

Day 01 Arithmetic Sequence Practice

Name Master E
Date _____ Block _____

1-4: For each arithmetic sequence, find the next 3 terms, the common difference, the nth term named in the problem, and finally, write an equation that models the sequence.

1. 8, -2, -12, -22, ... Find a_{31}

$d = -2 - 8 = -10$, $a_5 = -32$, $a_6 = -42$, $a_7 = -52$

$a_n = 8 + (n-1)(-10)$
 $8 - 10n + 10$
 $a_{31} = 8 + 30(-10)$

$a_n = -10n + 18$ $a_{31} = -292$

2. -20, -10, 0, 10, ... Find a_{38}

... 20, 30, 40

$d = 10$

$a_{38} = -20 + 37(10)$

$a_n = 10n - 30$ $a_{38} = 350$

3. -24, -44, -64, -84, ... Find a_{36}

... -104, -124, -144

$d = -20$

$a_n = -20n - 4$ $a_{36} = -24 + 35(-20)$

$a_{36} = -724$

4. 40, 44, 48, 52, ... Find a_{23}

... 56, 60, 64

$d = 4$

$a_n = 4n + 36$ $a_{23} = 40 + 22(4)$

$a_{23} = 128$

5-6: Find the nth term named in the problem.

5. $d = -7$, $a_1 = -37$. Find a_{26}

$a_{26} = -37 + 25(-7)$

$a_{26} = -212$

6. $d = 5$, $a_2 = -9$. Find a_{36}

$a_{36} = -9 + 34(5)$

$a_{36} = 161$

7-8: Find the indicated term in each arithmetic sequence.

7. ... -22, -28, -34, -40, -46, ...

$-22 + 4d = -46$
 $4d = -24$
 $d = -6$

8. ... $\frac{-32}{21}$, $-\frac{6}{7}$, $\frac{-4}{21}$, $\frac{10}{21}$, $\frac{8}{7}$, $\frac{38}{21}$, ...

$-\frac{6}{7} + 4d = \frac{38}{21}$ $\frac{38}{21} + \frac{18}{21}$
 $4d = \frac{56}{21}$
 $d = \frac{2}{3}$

9-10: Show your work to solve each word problem.

9. Julia loves a good sale! She only has \$75 to spend. She has her eye on a handbag that is \$355. The sale policy at TJ Max is to reduce the price of each item by 30% every week. How many weeks will she can purchase the Kate Spade bag?

355, 248.50, 173.95, ...

$355 = a_0$

until decay $(1-r)^n$
 $(1-.3)^n$
 $(.7)^n$

$75 = 355(.7)^n$
 $.2113 = (.7)^n$
 $\log_{.7} .2113 = n$
 $\log_{.7} .2113 = n$

$n \approx 4.36$
 \rightarrow $\boxed{5 \text{ weeks}}$

10. Jory loves to lift weights. This is AFTER he does his math homework every day! His goal is to lift 265 pounds unassisted. Currently, he can lift 125 pounds. If it takes him 7 weeks to reach his goal, and he increased the amount of weight each week by the same amount. How much weight did he add each week?

125, ..., 265
 a_0 a_7
 $265 = 125 + (7-0)d$
 $265 = 125 + 7d$
 $140 = 7d$
 $20 = d$

$\boxed{20 \text{ pounds each week}}$

Day 01 Arithmetic Series Practice

1-6: Find the sum (S_n) for each arithmetic series described.

1. $a_1 = 12, a_n = 100, n = 12$

$$S_{12} = \frac{12}{2}(12 + 100)$$

$$6(112) = \mathbf{672}$$

2. $a_1 = 50, a_n = -50, n = 15$

$$S_{15} = \frac{15}{2}(50 + -50)$$

$$7.5(0) = \mathbf{0}$$

3. $a_1 = 42, n = 8, d = 6$

$$S_8 = \frac{8}{2}(42 + a_n) \rightarrow a_8 = 42 + 7(6)$$

$$= 4(42 + 84) \Rightarrow \mathbf{504}$$

$a_8 = 84$

4. $a_1 = 4, n = 20, d = 2\frac{1}{2}$

$$S_{20} = \frac{20}{2}(4 + a_n)$$

$$= 10(4 + 51.5) \Rightarrow \mathbf{555}$$

$a_{20} = 4 + 19(2.5)$
 $a_{20} = 51.5$

5. $\sum_{n=1}^{20} (2n+1)$

$$S_{20} = \frac{20}{2} \left(\underset{n=1}{3} + \underset{n=20}{41} \right) = \mathbf{440}$$

6. $\sum_{n=5}^{25} n-1$

$$S_{21} = \frac{21}{2} \left(\underset{n=5}{4} + \underset{n=25}{24} \right) = \mathbf{294}$$

7-8: Use sigma notation to express each series and find the sum.

7. $8 + 6 + 4 + \dots + -10$

$$\sum_{n=1}^{10} -2n + 10$$

$d = -2$

$$-10 = 8 + (n-1)(-2)$$

$$-18 = -2n + 2$$

$$-20 = -2n$$

$$10 = n$$

$$S_{10} = \frac{10}{2}(8 + -10) = \mathbf{-10}$$

8. $3 + 6 + 9 + \dots + 99$

$$\sum_{n=1}^{33} 3n$$

$d = 3$

$$99 = 3 + (n-1)3$$

$$96 = 3n - 3$$

$$99 = 3n$$

$$33 = n$$

$$S_{33} = \frac{33}{2}(3 + 99) = \mathbf{1683}$$

9-10: Write each series in expanded form, and find its sum.

9. $\sum_{n=0}^6 -3n + 2$

$$S_7 = 2 + -1 + -4 + -7 + -10 + -13 + -16 = \mathbf{-49}$$

10. $\sum_{n=3}^8 \frac{1}{2}n - 6$

$$S_6 = -4.5 + -4 + -3.5 + -3 + -2.5 + -2 = \mathbf{-19.5}$$

11-12: Find the first three terms of each series.

11. $a_1 = 7, a_n = 83, S_n = 900$

$$900 = \frac{n}{2}(7 + 83)$$

$$900 = 45n$$

$$20 = n$$

$$83 = 7 + 19(d)$$

$$76 = 19d$$

$$4 = d$$

$\mathbf{7, 11, 15}$

12. $a_1 = 5, a_n = 200, S_n = 4100$

$$4100 = \frac{n}{2}(5 + 200)$$

$$4100 = 102.5n$$

$$40 = n$$

$$200 = 5 + 39(d)$$

$$195 = 39d$$

$$5 = d$$

$\mathbf{5, 10, 15}$

13: Solve the word problem.

13. Logs are stacked in a pile. The bottom row has 34 logs and the top row has 15 logs. Each row has one fewer log than the row below it. How many total logs are in the pile?

$$\begin{array}{r} 15 \\ \hline 34 \\ \hline \end{array}$$

$$S_{20} = \frac{20}{2}(34 + 15) = \mathbf{490}$$

$$15 = 34 + (n-1)(-1)$$

$$-19 = -n + 1$$

$$-20 = -n$$

$$20 = n$$