Types of Sequences and Series

Type	Example	When to Use	Formula	Example Calculation
Arithmetic Sequence (AS)	2, 5, 8, 11, ...	When a pattern increases or decreases by a constant difference	$a_n = a_1 + (n-1)d$	6th term: $a_6 = 2 + (6-1)3 = 17$
Arithmetic Series	2, 5, 8, 11, ...	Sum terms of an arithmetic sequence	$S_n = n(a_1 + a_n)/2$ or $S_n = n/2[2a_1 + (n-1)d]$	Sum of 100 terms: $a_{100} = 2 + 99(3) = 299$, $S_{100} = 100(2+299)/2 = 15,050$
Arithmetic Mean (AM)	Between 5 and 11	Find middle values in an arithmetic sequence	$AM = (a+b)/2$	One AM: $AM = (5+11)/2 = 8$; 4 AMs between 5 and 20: Sequence: 5,8,11,14,17,20
Geometric Sequence (GS)	2, 8, 32, 128, ...	When a pattern multiplies by a constant ratio	$a_n = a_1 * r^{(n-1)}$	4th term: $a_4 = 2 *$

4^3 = 128

Geometric Series

2, 6, 18, 54, ...

Sum terms of a geometric sequence

$S_n = a_1(r^n - 1)/(r-1)$

Sum of first 4 terms: $S_4 = 2(3^4 - 1)/(3-1) = 80$

Geometric Mean (GM)

Between 2 and 18

Find a number that forms a geometric sequence with two numbers

GM = sqrt(a*b)

One GM: GM = sqrt(2*18) = 6

Harmonic Sequence (HS)

1, 1/2, 1/3, 1/4, ...

When reciprocals of terms form an arithmetic sequence

$a_n = 1 /$ (AS of reciprocals)

First 4 terms: 1, 1/2, 1/3, 1/4

Harmonic Mean (HM)

Between 4 and 6

Find a number such that reciprocals form an arithmetic sequence

HM = 2ab/(a+b)

HM = 2*4*6/(4+6)

= 4.8

Fibonacci Sequence

0, 1, 1, 2, 3, 5, 8, ...

Each term is the sum of the previous two

F_n = F_(n-1) + F_(n-2)

Next term after 8: 13