4.6 Start Thinking

Use a graphing calculator to graph the function $f(x) = -4x + 5$.

Use the TABLE function to make a list of five y-values, beginning with $y = 5$, separating each with a comma.

Calculate how far apart each number is from the number before it. Compare this number to the function you graphed, and explain its significance.

4.6 Warm Up

Use the table to find the slope.

1.

x	2	3	4	5
y	4	11	18	25

2.

x	14	28	42	56	70
y	17	20	23	26	29

3.

x	5	21	37	53
y	11	27	43	59

4.

x	0	4	8	12	16
y	4	8	12	16	20

4.6 Cumulative Review Warm Up

Tell which number you would add to or subtract from each side of the inequality to solve.

1. $k - 12 > -4$

2. $0 \leq b + 8$

3. $x + 5 > -6$

4. $7 \leq m + 2$

5. $r - 2 > 6$

6. $8 + w > 8$

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4.6 Practice A

In Exercises 1 and 2, write the next three terms of the arithmetic sequence.

1. First term: 3
Common difference: 11

2. First term: 15
Common difference: -4

In Exercises 3–6, find the common difference of the arithmetic sequence.

3. 9, 15, 21, 27, …

4. 240, 210, 180, 150, …

5. $-15, -10, -5, 0, \ldots$

6. $2, 2\frac{1}{4}, 2\frac{1}{2}, 2\frac{3}{4}, \ldots$

In Exercises 7 and 8, graph the arithmetic sequence.

7. 3, 10, 17, 24, …

8. $-2, -6, -10, -14, \ldots$

In Exercises 9 and 10, determine whether the sequence is arithmetic. If so, find the common difference.

9. 12, 17, 21, 26, …

10. $-10, -3, 4, 11, \ldots$

In Exercises 11–14, write an equation for the *n*th term of the arithmetic sequence. Then find a_{10}.

11. $-3, -1, 1, 3, \ldots$

12. $2, -3, -8, -13, \ldots$

13. $4\frac{1}{2}, 6, 7\frac{1}{2}, 9, \ldots$

14. $\frac{2}{5}, \frac{4}{5}, \frac{6}{5}, \frac{8}{5}, \ldots$

15. The first term of an arithmetic sequence is 6. The common difference of the sequence is two-thirds the first term. Write the next three terms of the sequence.

16. The height (in feet) of the water in a tank each hour after opening its drain can be estimated by the sequence in the table.

Hours after opening drain	1	2	3	4
Height (feet)	18	15	12	9

a. Write a function that represents the arithmetic sequence.

b. Find and interpret the seventh term.

c. Would the eighth term apply in this situation?

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4.6 Practice B

In Exercises 1 and 2, write the next three terms of the arithmetic sequence.

1. First term: 8
Common difference: 5

2. First term: 40
Common difference: -12

In Exercises 3–6, find the common difference of the arithmetic sequence.

3. $-4, -1, 2, 5, \ldots$

4. $\frac{2}{7}, \frac{4}{7}, \frac{6}{7}, \frac{8}{7}, \ldots$

5. $8.6, 8.4, 8.2, 8.0, \ldots$

6. $7\pi, 5\pi, 3\pi, \pi, \ldots$

In Exercises 7 and 8, graph the arithmetic sequence.

7. $4, 18, 32, 46, \ldots$

8. $10, 7.5, 5, 2.5, \ldots$

In Exercises 9 and 10, determine whether the sequence is arithmetic. If so, find the common difference.

9. $67, 52, 37, 22, \ldots$

10. $128, 32, 8, 2, \ldots$

In Exercises 11–14, write an equation for the *n*th term of the arithmetic sequence. Then find a_{10}.

11. $-9, -1, 7, 15, \ldots$

12. $\frac{1}{3}, \frac{2}{3}, 1, 1\frac{1}{3}, \ldots$

13. $-160, -180, -200, -220, \ldots$

14. $-\frac{7}{3}, -\frac{5}{3}, -1, -\frac{1}{3}, \ldots$

15. The first term of an arithmetic sequence is 3. The common difference of the sequence is 10 less than twice the first term. Write the next three terms of the sequence.

16. The volume (in cubic feet) of the water in a tank each hour after turning on a faucet can be estimated by the sequence in the table.

Hours after turning on faucet	1	2	3	4
Volume (cubic feet)	12	15	18	21

a. Write a function that represents the arithmetic sequence.

b. The tank is in the shape of a rectangular box. The length is 6 feet, the width is 3 feet, and the height is 2 feet. Find the *n*th term that represents a full tank. Explain.

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4.6 Enrichment and Extension

Arithmetic Series

An arithmetic series is the sum of a certain number of terms in a sequence. Let S stand for the following series, which starts with 5 and each consecutive term is 5 more than the previous term.

$S = 5 + 10 + 15 + 20 + 25 + 30$

Series formula: The series will stay the same when you reverse the terms. After you do this, add the two series together to obtain a final formula.

$$\begin{aligned} S &= 5 + 10 + 15 + 20 + 25 + 30 \\ S &= 30 + 25 + 20 + 15 + 10 + 5 \\ \hline 2S &= 35 + 35 + 35 + 35 + 35 + 35 \end{aligned}$$

$$2S = 6(35)$$

$$S = \frac{6(35)}{2} = 105$$

So, the series formula is $S = \frac{n}{2}(a_1 + a_n)$, where n is the number of terms, a_1 is the first term, and a_n is the last term.

$$S = \frac{n}{2}(a_1 + a_n)$$

Example: Find the sum $-5 + (-2) + 1 + 4 + 7 + 10 + 13 + 16$.

$a_1 = -5$, $a_n = 16$, $n = 8$, so $S = \frac{8}{2}(-5 + 16) = 4(11) = 44$.

In Exercises 1–8, find the sum of the arithmetic series.

1. $1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10$
2. $-6 + (-1) + 4 + 9 + 14 + 19 + 24$
3. $90 + 99 + 108 + 117 + 126 + 135 + 144 + 153$
4. $\frac{1}{2} + 2 + 3\frac{1}{2} + 5 + 6\frac{1}{2} + 8 + 9\frac{1}{2}$
5. $27 + 23 + 19 + 15 + 11$
6. $(x + 3) + (2x + 5) + (3x + 7) + (4x + 9) + (5x + 11)$
7. odd whole numbers from 1 to 99
8. even integers from 0 to 50

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4.6 Puzzle Time

What Do You Get When You Cross A Centipede With A Parrot?

Write the letter of each answer in the box containing the exercise number.

Write the next three terms of the arithmetic sequence.

1. First term: 4; Common difference: 9

2. First term: 22; Common difference: -8

3. 3, 11, 19, 27, …

4. $-3, -5, -7, -9, \ldots$

5. $-17, -8\frac{1}{2}, 0, 8\frac{1}{2}, \ldots$

6. 5.4, 4, 2.6, 1.2, …

Use an equation for the *n*th term of the arithmetic sequence to find a_{12}.

7. 2, 4, 6, 8, …

8. $\frac{10}{11}, \frac{9}{11}, \frac{8}{11}, \frac{7}{11}, \ldots$

9. $-10, -5, 0, 5, \ldots$

10. $-7, -9, -11, -13, \ldots$

11. $-2\frac{2}{3}, -2\frac{1}{3}, -2, -1\frac{2}{3}, \ldots$

12. $-0.25, 0.25, 0.75, 1.25, \ldots$

13. The temperature of some water increases 2°F every hour after an initial temperature of 50°F. Use an equation for the *n*th term of the arithmetic sequence to find a_6, the temperature of the water in °F after 6 hours.

Answers

A. 14, 6, −2

I. 24

L. −29

A. −11, −13, −15

E. $-\frac{1}{11}$

L. $17, 25\frac{1}{2}, 34$

K. 1

E. 13, 22, 31

A. 45

W. 5.25

T. 60

K. −0.2, −1.6, −3

I. 35,43,51

4		12	2	10	6	3	8	-	13	9	5	11	7	1