Arithmetic Sequences and Series Assignment

Decide whether each sequence is arithmetic.

1. $3, 14, 25, 36 \ldots \ldots \ldots \ldots \ldots$

2. $-2, -8, -14, -20 \ldots \ldots \ldots$

Find the first six terms and common difference of each arithmetic sequence.

3. $a_n = n - 10$

4. $a_n = 10 - 5n$

Find the specified term of each arithmetic sequence.

5. $a_1 = 6, \quad d = -4$
    $56th\ term =?$

6. $11, 0, -11, -22 \ldots \ldots \ldots \ldots$
    $16th\ term =?$

Arithmetic Sequences and Series Assignment

Find the specified value for the arithmetic sequence with the given characteristics.

7. $a_{16} = 52, \quad d = -2$
    $a_1 = ?$

8. $a_{12} = 22, \quad d = 2$
    $a_1 = ?$

9. $a_{10} = 24, \quad a_1 = -3$
    $d = ?$

10. $a_{14} = 27, \quad a_1 = 1$
    $d = ?$

11. $a_n = -40, \quad a_1 = 20, \quad d = -5$
    $n = ?$

Arithmetic Sequences and Series Assignment

12. $a_n = 100, \quad a_1 = 35, \quad d = 5$

$n =$?

Find the indicated arithmetic means for each set of nonconsecutive terms.

13. $3 \ means, \ 10 \ and \ 34$

14. $5 \ means, \quad -12 \ and \ 36$

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Arithmetic Sequences and Series Assignment

Find the indicated sum for each arithmetic sequence.

15. $10th\ partial\ sum\ \ if: a_1 = 3,\ \ d = 12$
$S_{10} = ?$

16. $18th\ partial\ sum\ of - 5, 5, 15, 25 \dots \dots \dots \dots.$
$S_{18} = ?$

17. $8 + 12 + 16 + \cdots \dots \dots \dots + 128$

18. $\dfrac{1}{2} + 1 + 1\dfrac{1}{2} + \cdots \dots \dots \dots + 6\dfrac{1}{2}$

Arithmetic Sequences and Series Assignment

Write each arithmetic series in sigma notation. The lower bound is given.

19. $2 + 12 + 22 + \cdots \ldots \ldots \ldots + 412$ $\qquad n = 1$ **20.** $16 + 20 + 24 + \cdots \ldots \ldots \ldots + 96$ $\qquad n = 1$

Find each common difference.

21.
$$\sum_{n=5}^{10} (20 + 3n)$$

22. $a_{12} = 21$ $\qquad S_{12} = 186$

Name: _____ Period: _____ Date: _____

Arithmetic Sequences and Series Assignment

Decide whether each sequence is arithmetic.

1. $3, 14, 25, 36 \dots \dots \dots \dots \dots$

    $14 - 3 = 11$
    $25 - 14 = 11$
    $36 - 25 = 11$
    $d = 11$
    This sequence is arithmetic.

2. $-2, -8, -14, -20 \dots \dots \dots.$

    $-8 - (-2) = -8 + 2 = -6$
    $-14 - (-8) = -14 + 8 = -6$
    $-20 - (-14) = -20 + 14 = -6$
    $d = -6$
    This sequence is arithmetic.

Find the first six terms and common difference of each arithmetic sequence.

3. $a_n = n - 10$

    $a_1 = 1 - 10 = -9$
    $a_2 = 2 - 10 = -8$
    $a_3 = 3 - 10 = -7$
    $a_4 = 4 - 10 = -6$
    $a_5 = 5 - 10 = -5$
    $a_6 = 6 - 10 = -4$
    $d = -4 - (-5) = -4 + 5 = 1$
    $d = 1$

4. $a_n = 10 - 5n$

    $a_1 = 10 - 5 * 1 = 10 - 5 = 5$
    $a_2 = 10 - 5 * 2 = 10 - 10 = 0$
    $a_3 = 10 - 5 * 3 = 10 - 15 = -5$
    $a_4 = 10 - 5 * 4 = 10 - 20 = -10$
    $a_5 = 10 - 5 * 5 = 10 - 25 = -15$
    $a_6 = 10 - 5 * 6 = 10 - 30 = -20$
    $d = -20 - (-15) = -20 + 15 = -5$
    $d = -5$

Find the specified term of each arithmetic sequence.

5. $a_1 = 6, \ d = -4$
    $56th \ term = ?$

    $a_1 = 6, \ d = -4, \quad n = 56$

    $a_n = a_1 + (n - 1)d$
    $a_{56} = 6 + (56 - 1) * (-4)$
    $a_{56} = 6 + 55 * (-4)$
    $a_{56} = 6 - 220$
    $a_{56} = -214$

6. $11, 0, -11, -22 \dots \dots \dots.$
    $16th \ term = ?$

    $a_1 = 11 \quad d = 11 \quad n = 16$

    $a_n = a_1 + (n - 1)d$
    $a_{16} = 11 + (16 - 1) * 11$
    $a_{16} = 11 + 15 * 11$
    $a_{16} = 11 + 165$
    $a_{16} = 176$

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Arithmetic Sequences and Series Assignment

Find the specified value for the arithmetic sequence with the given characteristics.

7. $a_{16} = 52, \quad d = -2$
$a_1 =?$

$a_{16} = 52, \quad d = -2, \quad n = 16$

$a_n = a_1 + (n-1)d$
$a_{56} = a_1 + (16-1) * (-2)$
$52 = a_1 + (16-1) * (-2)$
$52 = a_1 + 15 * (-2)$
$52 = a_1 - 30$
$\boxed{a_1 = 82}$

8. $a_{12} = 22, \quad d = 2$
$a_1 =?$

$a_{16} = 22, \quad d = 2, \quad n = 12$

$a_n = a_1 + (n-1)d$
$a_{16} = a_1 + (12-1) * 2$
$22 = a_1 + 11 * 2$
$22 = a_1 + 222$
$22 - 222 = a_1 + 222 - 222$
$\boxed{a_1 = -200}$

9. $a_{10} = 24, \quad a_1 = -3$
$d =?$

$a_{10} = 24, \quad a_1 = -3, \quad n = 10$

$a_n = a_1 + (n-1)d$
$a_{10} = -3 + (10-1) * d$
$24 = -3 + 9 * d$
$24 + 3 = 3 - 3 + 9 * d$
$27 = 9 * d$
$\boxed{d = 3}$

10. $a_{14} = 27, \quad a_1 = 1$
$d =?$

$a_{14} = 27, \quad a_1 = 1, \quad n = 14$

$a_n = a_1 + (n-1)d$
$a_{14} = 1 + (14-1) * d$
$27 = 1 + 13 * d$
$27 - 1 = 1 - 1 + 13 * d$
$26 = 13 * d$
$\boxed{d = 2}$

11. $a_n = -40, \quad a_1 = 20, \quad d = -5$
$n =?$

$a_n = -40, \quad a_1 = 20, \quad d = -5$

$a_n = a_1 + (n-1)d$
$-40 = 20 + (n-1) * (-5)$
$-40 - 20 = 20 - 20 + (n-1) * (-5)$
$-60 = (n-1) * (-5)$
$n - 1 = \dfrac{-60}{-5}$
$n - 1 = 12$
$\boxed{n = 13}$

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Arithmetic Sequences and Series Assignment

12. $a_n = 100, \ a_1 = 35, \ d = 5$
$n = ?$

$a_n = 100, \ a_1 = 35, \ d = 5$

$a_n = a_1 + (n-1)d$
$100 = 35 + (n-1)*5$
$100 - 35 = 35 - 35 + (n-1)*5$
$65 = (n-1)*5$
$n - 1 = \dfrac{65}{5}$
$n - 1 = 13$
$\boxed{n = 14}$

Find the indicated arithmetic means for each set of nonconsecutive terms.

13. $3 \ means, \ 10 \ and \ 34$

$3 \ means \ \ 10 \ and \ 34$
$10, \underline{\quad}, \underline{\quad\,}, \underline{\quad\,}, 34$

$a_1 = 10 \qquad a_5 = 34$

$a_n = a_1 + (n-1)d$
$a_5 = a_1 + (5-1)d$
$34 = 10 + 4d$
$34 - 10 = 10 - 10 + 4d$
$24 = 4d$
$d = 6$
$a_2 = a_1 + d = 10 + 6 = 16$
$a_3 = a_2 + d = 16 + 6 = 22$
$a_4 = a_3 + d = 22 + 6 = 28$
$10, \textbf{16}, \textbf{22}, \textbf{28}, 34$

14. $5 \ means, \quad -12 \ and \ 36$

$5 \ means \ -12 \ and \ 36$
$-12, \underline{\quad}, \underline{\quad\,}, \underline{\quad\,}, \underline{\quad\,}, \underline{\quad\,}, 36$

$a_1 = -12 \qquad a_7 = 36$

$a_n = a_1 + (7-1)d$
$a_7 = a_1 + (7-1)d$
$36 = -12 + 6d$
$36 + 12 = -12 + 12 + 6d$
$48 = 6d$
$d = 8$
$a_2 = a_1 + d = -12 + 8 = -4$
$a_3 = a_2 + d = -4 + 8 = 4$
$a_4 = a_3 + d = 4 + 8 = 12$
$a_5 = a_4 + d = 12 + 8 = 20$
$a_6 = a_5 + d = 20 + 8 = 28$

$-12, \textbf{-4}, \textbf{4}, \textbf{12}, \textbf{20}, \textbf{28}, 36$

Arithmetic Sequences and Series Assignment

Find the indicated sum for each arithmetic sequence.

15. $10th\ partial\ sum\ \ if: a_1 = 3,\ \ d = 12$
$S_{10} =?$

$a_1 = 3,\ \ d = 12,\ \ n = 10$
$S_n = \dfrac{n}{2}(2a_1 + (n-1) * d)$
$S_{10} = \dfrac{10}{2}(2 * 3 + (10 - 1) * 12)$
$S_{10} = \dfrac{10}{2}(6 + 9 * 12)$
$S_{10} = \dfrac{10}{2}(6 + 108)$
$S_{10} = \dfrac{10}{2} * 114$
$S_{10} = 5 * 114$
$S_{10} = 570$

16. $18th\ partial\ sum\ of - 5, 5, 15, 25 \ldots \ldots \ldots \ldots$
$S_{18} =?$

$a_1 = -5,\qquad n = 18$
$d = 15 - 5$
$d = 10$
$S_n = \dfrac{n}{2}(2a_1 + (n-1) * d)$
$S_{18} = \dfrac{18}{2}(2 * (-5) + (18 - 1) * 10)$
$S_{18} = \dfrac{18}{2}(-10 + 17 * 10)$
$S_{18} = \dfrac{18}{2}(-10 + 170)$
$S_{18} = \dfrac{18}{2} * 160$
$S_{18} = 9 * 160$
$S_{18} = 1,440$

17. $8 + 12 + 16 + \cdots \ldots \ldots \ldots + 128$

$a_1 = 8,\qquad a_n = 128$
$d = 16 - 12$
$d = 4$

$a_n = a_1 + (n-1)d$
$128 = 8 + (n-1) * 4$
$128 - 8 = -8 + 8 + (n-1) * 4$
$120 = (n-1) * 4$
$n - 1 = \dfrac{120}{4}$
$n - 1 = 30$
$n = 31$

$S_n = \dfrac{n}{2}(a_1 + a_n)$
$S_{31} = \dfrac{31}{2}(8 + 128)$
$S_{31} = 15.5 * 136$
$S_{31} = 2,108$

18. $\dfrac{1}{2} + 1 + 1\dfrac{1}{2} + \cdots \ldots \ldots \ldots + 6\dfrac{1}{2}$

$a_1 = \dfrac{1}{2},\qquad a_n = 6\dfrac{1}{2}$
$d = 1\dfrac{1}{2} - 1$
$d = \dfrac{1}{2}$
$a_n = a_1 + (n-1)d$
$6\dfrac{1}{2} = \dfrac{1}{2} + (n-1) * \dfrac{1}{2}$
$6\dfrac{1}{2} - \dfrac{1}{2} = \dfrac{1}{2} - \dfrac{1}{2} + (n-1) * \dfrac{1}{2}$
$6 = (n-1) * \dfrac{1}{2}$
$n - 1 = \dfrac{6}{\frac{1}{2}}$
$n - 1 = 12$
$n = 13$
$S_n = \dfrac{n}{2}(a_1 + a_n)$
$S_{13} = \dfrac{13}{2}\left(\dfrac{1}{2} + 6\dfrac{1}{2}\right)$
$S_{13} = \dfrac{13}{2} * 7$
$S_{13} = \dfrac{91}{2} = 45.5$

Arithmetic Sequences and Series Assignment

Write each arithmetic series in sigma notation. The lower bound is given.

19. $2 + 12 + 22 + \cdots \ldots \ldots \ldots + 412$ $\qquad n = 1$ **20.** $16 + 20 + 24 + \cdots \ldots \ldots \ldots + 96$ $\qquad n = 1$

$a_1 = 2$

$d = 12 - 2$

$d = 10$

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

$412 = 2 + (n - 1) * 10$

$412 - 2 = 2 - 2 + (n - 1) * 10$

$410 = (n - 1) * 10$

$n - 1 = \dfrac{410}{10}$

$n - 1 = 41$

$n = 42$

$a_n = 2 + (n - 1)10$

$a_n = 2 + 10n - 10$

$a_n = -8 + 10n$

$$\sum_{n=1}^{42} (-8 + 10n)$$

$a_1 = 16$

$d = 24 - 20$

$d = 4$

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

$96 = 16 + (n - 1) * 4$

$96 - 16 = 16 - 16 + (n - 1) * 4$

$80 = (n - 1) * 4$

$n - 1 = \dfrac{80}{4}$

$n - 1 = 20$

$n = 21$

$a_n = 16 + (n - 1)4$

$a_n = 16 + 4n - 4$

$a_n = 12 + 4n$

$$\sum_{n=1}^{21} (12 + 4n)$$

Find each common difference.

21. $\displaystyle\sum_{n=5}^{10} (20 + 3n)$

$a_5 = 20 + 3 * 5 = 20 + 15 = 35$

$a_6 = 20 + 3 * 6 = 20 + 18 = 38$

$d = a_6 - a_5$

$d = 38 - 35$

$d = 3$

22. $a_{12} = 21$ $\qquad S_{12} = 186$

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

$21 = a_1 + (12 - 1)d$

$21 = a_1 + 11d$

$a_1 = 21 - 11d$

$S_n = \dfrac{n}{2}(2a_1 + (n - 1) * d)$

$186 = \dfrac{12}{2}(2(21 - 11d) + (12 - 1) * d)$

$186 = 6(42 - 22d + 11d)$

$186 = 6(42 - 11d)$

$186 = 252 - 66d$

$186 - 252 = 252 - 252 - 66d$

$-66 = -66d$

$d = \dfrac{-66}{-66}$

$d = -1$

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