Advanced Algebra Tutor

Worksheet 12

Arithmetic Sequences and Series

1. Find the explicit and recursive formulas for the general term of the arithmetic sequence. Then find a_{24}.

$$24, 32, 40, 48, \cdots$$

2. Find the explicit and recursive formulas for the general term of the arithmetic sequence. Then find a_{35}.

$$30, 28, 26, 24, \cdots$$

3. Find the explicit and recursive formulas for the general term of the arithmetic sequence. Then find a_{38}.

$$-3, -10, -17, -24, \cdots$$

4. Find the explicit and recursive formulas for the general term of the arithmetic sequence. Then find the sum of the first 45 terms.

$$7, 11, 15, 19, \cdots$$

5. Find the explicit and recursive formulas for the general term of the arithmetic sequence. Then find a_{75}.

$$-6, -1, 4, 9, \cdots$$

6. Find the explicit and recursive formulas for the general term of the arithmetic sequence. Then find a_{16}.

$$13, 9, 5, 1, \cdots$$

7. Find the specified term of the arithmetic sequence. Then find the sum of the first 26 terms.

$$4, 9, 14, 19, \cdots;\ a_{26}$$

8. Find the specified term of the arithmetic sequence. Then find the sum of the first 35 terms.

$$3, 11, 19, \cdots;\ a_{35}$$

9. Find the specified term of the arithmetic sequence. Then find the sum of the first 28 terms.

$$100, 98, 96, \cdots;\ a_{28}$$

10. Find the specified term of the arithmetic sequence. Then find the sum of the first 80 terms.

$$-2, -11, -20, \cdots; \ a_{80}$$

11. Find the specified term of the arithmetic sequence. Then find the sum of the first 60 terms.

$$2.4, 2.8, 3.2, \cdots; \ a_{60}$$

12. Find the specified term of the arithmetic sequence. Then find the sum of the first 20 terms.

$$18, 8, -2, \cdots; \ a_{20}$$

13. Find the specified term of the arithmetic sequence given the information below. Then find the sum of the first 15 terms.

$$a_1 = 5;\ a_3 = 20;\ a_{15}$$

14. Find the specified terms of the arithmetic sequence given the information below. Then find the sum of the first 21 terms.

$$a_2 = 7;\ a_4 = 8;\ a_1;\ a_{21}$$

15. Find the specified terms of the arithmetic sequence given the information below. Then find the sum of the first 34 terms.

$$a_5 = 24;\ a_9 = 40; a_1;\ a_{34}$$

16. Find the specified terms of the arithmetic sequence given the information below. Then find the sum of the first 40 terms.

$$a_8 = 60;\ a_{12} = 48; a_1;\ a_{40}$$

17. Find the specified terms of the arithmetic sequence given the information below. Then find the sum of the first 25 terms.

$$a_7 = -19;\ a_{10} = -280; a_1;\ a_{25}$$

18. Find the specified terms of the arithmetic sequence given the information below. Then find the sum of the first 30 terms.

$$a_{10} = 41;\ a_{15} = 61; a_1;\ a_{30}$$

19. Find the term number of the term in red in the arithmetic sequence. Assume that the given sequence begins with a_1.

$$25, 33, 41, \ldots, 145, \ldots$$

20. Find the term number of the term in red in the arithmetic sequence. Assume that the given sequence begins with a_1.

$$40, 37, 34, \ldots, -29, \ldots$$

Answers - Advanced Algebra Tutor - Worksheet 12 – Arithmetic Sequences and Series

1. Find the explicit and recursive formulas for the general term of the arithmetic sequence. Then find a_{24}.

$$24, 32, 40, 48, \cdots$$

The general explicit formula for an arithmetic sequence is $a_n = a_1 + d(n-1)$ where d is the common difference between each term. The general recursive formula for an arithmetic sequence is $a_n = a_{n-1} + d$.

Based on the given sequence, $a_1 = 24$ and each term is 8 more than the previous term, so $d = 8$. Enter these values into the formulas above.

Explicit: $a_n = 24 + 8(n-1)$; recursive: $a_n = a_{n-1} + 8$

Now, use the explicit formula to find the value of a_{24}:

$$a_{24} = a_1 + d(24-1) = 24 + 8(24-1) = 24 + 8(23) = 24 + 184 = 208$$

Answer: Explicit: $a_n = 24 + 8(n-1)$; recursive: $a_n = a_{n-1} + 8$; $a_{24} = 208$

2. Find the explicit and recursive formulas for the general term of the arithmetic sequence. Then find a_{35}.

$$30, 28, 26, 24, \cdots$$

The general explicit formula for an arithmetic sequence is $a_n = a_1 + d(n-1)$ where d is the common difference between each term. The general recursive formula for an arithmetic sequence is $a_n = a_{n-1} + d$.

Based on the given sequence, $a_1 = 30$ and each term is 2 less than the previous term, so $d = -2$. Enter these values into the formulas above.

Explicit: $a_n = 30 - 2(n-1)$; recursive: $a_n = a_{n-1} - 2$

Now, use the explicit formula to find the value of a_{35}:

$$a_{24} = a_1 + d(n-1) = 30 - 2(35-1) = 30 - 2(34) = 30 - 68 = -38$$

Answer: Explicit: $a_n = 30 - 2(n-1)$; recursive: $a_n = a_{n-1} - 2$; $a_{24} = -38$

3. Find the explicit and recursive formulas for the general term of the arithmetic sequence. Then find a_{38}.

$$-3, -10, -17, -24, \cdots$$

The general explicit formula for an arithmetic sequence is $a_n = a_1 + d(n-1)$ where d is the common difference between each term. The general recursive formula for an arithmetic sequence is $a_n = a_{n-1} + d$.

Based on the given sequence, $a_1 = -3$ and each term is 7 less than the previous term, so $d = -7$. Enter these values into the formulas above.

Explicit: $a_n = -3 - 7(n-1)$; recursive: $a_n = a_{n-1} - 7$

Now, use the explicit formula to find the value of a_{35}:

$$a_{38} = a_1 + d(38-1) = -3 - 7(38-1) = -3 - 7(37) = -3 - 259 = -262$$

Answer: Explicit: $a_n = -3 - 7(n-1)$; recursive: $a_n = a_{n-1} - 7$; $a_{24} = -262$

4. Find the explicit and recursive formulas for the general term of the arithmetic sequence. Then find the sum of the first 45 terms.

$$7, 11, 15, 19, \cdots$$

The general explicit formula for an arithmetic sequence is $a_n = a_1 + d(n-1)$ where d is the common difference between each term. The general recursive formula for an arithmetic sequence is $a_n = a_{n-1} + d$.

Based on the given sequence, $a_1 = 7$ and each term is 4 more than the previous term, so $d = 4$. Enter these values into the formulas above.

Explicit: $a_n = 7 + 4(n-1)$; recursive: $a_n = a_{n-1} + 4$

Now, use the explicit formula to find the value of a_{45}:

$$a_{45} = a_1 + d(45-1) = 7 + 4(45-1) = 7 + 4(44) = 7 + 176 = 183$$

The sum of the first n terms of an arithmetic series is $S_n = \frac{n}{2}(a_1 + a_n)$. Use this formula to find the requested sum.

$$S_{45} = \frac{45}{2}(a_1 + a_{45}) = \frac{45}{2}(7 + 183) = \frac{45}{2}(190) = 4275$$

Answer: Explicit: $a_n = 7 + 4(n-1)$; recursive: $a_n = a_{n-1} + 4$; $S_{45} = 4275$

5. Find the explicit and recursive formulas for the general term of the arithmetic sequence. Then find a_{75} and S_{75}.

$$-6, -1, 4, 9, \cdots$$

The general explicit formula for an arithmetic sequence is $a_n = a_1 + d(n-1)$ where d is the common difference between each term. The general recursive formula for an arithmetic sequence is $a_n = a_{n-1} + d$.

Based on the given sequence, $a_1 = -6$ and each term is 5 more than the previous term, so $d = 5$. Enter these values into the formulas above.

Explicit: $a_n = -6 + 5(n-1)$; recursive: $a_n = a_{n-1} + 5$

Now, use the explicit formula to find the value of a_{45}:

$$a_{75} = a_1 + d(75-1) = -6 + 5(75-1) = -6 + 5(74) = -6 + 370 = 364$$

The sum of the first n terms of an arithmetic series is $S_n = \frac{n}{2}(a_1 + a_n)$. Use this formula to find the requested sum.

$$S_{75} = \frac{75}{2}(a_1 + a_{75}) = \frac{75}{2}(-6 + 364) = \frac{75}{2}(358) = 13425$$

Answer: Explicit: $a_n = -6 + 5(n-1)$; recursive: $a_n = a_{n-1} + 5$; $a_{75} = 364$; $S_{75} = 13425$

6. Find the explicit and recursive formulas for the general term of the arithmetic sequence. Then find a_{16} and S_{16}.

$$13, 9, 5, 1, \cdots$$

The general explicit formula for an arithmetic sequence is $a_n = a_1 + d(n-1)$ where d is the common difference between each term. The general recursive formula for an arithmetic sequence is $a_n = a_{n-1} + d$.

Based on the given sequence, $a_1 = 13$ and each term is 4 less than the previous term, so $d = -4$. Enter these values into the formulas above.

Explicit: $a_n = 13 - 4(n-1)$; recursive: $a_n = a_{n-1} - 4$

Now, use the explicit formula to find the value of a_{16}:

$$a_{16} = a_1 + d(16-1) = 13 - 4(16-1) = 13 - 4(15) = 13 - 60 = -47$$

The sum of the first n terms of an arithmetic series is $S_n = \frac{n}{2}(a_1 + a_n)$. Use this formula to find the requested sum.

$$S_{16} = \frac{16}{2}(a_1 + a_{16}) = \frac{16}{2}(13 + -47) = 8(-34) = -272$$

Answer: Explicit: $a_n = 13 - 4(n-1)$; recursive: $a_n = a_{n-1} - 4$; $a_{16} = -47$;

$S_{16} = -272$

7. Find the specified term of the arithmetic sequence. Then find the sum of the first 26 terms.

$$4, 9, 14, 19, \cdots; \ a_{26}$$

To find a_{26}, we need to find the explicit formula. The general explicit formula for an arithmetic sequence is $a_n = a_1 + d(n-1)$ where d is the common difference between each term.

Based on the given sequence, $a_1 = 4$ and each term is 5 more than the previous term, so $d = 5$. Enter these values into the formula above.

Explicit: $a_n = 4 + 5(n-1)$

Now, use the explicit formula to find the value of a_{16}:

$$a_{26} = a_1 + d(26-1) = 4 + 5(26-1) = 4 + 5(25) = 4 + 125 = 129$$

The sum of the first n terms of an arithmetic series is $S_n = \frac{n}{2}(a_1 + a_n)$. Use this formula to find the requested sum.

$$S_{26} = \frac{26}{2}(a_1 + a_{26}) = \frac{26}{2}(4 + 129) = 13(133) = 1729$$

Answer: $a_{26} = 129;\ S_{26} = 1729$

8. Find the specified term of the arithmetic sequence. Then find the sum of the first 35 terms.

$$3, 11, 19, \cdots;\ a_{35}$$

To find a_{35}, we need to find the explicit formula. The general explicit formula for an arithmetic sequence is $a_n = a_1 + d(n-1)$ where d is the common difference between each term.

Based on the given sequence, $a_1 = 3$ and each term is 8 more than the previous term, so $d = 8$. Enter these values into the formula above.

Explicit: $a_n = 3 + 8(n-1)$

Now, use the explicit formula to find the value of a_{35}:

$$a_{35} = a_1 + d(35-1) = 3 + 8(35-1) = 3 + 8(34) = 3 + 272 = 275$$

The sum of the first n terms of an arithmetic series is $S_n = \frac{n}{2}(a_1 + a_n)$. Use this formula to find the requested sum.

$$S_{35} = \frac{35}{2}(a_1 + a_{35}) = \frac{35}{2}(3 + 275) = \frac{35}{2}(278) = 4865$$

Answer: $a_{35} = 275;\ S_{35} = 4865$

9. Find the specified term of the arithmetic sequence. Then find the sum of the first 28 terms.

$$100, 98, 96, \cdots;\ a_{28}$$

To find a_{28}, we need to find the explicit formula. The general explicit formula for an arithmetic sequence is $a_n = a_1 + d(n - 1)$ where d is the common difference between each term.

Based on the given sequence, $a_1 = 100$ and each term is -2 more than the previous term, so $d = -2$. Enter these values into the formula above.

Explicit: $a_n = 100 - 2(n - 1)$

Now, use the explicit formula to find the value of a_{28}:

$$a_{28} = a_1 + d(28 - 1) = 100 - 2(28 - 1) = 100 - 2(27) = 100 - 54 = 46$$

The sum of the first n terms of an arithmetic series is $S_n = \frac{n}{2}(a_1 + a_n)$. Use this formula to find the requested sum.

$$S_{28} = \frac{28}{2}(a_1 + a_{28}) = \frac{28}{2}(100 + 46) = \frac{28}{2}(146) = 2044$$

Answer: $a_{28} = 46;\ S_{28} = 2044$

10. Find the specified term of the arithmetic sequence. Then find the sum of the first 80 terms.

$$-2, -11, -20, \cdots; \ a_{80}$$

To find a_{80}, we need to find the explicit formula. The general explicit formula for an arithmetic sequence is $a_n = a_1 + d(n-1)$ where d is the common difference between each term.

Based on the given sequence, $a_1 = -2$ and each term is 9 less than the previous term, so $d = -9$. Enter these values into the formula above.

Explicit: $a_n = -2 - 9(n-1)$

Now, use the explicit formula to find the value of a_{28}:

$$80 = a_1 + d(80-1) = -2 - 9(80-1) = -2 - 9(79) = -2 - 711 = -713$$

The sum of the first n terms of an arithmetic series is $S_n = \frac{n}{2}(a_1 + a_n)$. Use this formula to find the requested sum.

$$S_{80} = \frac{80}{2}(a_1 + a_{80}) = \frac{80}{2}(-2 + -713) = 40(-715) = -28600$$

Answer: $a_{80} = -713; \ S_{8-} = -28600$

11. Find the specified term of the arithmetic sequence. Then find the sum of the first 60 terms.

$$2.4, 2.8, 3.2, \cdots; \ a_{60}$$

To find a_{60}, we need to find the explicit formula. The general explicit formula for an arithmetic sequence is $a_n = a_1 + d(n-1)$ where d is the common difference between each term.

Based on the given sequence, $a_1 = 2.4$ and each term is 0.4 more than the previous term, so $d = 0.4$. Enter these values into the formula above.

Explicit: $a_n = 2.4 + 0.4(n - 1)$

Now, use the explicit formula to find the value of a_{60}:

$$a_{60} = a_1 + d(60 - 1) = 2.4 + 0.4(60 - 1) = 2.4 + 0.4(59) = 2.4 + 23.6 = 26$$

The sum of the first n terms of an arithmetic series is $S_n = \frac{n}{2}(a_1 + a_n)$. Use this formula to find the requested sum.

$$S_{60} = \frac{60}{2}(a_1 + a_{60}) = \frac{60}{2}(2.4 + 26) = 30(28.4) = 852$$

Answer: $a_{60} = 26;\ S_{60} = 852$

12. Find the specified term of the arithmetic sequence. Then find the sum of the first 20 terms.

$$18, 8, -2, \cdots;\ a_{20}$$

To find a_{20}, we need to find the explicit formula. The general explicit formula for an arithmetic sequence is $a_n = a_1 + d(n - 1)$ where d is the common difference between each term.

Based on the given sequence, $a_1 = 18$ and each term is 10 less than the previous term, so $d = -10$. Enter these values into the formula above.

Explicit: $a_n = 18 - 10(n - 1)$

Now, use the explicit formula to find the value of a_{20}:

$$a_{20} = a_1 + d(20 - 1) = 18 - 10(20 - 1) = 18 - 10(19) = 18 - 190 = -172$$

The sum of the first n terms of an arithmetic series is $S_n = \frac{n}{2}(a_1 + a_n)$. Use this formula to find the requested sum.

$$S_{20} = \frac{20}{2}(a_1 + a_{20}) = \frac{20}{2}(18 + -172) = 10(-154) = -1540$$

Answer: $a_{20} = -172;\ S_{20} = -1540$

13. Find the specified term of the arithmetic sequence given the information below. Then find the sum of the first 15 terms.

$$a_1 = 5;\ a_3 = 20;\ a_{15}$$

We will use the explicit formula for an arithmetic sequence to find the common difference: $a_n = a_1 + d(n-1)$.

$$a_n = a_1 + d(n-1); 20 = 5 + d(3-1); 15 = 2d; d = 7.5$$

Now we know that the explicit formula for the sequence is: $a_n = 5 + 7.5(n-1)$.

Next, find the 15th term.

$$a_{15} = 5 + 7.5(15-1) = 5 + 7.5(14) = 5 + 105 = 110$$

The sum of the first n terms of an arithmetic series is $S_n = \frac{n}{2}(a_1 + a_n)$. Use this formula to find the requested sum.

$$S_{15} = \frac{15}{2}(5 + 110) = \frac{15}{2}(115) = 862.5$$

Answer: $a_{15} = 110;\ S_{15} = 862.5$

14. Find the specified terms of the arithmetic sequence given the information below. Then find the sum of the first 21 terms.

$$a_2 = 7;\ a_4 = 8;\ a_1;\ a_{21}$$

Since we know that the sequence is arithmetic, each term has a common difference d. We can say that the terms are a_1, a_2, a_3, and a_4, so $a_2 = a_1 + d$ and $a_4 = a_2 + 2d$. Use the given values to find d and a_1.

$$a_4 = a_2 + 2d; 8 = 7 + 2d; 1 = 2d; d = \frac{1}{2}$$

$$a_2 = a_1 + d; 7 = a_1 + \frac{1}{2};\ a_1 = \frac{13}{2}$$

Now we know that the explicit formula for the sequence is: $a_n = \frac{13}{2} + \frac{1}{2}(n-1)$.

We will use the explicit formula for an arithmetic sequence to find a_{21}:

$$a_n = a_1 + d(n-1);\ a_{21} = \frac{13}{2} + \frac{1}{2}(21-1); a_{21} = \frac{13}{2} + \frac{1}{2}(20);$$

$$a_{21} = \frac{13}{2} + 10; a_{21} = \frac{33}{2}$$

The sum of the first n terms of an arithmetic series is $S_n = \frac{n}{2}(a_1 + a_n)$. Use this formula to find the requested sum.

$S_{21} = \frac{21}{2}\left(\frac{13}{2} + \frac{33}{2}\right) = \frac{21}{2}(23) = \frac{483}{2}$ or 241.5

Answer: $a_1 = \frac{13}{2};\ a_{21} = \frac{33}{2};\ S_{21} = \frac{483}{2}$ or 241.5

15. Find the specified terms of the arithmetic sequence given the information below. Then find the sum of the first 34 terms.

$$a_5 = 24;\ a_9 = 40; a_1;\ a_{34}$$

Since we know that the sequence is arithmetic, each term has a common difference d. We can say that the terms are $a_1, a_5, a_9,$ and a_{34}, so $a_5 = a_1 + 4d$ and $a_9 = a_5 + 4d$. Use the given values to find d and a_1.

$$a_9 = a_5 + 4d; 40 = 24 + 4d; 16 = 4d; d = 4$$

$$a_5 = a_1 + 4d; 24 = a_1 + 4(4);\ 24 = a_1 + 16;\ a_1 = 8$$

Now we know that the explicit formula for the sequence is: $a_n = 8 + 4(n-1)$.

We will use the explicit formula for an arithmetic sequence to find a_{34}:

$$a_n = a_1 + d(n-1);\ a_{34} = 8 + 4(34-1); a_{34} = 8 + 4(33);$$

$$a_{34} = 8 + 132; a_{34} = 140$$

The sum of the first n terms of an arithmetic series is $S_n = \frac{n}{2}(a_1 + a_n)$. Use this formula to find the requested sum.

$$S_{34} = \frac{34}{2}(8 + 140) = 17(148) = 2516$$

Answer: $a_1 = 8;\ a_{34} = 140;\ S_{34} = 2516$

16. Find the specified terms of the arithmetic sequence given the information below. Then find the sum of the first 40 terms.

$$a_8 = 60;\ a_{12} = 48; a_1;\ a_{40}$$

Since we know that the sequence is arithmetic, each term has a common difference d. We can say that the terms are $a_1, a_8, a_{12},$ and a_{40}, so $a_8 = a_1 + 7d$ and $a_{12} = a_8 + 4d$. Use the given values to find d and a_1.

$$a_{12} = a_9 + 4d; 48 = 60 + 4d; -12 = 4d; d = -3$$

$$a_8 = a_1 + 7d; 60 = a_1 + 7(-3);\ 60 = a_1 - 21;\ a_1 = 81$$

Now we know that the explicit formula for the sequence is: $a_n = 81 - 3(n - 1)$.

We will use the explicit formula for an arithmetic sequence to find a_{40}:

$$a_n = a_1 + d(n - 1);\ a_{40} = 81 - 3(40 - 1); a_{40} = 81 - 3(39);$$

$$a_{40} = 81 - 117; a_{40} = -36$$

The sum of the first n terms of an arithmetic series is $S_n = \frac{n}{2}(a_1 + a_n)$. Use this formula to find the requested sum.

$$S_{40} = \frac{40}{2}(81 + -36) = 20(45) = 900$$

Answer: $a_1 = 81;\ a_{40} = -36;\ S_{40} = 900$

17. Find the specified terms of the arithmetic sequence given the information below. Then find the sum of the first 25 terms.

$$a_7 = -19;\ a_{10} = -280; a_1;\ a_{25}$$

Since we know that the sequence is arithmetic, each term has a common difference d. We can say that the terms are $a_1, a_7, a_{10},$ and a_{25}, so $a_7 = a_1 + 6d$ and $a_{10} = a_7 + 3d$. Use the given values to find d and a_1.

$$a_{10} = a_7 + 3d; -280 = -19 + 3d; -261 = 3d; d = -87$$

$$a_7 = a_1 + 6d; -19 = a_1 + 6(-87);\ -19 = a_1 - 522;\ a_1 = 503$$

Now we know that the explicit formula for the sequence is: $a_n = 503 - 87(n - 1)$.

We will use the explicit formula for an arithmetic sequence to find a_{40}:

$$a_n = a_1 + d(n-1);\ a_{25} = 503 - 87(25-1); a_{25} = 503 - 87(24);$$

$$a_{25} = 503 - 2088; a_{25} = -1585$$

The sum of the first n terms of an arithmetic series is $S_n = \frac{n}{2}(a_1 + a_n)$. Use this formula to find the requested sum.

$$S_{25} = \frac{25}{2}(503 + -1585) = \frac{25}{2}(-1082) = -13525$$

Answer: $a_1 = 503;\ a_{25} = -1585;\ S_{25} = -13525$

18. Find the specified terms of the arithmetic sequence given the information below. Then find the sum of the first 30 terms.

$$a_{10} = 41;\ a_{15} = 61; a_1;\ a_{30}$$

Since we know that the sequence is arithmetic, each term has a common difference d. We can say that the terms are $a_1, a_{10}, a_{15},$ and a_{30}, so $a_{10} = a_1 + 9d$ and $a_{15} = a_{10} + 5d$. Use the given values to find d and a_1.

$$a_{15} = a_{10} + 5d; 61 = 41 + 5d; 20 = 5d; d = 4$$

$$a_{10} = a_1 + 9d; 41 = a_1 + 9(4);\ 41 = a_1 + 36;\ a_1 = 5$$

Now we know that the explicit formula for the sequence is: $a_n = 5 + 4(n - 1)$.

We will use the explicit formula for an arithmetic sequence to find a_{30}:

$$a_n = a_1 + d(n - 1);\ a_{30} = 5 + 4(30 - 1); a_{30} = 5 + 4(29);$$

$$a_{30} = 5 + 116; a_{30} = 121$$

The sum of the first n terms of an arithmetic series is $S_n = \frac{n}{2}(a_1 + a_n)$. Use this formula to find the requested sum.

$$S_{30} = \frac{30}{2}(5 + 121) = 15(126) = 1890$$

Answer: $a_1 = 5;\ a_{30} = 121;\ S_{30} = 1890$

19. Find the term number of the term in red in the arithmetic sequence. Assume that the given sequence begins with a_1.

$$25, 33, 41, \ldots, 145, \ldots$$

Since we know that the sequence is arithmetic, each term has a common difference d. Thus, since each term increases by 8, we know that $d = 8$.

The general explicit formula for an arithmetic sequence is $a_n = a_1 + d(n - 1)$, so for this sequence the explicit formula is $a_n = 25 + 8(n - 1)$. Use this formula to find the requested term number.

$$a_n = 25 + 8(n - 1);\ 145 = 25 + 8(n - 1)$$

$$120 = 8(n - 1);\ \ 15 = n - 1; n = 16$$

Answer: 16

20. Find the term number of the term in red in the arithmetic sequence. Assume that the given sequence begins with a_1.

$$40, 37, 34, \dots , -29, \dots$$

Since we know that the sequence is arithmetic, each term has a common difference d. Thus, since each term decreases by 3, we know that $d = -3$.

The general explicit formula for an arithmetic sequence is $a_n = a_1 + d(n - 1)$, so for this sequence the explicit formula is $a_n = 40 - 3(n - 1)$. Use this formula to find the requested term number.

$$a_n = 40 - 3(n - 1);\ -29 = 40 - 3(n - 1)$$

$$-69 = -3(n - 1);\ \ 23 = n - 1; n = 24$$

Answer: 24