

1. A restaurant offers 8 appetizers and 14 entrées. How many choices do you have if:
  - (a) you will eat one dish - either an appetizers or an entrée?
  
  
  
  
  
  
  
  
  
  
  - (b) you are extra hungry and want to eat both an appetizer and an entrée?
  
2. Think about the methods you used to solve the counting problems above. Write down the rules for these methods.
  
  
  
  
  
  
  
  
  
  
3. Do your rules work? A standard deck of playing cards has 26 red cards and 12 face cards.
  - (a) How many ways can you select a card which is either red or a face card?
  
  
  
  
  
  
  
  
  
  
  - (b) How many ways can you select a card which is both red and a face card?
  
  
  
  
  
  
  
  
  
  
  - (c) How many ways can you select two cards so that the first one is red and the second one is a face card?

**STOP! Do not turn this page over until instructed to do so.**

**Additive Principle**

The *additive principle* states that if event  $A$  can occur in  $m$  ways, and event  $B$  can occur in  $n$  *disjoint* ways, then the event “ $A$  or  $B$ ” can occur in  $m + n$  ways.

**Multiplicative Principle**

The *multiplicative principle* states that if event  $A$  can occur in  $m$  ways, and each possibility for  $A$  allows for exactly  $n$  ways for event  $B$ , then the event “ $A$  and  $B$ ” can occur in  $m \cdot n$  ways.

4. You have a bunch of chips which come in colors red, blue, green and yellow.
- (a) How many different two-chip stacks can you make if the bottom chip must be red or blue? Explain your answer using both the additive and multiplicative principles.
  
  
  
  
  
  
  
  
  
  
  - (b) How many different three-chip stacks can you make if the bottom chip must be red or blue and the top chip must be green or yellow? How does this problem relate to the previous one?
  
  
  
  
  
  
  
  
  
  
  - (c) How many different three-chip stacks are there in which no color is repeated (but otherwise any colors could be on the top or bottom)?
  
  
  
  
  
  
  
  
  
  
  - (d) Suppose you wanted to take three different colored chips and put them in your pocket. How many different choices do you have? How does this problem relate to the previous one?