

## 1 Binomial Theorem

The binomial theorem states that

$$(x + y)^n = \binom{n}{0} x^n y^0 + \binom{n}{1} x^{n-1} y^1 + \binom{n}{2} x^{n-2} y^2 + \dots + \binom{n}{n-1} x^1 y^{n-1} + \binom{n}{n} x^0 y^n$$

or equivalently,

$$(x + y)^n = \sum_{k=0}^n \binom{n}{k} x^{n-k} y^k.$$

Then, the square of the binomial coefficient in text mode is  $\binom{n}{k}^2$  while in display mode it is

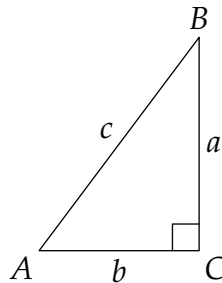
$$\binom{n}{k}^2.$$

## 2 Pythagorean Theorem

For a right triangle  $\triangle ABC$  with sides of length  $a$  and  $b$  and a hypotenuse of length  $c$  (as shown in **figure 1**), the Pythagorean theorem states that

$$a^2 + b^2 = c^2,$$

meaning that the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the other two sides.



**Figure 1** A triangle.