



Math Tips: Fractions, Frequency, and Probability

Key Terms:

Fraction: A fraction is a quantity in between two whole numbers (1, 2, 3, 4...). A fraction can be positive or negative, and can be greater than or less than 1. It represents a portion of a whole.

Quick Calculations:

- To convert a fraction to a **decimal**: Divide the numerator (top) of the fraction by the denominator (bottom) of the fraction: $\frac{1}{4} = 0.25$
- To convert a decimal to a **percentage**, multiply the decimal by 100: $0.25 \times 100 = 25$ percent

As we'll see below, **fractions also help us measure how likely things are to happen in real life!**

Frequency: How often something happens out of a certain number of trials or during a certain time period. Frequency is a straight count of **actual outcomes**.

- If you roll a die 10 times, and 4 of those times you roll a 3, then your **frequency** of rolling a 3 was **4 out of 10**. Expressed as a fraction, you rolled a 3 exactly $\frac{4}{10}$ of the time (or $\frac{2}{5}$).
- If twenty kids each throw a paper airplane and 5 of the kids throw it exactly 10 feet, the **frequency** of that length was **5 out of 20**, or $\frac{1}{4}$ th of the time.

Probability: The chance that a particular event will happen **in the future**. For example, if you have 10 marbles and only 1 is blue, the probability of choosing a blue marble is **1 out of 10**, also written as **$\frac{1}{10}$** or 10%. This is also the **fraction** of repeat events that are likely to turn out that way:

- If you keep tossing the marble back in and picking again, you'll probably pick blue $\frac{1}{10}$ of all those times. Example: if you pick 20 times always replacing the marble, you'll probably pick blue 2 out of 20 times (10%).

Sometimes the probability is **independent**, because each new event starts over fresh. For example:

- Flipping a coin: your chance of tails is **1 out of 2**, or **$\frac{1}{2}$** , or **50%** every time.
- Rolling a die: the chance of a certain number is **$\frac{1}{6}$** , because it is 1 of the 6 sides that can land facing up.

Other times, the probability is **dependent** on what already happened:

- If you pick from 25 pirate positions, 3 of which land you on treasure, your chance of landing on treasure is **3 out of 25**. But if you don't pick treasure the first time, and you pick again without replacing that slip of paper, there are now only **24 slips** in the bag – so your chance of picking treasure is now **3 out of 24**. It's higher!
- If you still don't pick treasure next time, your chance will rise to **3 out of 23**...and so on.
- If you keep picking spots other than the treasure, your chance of treasure will **rise** until only those 3 slips of paper are left. At that point you've hit **3 out of 3**, or **100%** chance of treasure!