

# Geometric Sequences ~ 1.3

RECALL: ARITHMETIC Sequences:

$$t_n = t_1 + (n-1)d$$

The term that we want/know →  $t_n$   
 1<sup>st</sup> term →  $t_1$   
 what term we are on →  $(n-1)$   
 common difference →  $d$

General:  $t_n = 3n + 8$  (put the  $t_1$  &  $d$  in and simplify)

Geometric:

1, 4, 16, 64, ...  
 $\times 4 \quad \times 4 \quad \times 4$

mult by 4  
 Common ratio

125, 25, 5, 1, 1/5, ...  
 $\div 5 \quad \div 5$

$= \frac{25}{125} = \frac{1}{5}$   
 $\frac{1}{5} = \frac{1}{5}$

Ex 1 3, 6, 12, 24, ...

$t_1 = 3$   
 $r = 2$

$t_1 = 3$   
 $t_2 = 3 \cdot 2^1 = 6$   
 $t_3 = 3 \cdot 2^2 = 12$   
 $t_4 = 3 \cdot 2^3 = 24$   
 $\vdots$   
 $t_{30} = 3 \cdot 2^{29}$   
 $\vdots$   
 $t_n = t_1 \cdot r^{n-1}$

So:

Geometric Sequences

$$t_n = t_1 \cdot r^{n-1}$$

← exponent  
 ← common ratio  
 term we want →  $t_n$   
 1<sup>st</sup> term →  $t_1$

Ex: 10, 20, 40, 80, ....

$$t_n = t_1 \cdot r^{n-1}$$

$$t_1 = 10$$
$$r = 2$$

$$(a) t_{10} = 10 \cdot 2^{10}$$

$$= 10 \cdot 1024 = \underline{\underline{10240}}$$

(\*) General term,  $t_n$   
↳ means put in  $t_1$  and  $r$ ,  
but leave  $n$  as  $n$

$$t_n = t_1 \cdot r^{n-1}$$

$$t_n = 10 \cdot 2^{n-1}$$

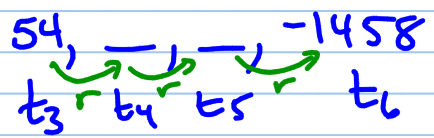
Ex

$t_3 = 54$

$t_6 = -1458$

find:  $t_1, t_2, t_3$   
and  $r$

Method 1



$-1458 = 54 \cdot r \cdot r \cdot r$

$\frac{-1458}{54} = \frac{54 r^3}{54}$

$r^3 = -27$

$r = -3$

$t_1, t_2, t_3$

$t_3 = t_1 \cdot r^2$

↓

$54 = t_1 \cdot (-3)^2$

$\frac{54}{9} = t_1 \cdot \frac{9}{9}$

$t_1 = 6$

$t_2 = -18$

$t_3 = 54$

Method 2

$t_6 = t_1 \cdot r^5 \rightarrow$

$t_3 = t_1 \cdot r^2 \rightarrow$

$\frac{-1458 = t_1 \cdot r^5}{54 = t_1 \cdot r^2}$  divide

$-27 = r^3$

$r = -3$

If  $t_1 = 1$  and  $t_6 = 32$ , find  $r$

$$t_n = t_1 \cdot r^{n-1}$$

$$\begin{array}{ccc} \downarrow & & \downarrow \\ 32 & = & (\underline{1}) \cdot r^5 \end{array}$$

$$32 = r^5$$

$$r = 2$$