

Unit 6: Representations of Linear Relations
PRE-TEST

Determine if the sequence is arithmetic. If it is, find the common difference.

<p>1. 1, 1, 1, 1, ...</p> <p>$1 - (1) = 0$ Not</p> <p>$1 - (1) = 0$ Arithmetic</p> <p>$1 - (1) = 0$</p>	<p>2. -20, -13, -6, 1, ...</p> <p>$-13 - (-20) = 7$ Arithmetic</p> <p>$-6 - (-13) = 7$</p> <p>$1 - (-6) = 7$ $d = 7$</p>
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Find the recursive formula for each of the following:

<p>3. -8, -17, -26, -35, ...</p> <p>$-17 - (-8) = -9$ $a_1 = -8; d = -9$</p> <p>$a_n = a_{n-1} - 9$</p>	<p>4. 18, -2, -22, -42, ...</p> <p>$-2 - (18) = -20$ $a_1 = 18$ $d = -20$</p> <p>$a_n = a_{n-1} - 20$</p>
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Find the explicit formula for each of the following:

<p>5. -20, -29, -38, -47, ...</p> <p>$a_n = n \cdot d + b$</p> <p>$-29 - (-20) = -9$</p> <p>$-20 = -9(1) + b$</p> <p>$-20 = -9 + b$</p> <p>$+9 \quad +9$</p> <p>$-11 = b$</p> <p>$a_n = -9n - 11$</p>	<p>6. 23, 26, 29, 32, ...</p> <p>$a_n = n \cdot d + b$</p> <p>$26 - (23) = 3$</p> <p>$23 = 1 \cdot 3 + b$</p> <p>$23 = 3 + b$</p> <p>$-3 \quad -3$</p> <p>$20 = b$</p> <p>$a_n = 3n + 20$</p>
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Given the following arithmetic sequences answer each of the following:

<p>7. -26, -126, -226, -326, ...</p> <p>A. Find the next three terms</p> <p>$-126 - (-26) = -100$</p> <p>$-226 - (-126) = -100$</p> <p>$-326 - (-226) = -100$</p> <p>$-326 - 100 = -426$</p> <p>$-426 - 100 = -526$</p> <p>$-526 - 100 = -626$</p>	<p>B. Find a_{38}</p> <p>$a_n = n \cdot d + b$</p> <p>$-26 = 1(-100) + b$</p> <p>$-26 = -100 + b$</p> <p>$+100 \quad +100$</p> <p>$74 = b$</p> <p>$a_{38} = 38(-100) + 74$</p> <p>$= -3800 + 74$</p> <p>$= -3726$</p>	<p>C. Find a_{52}</p> <p>Explicit Formula</p> <p>$a_n = -100n + 74$</p> <p>$a_{52} = -100(52) + 74$</p> <p>$= -5200 + 74$</p> <p>$= -5126$</p>
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8. -33, -29, -25, -21, ...

<p>A. Find the next three terms</p> <p>$-29 - (-33) = 4$</p> <p>$-25 - (-29) = 4$</p> <p>$-21 - (-25) = 4$</p> <p>$-21 + 4 = -17$</p> <p>$-17 + 4 = -13$</p> <p>$-13 + 4 = -9$</p>	<p>B. Find a_{30}</p> <p>$a_n = n \cdot d + b$</p> <p>$-33 = 1 \cdot 4 + b$</p> <p>$-33 = 4 + b$</p> <p>$-4 \quad -4$</p> <p>$-37 = b$</p> <p>$a_{30} = 30(4) - 37$</p> <p>$= 120 - 37$</p> <p>$= 83$</p>	<p>C. Find a_{52}</p> <p>Explicit Formula</p> <p>$a_n = 4n - 37$</p> <p>$a_{52} = 4(52) - 37$</p> <p>$= 208 - 37$</p> <p>$= 171$</p>
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Find the missing term or terms in each arithmetic sequence.

9. ..., 23, ____, 17, ... $a_2 = 20$	10. ..., -6, ____, 194, ... $a_2 = 94$
11. ..., 17, ____, ____, 8, ... $a_2 = 14$ $a_3 = 11$	12. ..., -33, ____, ____, -48, ... $a_2 = -38$ $a_3 = -43$
13. ..., -15, ____, ____, ____, -95, ... $a_2 = -35$ $a_3 = -55$ $a_4 = -75$	14. ..., 19, ____, ____, ____, -17, ... $a_2 = 10$ $a_3 = 1$ $a_4 = -8$
15. ..., 21, ____, ____, ____, ____, -29, ... $a_2 = 11$ $a_3 = 1$ $a_4 = -9$ $a_5 = -19$	16. ..., -14, ____, ____, ____, ____, -29, ... $a_2 = -17$ $a_3 = -20$ $a_4 = -23$ $a_5 = -26$
17. ..., -8, ____, ____, ____, ____, ____, -62, ... $a_2 = -17$ $a_4 = -35$ $a_6 = -53$ $a_3 = -26$ $a_5 = -44$	18. ..., -13, ____, ____, ____, ____, ____, 587, ... $a_3 = 187$ $a_5 = 387$ $a_2 = 87$ $a_4 = 287$ $a_6 = 487$

Work on additional pages.

should be positive.

Evaluate the related series of each sequence.

19. 20, 28, 36, 44, 52, 60 $20 + 28 + 36 + 44 + 52 + 60 = 240$	20. 6, 9, 12, 15, 18, 21 $6 + 9 + 12 + 15 + 18 + 21 = 81$
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Evaluate each arithmetic series described.

21. $5 + 7 + 9 + 11 \dots, n = 12$ 192	22. $28 + 35 + 42 + 49 \dots, n = 18$ 1575
23. $\sum_{k=1}^{10} (7k - 2)$ 365	24. $\sum_{n=1}^{40} (5n)$ 4100
25. $a_1 = 2, d = 4, n = 10$ 200	26. $a_1 = 23, d = 8, n = 8$ 408

Equation to use: $\frac{n}{2}(2a_1 + (n-1)d)$

Work on additional pages

$$\textcircled{9} \quad 23, \quad \underline{\quad}, \quad 17$$

$a_1 \quad a_2 \quad a_3$

$$a_2 = a_1 + (2-1) \cdot d$$

$$a_2 = 23 + 1(-3)$$

$$a_2 = 23 - 3$$

$$\boxed{a_2 = 20}$$

Using $a_n = a_1 + (n-1) \cdot d$

$$17 = 23 + (3-1) \cdot d$$

$$17 = 23 + 2d$$

$$\begin{array}{r} -23 \\ -23 \end{array}$$

$$\frac{-6}{2} = \frac{2d}{2}$$

$$\boxed{-3 = d}$$

$$\textcircled{10} \quad -6, \quad \underline{\quad}, \quad 194$$

$a_1 \quad a_2 \quad a_3$

$$a_2 = a_1 + (2-1) \cdot d$$

$$a_2 = -6 + 1(100)$$

$$a_2 = -6 + 100$$

$$\boxed{a_2 = 94}$$

Using $a_n = a_1 + (n-1) \cdot d$

$$194 = -6 + (3-1) \cdot d$$

$$194 = -6 + 2d$$

$$\begin{array}{r} +6 \\ +6 \end{array}$$

$$\frac{200}{2} = \frac{2d}{2}$$

$$\boxed{100 = d}$$

$$\textcircled{11} \quad 17, \quad \underline{\quad}, \quad \underline{\quad}, \quad 8$$

$a_1 \quad a_2 \quad a_3 \quad a_4$

$$a_2 = a_1 + (2-1) \cdot d$$

$$a_2 = 17 + 1(-3)$$

$$a_2 = 17 - 3$$

$$\boxed{a_2 = 14}$$

$$a_3 = a_1 + (3-1) \cdot d$$

$$a_3 = 17 + 2(-3)$$

$$a_3 = 17 - 6$$

$$\boxed{a_3 = 11}$$

using $a_n = a_1 + (n-1) \cdot d$

$$8 = 17 + (4-1) \cdot d$$

$$8 = 17 + 3d$$

$$\begin{array}{r} -17 \\ -17 \end{array}$$

$$\frac{-9}{3} = \frac{3d}{3}$$

$$\boxed{-3 = d}$$

$$\textcircled{12} \quad -33, \quad \underline{\quad}, \quad \underline{\quad}, \quad -48$$

$$a_1, \quad a_2, \quad a_3, \quad a_4$$

$$a_2 = a_1 + (2-1) \cdot d$$

$$a_2 = -33 + 1(-5)$$

$$a_2 = -33 - 5$$

$$\boxed{a_2 = -38}$$

$$a_3 = a_1 + (3-1) \cdot d$$

$$a_3 = -33 + 2(-5)$$

$$a_3 = -33 - 10$$

$$\boxed{a_3 = -43}$$

Using $a_n = a_1 + (n-1) \cdot d$

$$-48 = -33 + (4-1) \cdot d$$

$$-48 = -33 + 3d$$

$$+33 \quad +33$$

$$\frac{-15}{3} = \frac{3d}{3}$$

$$\boxed{-5 = d}$$

$$\textcircled{13} \quad -15, \quad \underline{\quad}, \quad \underline{\quad}, \quad \underline{\quad}, \quad -95$$

$$a_1, \quad a_2, \quad a_3, \quad a_4, \quad a_5$$

Using $a_n = a_1 + (n-1) \cdot d$

$$-95 = -15 + (5-1) \cdot d$$

$$-95 = -15 + 4d$$

$$+15 \quad +15$$

$$\frac{-80}{4} = \frac{4d}{4}$$

$$\boxed{-20 = d}$$

$$a_2 = a_1 + (2-1) \cdot d$$

$$a_2 = -15 + 1(-20)$$

$$a_2 = -15 - 20$$

$$\boxed{a_2 = -35}$$

$$a_3 = a_1 + (3-1) \cdot d$$

$$a_3 = -15 + 2(-20)$$

$$a_3 = -15 - 40$$

$$\boxed{a_3 = -55}$$

$$a_4 = a_1 + (4-1) \cdot d$$

$$a_4 = -15 + 3(-20)$$

$$a_4 = -15 - 60$$

$$\boxed{a_4 = -75}$$

$$(14) \quad 19, \quad \underline{\quad}, \quad \underline{\quad}, \quad \underline{\quad}, \quad -17$$

$$a_1 \quad a_2 \quad a_3 \quad a_4 \quad a_5$$

using $a_n = a_1 + (n-1) \cdot d$

$$-17 = 19 + (5-1)d$$

$$-17 = 19 + 4d$$

$$\begin{array}{r} -17 \\ -19 \end{array}$$

$$\frac{-36}{4} = \frac{4d}{4}$$

$$\boxed{-9 = d}$$

$$a_2 = a_1 + (2-1) \cdot d$$

$$a_2 = 19 + 1 \cdot (-9)$$

$$a_2 = 19 - 9$$

$$\boxed{a_2 = 10}$$

$$a_3 = a_1 + (3-1) \cdot d$$

$$a_3 = 19 + 2 \cdot (-9)$$

$$a_3 = 19 - 18$$

$$\boxed{a_3 = 1}$$

$$a_4 = a_1 + (4-1) \cdot d$$

$$a_4 = 19 + 3 \cdot (-9)$$

$$a_4 = 19 - 27$$

$$\boxed{a_4 = -8}$$

$$(15) \quad 21, \quad \underline{\quad}, \quad \underline{\quad}, \quad \underline{\quad}, \quad \underline{\quad}, \quad -29$$

$$a_1 \quad a_2 \quad a_3 \quad a_4 \quad a_5 \quad a_6$$

using $a_n = a_1 + (n-1) \cdot d$

$$-29 = 21 + (6-1) \cdot d$$

$$-29 = 21 + 5d$$

$$\begin{array}{r} -29 \\ -21 \end{array}$$

$$\frac{-50}{5} = \frac{5d}{5}$$

$$\boxed{-10 = d}$$

$$a_2 = a_1 + (2-1) \cdot d$$

$$a_2 = 21 + 1 \cdot (-10)$$

$$a_2 = 21 - 10$$

$$\boxed{a_2 = 11}$$

$$a_3 = a_1 + (3-1) \cdot d$$

$$a_3 = 21 + 2 \cdot (-10)$$

$$a_3 = 21 - 20$$

$$\boxed{a_3 = 1}$$

$$a_4 = a_1 + (4-1) \cdot d$$

$$a_4 = 21 + 3 \cdot (-10)$$

$$a_4 = 21 - 30$$

$$\boxed{a_4 = -9}$$

$$a_5 = a_1 + (5-1) \cdot d$$

$$a_5 = 21 + 4 \cdot (-10)$$

$$a_5 = 21 - 40$$

$$\boxed{a_5 = -19}$$

$$(16) \quad -14, \quad \underline{\quad}, \quad \underline{\quad}, \quad \underline{\quad}, \quad \underline{\quad}, \quad -29$$

$$a_1 \quad a_2 \quad a_3 \quad a_4 \quad a_5 \quad a_6$$

Using $a_n = a_1 + (n-1) \cdot d$

$$-29 = -14 + (6-1) \cdot d$$

$$-29 = -14 + 5d$$

$$+14 \quad +14$$

$$\frac{-15}{5} = \frac{5d}{5}$$

$$\boxed{-3 = d}$$

$$a_2 = a_1 + (2-1) \cdot d$$

$$a_2 = -14 + 1 \cdot (-3)$$

$$a_2 = -14 - 3$$

$$\boxed{a_2 = -17}$$

$$a_3 = a_1 + (3-1) \cdot d$$

$$a_3 = -14 + 2 \cdot (-3)$$

$$a_3 = -14 - 6$$

$$\boxed{a_3 = -20}$$

$$a_4 = a_1 + (4-1) \cdot d$$

$$a_4 = -14 + 3 \cdot (-3)$$

$$a_4 = -14 - 9$$

$$\boxed{a_4 = -23}$$

$$a_5 = a_1 + (5-1) \cdot d$$

$$a_5 = -14 + 4 \cdot (-3)$$

$$a_5 = -14 - 12$$

$$\boxed{a_5 = -26}$$

$$(17) \quad -8, \quad \underline{\quad}, \quad \underline{\quad}, \quad \underline{\quad}, \quad \underline{\quad}, \quad \underline{\quad}, \quad -62$$

$$a_1 \quad a_2 \quad a_3 \quad a_4 \quad a_5 \quad a_6 \quad a_7$$

using $a_n = a_1 + (n-1) \cdot d$

$$-62 = -8 + (7-1) \cdot d$$

$$-62 = -8 + 6d$$

$$+8 \quad +8$$

$$\frac{-54}{6} = \frac{6d}{6}$$

$$\boxed{-9 = d}$$

$$a_2 = a_1 + (2-1) \cdot d$$

$$a_2 = -8 + 1 \cdot (-9)$$

$$a_2 = -8 - 9$$

$$\boxed{a_2 = -17}$$

$$a_3 = a_1 + (3-1) \cdot d$$

$$a_3 = -8 + 2 \cdot (-9)$$

$$a_3 = -8 - 18$$

$$\boxed{a_3 = -26}$$

$$a_4 = a_1 + (4-1) \cdot d$$

$$a_4 = -8 + 3 \cdot (-9)$$

$$a_4 = -8 - 27$$

$$\boxed{a_4 = -35}$$

$$a_5 = a_1 + (5-1) \cdot d$$

$$a_5 = -8 + 4 \cdot (-9)$$

$$a_5 = -8 - 36$$

$$\boxed{a_5 = -44}$$

$$a_6 = a_1 + (6-1) \cdot d$$

$$a_6 = -8 + 5 \cdot (-9)$$

$$a_6 = -8 - 45$$

$$\boxed{a_6 = -53}$$

$$\textcircled{18} \quad -13, \quad \text{---}, \quad \text{---}, \quad \text{---}, \quad \text{---}, \quad \text{---}, \quad 587$$

$$a_1 \quad a_2 \quad a_3 \quad a_4 \quad a_5 \quad a_6 \quad a_7$$

$$\text{using } a_n = a_1 + (n-1) \cdot d$$

$$587 = -13 + (7-1) \cdot d$$

$$587 = -13 + 6d$$

$$+13 \quad +13$$

$$\frac{600}{6} = \frac{6d}{6}$$

$$\boxed{100 = d}$$

$$a_2 = a_1 + (2-1) \cdot d$$

$$a_2 = -13 + 1 \cdot (100)$$

$$a_2 = -13 + 100$$

$$\boxed{a_2 = 87}$$

$$a_3 = a_1 + (3-1) \cdot d$$

$$a_3 = -13 + 2 \cdot (100)$$

$$a_3 = -13 + 200$$

$$\boxed{a_3 = 187}$$

$$a_4 = a_1 + (4-1) \cdot d$$

$$a_4 = -13 + 3 \cdot (100)$$

$$a_4 = -13 + 300$$

$$\boxed{a_4 = 287}$$

$$a_5 = a_1 + (5-1) \cdot d$$

$$a_5 = -13 + 4 \cdot (100)$$

$$a_5 = -13 + 400$$

$$\boxed{a_5 = 387}$$

$$a_6 = a_1 + (6-1) \cdot d$$

$$a_6 = -13 + 5 \cdot (100)$$

$$a_6 = -13 + 500$$

$$\boxed{a_6 = 487}$$

$$\textcircled{21} \quad \text{Using } \frac{n}{2} (2 \cdot a_1 + (n-1) \cdot d)$$

$$\boxed{n = 12}$$

$$\boxed{a_1 = 5}$$

$$\frac{12}{2} (2(5) + (12-1)(2))$$

$$6(10 + (11)(2))$$

$$6(10 + 22)$$

$$6(32)$$

$$\boxed{192}$$

$$d = a_2 - a_1$$

$$d = 7 - 5$$

$$\boxed{d = 2}$$

$$\textcircled{22} \quad \text{Using } \frac{n}{2} (2 \cdot a_1 + (n-1) \cdot d)$$

$$\boxed{n = 18}$$

$$\boxed{a_1 = 28}$$

$$\frac{18}{2} (2(28) + (18-1)(7))$$

$$9(56 + (17)(7))$$

$$9(56 + 119)$$

$$9(175)$$

$$\boxed{1575}$$

$$d = a_2 - a_1$$

$$d = 35 - 28$$

$$\boxed{d = 7}$$

23) Using $\frac{n}{2} (2 \cdot a_1 + (n-1) \cdot d)$

$$\frac{10}{2} (2(5) + (10-1)(7))$$

$$5(10 + (9)(7))$$

$$5(10 + 63)$$

$$5(73)$$

$$\boxed{365}$$

$$\boxed{n=10}$$

$$a_1 = 7(1) - 2$$

$$a_1 = 7 - 2$$

$$\boxed{a_1=5}$$

d = # on the variable

$$\boxed{d=7}$$

24) Using $\frac{n}{2} (2 \cdot a_1 + (n-1) \cdot d)$

$$\frac{40}{2} (2(5) + (40-1)(5))$$

$$20(10 + (39)(5))$$

$$20(10 + 195)$$

$$20(205)$$

$$\boxed{4100}$$

$$\boxed{n=40}$$

$$a_1 = 5(1)$$

$$\boxed{a_1=5}$$

d = # on the variable

$$\boxed{d=5}$$

25) Using $\frac{n}{2} (2 \cdot a_1 + (n-1) \cdot d)$

$$\frac{10}{2} (2(2) + (10-1)(4))$$

$$5(4 + (9)(4))$$

$$5(4 + 36)$$

$$5(40)$$

$$\boxed{200}$$

$$\boxed{n=10}$$

$$\boxed{a_1=2}$$

$$\boxed{d=4}$$

26) Using $\frac{n}{2} (2 \cdot a_1 + (n-1) \cdot d)$

$$\frac{8}{2} (2(23) + (8-1)(8))$$

$$4(46 + (7)(8))$$

$$4(46 + 56)$$

$$4(102)$$

$$\boxed{408}$$

$$\boxed{n=8}$$

$$\boxed{a_1=23}$$

$$\boxed{d=8}$$