



# Introduction

Lotteries comprise one of the simplest of games. There is no strategy to win. This book is about how to play so you lose less.

The book is in four parts. The first part introduces the concepts of chance, odds, mathematical expectation, Expected Win, Expected Utility, the Law of Large Numbers, and the misconception known as the Law of Averages and the various forms in which it appears as fallacies.

The second part covers the gimmicks by lotteries and the 'strategies' and ways people use to pick numbers in lotto.

The third part discusses the chances of a single block – a block, also called a selection, is the fixed number of distinct numbers you pick in a lotto. The phenomena of jackpot rollover and shared jackpots are covered.

The fourth part discusses lists of blocks you can use in actual play in Pick-5, Pick-6, and Pick-7 lotto games. You hope to win. So you play one or more blocks of numbers in your favorite lotto. But when you play several blocks for the same draw, it usually happens that some numbers drawn by the lottery are spread out among your blocks and no block has at least the minimum number of the numbers drawn to win prizes. Enter 'lotto designs!' These are special lists of blocks which ensure that when some of the drawn numbers are in your blocks, at least one block has the numbers needed for a given win other than the jackpot. These lists are displayed in books selling them as lists guaranteeing wins. However, the guarantee comes in to play only if a stipulated minimum number of winning numbers is among the numbers in the blocks in the list. This is good. We identify among such lists those that cost the least.

It is elementary mathematics to figure out the chances of a single block but difficult even for two blocks. We introduce an object called the 'spectrum' of a list of blocks and show how to easily compute chances using the spectrum. We give the spectrum for each of the designs (systems) we list.

Questions about ways of playing the various lotto games, are answered here. Questions on the most probable number of players splitting the next jackpot, the effect the intersection size of two blocks has on the overall wins in those blocks, popular numbers, number patterns in the blocks, your chances in doubling your bet, are a few of the questions answered here.

Groups that play a list would find the book a useful reference. The more mathematically sophisticated reader may skip Chapter 1. High school and university instructors may use the appendices to construct questions about chances in lotto games. After all, the whole subject of probability began with a question on dice – the Problem of Points. Those mathematicians working in combinatorial designs would be interested in the grids in Chapter 12 and ponder the minimal designs that exist but have not been found. Those lottery players not interested in the mathematics but only in the play may skip the appendices altogether and study only the chapters. If questions still arise, do post them on the blog at [www.playhow.net](http://www.playhow.net).