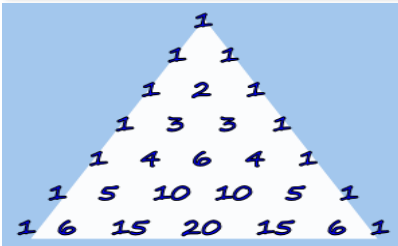


## Goals

By the end of this week, you should be able to:

- understand the notion of a combination as an unordered set of  $r$  objects taken from a set of  $n$  distinct objects
- use the notation  $\binom{n}{r}$  and the formula  $\binom{n}{r} = \frac{n!}{r!(n-r)!}$  for the number of combinations of  $r$  objects taken from a set of  $n$  distinct objects
- expand  $(x + y)^n$  for small positive integers  $n$
- recognise the numbers  $\binom{n}{r}$  as binomial coefficients, (as coefficients in the expansion of  $(x + y)^n$ )
- use Pascal's triangle and its properties



## Theoretical Components

### Knowledge checklist:

- Use  ${}^n P_r$  to count number of possible arrangements where order is important (permutations)
- Use  ${}^n C_r$  to represent selections where order is not important (combinations)
- Make connections between the number of combinations and the number of permutations.
- Investigate patterns in Pascal's triangle and the relationship to combinations, establish counting principles and use them to solve simple problems involving numerical values for  $n$  and  $r$ .
- Use CAS to compute  ${}^n C_r$  for a given  $n$  and a given  $r$

### Videos

Combinations -

[https://www.youtube.com/watch?v=Ej\\_4oSipqes&feature=youtu.be](https://www.youtube.com/watch?v=Ej_4oSipqes&feature=youtu.be)

Binomial Expansion theorem -

<https://www.youtube.com/watch?v=ajaAk1CP5pw>

### Online reading

<http://www.mathsisfun.com/combinatorics/combinations-permutations.html>

<http://www.mathsisfun.com/pascals-triangle.html>

## Practical Components

Chapter 12 of **Maths Quest 11 Mathematical Methods** (pdf - Google Classroom). Make notes as needed then complete the following questions.

Ex 12D Permutations using  $nPr$

- ALL even numbered questions

Ex 12G Combinations using  $nCr$

- ALL odd numbered questions

**Mathspace** - Read about [Pascal's Triangle](#).

Then complete questions: 3-7, 18-21 from

<https://mathspace.co/ebook/chapter/237691>

## Investigation

1. There are 10 people who are going to spend the afternoon in 2 groups, one group to go to the theatre and the other to play tennis. In how many ways can the group for tennis be selected if there must be at least 4 people in each group?
2. a) Expand  $(x - 2y)^6$  using Pascal's triangle.  
b) Research and write down some interesting things about the number patterns in Pascal's triangle (at least 3).

**QFO**

Quiz/Forum/Other

**Remember to scan in when you come to Maths and when you leave.**

You will need a CAS calculator for this course.  
Please see Jenny if you have any concerns.