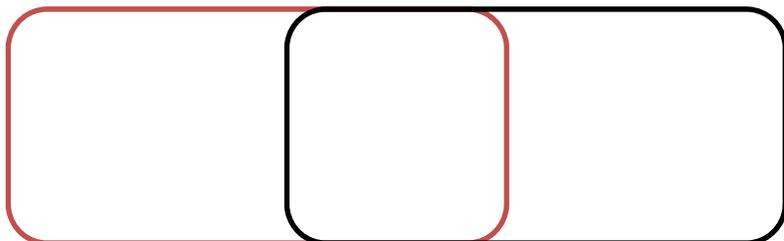We will explore how Venn diagrams can help us organize objects. You have been given a pack of poker cards and two loops of cardboard or string. Lay down the loops so they look like the figure below. Notice three distinct areas are formed.

We will consider the pack of poker cards as the universal set, or the set of all objects. The cards in a poker deck are split up into four suits, diamonds, hearts, spades, and clubs. The diamonds and hearts are red and the spades and clubs are black. Each suit has 13 cards labeled Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, and King. This makes a total of 52 cards.

1. Choose two categories (or sets) from the deck to explore. They could be "10's" or "red cards" or "black Kings", etc. Assign a loop of cardboard (or string) to denote each category. Then find the appropriate cards and place them inside each loop. Draw and label what you end up with here. You may use abbreviations for the cards.

2. Are there any cards in the middle section? What cards, in words, should this section hold? Explain why you have cards or the absence of cards here.

The term for this middle section is the **intersection**. It is like the intersection of two roads, where both roads exist.

3. Choose another two sets of cards. But this time, make sure there are cards to put in the middle section. Draw and label the loops and cards.

4. How did you ensure that you had cards in the middle section? In other words, what about your categories made sure that there would be cards in the middle?

5. Choose another two sets of cards. But this time, make sure there are **no** cards to put in the middle section. Draw and label the loops and cards.

6. How did you ensure that you had **no** cards in the middle section? In other words, what about your categories made sure there would be **no** cards in the middle?

7. Now explore this set-up. Lay down your loops and use the two categories "red cards" and "even cards". Place the cards that are neither red nor even outside both loops but inside the larger rectangle which indicates the universal set. Label the loops below with the cards.

Universal set (all cards)

Red cards   Even cards
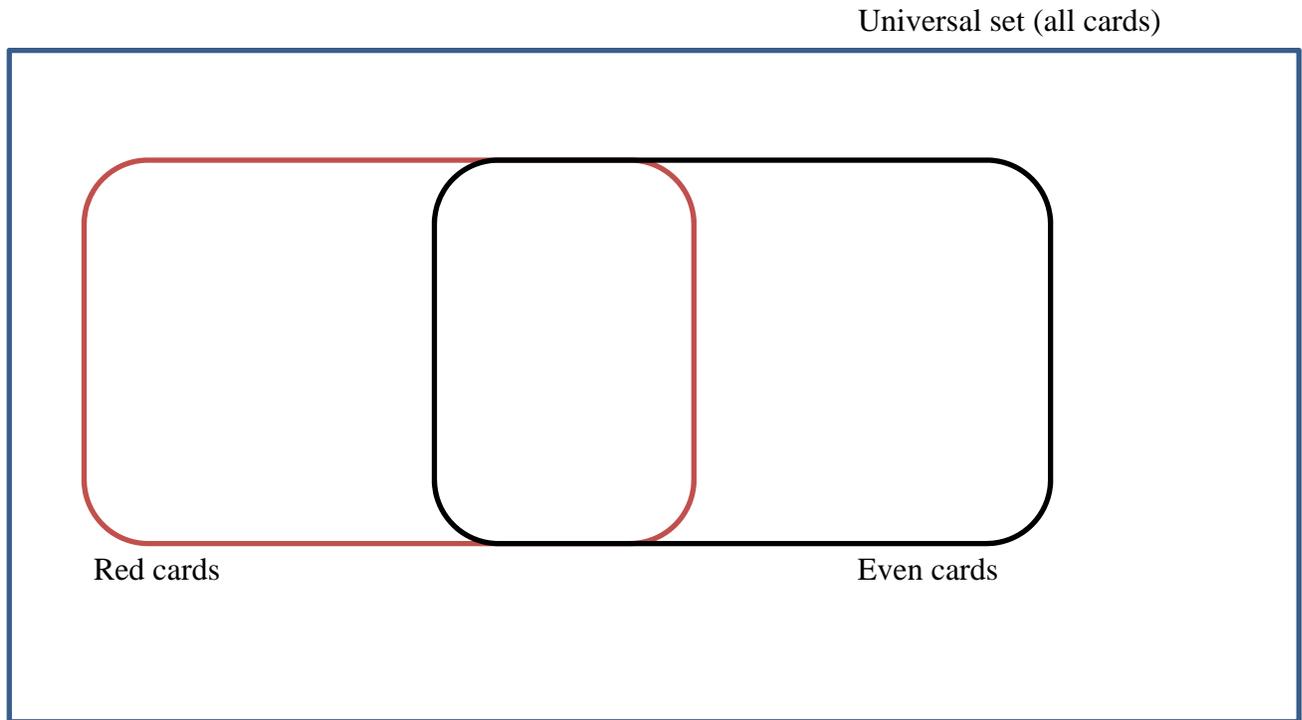
8. Count the number of cards in each section and label (and circle) your diagram with those counts. Do not forget the outside section, or those cards that are **not** in either loop.

9. There are 26 red cards and 20 even cards in a deck of poker cards. Why can we not simply add 26 + 20 to get a total of 46 cards that are red or even? How many cards are there total inside the loops?