SOLUTIONS => **Geometric Sequence Worksheet**

1. $3, 6, 9, 12, 24$ Find t_9.

D: $3, 3, 3, 12$

Since this sequence is not Arithmetic or Geometric we are unable to determine t_9. (NOT POSSIBLE!)

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2. $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}$ ($\times\frac{1}{2}$, $\times\frac{1}{2}$, $\times\frac{1}{2}$)

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

$t_9 = \frac{1}{2}\left(\frac{1}{2}\right)^{9-1}$

$t_9 = \frac{1}{2}\left(\frac{1}{2}\right)^{8}$

$t_9 = \frac{1}{2}\left(\frac{1}{256}\right)$

$t_9 = \frac{1}{512}$

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3. $2, -4, 8, -16$ ($\times -2$, $\times -2$, $\times -2$)

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

$t_{12} = 2(-2)^{12-1}$

$t_{12} = 2(-2)^{11}$

$t_{12} = 2(-2048)$

$t_{12} = -4096$

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4. $4, 8, 16, 32, \ldots, 512$ ($\times 2$, $\times 2$, $\times 2$)

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

$t_n = 4(2)^{n-1}$

since $t_n = 512$,

$512 = 4(2)^{n-1}$

$\frac{512}{4} = \frac{4(2)^{n-1}}{4}$

$128 = 2^{n-1}$

$2^7 = 2^{n-1}$

$7 = n-1$

$7+1 = n$

$8 = n$

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5. $192, 96, 48, \ldots, 3$ ($\times\frac{1}{2}$, $\times\frac{1}{2}$)

$t_1 = 192$

$r = \frac{1}{2}$

$t_n = 3$

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

$3 = 192\left(\frac{1}{2}\right)^{n-1}$

$\frac{3}{192} = \left(\frac{1}{2}\right)^{n-1}$

(lowest terms) $\frac{1}{64} = \left(\frac{1}{2}\right)^{n-1}$

We need to make the "bases" the same

$\left(\frac{1}{2}\right)^{6} = \left(\frac{1}{2}\right)^{n-1}$

Since the bases are now equal:

$6 = n-1$

$6+1 = n$

$\boxed{7 = n}$

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6. $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \ldots, \frac{1}{2187}$ ($\times\frac{1}{3}$, $\times\frac{1}{3}$)

$t_1 = \frac{1}{3}$

$r = \frac{1}{3}$

$t_n = \frac{1}{2187}$

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

$\frac{1}{2187} = \frac{1}{3}\left(\frac{1}{3}\right)^{n-1}$

$\frac{1}{2187} \div \frac{1}{3} = \left(\frac{1}{3}\right)^{n-1}$

$\frac{1}{2187} \times \frac{3}{1} = \left(\frac{1}{3}\right)^{n-1}$

$\frac{3}{2187} = \left(\frac{1}{3}\right)^{n-1}$

lowest terms! $\frac{1}{729} = \left(\frac{1}{3}\right)^{n-1}$

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We need to make the "bases" the same:

$\left(\frac{1}{3}\right)^{6} = \left(\frac{1}{3}\right)^{n-1}$

Since the "bases" are now equal:

$6 = n-1$

$6+1 = n$

$7 = n$

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