

a) If a coin is tossed 100 times, how many times would you expect it to land on heads?

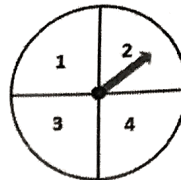
$$\frac{1}{2} \cdot 100 = 50 \text{ times}$$

b) If a coin is tossed 30 times, how many times would you expect it to land on tails?

$$\frac{1}{2} \cdot 30 = 15 \text{ times}$$

c) If the spinner pictured to the right was spun 800 times, how many times would you expect it to land on the number 4?

$$\frac{1}{4} \cdot 800 = 200 \text{ times}$$



### Expected Probability - Predicting Outcomes

**Expected Probability** =  $P(E) \cdot \text{Number of Attempts}$

Expected Probability can also be found using a **proportion**

**Example:** If a coin is tossed 40 times, how many times would you expect it to land on tails?

1<sup>st</sup> Method:  $\frac{1}{2} \cdot 40 = \boxed{20}$

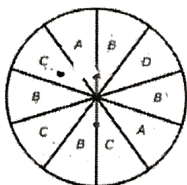
2<sup>nd</sup> Method:

$$\frac{1}{2} = \frac{x}{40}$$

$$\frac{x}{2} = \frac{40}{2}$$

$$x = \boxed{20}$$

1. The spinner below is spun 300 times. About how many times can we expect to land on the letter C?



$$\frac{3}{10} \cdot 300 = \boxed{90}$$

2. The rules of a contest say that there is a 5% probability of winning a prize. If 400 people enter the contest, predict how many people will win.

$$5\% \cdot 400$$

$$(.05)(400) = \boxed{20}$$

3. The theoretical probability that a song by One Republic plays on your iPhone is 0.45. If there are 80 songs on your iPhone, how many of the songs are by One Republic?

$$(0.45)(80) = \boxed{36}$$

### Discussion/Investigation.

On Mondays, the school cafeteria offers a choice of a chicken sandwich or a vegetarian sandwich and an orange juice, milk or soda for a drink. How many different meals can you choose from at the cafeteria assuming you get one sandwich and one drink?

$$\begin{matrix} CO & VO \\ CM & VM \\ CS & VS \end{matrix} \quad \text{or} \quad 2 \cdot 3 = \boxed{6}$$

## Fundamental Counting Principle

Event **M** has  $m$  possible outcomes. Event **N** has  $n$  possible outcomes.  
The total number of outcomes of event **M** followed by event **N** is  $m \times n$ .

**Examples:** Find the total number of outcomes.



1. Flip a coin and roll a die

$$2 \cdot 6$$
$$\boxed{12}$$



2. Spin a spinner and roll a die

$$4 \cdot 6$$
$$\boxed{24}$$



3. Roll two six-sided dice

$$6 \cdot 6$$
$$\boxed{36}$$

4. Samantha is buying a new car. She wants either a convertible or an SUV. Both types of cars are available in navy, white, or red and with automatic *or* standard transmission. How many different options does Samantha have to choose from?

$$\begin{array}{ccc} \text{Type} & \text{Color} & \text{Transmission} \\ 2 & \cdot 3 & \cdot 2 \\ \hline & & \boxed{12} \end{array}$$

5. If a man has five different shirts, four different neckties, and three different sport jackets, how many different possible outfits consisting of a shirt, tie, and sports jacket are possible?

$$\begin{array}{ccc} \text{Shirt} & \text{Tie} & \text{Jacket} \\ 5 & \cdot 4 & \cdot 3 \\ \hline & & \boxed{60} \end{array}$$

6. A type of chair comes in 4 styles, 4 colors, and 3 different upholsteries. How many different types of chairs can be made?

$$\begin{array}{ccc} \text{style} & \text{color} & \text{Upholstery} \\ 4 & \cdot 4 & \cdot 3 \\ \hline & & \boxed{48} \end{array}$$

7. Debbie orders from a lunch menu that has five appetizers, three soups, seven entrees and four desserts. How many different meals consisting of either an appetizer *or* a soup, one entrée and one dessert can Debbie order?

$$\begin{array}{ccc} \text{Starter} & \text{Entree} & \text{Dessert} \\ 8 & \cdot 7 & \cdot 4 \\ \hline & & \boxed{224} \end{array}$$

$$\boxed{1920}$$