

Questions from Homework

③ d) $\frac{1}{6} + \frac{1}{3} + \frac{1}{2} + \dots + \frac{5}{3}$ ←

$a = \frac{1}{6}$ $d = \frac{1}{3} - \frac{1}{6}$ $= \frac{2}{6} - \frac{1}{6}$ $= \frac{1}{6}$ $t_n = \frac{5}{3}$	$t_n = a + (n-1)d$ $\frac{5}{3} = \frac{1}{6} + (n-1)\left(\frac{1}{6}\right)$ $\frac{5}{3} = \frac{1}{6} + \frac{n-1}{6}$ $6 \times \frac{5}{3} = \frac{n}{6} \times 6$ $10 = n$	$S_{10} = \frac{10}{2} \left(\frac{1}{6} + \frac{5}{3} \right)$ $S_{10} = 5 \left(\frac{1}{6} + \frac{10}{6} \right)$ $S_{10} = 5 \left(\frac{11}{6} \right)$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $S_{10} = \frac{55}{6}$ </div>
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$3x + 4x+y + 5x+2y + \dots$

④ c) $a = 3x$ $t_{30} = 3x + (30-1)(x+y)$
 $d = x+y$ $t_{30} = 3x + 29x + 29y$
 $t_{30} = ?$ $t_{30} = 32x + 29y$

$S_{30} = \frac{30}{2} (3x + (32x + 29y))$

$S_{30} = 15 (35x + 29y)$

$S_{30} = 525x + 435y$

⑧ $t_{15} = 15$ $S_{15} = 105$

$t_{15} = a + (15-1)d$ $t_{15} = a + 14d$ $15 = a + 14d$ <div style="border: 1px solid red; padding: 2px; display: inline-block;"> $a + 14d = 15$ </div>	$S_{15} = \frac{15}{2} [2a + (15-1)d]$ $S_{15} = \frac{15}{2} [2a + 14d]$ $S_{15} = 15a + 105d$ $105 = 15a + 105d$ $15a + 105d = 105$ Divide by 15 <div style="border: 1px solid red; padding: 2px; display: inline-block;"> $a + 7d = 7$ </div>
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Elimination Method:

$a + 14d = 15$ $\Leftrightarrow a + 7d = 7$ <hr style="width: 50%; margin-left: 0;"/> $4d = 8$ <div style="border: 1px solid blue; padding: 2px; display: inline-block;"> $d = 2$ </div>	$a + 7(2) = 7$ $a + 14 = 7$ <div style="border: 1px solid red; padding: 2px; display: inline-block;"> $a = -7$ </div>	$\underline{-7} + \underline{-5} + \underline{-3}$ $-7 - 5 - 3 - 1 + 1 + 3 \dots$
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Geometric Series

A **Geometric Series** is the sum of the terms of a finite Geometric Sequence. (Remember geometric sequences have a common ratio, $r = t_2 \div t_1$)

$$2+6+18+54+162+486. \quad r = \frac{6}{2} = \frac{18}{6} = \frac{54}{18} = \boxed{3}$$

$t_3 = 18 \quad S_3 = 26$

To find the sum of a geometric series we use the following formula:

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

Try solving the series above!

Geometric Series

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

Find the indicated sum for the following series:

$$S_7 = 1 + 3 + 9 + \dots \quad S_7 = \frac{1((3)^7 - 1)}{3 - 1}$$

$$a = 1$$

$$r = 3$$

$$n = 7$$

$$S_7 = \frac{1(2187 - 1)}{2}$$

$$S_7 = 1093$$

$$S_8 = 8 - 4 + 2 - 1 + \dots \quad S_8 = \frac{8\left(\left(-\frac{1}{2}\right)^8 - 1\right)}{-\frac{1}{2} - 1}$$

$$a = 8$$

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

$$n = 8$$

$$S_8 = \frac{8\left(\frac{1}{256} - \frac{256}{256}\right)}{-\frac{1}{2} - 2}$$

$$S_8 = \frac{8(-255)}{1} \div \frac{-3}{2}$$

$$S_8 = \left(\frac{8}{1}\right) \left(\frac{-255}{256}\right) \left(\frac{2}{-3}\right)$$

$$S_8 = \frac{-255}{-48} = \frac{255}{48} = \frac{85}{16}$$

$$\frac{4080}{768}$$

Geometric Series

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

Find the sum of the following series:

$$2 + 4 + 8 + \dots + 1024$$

$$a = 2$$

$$r = 2$$

$$t_n = 1024$$

$$n = ?$$

$$S_n =$$

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

$$1024 = (2)(2)^{n-1}$$

$$512 = 2^{n-1}$$

$$2^9 = 2^{n-1}$$

$$9 = n - 1$$

$$10 = n$$

$$\log 512 / \log 2 = 9$$

$$S_{10} = \frac{2(2^{10} - 1)}{2 - 1}$$

$$= \frac{2(1024 - 1)}{1}$$

$$= 2046$$

Homework

Do #1 - 8

Omit #4

Geometric Series

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

Word Problems (**READ CAREFULLY!**)

A ball is dropped from a height of 16 m. It bounces $\frac{1}{2}$ of its original height after each bounce. How high will the ball be after its third bounce?

How far has the ball travelled when it touches the ground after the third bounce?