What you'll Learn About

- Arithmetic Sequences

Arithmetic Sequence

Common Difference (d)

$a_1 =$

$a_2 =$

$a_3 =$

Determine if the following sequences are arithmetic. If they are give the common difference.

A) 7, 11, 15, 19, 23, ...

+4 +4 +4 +4

Yes Arithmetic

Common Difference = 4

B) 2, -3, -8, -13, ...

$-3-2=-5$

$-8-(-3)=-5$

$-13-(-8)=-5$

$d=a_2-a_1$

$d=a_3-a_2$

a_4-a_3

Yes Arithmetic

$d=-5$

C) $1, \frac{5}{4}, \frac{3}{2}, \frac{7}{4}, \ldots$

$\frac{4}{4}, \frac{5}{4}, \frac{6}{4}, \frac{7}{4}$

Yes Arithmetic

$d=\frac{1}{4}$

D) 1, 4, 9, 16, ...

+3 +5 +7

Not Arithmetic

Write the first 5 terms given the rule of the sequence.

10) $a_n = 2^n n$

2, 8, 24, 64, 160

$a_1 = 2^1(1) = 2$

$a_2 = 2^2(2) = 8$

$a_3 = 2^3(3) = 24$

$a_4 = 2^4(4) = 64$

$a_5 = 2^5(5) = 160$

16. $a_n = 3 - 4(n + 6)$

$a_1 = 3-4(1+6) = -25$

$a_2 = 3-4(2+6) = -29$

$a_3 = 3-4(3+6) = -33$

$a_4 = 3-4(4+6) = -37$

$a_5 = 3-4(5+6) = -41$

→ Explicit

$a_n = a_1 + d(n-1)$

a_1 = 1st term

d = common Difference

Find the formula for the arithmetic series

18) $a_1 = 15$ $d = 4$

$a_n = 15 + 4(n-1)$

26) $a_5 = 190$ $a_{10} = 115$

(5, 190) (10, 115)

$\frac{115-190}{10-5} = \frac{-75}{5}$

$d = \boxed{-15}$

$a_n = a_1 - 15(n-1)$ $a_n = a_1 + d(n-1)$

$a_5 = a_1 - 15(5-1)$

$190 = a_1 - 15(5-1)$

$190 = a_1 - 60$

$250 = a_1$

$a_n = 250 - 15(n-1)$

Recursive

$a_1 =$

$a_n = a_{n-1} + d$

Find the first 5 terms using the recursive formula

36) $a_1 = 200$ $a_{k+1} = a_k - 10$

$a_1 = 200$ 200, 190, 180, 170, 160,

$a_{1+1} = a_1 - 10$

$a_2 = 200 - 10 = 190$

$a_{2+1} = a_2 - 10$

$a_3 = 190 - 10 = 180$

A) $a_1 = 10$ $a_{k+1} = a_k + 4$

$a_1 = 10$

$a_2 = 10 + 4 = 14$

$a_3 = 14 + 4 = 18$

$a_4 = 18 + 4 = 22$

$a_5 = 22 + 4 = 26$

Find the missing term.

40) $a_1 = 3$ $a_2 = 13$ $a_9 =$

d = 10

Recursive

$a_1 = 3$ $a_9 = 83$

$a_2 = 13$

$a_3 = 23$

$a_4 = 33$

$a_5 = 43$

$a_6 = 53$

$a_7 = 63$

$a_8 = 73$

Explicit

$a_n = a_1 + d(n-1)$

$a_n = 3 + 10(n-1)$

$a_9 = 3 + 10(9-1)$

$= 83$

$S = \frac{n}{2}(a_1 + a_n)$

Find the sum of the first 50 terms

↳ n = 50

54) -6, - 2, 2, 6, ...

$n = 50 \quad a_1 = -6$

$a_{50} = -6 + 4(50-1)$

$= 190$

$S = \frac{50}{2}(-6 + 190)$

$25(184)$

-4600

56) $4\frac{7}{8}$, 3.7, 2. 7, ...

$d = -1$

$a_{50} = 4.7 - 1(50-1)$

$= 4.7 - 49$

$= -44.3$

$S = \frac{50}{2}(4.7 + (-44.3))$

$25(-39.6)$

-990

Ending — Sum — Starting

Find the sum of the series given in sigma notation

62. $\sum_{n=1}^{100} 2n$

2, 4, 6, 8, 10, 12, ... 200

$n = 100$

$a_1 = 2$

$a_{100} = 200$

$S = \frac{100}{2}(2 + 200)$

$= 50(202)$

$= 10{,}100$

66. $\left[\sum_{n=51}^{100} n\right] - \left[\sum_{n=1}^{50} n\right]$

$S = \frac{50}{2}(51 + 100) - \left[\frac{50}{2}(1 + 50)\right]$

$= [25(151) - 25(51)]$