UNIT 21 *Probability of One Event* Teaching Notes

Historical Background and Introduction

Probability owes its origins to gambling, and is now defined as 'the chance or likelihood of something happening'.

Gambling is an activity that has been practised by humankind for many centuries. Archeologists have found evidence of games of chance being played in Egypt as early as 3500 BC, and six-faced dice dating from about 3000 BC have been found in Iraq and India.

However, it was not until about 1500 AD that any real thought was given to the probabilities which underlie any game of chance, and the work done was very fragmented – more in the nature of speculation than reasoned argument. The generally accepted view of the beginnings of the mathematical study of probability are these:

> In about 1650, the *Chevalier de Méré*, who was an able and experienced French gambler, found that his own reasoning on the subject did not agree with his observations. Realising that it must be his reasoning which was wrong, he wrote to *Blaise Pascal* (1623-1662), a leading French mathematician at that time, and explained his dilemma.
>
> The now famous exchange of correspondence between Pascal and another French mathematician, *Pierre de Fermat* (1601-1665) took place: these letters are now accepted as being the beginning of the theory of probability. One of the earlier (and easier) problems they dealt with was "How many times must one throw a pair of dice before expecting to get a double six?".
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> *Christiaan Huygens* (1629-1695), a Dutch mathematician, on a visit to Paris, learnt of the correspondence and, as a result, in 1657 published his own book. 'De Ratiociniis in Ludo Aleae' (On reasoning in dice games) – the first published work of importance on probability.

For preparatory work, make sure that you have an adequate supply of dice, spinners and coins – specialist suppliers can provide biased dice which can be used in experiments to find actual probabilities.

Routes	**Standard**	**Academic**	**Express**
21.1 Introduction to Probability	✓	✓	✓
21.2 Calculating the Probability of a Single Event	✓	✓	✓
21.3 Relative Frequency	✓	✓	✓
21.4 Complementary Events	✓	✓	✓
21.5 Estimating the Number of Outcomes	(✓)	✓	✓
21.6 Addition Law for Mutually Exclusive Events	×	✓	✓
21.7 General Addition Law	×	×	✓

(✓) *denotes extension work for these pupils*

Language

Probability line	✓	✓	✓
Certain, likely, unlikely, impossible	✓	✓	✓
Even chance	✓	✓	✓
Outcomes; trials	✓	✓	✓
Relative frequency	✓	✓	✓
Complementary events	✓	✓	✓
Mutually exclusive events	×	✓	✓

Misconceptions

- It is a fact that the probability of an event must be ≤ 1. Any probability answer that is > 1 must be incorrect.
- If you obtain 4 Heads in a row when tossing a fair coin, then the probability of Heads on the fifth throw is still $\frac{1}{2}$ – a result which often seems to be in conflict with the expectation that over a period of many tosses of the coin, the number of Heads will approximately equate to the number of Tails. However, pupils must realise that each toss of the coin is an *independent* event.

  See also OS 21.10 for more misconceptions.

Challenging Questions

The following questions are more challenging than others in the same section:

	Section	*Question No.*	*Page*
Practice Book Y7B	21.4	10	150
	21.5	10	153
	21.6	10	157
	21.7	10	162