Pascal's Triangle :

You can use Pascal's Triangle to quickly expand expressions such as $(x+2y)^3$.

```
          1
        1   1
      1   2   1
    1   3   3   1
  1   4   6   4   1
1   5   10  10  5   1
```

Factorial notation:

$n! = n \times (n-1) \times (n-2) \times (n-3) \times 3 \times 2 \times 1$

$4! = 4 \times 3 \times 2 \times 1 = 24$

$0! = 1$

-The number of ways of choosing 'r' items from a group of 'n' items is written as ${}^nC_r$ or $\binom{n}{r}$ and is calculated by $\frac{n!}{(n-r)!r!}$.

e.g. ${}^3C_2 = \frac{3!}{(3-2)!2!} = \frac{6}{1 \times 2} = 3$

Working out coefficient in the binomial expansion using $\binom{n}{r}$

The binomial expansion is

$(a+b)^n = {}^nC_0 a^n + {}^nC_1 a^{n-1}b + {}^nC_2 a^{n-2}b^2 + {}^nC_3 a^{n-3}b^3 + \dots = + {}^nC_n b^n$

Similarly:

$(a+bx)^n = {}^nC_0 a^n + {}^nC_1 a^{n-1}bx + {}^nC_2 a^{n-2}b^2x^2 + {}^nC_3 a^{n-3}b^3x^3 + \dots = + {}^nC_n b^n x^n$

Chapter 6: Radian measure and its applications

Geometric Sequences:
-To get from one term to he next we multiply by the same number each time. This number is called the common ratio 'r'.
-You can define a geometric sequence using the first term 'a' and the common ratio 'r'.

a	ar	ar^2	$ar^3,\ldots$	ar^{n-1}
1st term	2nd term	3rd term	4th term	nth term

-So formula of nth term is $U_n = ar^{n-1}$.

Use of geometric sequences:
-You can use geometric sequences to solve problems involving growth and decay, interest rates, population growth and decline.

Sum of geometric series:

$$S_n = \frac{a(1-r^n)}{1-r}$$

Sum to infinity of a convergent geometric series:

$$S_\infty = \frac{a}{1-r}, \text{ if } |r|<1$$

Chapter 8: Graphs of trigonometric functions