are included in the game), how many cards are in the game? A more mathematical way to ask this question is as follows: Let $G$ represent the set* of all cards in the game. What is the cardinality of $G$? Equivalently, determine $|G|$. (“SET” is defined in this game as above; “set” is a mathematical term meaning an unordered collection of objects, called elements or members of the set.)

2) How many red cards are there? Equivalently, let $R$ represent the subset of $G$ containing all red cards. What is the cardinality of $R$? Equivalently, determine $|R|$.

3) How many striped cards are there? Equivalently, let $S$ be the subset of $G$ containing all striped cards. What is the cardinality of $S$? Equivalently, determine $|S|$.

4) How many red, striped cards are there? Equivalently, what is the cardinality of the intersection of $R$ and $S$? Equivalently, what is the cardinality of $R \cap S$? Equivalently, determine $|R \cap S|$.

5) How many cards are either red or striped, or both? Equivalently, what is the cardinality of the union of $R$ and $S$? Equivalently, what is the cardinality of $R \cup S$? Equivalently, determine $|R \cup S|$. More generally, can you come up with a formula for determining the union of two sets?

6) How many cards are red but not striped? Equivalently, what is the cardinality of the set difference $R - S$? Equivalently, determine $|R - S| = |R \cap S^C| = |R \cap S^C|$.

7) If you start the game with 12 cards, are you guaranteed to have a SET present?

8) To how many different SETs can one specific card belong? (Not at the same time!)

9) Can you think of 1 or 10 more questions that you could ask about the Game of SET? Please put some of your ideas on the board.

*The bolded parts above, as well as all of the above symbols, are discussed in detail in your pre-class reading for next class.