1. Find the sum of the first 120 positive even integers.

$a_1 = 2 \quad a_{120} = ? \quad a_{120} = 2 + (120-1)2 \quad S_{120} = \frac{120}{2}(2+240)$

Arithmetic $\quad a_{120} = 240 \quad = 14520$

1. 14520

2. Find the 9th term in a geometric sequence if $a_4 = 108$ and $a_6 = 972$.

$a_4 = a_1 r^{4-1} \quad 108 = a_1 r^3$

$a_6 = a_1 r^{6-1} \quad 972 = a_1 r^5 \quad 972 = a_1 r^3 \cdot r^2 \quad 972 = 108 r^2 \quad r^2 = 9 \quad r = \pm 3$

$a_9 = a_1 r^{9-1} = a_1 r^8 = a_1 r^3 \cdot r^5 = 108(\pm 3)^5 = \pm 26244$

2. ± 26244

3. Find the sum of the infinite geometric series: $30 + 6 + 6/5 + 6/25 + \ldots$

$\sum_{k=1}^{\infty} 30\left(\frac{1}{5}\right)^{k-1} = \frac{30}{1 - 1/5} = \frac{30}{4/5} = 30 \cdot \frac{5}{4} = 37.5 \quad r = \frac{1}{5}$

$6/30 = 1/5 \quad \frac{6/5}{6} = \frac{6}{5} \cdot \frac{1}{6} = \frac{1}{5} \quad \ldots$ ☺

3. 37.5 OR $\frac{75}{2}$

4. Find the n^{th} term of the geometric sequence if: $a_2 = 4$ and $a_6 = \frac{1}{64}$.

$a_2 = 4 \rightarrow a_2 = a_1 r^{2-1} \quad 4 = a_1 r \quad 4 = a_1\left(\frac{1}{4}\right) \quad 16 = a_1$

$a_6 = \frac{1}{64} \rightarrow a_6 = a_1 r^{6-1} \quad \frac{1}{64} = a_1 r^5 \quad \frac{1}{64} = a_1 \cdot r^4$

$4r^4 = \frac{1}{64} \quad r^4 = \frac{1}{256} \quad r = \frac{1}{4}$

$a_n = a_1 r^{n-1} \quad a_n = 16\left(\frac{1}{4}\right)^{n-1}$ or $16\left(\frac{1}{4}\right)^n\left(\frac{1}{4}\right)^{-1} \quad 16\left(\frac{1}{4}\right)^n(4) \quad 64\left(\frac{1}{4}\right)^n$

4. $16\left(\frac{1}{4}\right)^{n-1}$ OR $64\left(\frac{1}{4}\right)^n$

5. Find a_n for the arithmetic sequence with $a_1 = 8$, $d = -3$.

$a_n = a_1 + (n-1)d \quad a_n = 8 + (n-1)(-3) \quad a_n = 8 + -3n + 3 \quad a_n = -3n + 11$

5. $a_n = -3n + 11$

6. Find the 4th term of $(x+2)^6$ ← n

$r = 4 \quad r - 1 = 3$

$\binom{6}{3}(x)^3(2)^3 = \frac{6!}{3!(6-3)!} \cdot x^3 \cdot 8 = \frac{6 \cdot 5 \cdot 4 \cdot 3!}{3! \cdot 3 \cdot 2 \cdot 1} \cdot 8x^3 = 20 \cdot 8x^3 = 160x^3$

6. $160x^3$

7. Find $\frac{(x+3)!}{(x-2)!}$

$= \frac{(x+3)(x+2)(x+1)(x)(x-1)(x-2)!}{(x-2)!}$

$= (x+3)(x+2)(x+1)(x)(x-1)$

7. $(x+3)(x+2)(x+1)(x)(x-1)$

Calculator

8. Find the partial sum of $\sum_{n=0}^{37} \frac{15 - \frac{n}{2}}{5}$.

8. 43.7

Calculator

9. What is the 8th term in the expansion of $(2x - 5)^{11}$ ← n

$r = 8 \quad r - 1 = 7$

$\binom{11}{7}(2x)^4(-5)^7 = -412500000x^4$

9. $-412500000x^4$ OR $-4.125 \times 10^8 \cdot x^4$

Calculator

10. Find the formula for a_n for the arithmetic sequence: $a_3 = 52$, $a_{10} = 136$.

$a_3 = a_1 + (3-1)d \quad 52 = a_1 + 2d$

$a_{10} = a_1 + (10-1)d \quad 136 = a_1 + 9d$

Solve system linear eqs → $a_1 = 28 \quad d = 12$

$a_n = 28 + (n-1)12 \quad a_n = 28 + 12n - 12 \quad a_n = 12n + 16$

10. $a_n = 12n + 16$

Calculator

11. Evaluate the summation: $\sum_{n=0}^{\infty} 2(0.015)^n$

11. 2.030

$a_1 = 2(.015)^0 = 2$

$r = .015$

$\frac{2}{1-.015} = 2.03045685$

Calculator

12. Find the sum of the coefficients of $(3x-y)^5$.

12. 32

$(3-1)^5 = 2^5 = 32$

Calculator

13. Evaluate the summation:

$$\sum_{n=0}^{7} 3\left(\frac{5}{7}\right)^n = \frac{8061264}{823543}$$

OR 9.788516...

13. $\frac{8061264}{823543}$ OR 9.789