

**Chapter**

**9**

# **Probability**

**Syllabus reference: 3.5, 3.6, 3.7**

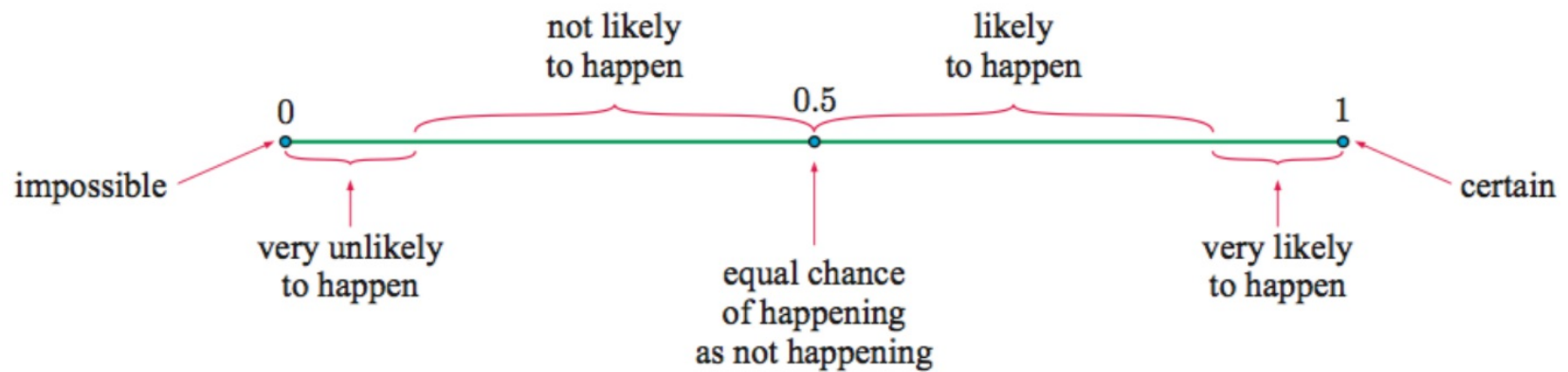
- A** Experimental probability
- B** Sample space
- C** Theoretical probability
- D** Compound events
- E** Tree diagrams
- F** Sampling with and without repl
- G** Expectation
- H** Probabilities from Venn diagram
- I** Laws of probability
- J** Conditional probability
- K** Independent events

In the field of **probability theory** we use mathematics to describe the **chance** or **likelihood** of an event happening.

We apply probability theory in physical and biological sciences, economics, politics, sport, life insurance, quality control, production planning, and a host of other areas.

We assign to every event a number which lies between 0 and 1 inclusive. We call this number a **probability**.

An **impossible** event which has 0% chance of happening is assigned a probability of 0.  
A **certain** event which has 100% chance of happening is assigned a probability of 1.  
All other events can be assigned a probability between 0 and 1.



# A

## EXPERIMENTAL PROBABILITY

In experiments involving chance

- The **number of trials** is the total number of times the experiment is repeated.
- The **outcomes** are the different results possible for one trial of the experiment.
- The **frequency** of a particular outcome is the number of times that this outcome is observed.
- The **relative frequency** of an outcome is the frequency of that outcome expressed as a fraction or percentage of the total number of trials.

**Experimental probability = relative frequency.**

Complete  
Investigation 3  
on page 262  
in the textbook.

<i>Outcome</i>	<i>Tally</i>	<i>Frequency</i>	<i>Relative frequency</i>
1			
2			

Outcome	Tally	Frequency	Relative frequency
1	10 12 8	12 11 15 12	8 98 81.5
2	6 6 8	9 17 13 10	12 81 81.5
3	9 8 8	13 7 6 6	6 63 81.5
4	12 11 13	11 8 10 6	12 89
5	9 7 11	9 4 8 10	12 70
6	14 10 12	6 13 8 11	14 88

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## ESTIMATING PROBABILITIES FROM DATA

Main reason for journey	April 2011	May 2011	June 2011
Convention/conference	8300	14800	8800
Business	27200	33900	32000
Visiting friends/relatives	77500	52700	59900
Holiday	159300	119300	156500
Employment	4200	4300	5500
Education	9800	7900	12500
Other	35200	28000	33200
<b>Total</b>	<b>321500</b>	<b>260900</b>	<b>308300</b>

$$\frac{156500}{308300} = 0.508$$

The table shows the number of short-term visitors coming to Australia in the period April - June 2011, and the main reason for their visit.

- Find the probability that a person who visited in June was on holiday.
- Find the probability that a person coming to Australia arrived in May.
- Lars arrived in Australia in April, May, or June 2011. He came to visit his brother. What is the probability that he arrived in April?

holiday  
June



Assignment:

Exercises 9 A.1 all  
A.2 # 1, 3