Lower 6 Chapter 8

Binomial Expansion

Chapter Overview

1. Pascal’s Triangle

2. Factorial Notation

3. Binomial Expansion

4. Using Expansions for Estimation



Pascal’s Triangle:

Starter

1. Expand
2. Expand
3. Expand
4. Expand
5. Expand

What do you notice about the powers of a and b?

Example

Find the expansion of

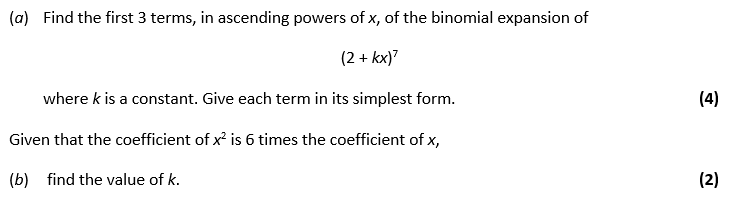
Example

Find =

Finding a single term example:

The coefficient of in the expansion of is 720. Find the possible value(s) of the constant .

Test Your Understanding



**Extension**

*[MAT 2009 1J]*

The number of pairs of positive integers which solve the equation:

is:

1. 0

Exercise 8A Page 161



Factorial Notation

Notation:

For example, suppose you had three letters, A, B and C, and wanted to arrange them in a line to form a ‘word’, e.g. ACB or BAC.

* There are 3 choices for the first letter.
* There are then 2 choices left for the second letter.
* There is then only 1 choice left for the last letter.

There are therefore possible combinations.

**Your calculator can calculate a factorial using the button.**

For example, if you are a football team captain and need to choose 4 people from amongst 10 in your class, there are possible selections.

*(Note: the notation is preferable to )*

**Use the button on your calculator (your calculator input should display “10C4”)**

Examples:

Calculate the value of the following. You may use the factorial button, but not the nCr button.

1. b)
2. d)

e) f)

g) g)

Exercise 8B Page 162

Binomial Expansion

Example

Find the first 4 terms in the expansion of , in ascending powers of .

Test Your Understanding

Find the first 3 terms in the expansion of , in ascending powers of .

Extension

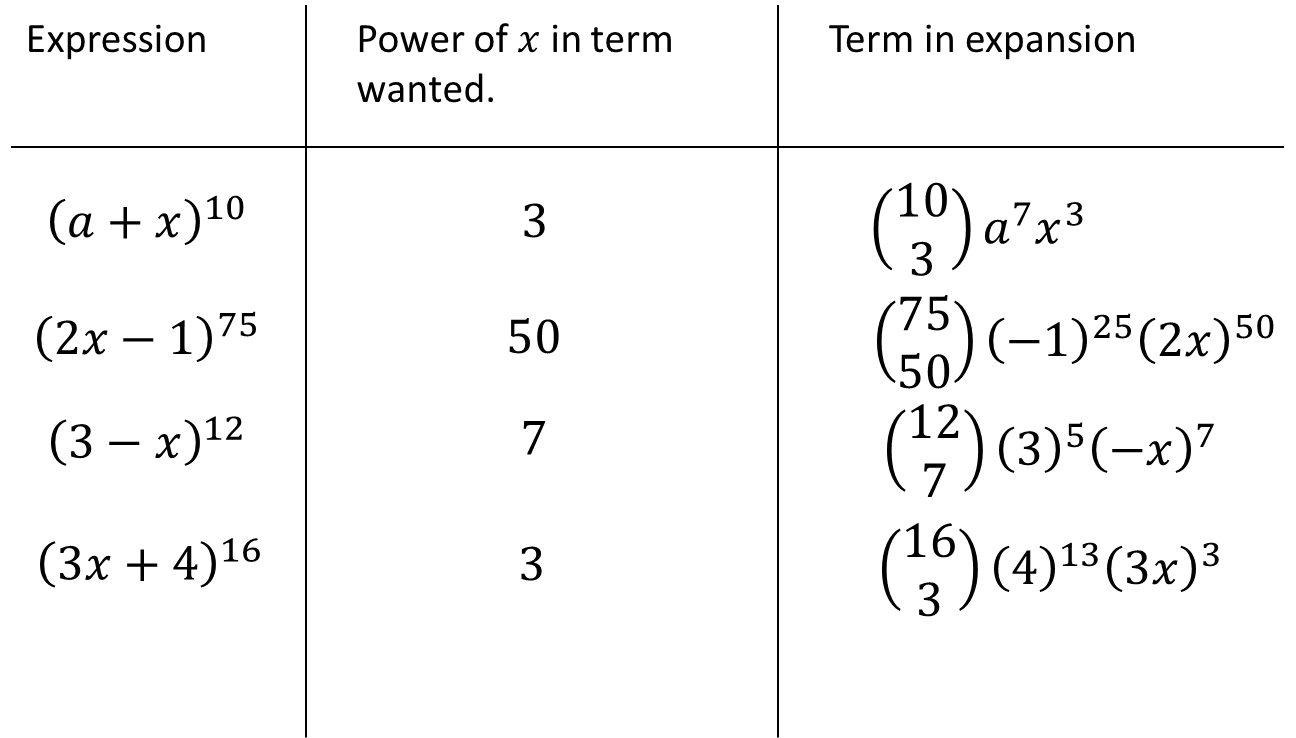
1. [AEA 2013 Q1a] In the binomial expansion of the coefficients of and are equal and non-zero.

Find the possible values of .

2. [STEP I 2010 Q5a] By considering the expansion of , where is a positive integer, or otherwise, show that:

Exercise 8C Page 164

Finding a Single Term in the Expansion



Example

The coefficient of in the expansion of is 3360. Find the possible value(s) of the constant .

Test Your Understanding

In the expansion of , where is a non-zero constant the coefficient of is double the coefficient of . Find the value of .

Extension

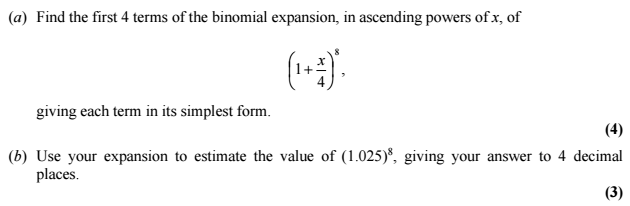
1. *MAT 2014 1G]* Let be a positive integer. The coefficient of in the expansion of equals:

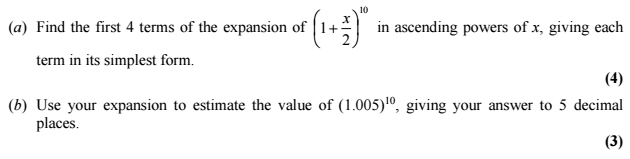



7. [STEP I 2013 Q6] By considering the coefficient of in the series for , or otherwise, obtain the following relation between binomial coefficients:

Exercise 8D Page 166

Using Expansions for Estimating

Example

Test Your Understanding

Exercise 8E Page 168