# Intermediate Algebra
# Chapter 11, Sections 1 through 5
# IMPORTANT FORMULAS

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|---|---|---|
| Variables | $a_1$ : Amount of the **first** term<br>$a_n$ : Amount of the **last** term<br>n : Number of the term<br>d : Difference between any term and the term before (i.e.: $a_2 - a_1$).<br>r : Rate of change between any term and the term before (i.e.: $a_2 \div a_1$). | |
| 11-1 | $a_n = a_1 + (n-1)d$ | For arithmetic sequences:<br>• to find a particular term<br>• to write an equation for the nth term<br>• to find arithmetic means |
| 11-2 | $S_n = \frac{n}{2}[2a_1 + (n-1)d]$ | For arithmetic series (the sum of the terms of a sequence):<br>• to find the sum<br>• to find the first term<br>• to find the difference (must first find the n, then use the equation for the nth term of an arithmetic sequence to find the d; see example 3, page 584) |
| 11-2 | $S_n = \frac{n}{2}(a_1 + a_n)$ | Also for an arithmetic series. This formula requires the last term but does not require the difference. This formula can be used in conjunction with the formula for the nth term of an arithmetic sequence to find the d; see example 3, page 584) |
| 11-2 | $\sum_{x=1}^{7} (3x+4)$ | Sigma Notation: This concise way to write a series is less time-consuming and lengthy. Read as follows: "*The sum of 3x plus 4 as x goes from 1 to 7.*" Use the expression to get the first and last terms then use the series formula above. **Be aware of the total number of terms**, in case x starts as something other than 1. |
| 11-3 | $a_n = a_1 \bullet r^{n-1}$ | For geometric sequences:<br>• to find a particular term (sometimes using a different term to find $a_1$, then find the desired term, as shown in example 4, page 589)<br>• to write an equation for the nth term<br>• to find geometric means |
| 11-4 | $S_n = \frac{a_1(1-r^n)}{1-r}$ or $\frac{a_1 - a_1 r^n}{1-r}$ | For geometric series (the sum of the terms of a sequence):<br>• to find the sum<br>• to find the first term |
| 11-4 | $S_n = \frac{a_1 - a_n r}{1-r}$ | For geometric series when you have the last term ($a_n$) but not the value of n (the number of terms in the sequence). |
| 11-4 | $\sum_{n=1}^{7} 6(.4)^{n-1}$ | Sigma Notation. Use it to get the first and last terms then use the series formula above. Read as: "*The sum of 6 times 4 to the n minus 1 as n goes from 1 to 7.*" **Be aware of the total number of terms**, in case n starts as something other than 1. |
| 11-5 | $S_n = \frac{a_1}{1-r}$ | Sum of an infinite geometric series.<br>***WARNING:*** Remember about r: $-1 < r < 1$. If the absolute value of r is equal to or greater than 1, there is no sum of the series. |
| 11-5 | $0.\overline{84} = \frac{84}{100} + \frac{84}{10000} + \frac{84}{1000000} + \cdots$ | To write a repeating decimal as a fraction, use this method of breaking down a repeating decimal into an infinite geometric series. Find the rate and use the above formula for the sum of an infinite geometric series. |