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Theoretical Probability

Probability is used to predict the outcomes of various events. It is the chance of something happening.

Probability is used to make predictions about _____, _____, _____.

Probabilities can be written in 3 ways:

			Example 1	Example 2		
i. as a fraction	$\frac{\#\text{ of successful attempts}}{\text{total }\#\text{ of attempts}}$	↓	$\frac{1}{2}$		↑	$\frac{\#\text{ of successful attempts}}{\text{total }\#\text{ of attempts}}$
ii. as a decimal	divide the fraction to convert to percent	↓			↑	use place value to convert to fraction
iii. as a percent	multiply by 100 to convert to percent	↓		60%	↑	divide by 100 to convert to decimal

When two or more things have the same probability of happening, they are considered to have **equally likely outcomes.**

Theoretical Probability is the chance of something happening in a perfect world. It can be calculated using the formula:

$$P = \frac{\#\text{ of favourable outcomes}}{\#\text{ of possible outcomes}}$$

Example 1

A number from 1 to 50 inclusive is chosen at random. What is the probability that the number . . .

a. is even?		b. ends in a 3?	
c. is odd?		d. does not end in a 3?	
e. is greater than 13?		f. is prime?	
g. is divisible by 5?		h. has 2 digits the same?	

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Example 2

The Toronto Maple Leafs are playing the Detroit Redwings in the 2003 Stanley Cup Finals. The probability of the Maple Leafs winning are $^4/_{11}$.

a. What is the probability of each team winning a single game? Write your answers as percentages.

b. If these teams were to play 6 games, how many is each expected to win?

Example 3

Suppose you toss a coin three times.

a. Which event do you think is more likely: you get 3 heads, or you get 1 head and 2 tails? Explain your thinking.

b. Draw a tree diagram to show the possible outcomes when a coin is tossed three times. Are the outcomes equally likely?

c. Use your diagram to determine the probability of each event.

i. 3 heads ii. no heads iii. 1 head and 2 tails