

Chapter 10 Review

FORMULAS:

Arithmetic: $t(n) = \text{change}(n-1) + \text{1st term}$ $\text{Sum} = \frac{n}{2}(\text{1st} + \text{last})$

Geometric: $t(n) = \text{1st term} \cdot \text{change}^{n-1}$ $\text{Sum} = \frac{\text{1st term} \cdot \text{change}^n - 1}{\text{change} - 1}$ $\text{Sum} = \frac{\text{1st term}}{1 - \text{change}}$

Show your work.

Find the nth term of each arithmetic sequence:

1) 1st term = 13, change = 11.75, n = 12

$$\begin{aligned} t(n) &= 13 + 11.75(n-1) \\ t(12) &= 13 + 11.75(12-1) \\ t(12) &= 142.25 \end{aligned}$$

2) 185, 177.8, 170.6..., n = 29

$$\begin{aligned} t(n) &= 185 - 7.2(n-1) \\ t(29) &= 185 - 7.2(29-1) \\ t(29) &= -16.6 \end{aligned}$$

3) Find the 17th term in the arithmetic sequence 7, 29, 51,...

$$\begin{aligned} t(n) &= 7 + 22(n-1) \\ t(17) &= 7 + 22(17-1) \\ t(17) &= 359 \end{aligned}$$

$$1, \underline{7}, \underline{15}, \underline{23}, \underline{31}, \underline{39}, \underline{47}, 55$$

4) Find the missing terms of the arithmetic sequence 35, 50, 65, 82, 98

$$(1, 35)(5, 98) \quad \frac{98 - 35}{5 - 1} = \frac{63}{4} = 15.75$$

5) Find Sum for the arithmetic sequence 1st term = 13, 2nd term = 21, n = 42

$$\begin{aligned} t(n) &= 13 + 8(n-1) \\ t(42) &= 13 + 8(42-1) = 341 \\ S(42) &= (13 + 341)(\frac{42}{2}) \\ S(42) &= 17,434 \end{aligned}$$

6) Find the sum: $\sum_{n=1}^{12} (3(n-1) + 17)$ $S(12) = (17 + 50)\frac{12}{2}$

$$\begin{aligned} t(1) &= 3(1-1) + 17 = 17 \\ t(12) &= 3(12-1) + 17 = 50 \end{aligned}$$

$$\begin{array}{r} 67 \cdot 6 \\ \hline 402 \end{array}$$

7) Write the following series in sigma notation: -28, -19.75, -11.5, ...

$$t(n) = -28 + 8.25(n-1)$$

$$\sum_{n=1}^{\infty} (-28 + 8.25(n-1))$$

8) What is the last term of the arithmetic series in which n = 37, the 1st term = 19 and the sum = -1628?

$$-1628 = (19 + x)(\frac{37}{2})$$

$$-1628 = 351.5 + \frac{37}{2}x$$

$$-26.75 = x$$

9) Find the number of terms of the series where the 1st term = -38, the last term = 221 and the sum = 6862.5.

$$6862.5 = (-38 + 221)(\frac{n}{2}) \quad 2(-38.5) = (\frac{n}{2})^2$$

$$6862.5 = (183)(\frac{n}{2}) \quad \boxed{75 = n}$$

$$37.5 = \frac{n}{2}$$

10) Find the next 3 terms of the geometric sequence: 125, -50, 20, -8, 3.2, -1.28

$$r = \frac{-50}{125} = -\frac{2}{5} \quad t(4) = 125 \left(-\frac{2}{5}\right)^{4-1} = -8$$

$$t(5) = 125 \left(-\frac{2}{5}\right)^{5-1} = 3.2$$

$$t(6) = 125 \left(-\frac{2}{5}\right)^{6-1} = -1.28$$

11) Find the nth term of the geometric sequence: 1st term = 8, change = -3, n = 12

$$t(n) = 8(-3)^{n-1}$$

$$t(12) = 8(-3)^{12-1} = \boxed{-1417176}$$

12) Find the 10th term of the following geometric sequence: $\frac{24}{25}, \frac{12}{5}, 6, \dots$ (do not round)

$$t(n) = \frac{24}{25} \left(\frac{5}{2}\right)^{n-1}$$

$$t(10) = \frac{24}{25} \left(\frac{5}{2}\right)^{10-1} = \boxed{3662.109375}$$

$$r = \frac{12}{5} \div \frac{24}{25} = \frac{12}{5} \cdot \frac{25}{24} = \frac{5}{2}$$

13) What term number would 201,326,592 be in the geometric sequence whose 1st term = 3 and has a change = 2? $r=2$ $t(n)$

$$t(n) = 3(2)^{n-1} \quad \frac{201,326,592}{3} = 3(2)^{n-1}$$

$$67108864 = 2^{n-1}$$

$$\log(67108864) = (n-1)\log 2$$

$$\frac{\log(67108864)}{\log(2)} = n-1$$

$$26 = n-1$$

$$\boxed{27 = n}$$

14) Find Sum for the geometric series: 1st term = 2.25, change = 4, n = 7

$$t(n) = 2.25(4)^{n-1} \quad S(7) = \frac{36864 - 2.25}{4-1}$$

$$\text{next term} = t(8) = 2.25(4)^{8-1}$$

$$t(8) = 36864 \quad S(7) = \frac{36861.75}{3} = \boxed{12287.25}$$

15) Find the sum of the geometric series: $\sum_{n=1}^{12} 6(-3)^{n-1}$

$$t(1) = 6(-3)^{1-1} = 6 \quad S(12) = \frac{3188646 - 6}{-3 - 1}$$

$$t(12) = 6(-3)^{12-1} = -1062882$$

$$t(13) = 6(-3)^{13-1} = 3188646$$

$$\frac{3188640}{-4} = \boxed{-797160}$$

16) Find the sum, if possible, of the infinite geometric series 1024+896+784+....

$$r = \frac{896}{1024} = \frac{7}{8} \quad S_{\infty} = \frac{1024}{1 - \frac{7}{8}}$$

$$\frac{1024}{\frac{1}{8}} = \boxed{8192}$$

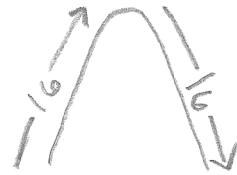
17) Given a bouncing ball that travels 16 inches up on the first throw and bounces 85% of the previous height after each bounce.

a. Find the total distance(up and down) after 14 bounces.

$$t(n) = 32(0.85)^{n-1}$$

$$S(14) = \frac{32(0.85)^{14} - 32}{0.85 - 1}$$

$$S(14) = 191.409 \text{ inches}$$



b. Find the total distance if the ball were to bounce an infinite number of times.

$$S_{\infty} = \frac{32}{1-0.85} = 213\frac{1}{3} \text{ inches}$$

18) Expand $(3x-5)^6$ using the Binomial Theorem.

$$\begin{array}{ccccccccc} {}^6C_6 & {}^6C_5 & {}^6C_4 & {}^6C_3 & {}^6C_2 & {}^6C_1 & {}^6C_0 \\ 1 & 6 & 15 & 20 & 15 & 6 & 1 \end{array}$$

$$(3x)^6 + 6(3x)^5(-5) + 15(3x)^4(-5)^2 + 20(3x)^3(-5)^3 + 15(3x)^2(-5)^4 + 6(3x)(-5)^5 + (-5)^6$$

$$729x^6 - 7290x^5 + 30375x^4 - 67500x^3 + 84375x^2 - 56250x + 15625$$

19) Find the 13th term of the expansion of $(2x-3)^{20}$.

$$20 C_8 = 125970 a^8 b^{12}$$

$$125970 (2x)^8 (-3)^{12} = 17,138,079,429,120 x^8$$

20) What would the balance be if you invested \$38,850 into an account that earned 4.75%, compounded monthly, for 8 years?

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$$38850 \left(1 + \frac{0.0475}{12}\right)^{12 \cdot 8}$$

21) Find the difference between the balances of accounts that earned 5.5% interest, where one account compounds monthly and the other compounds continuously, for 12 years.

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* Make sure to review logarithms, solving for the terms of a parabola with a system of 3 variables. *