1, 7, 2, 8, ... 3, 9

common difference

1, 3, 5, 7, ... 9, 11

2 2 2

$\underbrace{2, 4}_{2}$, $\underbrace{4, 8}_{4}$, 16, ... ___ ___

common ratio $\dfrac{\text{value of } 2^{nd}}{\text{value of } 1^{st}} = \dfrac{3^{rd}}{2^{nd}} = \dfrac{4^{th}}{3^{rd}}$

$\frac{4}{2} = 2$ $\frac{8}{4} = 2$ $\frac{16}{8} = 2$

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2, 6, 18, 54, ...

2 - , 2-3, 2·9, 2-27

$2 \cdot 3^0$, $2 \cdot 3^1$, $2 \cdot 3^2$, $2 \cdot 3^3$

T_n = value of the last term

a = value of the 1^{st} term
= found in all terms

r = common ratio

n = number of terms

n th term

ar^0 ar^1 ar^2 ... ar^{n-1}

$T_n = l = ar^{n-1}$

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$a=3, n=6, r=5$ $t_6=t_n=l$

$l=ar^{n-1} = 3\,5^{6-1} = 3\cdot 5^5$

$= 3\cdot 3125$

$= 9375$

$a=1, n=30, r=2$

$t_n=l=ar^{n-1}$

$=1\cdot 2^{30-1}$

$=2^{29}$

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$n=8, a=7, l=64$

$l=ar^{n-1}$

$64=7r^{8-1}$ $\frac{64}{7}=r^7$ $\sqrt[7]{\frac{64}{7}}=r$

$n=9, l=100, r=2/3$

$l=ar^{n-1}$

$100=a(2/3)^{9-1}$

6561 $100=a\cdot\frac{256}{6561}$ 6561

$\frac{656100}{256}=a$

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$l = 3645 \quad a = 5 \quad r = 3$

$l = ar^{n-1} \quad 3645 = 5 \cdot 3^{n-1}$

$729 = 3^{n-1}$

$\log 729 = (n-1)\log 3 \quad 3^{6} = 3^{n-1}$

$6 = n-1 \quad n = 7$

Insert 4 gm's between 5 and 17

$5 \quad \underline{5\left(\sqrt[5]{\tfrac{17}{5}}\right)^1} \quad \underline{5\cdot\left(\sqrt[5]{\tfrac{17}{5}}\right)^2} \quad \underline{5\cdot\left(\sqrt[5]{\tfrac{17}{5}}\right)^3} \quad \underline{5\cdot\left(\sqrt[5]{\tfrac{17}{5}}\right)^4} \quad 17$

$l = ar^{n-1}$

$17 = 5r^5$

$5\cdot\left(\sqrt[5]{\tfrac{17}{5}}\right)^5 \quad \sqrt[5]{\tfrac{17}{5}} = r$

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$T_n = l = ar^{n-1}$

Inserting g-m's

Insert 5 gms between -30 and -2

$-30 \quad \underline{-30\left(\sqrt[6]{\tfrac{1}{15}}\right)} \quad \underline{-30\left(\sqrt[6]{\tfrac{1}{15}}\right)^2} \quad \underline{-30\left(\sqrt[6]{\tfrac{1}{15}}\right)^3} \quad \underline{-30\left(\sqrt[6]{\tfrac{1}{15}}\right)^4} \quad \underline{-30\left(\sqrt[6]{\tfrac{1}{15}}\right)^5} \quad -2$

$-30\left(\pm\sqrt[6]{\tfrac{1}{15}}\right)^6$

$-30\left(\tfrac{1}{15}\right)$

$-2 = -30r^{7-1}$

$\frac{1}{15} = r^6$

$\pm\sqrt[6]{\tfrac{1}{15}} = r$

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Insert a g.m. between 5 and 15

$5 \quad \underline{5(\pm\sqrt{3})} \quad 15$

$l = ar^{n-1}$ $\quad 5(\pm\sqrt{3})^2$

$15 = 5r^2$ $\quad 5 \cdot 3 = 15$

$3 = r^2$ $\quad am = \frac{a+l}{2}$

$\pm\sqrt{3} = r$

$g.m = \pm\sqrt{a \cdot l}$

$\pm\sqrt{5 \cdot 15} = \pm\sqrt{75}$

$= \pm\sqrt{25 \cdot 3} = \pm 5\sqrt{3}$

Dec 8-11:22 AM

Determine the value of the 3rd & 2nd terms if the 6th is 12 and the 9th = 42

Mini-Sequence

$\_\ \_\ \{\ \underline{?}\ \_\ \_\ |\ \underline{12}\ \_\ \_\ \underline{42}\ |\ \}$

$l = ar^{n-1}$

$42 = 12r^3$

$\frac{42}{12} = r^3 \Rightarrow r = \sqrt[3]{\frac{42}{12}}$

$42 = a \cdot \left(\sqrt[3]{\frac{42}{12}}\right)^6$

$42 = a\left(\left(\frac{42}{12}\right)^{1/3}\right)^6$

$42 = a\left(\frac{42}{12}\right)^2 \Rightarrow a = \frac{42}{\left(\frac{42}{12}\right)^2} = \frac{42}{12.25} = 3.42$

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$r = \sqrt[3]{\frac{42}{12}}$ $n = 8$ $l = 42$

$42 = a\left(\sqrt[3]{\frac{42}{12}}\right)^{8-1}$

$42 = a\left(\frac{42}{12}\right)^{7/3}$

$\frac{42}{\left(\frac{42}{12}\right)^{7/3}} = a$

Dec 8-11:34 AM

Sum of a Geometric Sequence/Progression

$S_n = 2 + 6 + 18 + 54 + 162$ Sequence $\downarrow$ Series

$-3S_n = -6 - 18 - 54 - 162 - 486$

$-2S_n = 2 - 486$

$-2S_n = -484$ $S_n = 242$

$S_n = a + ar + ar^2 + \ldots + ar^{n-2} + ar^{n-1}$

$-rS_n = -ar - ar^2 + \ldots - ar^{n-1} - ar^n$

$S_n - rS_n = a - ar^n$

$S_n(1-r) = a(1-r^n)$

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

Dec 9-10:59 AM

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

$$\frac{a - r \cdot ar^{n-1}}{1-r}$$

$$S_n = \frac{a - rl}{1-r}$$

$$T_n = l = ar^{n-1}$$

Dec 9-11:24 AM

$a = 3$, $r = 4$ $n = 10$

*

$$S_n = \frac{a(1-r^n)}{(1-r)} = \frac{3(1-4^{10})}{(1-4)}$$

$$S_n = \frac{\cancel{3}(1-1048576)}{-\cancel{3}}$$

$$S_n = 1048575$$

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$a = 5 \quad r = -2 \quad n = 11$

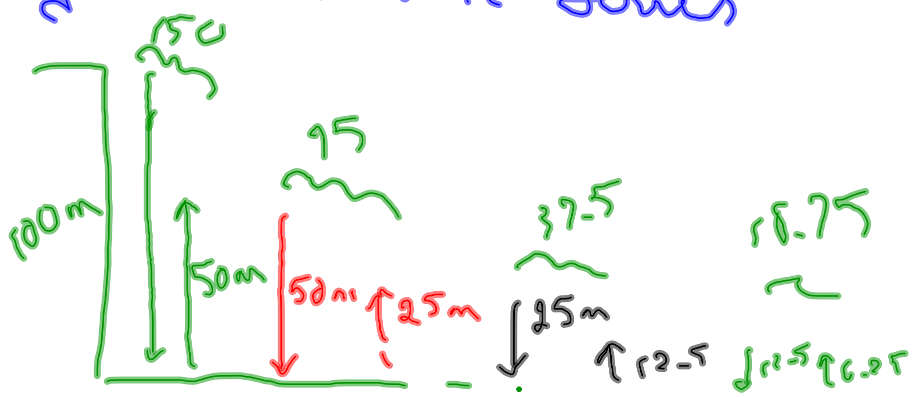
$$S_n = \frac{a(1-r^n)}{(1-r)} = \frac{5(1-(-2)^{11})}{(1-(-2))}$$

$$= \frac{5(1-(-2048))}{1+2}$$

$$= \frac{5(2049)}{3} = 3415$$

Dec 9-11:31 AM

Infinite Geometric Series



$a: 100 + 50 = 150\text{m} \quad r = \frac{1}{2} \quad n = \infty$

$$S_n = \frac{a(1-r^n)}{(1-r)} = \frac{150(1-\frac{1}{2}^{\infty})}{(1-\frac{1}{2})} = \frac{150(1-0)}{\frac{1}{2}}$$

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$$\frac{150(1-0)}{1/2} = \frac{150(1)}{1/2} = 150 \cdot \frac{2}{1} = 300$$

$$|r| < 1 \quad S_n = \frac{a}{1-r} \quad *$$

a ball is dropped 200m & rebounds 3/4 the distance travelled, find:

a) How far did the ball in the 7th down-up? term

$a = 350 \quad r = 3/4 \quad n = 7 \quad l = ar^{n-1}$

$l = 350\left(\frac{3}{4}\right)^6 = 62.29$

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b) How far did the ball travel in 7 bounces? Sum

$a = 350 \quad r = 3/4 \quad n = 7 \quad l = 62.29$

$$S_n = \frac{a - rl}{1-r} = \frac{350 - (3/4)(62.29)}{1 - 3/4} = \frac{350 - 46.6}{1/4}$$

c) How far did it travel in coming to rest? ∞

303.4×4

1213.6

$$S_n = \frac{a}{1-r} = \frac{350}{1 - 3/4} = \frac{350}{1/4} = 350 \times 4 = 1400$$

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Summation Notation

$1+4+16+\ldots$ to 10 terms

$$\sum_{n=1}^{10} (1)(4)^{n-1}$$

$-3+6-12+24-48+96-192$

$$\sum_{n=1}^{7} -3(-2)^{n-1}$$

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Expand & solve

$$\begin{array}{r} 128 \\ \times\ 4 \\ \hline 512 \end{array}$$

$$\sum_{n=1}^{5} 2(4)^{n-1}$$

$2+8+32+128+512$

$S_n = \frac{a-rl}{1-r} = \frac{2-(4)(512)}{1-(4)}$

3rd 4th 5th 6th 7th

$18+54+162+486+1458$

$$\sum_{n=3}^{7} 2(3)^{n-1}$$

*

$S_n = \frac{a-rl}{1-r} = \frac{18-(3)(1458)}{1-(3)}$

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$6 + 2 + \frac{2}{3} + \ldots$ Summarize

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

$$\sum_{n=1}^{\infty} 5\left(\frac{1}{7}\right)^{n-1}$$

Expand & find the sum

$5 + 5/7 + 5/49 + \ldots$

$$S_n = \frac{a}{1-r}$$

$$= \frac{5}{1-1/7} = \frac{5}{6/7} = \frac{5 \cdot 7}{6}$$

$= 5.83$

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$$\frac{a}{\frac{b}{c}} = \frac{ac}{b}$$

$$\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{ad}{bc}$$

$$\frac{\frac{a}{b}}{c} = \frac{a}{bc}$$

$$\frac{\frac{3}{4}}{5/9} = \frac{3 \cdot 9}{4 \cdot 5} = \frac{27}{20}$$

Dec 10-12:05 PM