

UNIT 19 *Probability of One Event*

Introduction to SIM

Learning objectives

This is a really important unit, the first of two that deal with *probability*. After completing this unit of STUDENT INSTRUCTIONAL MATERIAL (SIM) you should

- understand how to classify probabilities using words such as CERTAIN, LIKELY, UNLIKELY, IMPOSSIBLE and illustrate probabilities on a probability line
- be able to calculate simple probabilities
- be able to make estimates of probabilities using relative frequency
- be confident in determining the probability of an outcome when all possibilities are equally likely to occur.

Key points and principles

- The probability of any outcome, p , must satisfy $0 \leq p \leq 1$.
- The sum of the probabilities of all outcomes must equal 1.
- Probabilities can be illustrated on a probability line: $\begin{array}{c} 0 \qquad \qquad \qquad 1 \\ | \text{-----} | \end{array}$

Facts to remember

- For finding probabilities by experiment:

$$\text{probability of event} = \frac{\text{frequency of event}}{\text{total frequency}}$$

- For equally likely outcomes:

$$\text{probability of particular event} = \frac{\text{number of ways of obtaining event}}{\text{total no. of possible outcomes}}$$

For example, when throwing a fair die,

$$p(6) = \frac{1}{6}, \quad p(\text{prime number}) = p(2, 3 \text{ or } 5) = \frac{3}{6} = \frac{1}{2}$$

Glossary of terms

<i>Outcomes</i>	events that can occur after an experiment (for example, obtaining a '6' when throwing a die)
<i>Sample space</i>	for an experiment is the set of all possible outcomes (for example, $\{1, 2, 3, 4, 5, 6\}$ when throwing a die)
<i>Event</i>	subject of the sample space (for example, obtaining even numbers when throwing a die)
<i>Relative frequency</i>	the frequency of an event divided by the total frequency; this is used as an estimate for the probabilities of that event

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Independent events when the result of one event happening does not affect the probability of the other

Fair or unbiased die (coin, spinner, etc.) - every face (side) has an equal chance

Biased die (coin, spinner, etc.) - all outcomes are not equally likely to occur. For example, a weighted die.

(Note that the word '*dice*' is the plural of '*die*', but is often used as a singular.)