THEORETICAL PROBABILITY

If all outcomes in a sample space are equally likely, the theoretical probability of an event occurring is:

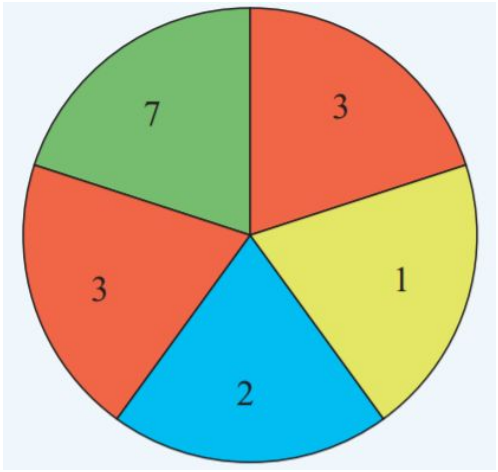
$$P(\text{event}) = \frac{\text{number of favourable outcomes}}{\text{total number of outcomes}}$$

A probability can be expressed as a fraction or decimal (ranging from 0 to 1) or a percentage (from 0% to 100%).

A event certain to occur has a probability of 1 (0 for an impossible event).

EXAMPLE OF CALCULATION - PROBABILITY

This spinner has 5 equally divided sections.



a List the sample space using the given numbers.

a {1, 2, 3, 3, 7}

b Find P(3). **b** $P(3) = \frac{2}{5}$ or 0.4

c Find P(not a 3). $P(\text{not a } 3) = 1 - P(3) = 1 - \frac{2}{5}$ or $1 - 0.4 = \frac{3}{5}$ or 0.6

d Find P(a 3 or a 7). $P(\text{a 3 or a 7}) = \frac{2}{5} + \frac{1}{5} = \frac{3}{5}$

e Find P(a number that is at least a 3). **e** $P(\text{at least a 3}) = \frac{3}{5}$

EXAMPLE OF CALCULATION - PROBABILITY

A letter is chosen from the word TELEVISION. Find the probability that the letter is:

a a V

b an E

c not an E

d either an E or a V

a $P(\text{V}) = \frac{1}{10} (= 0.1)$

$P(\text{V}) = \frac{\text{number of Vs}}{\text{total number of letters}}$

b $P(\text{E}) = \frac{2}{10}$

There are 2 Es in the word TELEVISION.

$= \frac{1}{5} (= 0.2)$

Simplify the fraction.

c $P(\text{not an E}) = \frac{8}{10}$

If there are 2 Es in the word TELEVISION with 10 letters, then there must be 8 letters that are not E.

$= \frac{4}{5} (= 0.8)$

d $P(\text{an E or a V}) = \frac{3}{10} (= 0.3)$

The number of letters that are either E or V is 3.