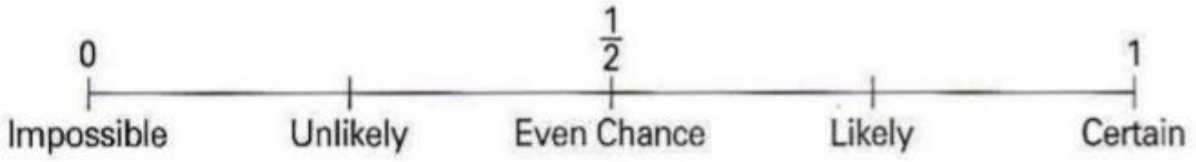
Hillcrest Mathematics Knowledge Organiser

40 - Probability Scale, Theoretical and Experimental

Basic Probability:

- Probability should always be expressed as either a fraction, decimal or percentage less than 1.
- The probability of an event occurring can never be greater than 1.
- The sum of the probabilities of every outcome must = 1.

Probability Scale:



Events can be placed on the probability scale. The scale represents how likely an event is to happen. E.g: flipping a coin = even chance. Monday will follow Sunday = certain.

Calculating Basic Probability:

P (event) = $\frac{\text{Number of ways the event can occur}}{\text{Total number of outcomes}}$

$$P(rolling\ a\ 6) = \frac{1}{6}$$

P (event **not** happening) = 1 - P (event happening).

$$P(not\ rolling\ a\ 6) = 1 - \frac{1}{6} = \frac{5}{6}$$

Theoretical Probability:

Theoretical Probability is what we expect the probability of an event to be. E.g the theoretical probability of rolling a 1 on a regular 6 sided dice is $\frac{1}{6}$

Estimating Outcomes:

We can estimate the number of times we expect to get a result by multiplying the number of trials by the theoretical probability of the event happening. This is the same process as finding a fraction of an amount.

Example: I am going to roll a dice 60 times, how many times would I expect to roll a 1?

$$60 \times \frac{1}{6} = 60 \div 6 \times 1 = 10.$$

I would expect to get 10 results of a 1.

Experimental probability:

Is when you calculate the probability of an event based on data that has been collected.

Example: a dice is rolled 60 times. The results are in the table:

Result	**1**	**2**	**3**	**4**	**5**	**6**
No of Result	20	5	12	10	7	6
Experimental Probability	$\frac{20}{60}$	$\frac{5}{60}$	$\frac{12}{60}$	$\frac{10}{60}$	$\frac{7}{60}$	$\frac{6}{60}$

Experimental Probability = number of times result happened / total trials

Linked Prior Topics: Fractions, decimals, percentages, Venn diagrams, listing outcomes, multiplicative reasoning, collecting data, testing hypotheses.

Vocabulary: Probability, event, outcome, result, likelihood, chance, impossible, certain, fraction, decimal, percentage, theoretical, expected, experimental, trials.

Linked Future Topics: Tree diagrams, replacement, conditional, independent and dependent events, sets, Venn diagrams.