

# Make Predictions Using Theoretical Probability

Theoretical probability is the probability that is mathematically expected. You can find theoretical probability using the following fraction:

$$\text{Theoretical probability} = \frac{\text{number of favorable outcomes}}{\text{total number of possible outcomes}}$$

So, if you flip a coin, the theoretical probability of the coin landing on heads is  $\frac{1}{2}$ .

**You can use theoretical probability to make predictions!** If you flip a coin 600 times, what is the best prediction for the number of times the coin will land on heads?

$$\frac{1}{2} = \frac{n}{600}$$

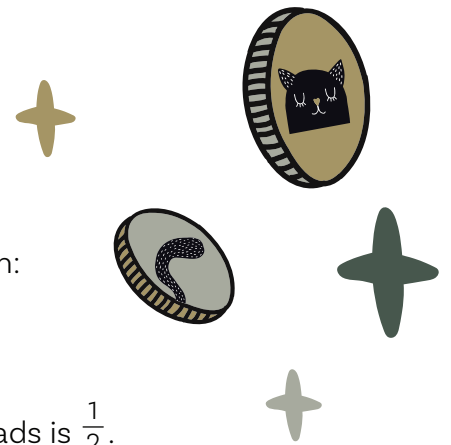
*Write a proportion that sets the two ratios equal to each other.*

$$\frac{1}{2} \cdot 600 = \frac{n}{600} \cdot 600$$

*Multiply both sides by 600.*

$$300 = n$$

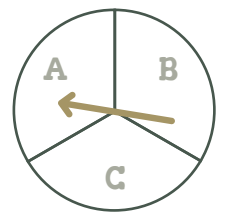
*Simplify. So, you can predict the coin will land on heads 300 times.*



Use theoretical probability to make each prediction.

1. If you roll a six-sided die 24 times, what is the best prediction for the number of times you will roll the number 3?

2. If you spin this spinner 45 times, what is the best prediction for the number of times it will land on section A?



3. There are 3 blue marbles and 5 red marbles in a bag. You randomly select a marble and put it back in the bag. If you do this 40 times, what is the best prediction for the number of times you will select a red marble?

4. If you spin this spinner 20 times, what is the best prediction for the number of times it will land on an even number?

