

## 20.1 Geometric Sequences

Geometric Sequence - Always multiplies by the same number, called the common ratio "r".

Ex#1 Determine the value of the common ratio, r, and find the next three terms.

a) 2, 4, 8,  $\frac{16}{1}$ ,  $\frac{32}{1}$ ,  $\frac{64}{1}$  |  $r=2$

b) 256, 64, 16,  $\frac{4}{1}$ ,  $\frac{1}{1}$ ,  $\frac{1}{4}$  |  $r=\frac{1}{4}$

### Explicit Formula/Rule for Geometric Sequences

$$a_n = a_1 (r)^{n-1} \quad \star \text{ follow PEMDASA}$$

Ex#2 If the explicit formula is  $a_n = -2(3)^{n-1}$ , what are  $a_8$  and  $a_{15}$ ?

$$a_8 = -2(3)^{8-1} = -2(3)^7 = -2(2,187) = -4,374 = a_8$$

$$a_{15} = -2(3)^{15-1} = -2(3)^{14} = -2(4,782,969) = -9,565,938 = a_{15}$$

Ex#3 Write the explicit rule for 5, 15, 45, 135, ...

$$a_1 = 5 \quad r = 3 \quad a_n = 5(3)^{n-1}$$

Ex#4 Write the explicit rule for  $6, -4, \frac{8}{3}, -\frac{16}{9}, \dots$

$$a_1 = 6 \quad r = -\frac{2}{3} \quad a_n = 6\left(-\frac{2}{3}\right)^{n-1}$$

### Recursive Formula/Rule for Geometric Sequences

$$a_n = (r)a_{n-1} \quad \text{with } a_1 = \#$$

Ex#5 Given the recursive rule is  $a_n = 3a_{n-1}$  and  $a_1 = 4$ , what are  $a_8$  and  $a_9$ ?

$$4, \underline{12}, \underline{36}, \underline{108}, \underline{324}, \underline{972}, \underline{2916}, \underline{8749}, \underline{26244}$$

$$a_8 = 8,749 \quad a_9 = 26,244$$

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Ex#6 Write the recursive rule for  $\frac{4}{5}, \frac{4}{25}, \frac{4}{125}, \dots$

$$a_1 = \frac{4}{5} \quad r = \frac{1}{5} \quad a_n = \left(\frac{1}{5}\right)a_{n-1}$$

$$a_1 = \frac{4}{5}$$