



## Probability

### Key Notes

#### 11.1 Sample Space

1. We can calculate the probability of an event happening. The measure of probability takes on values between 0 and 1, inclusively.
2. When an event will definitely not occur, probability = 0.  
When an event is certain to occur, probability = 1.

For example,

In a bag of blue balls, the probability of picking a blue ball is 1 and the probability of picking a red ball is 0.

3. The **sample space**,  $n(S)$ , lists all the possible outcomes.

For example,

- (i) When a coin is tossed, the sample space of this experiment is 'head' or 'tail'.
- (ii) When a fair die is rolled, the sample space of this experiment is '1', '2', '3', '4', '5' or '6'.

Since a die does not have the number '7', the probability of rolling a '7' is 0.

## Chapter 11 • Probability

## 11.2 Probability of Single Events

$$P(A) = \frac{\text{Number of outcomes for event } A}{\text{Total number of possible outcomes}}$$

This is the probability of event  $A$  occurring. Since the total probability is 1, we can also calculate the probability that event  $A$  does not occur.

$$P(A \text{ does not occur}) = 1 - P(A)$$

For example,

- (i) When a coin is tossed, there are 2 outcomes.

The coin will land on 'head' in 1 out of 2 outcomes. Therefore, the probability of landing on 'head' is  $\frac{1}{2}$ .

Similarly, the probability of landing on 'tail' is also  $\frac{1}{2}$ . Alternatively, the probability of landing on 'tail' is  $(1 - \frac{1}{2}) = \frac{1}{2}$ .

- (ii) When a fair die is rolled, there are 6 outcomes.

The probability of rolling '1' is 1 out of 6 outcomes. Therefore, the probability of rolling '1' is  $\frac{1}{6}$ .

The probability of rolling '2', '3', '4', '5' or '6' is  $(1 - \frac{1}{6}) = \frac{5}{6}$ .

This is the same as finding the total probability of rolling each number.

$$\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{5}{6}$$