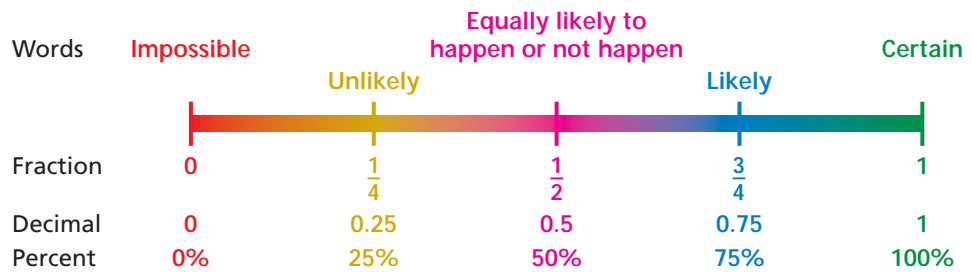# 8.1 Assigning a Measure to Likelihood

▶ Use probability to describe the likelihood of an event.

▶ Analyze the likelihood of a risk.

▶ Use likelihood to describe actuarial data.

Describing the Likelihood of an Event

The **probability** of an event is a number that measures the likelihood that the event will occur. Probabilities are between 0 and 1, including 0 and 1. The diagram relates likelihoods (described in words) and probabilities (numbers from 0 to 1).

Words	Impossible	Unlikely	Equally likely to happen or not happen	Likely	Certain
Fraction	0	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1
Decimal	0	0.25	0.5	0.75	1
Percent	0%	25%	50%	75%	100%

EXAMPLE 1   Describing Likelihoods

Describe the likelihood of each event in words.

Probability of an Asteroid or a Meteoroid Hitting Earth			
Asteroid	Diameter	Probability of impact	Date
● Meteoroid	6 in.	0.75	Any day
● Apophis	886 ft	0	2029
● 2000 SG344	121 ft	1/435	2068–2110
● 2008 TC3	4 m	1	2008 (occurred)

NASA says there is no chance of the 886-foot asteroid Apophis smashing into Earth in its first flyby in 2029, and only a 1-in-250,000 chance of a collision in 2036.

SOLUTION

● On any given day, it is *likely* that a meteoroid of this size will enter Earth's atmosphere. If you have ever seen a "shooting star," you have seen one.

● A probability of zero means this event is *impossible*.

● With a probability of $1/435 \approx 0.23\%$, this event is *unlikely*.

● With a probability of 1, this event is *certain*. It occurred in 2008.

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Describe each event as unlikely, equally likely to happen or not happen, or likely. Explain your reasoning.

a. The oldest child in a family is a girl.

b. The two oldest children in a family are both girls.