1. You want to frame a picture to hang at home. At the frame shop there are 12 different frame styles to choose from, 15 different background colors to choose from, and 5 different frame sizes to choose from. How many different pictures can you create?

$$\frac{12}{12_1} \cdot \frac{15}{15_1} \cdot \frac{5}{5_1} = 900$$

2. Ten students are going to receive an award. Your job is to give the principal a list of these ten students to be read aloud at an assembly. How many different lists can you give the principal to read?

$$_{10}P_{10} = 3,628,800$$

or

$$10!$$

3. For dinner your parents bring home a bag full of food. In the bag there are 2 salami sandwiches, 4 Balogna sandwiches and 3 turkey sandwiches. Find each probability as a fraction.

a) You reach in and randomly grabs a sandwich and eat it and then your brother randomly grabs a sandwich too.

P(turkey sandwich and turkey sandwich) = $\frac{3}{9} \cdot \frac{2}{8} = \frac{6}{72}$

b) You randomly grab a sandwich, look at and decide that you don't want that kind, then grab another sandwich.

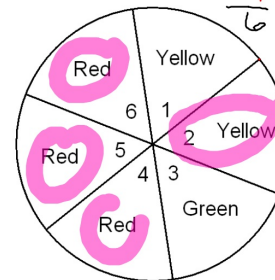P(Salami and Balogna) = $\frac{2}{9} \cdot \frac{4}{9} = \frac{8}{81}$

4. You spin the spinner shown once. Find each probability as a fraction.

a) P(Prime and Red) $= \frac{1}{6}$

b) P(Yellow and Odd) $\frac{1}{6}$

c) P(Factor of 6 or Green) $\frac{4}{6}$

d) P(Red or Even) $\frac{4}{6}$

5. The probability that the driver gets a speeding ticket is $\frac{4}{15}$ and the probability that the driver gets a ticket for no seat belt is $\frac{2}{9}$. Find the following probability as a fraction.

P(Speeding Ticket or Seat Belt Ticket) =

$$\frac{4}{15} + \frac{2}{9} - \frac{4}{15} \cdot \frac{2}{9}$$

$$\frac{36}{135} + \frac{30}{135} - \frac{8}{135} = \frac{58}{135}$$

6. There are 8 volumes to a set of Encyclopedias.
a) How many ways can you arrange the 8 volumes on the shelf?
b) If there is only room for 6 of the volumes how many ways can 6 of the volumes be arranged on the shelf?

$$_8P_8 \text{ or } 8! = 40,320$$

$$_8P_6 = 20,160$$

7. You are painting your bedroom. You've narrowed it down to 8 choices for wall color, 4 choices for color of the window trim, and 2 choices for ceiling color. How many different color schemes for your room are there?

$$8 \cdot 4 \cdot 2 = 64$$

8. Use the results of the survey to find each probability as fraction:

	Snakes	Spiders	Mice	Dogs	Total
Boys	23	14	5	2	44
Girls	35	20	8	3	66
Total	58	34	13	5	110

a) P(Snakes | Boys)= $\frac{23}{44}$ b) P(Mice and Girls)= $\frac{8}{110}$ c) P(Boys or Spid

d) P(Girls | Dogs)= $\frac{3}{5}$ e) P(Spiders or Snakes)= $\frac{92}{110}$ + $\frac{64}{110}$

9. There are 9 different ice cream flavors to choose from, 4 different toppings to choose from, and 3 different sizes. Find the number of 2-scoop Sundaes with 3 toppings that are possible.

$$\frac{36}{{}_9C_2} \cdot \frac{4}{{}_4C_3} \cdot \frac{3}{{}_3C_1} = 432$$

10. A license plate contains 3 numbers and 3 letters. If numbers can't repeat but letters can, find the number of license plates that are possible.

$${}_{10}P_3$$

$$10 \cdot 9 \cdot 8 \cdot 26 \cdot 26 \cdot 26$$
$$12,654,720$$

11. There are 12 people that work in an office.
   a) If you want to buy 4 new chairs and give them to the workers how many different ways could this be done?
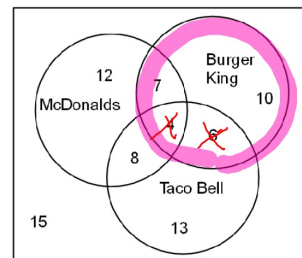
$${}_{12}C_4 = 495$$

   b) You are completing a technology upgrade and are giving everybody their own phone number. How many different ways could you assign phone numbers?

$${}_{12}P_{12} \text{ or } 12!$$

$$479,001,600$$

12. Use the following Venn Diagram to find each probability as a fraction.

a) P(McD and BK)= $\dfrac{11}{75}$

b) P(TB or McD but NOT BK)= $\dfrac{33}{75}$

c) P(Not McD)= $\dfrac{44}{75}$

d) P(BK but not TB)= $\dfrac{17}{75}$