USING PROBABILITY

Probability is the possibility that a certain event will occur.

Probability is the chance of an event occurring divided by the total number of possible outcomes. Probability is based on whether events are dependent or independent of each other.

- An **independent event** refers to the outcome of one event not affecting the outcome of another event.
- A **dependent event** is when the outcome of one event does affect the outcome of the other event.

The number of ways that an event can happen depends on the order.

- A **permutation** is an arrangement of objects in which order matters.
- A **comb**[illegible] matter.

Just as pro[illegible]ning, **odds** refer to th[illegible]

How to u[illegible]

The **probability** of one event occurring is equal to the chance of the event occurring divided by the total outcomes. Probabilities of independent or dependent events are based on how one event affects the other event, if at all.

- For example, if there are 10 marbles in a bag with 4 blue and 6 red marbles, the probability of picking a red marble, putting it back and then picking another red marble is 6/10 · 6/10 = 36/100 or 9/25. This probability is **independent** because what happened the first time does not affect what happens the second time. This can be shown by the term 'with replacement', which means that the first item has been replaced.

  The probability of picking a red marble and then another red marble without replacing the first is 6/10 ·5/9 = 30/90 or 1/3. This probability is **dependent** because the first event affects the second event.

Since probability is divided by total outcomes, it is useful to be able to figure out the total outcomes. **Permutations** are a way to arrange objects in which order matters.

- For example if there are 3 students and 3 chairs, the way the can be arranged is as follows:

Ex. There are 3 chairs, ___, ___, ___.

There are **3** students to choose from for the **first** chair, **_3_, ___, ___.**

There are **2** students to choose from for the **second** chair, **_3_, _2_,___.**

There is one student left for the last chair**, 3 , 2 , 1 .**

The number of ways the 3 students can be arranged in 3 chairs is 3 · 2 · 1 or 3! = 6 ways.

The notati e consecutive numbers f

A **combin** but in the case of co ow many different c t of the word DOG?

Ex. The combinations of two letters are: DO, DG, and OG
Since order does not matter, DO and OD are considered the same.
There are 3 ways to pick 2 letters out of the word DOG.

Another concept with probability is **odds**. Odds refer to the odds against an event happening. **Odds** are used to compare unfavorable possibilities with favorable possibilities. For example, what are the **odds** of picking a **seven** out of a deck of **52** cards?

Ex. There are 52 - 4 or 48 ways not to get a seven.

There are **4** ways to get a **seven**.

The **odds** against picking a seven are **48:4**

The odds are 48:4 because there are 48 unfavorable possibilities compared to 4 favorable possibilities.

Try This!

1. What is the **probability** of picking a red card out of a deck of 52 cards, replacing it and then picking out an ace?

2. There are 4 red, 6 yellow and 5 blue marbles in a bag. What is the **probability** of picking a red marble, and without replacing it, then picking out a blue marble?

3. How many **permutations** can be made by arranging the letters in the word, MATH?

4. How ma flavors of ice cream c d mint?

5. What are the **odds** against rolling the number 5 on a die?