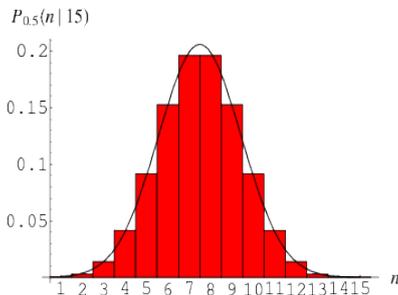


Goals

This fortnight we are going to:

- Understand probability distributions for discrete variables
- Understand Bernoulli trials
- Understand binomial theorem and binomial probability distribution
- Recognise situations when the binomial distribution applies and learn how to solve problems involving the binomial distribution
- Recognise and use the formula and CAS for binomial probabilities and graphs
- Understand the assumptions on which the binomial model is based



Theoretical Components

Make notes on the following chapters:

Maths Quest 12 Mathematical Methods

- 11A - The binomial distribution
- 11B - Problems involving the binomial distribution for multiple probabilities
- 11D - Expected value, variance and standard deviation of the binomial

Binomial Distribution:

- <https://www.youtube.com/watch?v=xNLQuuvE9uq>
- <https://www.youtube.com/watch?v=WWv0RUxDfbs>
- <https://stattrek.com/probability-distributions/binomial>

$$Pr(X = x) = {}^n C_x p^x q^{n-x} \text{ where } x = 0, 1, 2, \dots, n.$$

That is: x = the occurrence of the successful outcome.

The formula may also be written as:

$$Pr(X = x) = {}^n C_x p^x q^{n-x} \text{ where } x = 0, 1, 2, \dots, n.$$

Here, the probability of failure, q , is replaced by $1 - p$

Practical Components

Do the following questions:

Organise your solutions neatly in your exercise book.

Chapter 11 of Maths Quest 12 Mathematical Methods (pdf – Google Classroom)

- 11A: 3, 5, 7, 11, 14, 15, 23, 29
- 11B: 2, 4, 7, 9, 11, 13, 21, 22, 28
- 11D: As many as you need

Mathspace

Investigation

In-class in Week 6 during your double lesson.

Other

In-class in Week 6 during your double lesson.

Random fun fact: It is surprising that there should be a connection between the Riemann zeta-function, defined as a function over the complex numbers, and the set of prime numbers. But such a connection is exactly what one of the most famous and important unsolved mathematical mysteries describes. The Riemann hypothesis, which purports that all zeros of the Riemann zeta-function have real parts equal to $\frac{1}{2}$, is equivalent to a statement describing the asymptotic distribution of the prime numbers. This hypothesis holds such importance in mathematics that either proving or disproving it will reward the solver a prize of a million dollars!