UW Math Circle
October 24, 2013

1. SET is a card game in which each card has four features: number (one, two, or three); symbol (diamond, squiggle, oval); shading (solid, striped, or open); and color (red, green, or blue). Each possible combination of features (e.g., a card with three striped green diamonds) appears precisely once in the deck.

   (a) How many cards are there in a SET deck?

   (b) How many red cards are there?

   (c) How many ways are there to choose three cards if one is red, one is green, and one is blue?

   (d) How many ways are there to choose three cards if one is red and one is a green squiggle?

   (e) How many ways are there to choose three cards if one is red, one is green, and one is a squiggle?

2. 20 math circle students line up in a row to receive Halloween candy. In how many ways can you give one piece of candy – either chocolate or taffy – to each student if you are not allowed to give chocolate to two consecutive students?

3. A poker hand is 5 cards dealt from a standard 52-card deck. How many different ways are there to have a full house (3 of one card and 2 of another, like 3 Queens and 2 fours)? A straight (5 cards in numerical order, not necessarily of the same suit)? A flush (5 cards of the same suit, not necessarily in order)?

4. How many numbers between 1 and 1000 are NOT divisible by 4 or 7? How about numbers between 1 and 1000 that are NOT divisible by 4, 7, or 9?

5. How many ways are there to arrange 10 identical yellow balls and 2 identical purple balls in a straight line? What about 10 identical yellow balls, 2 identical purple balls, and one pink ball?

6. How many five digit numbers can be formed with the digits 0, 1, 2, 3, 4, and 5 (with no repeated digits) so that the resulting number is divisible by 3?