Honors Algebra 2 Name _____

WS12.3 Hour _____

SHOW EVIDENCE OF YOUR THOUGHT PROCESS. YOUR SHOWN PROCESS SHOULD "SPEAK" TO ME. ☺

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

1. 35, 32, 29, 26, ... ARITHMETIC
   −3 −3 −3
   $d = -3$ $a_5 = 23$

2. −3, −23, −43, −63, ... ARITHMETIC
   −20 −20 −20
   $d = -20$ $a_5 = -83$

3. −34, −64, −94, −124, ... ARITHMETIC
   −30 −30 −30
   $d = -30$ $a_5 = -154$

4. 9, 14, 19, 24, ... ARITHMETIC
   +5 +5 +5
   $d = 5$ $a_5 = 29$

Given the explicit formula for an arithmetic sequence, find the term named in the problem.

5. $a_n = -11 + 7n$
   Find a_{34}
   $a_{34} = -11 + 7(34)$
   $\boxed{a_{34} = 227}$

6. $a_n = 65 - 100n$
   Find a_{39}
   $a_{39} = 65 - 100(39)$
   $\boxed{a_{39} = -3835}$

Given the 1st term & common difference of an arithmetic sequence, find the 1st 5 terms & explicit formula.

7. $a_1 = 28$, $d = 10$
   $\boxed{28, 38, 48, 58, 68}$
   $a_n = a_1 + (n-1)d$
   $\boxed{a_n = 28 + (n-1)10}$
   $= 28 + 10n - 10$
   $\boxed{a_n = 18 + 10n}$
   or

8. $a_1 = -38$, $d = -100$
   $\boxed{-38, -138, -238, -338, -438}$
   $a_n = a_1 + (n-1)d$
   $\boxed{a_n = -38 + (n-1)-100}$
   $-38 + -100n + 100$
   $\boxed{a_n = 62 - 100n}$
   or

Given the arithmetic sequence, find the 30th term.

9. −34, −44, −54, −64, −74 $d = -10$
   −10 −10 −10
   $a_n = a_1 + (n-1)d$
   $a_{30} = -34 + (30-1)-10$
   $= -34 + 29(-10)$
   $= -34 - 290$
   $\boxed{a_{30} = -324}$

10. −39, −31, −23, −15, −7 $d = 8$
    +8 +8 +8 +8
    $a_n = a_1 + (n-1)d$
    $a_{30} = -39 + (30-1)8$
    $= -39 + 29(8)$
    $= -39 + 232$
    $\boxed{a_{30} = 193}$

Find the missing terms in the sequence.

11. 30, 28, 26, 24, 22
a_1 a_2 a_3 a_4 a_5

$a_n = a_1 + (n-1)d$
$22 = 30 + (5-1)d$
$-30 \quad -30$
$\frac{-8}{4} = \frac{4d}{4}$
$d = -2$

$a_2 = 30 + -2 = 28$
$a_3 = 28 + -2 = 26$
$a_4 = 26 + -2 = 24$
$a_5 = 24 + -2 = 22$ ✓

12. -15, -25, -35, -45, -55, -65, -75
a_1 a_2 a_3 a_4 a_5 a_6 a_7

$a_n = a_1 + (n-1)d$
$-75 = -15 + (7-1)d$
$+15 \quad +15$
$\frac{-60}{6} = \frac{6d}{6}$
$d = -10$

$a_2 = -15 + -10 = -25$
$a_3 = -25 + -10 = -35$
$a_4 = -35 + -10 = -45$
$a_5 = -45 + -10 = -55$
$a_6 = -55 + -10 = -65$
$a_7 = -65 + -10 = -75$ ✓

13. -31, -38, -45, -52, -59, -66, -73,
a_1 a_2 a_3 a_4 a_5 a_6 a_7

$a_n = a_1 + (n-1)d$
$-73 = -31 + (7-1)d$
$+31 \quad +31$
$\frac{-42}{6} = \frac{6d}{6}$
$d = -7$

$a_2 = -31 + -7 = -38$
$a_3 = -38 + -7 = -45$
$a_4 = -45 + -7 = -52$
$a_5 = -52 + -7 = -59$
$a_6 = -59 + -7 = -66$
$a_7 = -66 + -7 = -73$ ✓

14. 15, 19, 23, 27, 31, 35, 39, 43
a_1 a_2 a_3 a_4 a_5 a_6 a_7 a_8

$a_n = a_1 + (n-1)d$
$43 = 15 + (8-1)d$
$-15 \quad -15$
$\frac{28}{7} = \frac{7d}{7}$
$d = 4$

$a_2 = 15 + 4 = 19$
$a_3 = 19 + 4 = 23$
$a_4 = 23 + 4 = 27$
$a_5 = 27 + 4 = 31$
$a_6 = 31 + 4 = 35$
$a_7 = 35 + 4 = 39$
$a_8 = 39 + 4 = 43$ ✓

Given two terms in an arithmetic sequence, find the term named in the problem.

15. $a_{18} = 3362$ and $a_{38} = 7362$
Find a_{10}

$a_n = a_1 + (n-1)d$
$7362 = 3362 + (38-18)d$
$-3362 \quad -3362$
$\frac{4000}{20} = \frac{20d}{20}$
$d = 200$

$a_n = a_1 + (n-1)d$
$3362 = a_1 + (18-1)(200)$
$3362 = a_1 + 3400$
$-3400 \quad -3400$
$-38 = a_1$

$a_{10} = a_1 + (n-1)d$
$= -38 + (10-1)200$
$= -38 + 9(200)$
$\boxed{a_{10} = 1762}$

16. $a_{18} = 44.3$ and $a_{33} = 84.8$
Find a_{50}

$a_n = a_1 + (n-1)d$
$84.8 = 44.3 + (33-18)d$
$-44.3 \quad -44.3$
$\frac{40.5}{15} = \frac{15d}{15}$
$d = 2.7$

$a_n = a_1 + (n-1)d$
$44.3 = a_1 + (18-1)(2.7)$
$44.3 = a_1 + 45.9$
$-45.9 \quad -45.9$
$-1.6 = a_1$

$a_{50} = a_1 + (n-1)d$
$= -1.6 + (50-1)(2.7)$
$\boxed{a_{50} = 130.7}$

17. $a_{26} = 492$ and $a_{34} = 1292$
Find a_{50}

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

$1292 = 492 + (34-26)d$

$-492 \quad -492$

$\frac{800}{8} = \frac{8d}{8}$

$d = 100$

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

$492 = a_1 + (26-1)(100)$

$492 = a_1 + 2500$

$-2500 \quad -2500$

$-2008 = a_1$

$a_{50} = a_1 + (n-1)d$

$= -2008 + (50-1)100$

$= -2008 + 4900$

$\boxed{a_{50} = 2892}$

18. $a_{35} = 202$ and $a_{40} = 177$
Find a_{10}

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

$177 = 202 + (40-35)d$

$-202 \quad -202$

$\frac{-25}{5} = \frac{5d}{5}$

$d = -5$

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

$202 = a_1 + (35-1)(-5)$

$202 = a_1 + -170$

$+170 \quad +170$

$a_1 = 372$

$a_{10} = a_1 + (n-1)d$

$= 372 + (10-1)(-5)$

$= 372 + -45$

$\boxed{a_{10} = 327}$

Evaluate each arithmetic series described.

19. $\sum_{k=1}^{35} (5k-2) = 5\sum_{k=1}^{35} k - \sum_{k=1}^{35} 2$

$= 5\left(\frac{n(n+1)}{2}\right) - 2(n)$

$= 5\left(\frac{35(36)}{2}\right) - 2(35)$

$= 3150 - 70 = \boxed{3080}$

20. $\sum_{m=1}^{10} (7m-2) = 7\sum_{m=1}^{10} m - \sum_{m=1}^{10} 2$

$= 7\left(\frac{10(10+1)}{2}\right) - 2(10)$

$= 385 - 20$

$= \boxed{365}$

21. $\sum_{i=1}^{7} (7i-4) = 7\sum_{i=1}^{7} i - \sum_{i=1}^{7} 4$

$= 7\left(\frac{7(7+1)}{2}\right) - 4(7)$

$= 196 - 28$

$= \boxed{168}$

22. Find S_n if $a_1 = 42$, $a_n = 146$, $n = 14$

$S_{14} = 7\left(\frac{42 + 146}{2}\right) = 7(188)$

$\boxed{S_{14} = 1316}$

23. Find S_n if $a_1 = 4$, $a_n = 22$, $n = 10$

$S_{10} = 5\left(\frac{4 + 22}{2}\right) = 5(26)$

$\boxed{S_{10} = 130}$

24. Find S_n if $a_1 = 17$, $d = 4$, $n = 20$

$S_{20} = 10\left(\frac{17 + 93}{2}\right)$

$\boxed{S_{20} = 1100}$

$a_{20} = 17 + (20-1)4$

$= 17 + 76$

$a_{20} = 93$

Find the term named in the problem.

25. $-39, -49, -59, -69, \ldots$ $\quad -10 \quad -10 \quad -10$ $\quad d = -10$
Find a_{40}

$a_{40} = a_1 + (n-1)d$
$= -39 + (40-1)-10$
$= -39 + 39(-10)$
$= -39 + -390$
$\boxed{a_{40} = -429}$

26. $-14, -10, -6, -2, \ldots$ $\quad +4 \quad +4 \quad +4$ $\quad d = 4$
Find a_{34}

$a_{34} = a_1 + (n-1)d$
$= -14 + (34-1)4$
$= -14 + 33(4)$
$\boxed{a_{34} = 118}$

Evaluate each arithmetic series described.

27. Find S_n if $20 + 27 + 34 + 41\ldots$ and $n = 16$
$+7 \quad +7 \quad +7$

$S_{16} = 16\left(\frac{20 + a_{16}}{2}\right)$
$= 16\left(\frac{20 + 125}{2}\right)$
$= 8(145)$
$\boxed{S_{16} = 1160}$

$a_{16} = 20 + (16-1)7$
$a_{16} = 20 + 15(7)$
$a_{16} = 125$

28. Find S_n if $20 + 30 + 40 + 50\ldots$ and $n = 15$
$+10 \quad +10 \quad +10$ $\quad d = 10$

$S_{15} = 15\left(\frac{20 + 160}{2}\right)$
$= 15\left(\frac{180}{2}\right)$
$= 15(90$
$\boxed{S_{15} = 1350}$

$a_{15} = 20 + (15-1)10$
$= 20 + 14(10)$
$= 20 + 140$
$a_{15} = 160$

Determine the number of terms n in each arithmetic series

29. $a_1 = 19$, $a_n = 96$, $S_n = 690$

$S_n = n\left(\frac{a_1 + a_n}{2}\right)$
$690 = n\left(\frac{19 + 96}{2}\right)$
$\left(\frac{2}{115}\right)690 = n\left(\frac{115}{2}\right)\frac{2}{115}$
$\boxed{n = 12}$

30. $a_1 = 16$, $a_n = 163$, $S_n = 4475$

$S_n = n\left(\frac{a_1 + a_n}{2}\right)$
$4475 = n\left(\frac{16 + 163}{2}\right)$
$\left(\frac{2}{179}\right)4475 = n\left(\frac{179}{2}\right)\frac{2}{179}$
$\boxed{n = 50}$

Book Work: p. 885 (43 – 49)