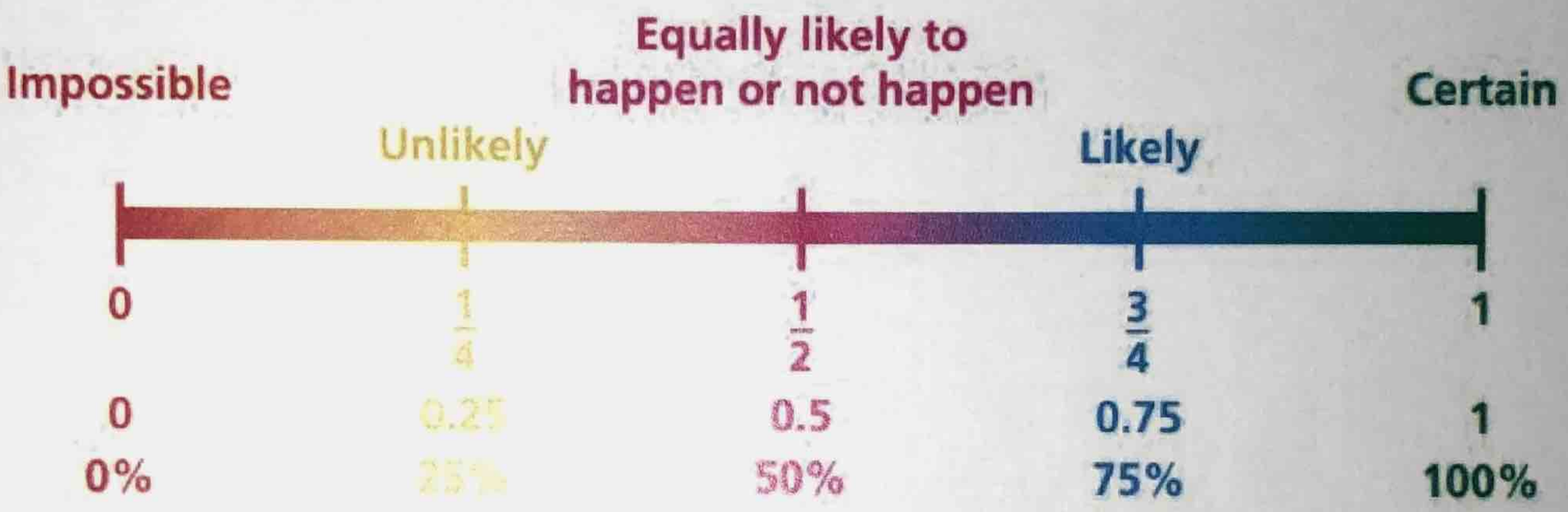
10.2 Probability

What does it mean to say "something happens by chance"?

Describe an event that is IMPOSSIBLE. Describe an event that is CERTAIN.

probability - measures the likelihood that an event will occur, can be written as a fraction, decimal, or percent



Can you come up with an event with each of these probabilities?

0%	25%	50% (equally likely)	75%	100%
pigs flying	winning lottery	flipping a coin: heads	the bell will ring	death !!

Ex: There is a 80% chance of thunderstorms tomorrow. Describe the likelihood of the event. LIKELY

Ex: The probability that you land a jump on a snowboard is $\frac{1}{2}$. Describe the likelihood of the event. EQUALLY LIKELY

Ex: There is a 100% chance that the temperature will be less than 120°F tomorrow. Describe the likelihood of the event. CERTAIN

Ex: There is a 20% chance of snow flurries tomorrow. Describe the likelihood of the event. UNLIKELY

When all possible outcomes are **equally likely**, the probability of an event is:

$$P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$ (total)

Examples of equally likely events: spinner (where all spaces are same size), bag of marbles (same # of each), coin, die/cube

Ex: You roll a number cube. Write out the outcomes (AKA **sample** space)

1, 2, 3, 4, 5, 6

(a) What is the probability of rolling an odd number?

$P(\text{odd \#}) = \frac{3}{6} = \frac{1}{2} = 0.5 = 50\%$

(b) What is the probability of rolling a number greater than 4?

$P(\# > 4) = \frac{2}{6} = \frac{1}{3} = 0.\overline{3} = 33.\overline{3}\% = 33\frac{1}{3}\%$

(c) What is the probability of rolling an even number?

$P(\text{even \#}) = \frac{3}{6} = \frac{1}{2} = 0.5 = 50\%$

(d) What is the probability of rolling a prime number?

$P(\text{prime \#}) = \frac{3}{6} = \frac{1}{2} = 0.5 = 50\%$

(e) What is the probability of rolling a number greater than 2?

$P(\# > 2) = \frac{4}{6} = \frac{2}{3} = 0.\overline{6} = 66.\overline{6}\% = 66\frac{2}{3}\%$

(f) What is the probability of rolling a number greater than 8?

$P(\# > 8) = \frac{0}{6} = 0 = 0 = 0\%$

Ex: The probability that you randomly draw a short straw from a group of 40 straws is $\frac{3}{20}$. How many are short straws? → equally likely

$\frac{\text{short}}{\text{total}} = \frac{\text{short}}{\text{total}}$

$\frac{3}{20} = \frac{x}{40}$ (×2)

$x = 3(2)$

$x = 6$ short straws

Ex: You randomly choose a paper clip from a jar that contains 6 green, 3 white, 4 red, 2 blue, 5 yellow. What is the probability of not choosing a green paper clip. Find the solution in **2 ways**.

$P(\text{not green}) = \frac{14}{20} = \frac{7}{10} = 0.7 = 70\%$

$P(\text{not green}) = 1 - \frac{6}{20} = \frac{20}{20} - \frac{6}{20} = \frac{14}{20}$