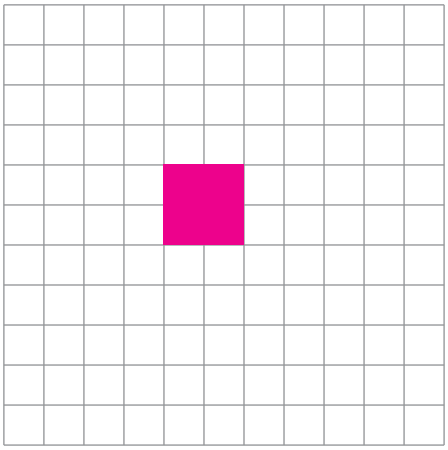
Name: ..... Date: ..... Period: .....

Additional Practice 1.01

1. Sketch a 2×2 square on the grid.



2. How many tiles does the square cover in the grid?

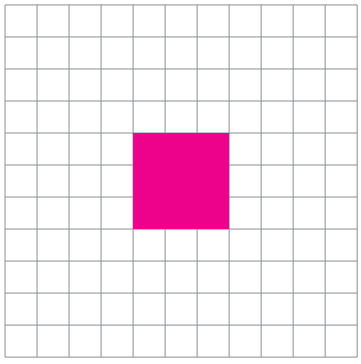
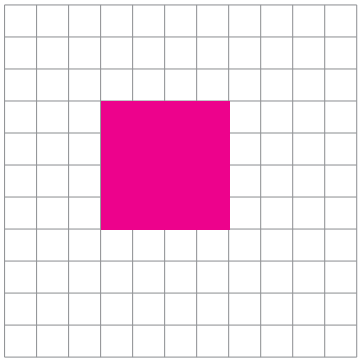
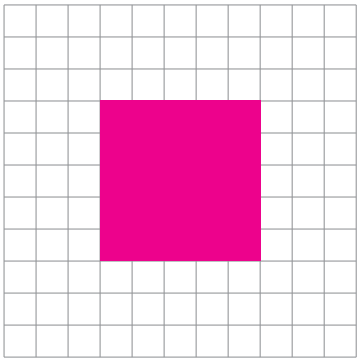
4 tiles

3. Figures 1–3 represent the square growing in size.

Here are the number of tiles in Figures 1–3 of the pattern.

Figure #	Number of Tiles
1	9
2	16
3	25

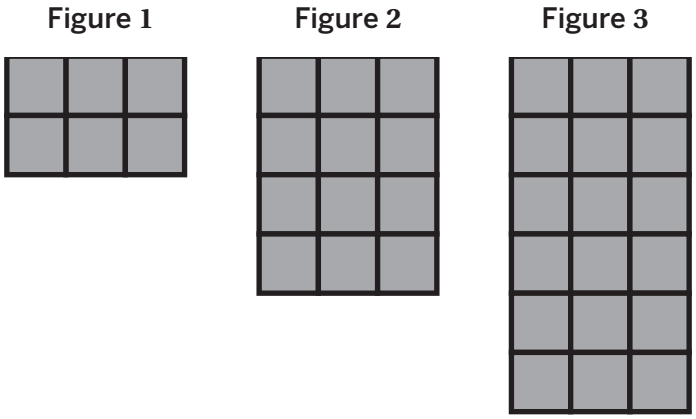
a Draw three figures to match the patterns in the table.

Figure 1	Figure 2	Figure 3
		

b How many tiles will there be in Figure 4?

36 tiles

4. Here is a visual pattern.



a Describe what Figure 4 will look like.

Responses vary. **I think Figure 4 will be a rectangle. The rectangle will have 3 columns of tiles and 8 rows of tiles.**

b How many tiles will there be in Figure 4?

24 tiles

Problems 5–6. This table shows the number of tiles in Figures 1–3.

Figure #	Number of Tiles
1	6
2	12
3	18

5. Do you agree that Figure 5 will have $24 + 6$ tiles? Circle one. Explain your reasoning.

(Yes) No I'm not sure

Explanations vary. **I agree. There is a pattern. The difference between Figure 1 and Figure 2 is 6. The difference between Figure 2 and Figure 3 is 6. It makes sense the next figure would grow by 6 tiles.**

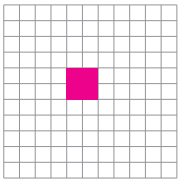
6. How many tiles will there be in Figure 6?

36 tiles

Name: Date: Period:

Additional Practice 1.01

1. Sketch a 2×2 square on the grid.



2. How many tiles does the square cover in the grid?

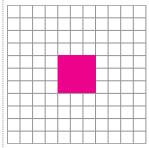
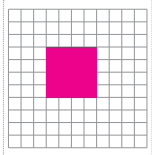
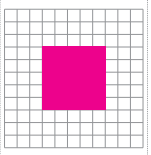
4 tiles

3. Figures 1–3 represent the square growing in size.

Here are the number of tiles in Figures 1–3 of the pattern.

Figure #	Number of Tiles
1	9
2	16
3	25

a. Draw three figures to match the patterns in the table.

Figure 1	Figure 2	Figure 3
		

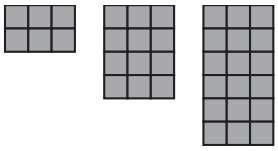
b. How many tiles will there be in Figure 4?

36 tiles

Name: Date: Period:

4. Here is a visual pattern.

Figure 1 Figure 2 Figure 3



a. Describe what Figure 4 will look like.

Responses vary. I think Figure 4 will be a rectangle. The rectangle will have 3 columns of tiles and 8 rows of tiles.

b. How many tiles will there be in Figure 4?

24 tiles

Problems 5–6. This table shows the number of tiles in Figures 1–3.

Figure #	Number of Tiles
1	6
2	12
3	18

5. Do you agree that Figure 5 will have $24 + 6$ tiles? Circle one. Explain your reasoning.

(Yes) No I'm not sure

Explanations vary. I agree. There is a pattern. The difference between Figure 1 and Figure 2 is 6. The difference between Figure 2 and Figure 3 is 6. It makes sense the next figure would grow by 6 tiles.

6. How many tiles will there be in Figure 6?

36 tiles

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSF.BF.A.1.A
2	1	HSF.BF.A.1.A
3	2	HSF.BF.A.1.A
4	2	HSF.BF.A.1.A
5	2	HSF.BF.A.1.A
6	2	HSF.BF.A.1.A

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 1.02

1. Here is a sequence that has a *constant ratio*.

$$200,\ 100,\ 50,\ \ldots$$

What is the next term? Explain your thinking.

Explanations vary. **25. I divided each term by 2 because each term is half as big as the one before it.**

Problems 2–4: Fill in the blanks to complete each sequence. Each sequence has a *constant difference*.

2. 10, 13, 16, **19**, **22**, 25

3. **5**, 11, 17, **23**, 29, **35**

4. 1.5, 1.0, 0.5, **0.0**, **−0.5**, **−1.0**

5. Which sequence has a *constant ratio* of 4?

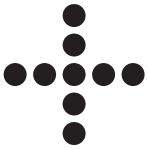
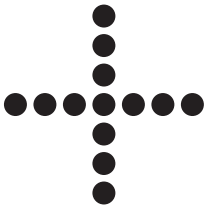
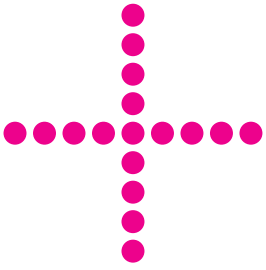
A. 16, 64, 256, ...

B. 24, 20, 16, ...

C. 80, 20, 5, ...

D. 4, 8, 12, ...

6. Here is a visual pattern. Sketch Figure 4.

Figure 1	Figure 2	Figure 3	Figure 4
			

7. How many dots will Figure 6 have? Show or explain your reasoning.

Explanations vary. **25 dots. I counted the number of dots in the first three patterns and noticed that 4 dots were added each time. So, I continued this pattern. So, Figure 4 has 17 dots, Figure 5 has 21 dots, and Figure 6 has 25 dots.**

8. What rule does the sequence for this visual pattern follow?

A. Constant ratio of 2

B. Constant ratio of 4

C. Constant difference of 2

D. Constant difference of 4

9. A sequence has a first term of 12 and a constant ratio of $\frac{1}{2}$.What are the first four terms of the sequence?

A. $12,\ 12\frac{1}{2},\ 13,\ 13\frac{1}{2}$

B. $\frac{1}{2},\ 12\frac{1}{2},\ 24\frac{1}{2},\ 36\frac{1}{2}$

C. $12,\ 6,\ 3,\ \frac{3}{2}$

D. $12,\ 24,\ 36,\ 48$

Name: Date: Period:

Additional Practice 1.02

1. Here is a sequence that has a *constant ratio*.

200, 100, 50, ...

What is the next term? Explain your thinking.

Explanations vary. **25. I divided each term by 2 because each term is half as big as the one before it.**

Problems 2–4: Fill in the blanks to complete each sequence. Each sequence has a *constant difference*.

2. 10, 13, 16, 19, 22, 25

3. 5, 11, 17, 23, 29, 35

4. 1.5, 1.0, 0.5, 0.0, −0.5, −1.0

5. Which sequence has a *constant ratio* of 4?

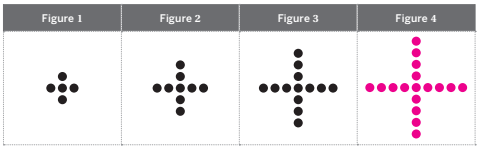
(A.) 16, 64, 256, ...

B. 24, 20, 16, ...

C. 80, 20, 5, ...

D. 4, 8, 12, ...

6. Here is a visual pattern. Sketch Figure 4.



Name: Date: Period:

7. How many dots will Figure 6 have? Show or explain your reasoning.

Explanations vary. **25 dots. I counted the number of dots in the first three patterns and noticed that 4 dots were added each time. So, I continued this pattern. So, Figure 4 has 17 dots, Figure 5 has 21 dots, and Figure 6 has 25 dots.**

8. What rule does the sequence for this visual pattern follow?

A. Constant ratio of 2

B. Constant ratio of 4

C. Constant difference of 2

(D.) Constant difference of 4

9. A sequence has a first term of 12 and a constant ratio of $\frac{1}{2}$.What are the first four terms of the sequence?

A. $12, 12\frac{1}{2}, 13, 13\frac{1}{2}$

B. $\frac{1}{2}, 12\frac{1}{2}, 24\frac{1}{2}, 36\frac{1}{2}$

(C.) $12, 6, 3, \frac{3}{2}$

D. 12, 24, 36, 48

Practice Problem Analysis

Problem	DOK	Standard(s)
1	2	HSF.BF.A.1.A
2	2	HSF.BF.A.1.A
3	2	HSF.BF.A.1.A
4	2	HSF.BF.A.1.A
5	2	HSF.BF.A.1.A
6	2	HSF.BF.A.1.A
7	2	HSF.BF.A.1.A
8	2	HSF.BF.A.1.A
9	2	HSF.BF.A.1.A

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 1.03

1. This sequence has a *constant ratio* of 5. Fill in the missing terms.

$\frac{1}{5}$, 1, 5, **25**, **125**, **625**

2. This sequence has a *constant difference* of 7. Find the missing terms.

−6, **1**, 8, **15**, **22**

3. Here is the start of a sequence: $-2, 1, 4, \ldots$

a Write a rule for this sequence.

Explanations vary. **This sequence has a constant difference of 3.**

b Write the next three terms of this sequence.

... 7, 10, 13

Problems 4–5: Here is a start of a sequence: $1, 6, \ldots$.

4. Write a rule and the next three terms the sequence could follow.

Rule: **Constant difference of 5** Terms: **11, 16, 21**

5. Write a *different* rule and the next three terms the sequence could follow.

Rule: **Constant ratio of 6** Terms: **36, 216, 1296**

6. Brenden is saving money to buy a new phone. He started with $\$200$ and is saving an additional $\$50$ each month. Write a recursive definition to model the situation.

First term: **200** Rule: **Constant difference of 50**

Name: ..... Date: ..... Period: .....

Problems 7–9: Here is a visual pattern.

7. Complete the table with the number of tiles in each figure.

Figure #	Tiles
1	**7**
2	**8**
3	**9**

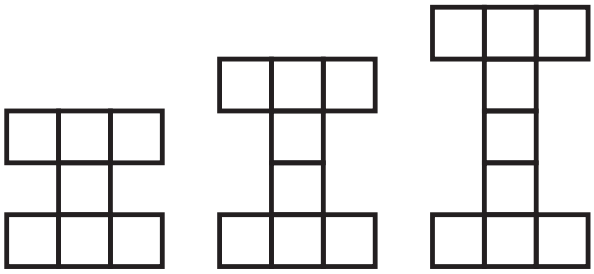


Figure 1 **Figure 2** **Figure 3**

8. Write a recursive definition to model the situation.

First term: **7** Rule: **Constant difference of 1**

9. How many tiles would be in Figure 10? Show or explain your thinking.

Explanations vary. **There will be $7 + 10 - 1$ or 16 tiles. Each time, they started with the initial 7 tiles and then added one more, starting with the second figure. So, Figure 1 was $7 + (1 - 1)$; Figure 2 was $7 + (2 - 1)$, Figure 3 was $7 + (3 - 1)$, and so on... so Figure 10 will be $7 + (10 - 1)$ or 16 tiles.**

Name: Date: Period:

Additional Practice 1.03

1. This sequence has a *constant ratio* of 5. Fill in the missing terms.

$\frac{1}{5}$, 1, 5, 25, 125, 625

2. This sequence has a *constant difference* of 7. Find the missing terms.

−6, 1, 8, 15, 22

3. Here is the start of a sequence: $-2, 1, 4, \ldots$

a. Write a rule for this sequence.

Explanations vary. **This sequence has a constant difference of 3.**

b. Write the next three terms of this sequence.

... 7, 10, 13

Problems 4–5: Here is a start of a sequence: $1, 6, \ldots$.

4. Write a rule and the next three terms the sequence could follow.

Rule: **Constant difference of 5** Terms: **11, 16, 21**

5. Write a *different* rule and the next three terms the sequence could follow.

Rule: **Constant ratio of 6** Terms: **36, 216, 1296**

6. Brenden is saving money to buy a new phone. He started with $200 and is saving an additional $50 each month. Write a recursive definition to model the situation.

First term: **200** Rule: **Constant difference of 50**

Name: Date: Period:

Problems 7–9: Here is a visual pattern.

7. Complete the table with the number of tiles in each figure.

Figure #	Tiles
1	7
2	8
3	9

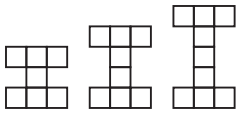


Figure 1 Figure 2 Figure 3

8. Write a recursive definition to model the situation.

First term: **7** Rule: **Constant difference of 1**

9. How many tiles would be in Figure 10? Show or explain your thinking.

Explanations vary. **There will be $7 + 10 - 1$ or 16 tiles. Each time, they started with the initial 7 tiles and then added one more, starting with the second figure. So, Figure 1 was $7 + (1 - 1)$; Figure 2 was $7 + (2 - 1)$, Figure 3 was $7 + (3 - 1)$, and so on... so Figure 10 will be $7 + (10 - 1)$ or 16 tiles.**

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSF.LE.A.1.B
2	1	HSF.LE.A.1.C
3	1	HSF.LE.A.1.B
4	2	HSF.LE.A.1B, HSF.BF.A.2
5	2	HSF.LE.A.1C, HSF.BF.A.2
6	2	HSF.LE.A.2, HSF.LE.A.1.B
7	2	HSF.LE.A.1.B
8	2	HSF.LE.A.2
9	2	HSF.LE.A.1.B

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 1.04

1. Determine whether each sequence is arithmetic, geometric, or neither.

Sequence	$3, 10, 17, 24$	$1, 10, 100, 1000$	$12, 6, 3, \frac{3}{2}$	$1, 4, 9, 25$
Arithmetic, Geometric, Or Neither	Arithmetic	Geometric	Geometric	Neither

2. Complete each arithmetic sequence with its missing terms.

a $-10, -4,$ **2**, $8,$ **14**, 20

b $14,$ **114**, $214,$ **314**, 414

c **3**, $4.25, 5.50,$ **6.75**, **8**

d $12,$ **5**, $-2, -9,$ **−16**

3. Complete each geometric sequence with its missing terms.

a $10, 20,$ **40**, $80,$ **160**, 320

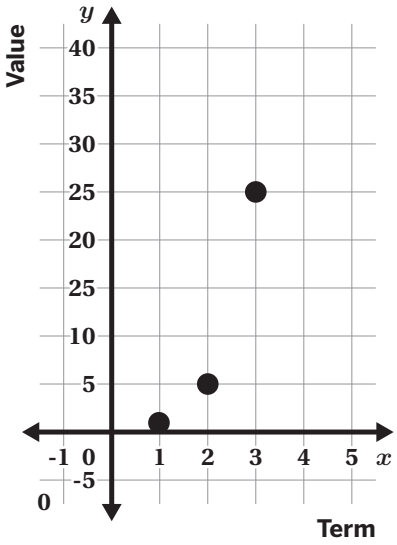
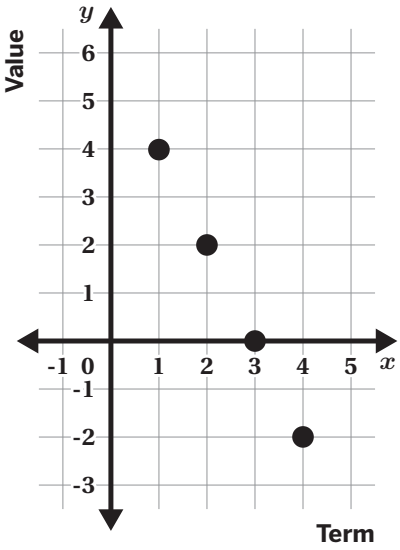
b $12,$ **6**, $3,$ **$\frac{3}{2}$**, $\frac{3}{4}$

c **$\frac{4}{3}$**, $4, 12,$ **36**, **108**

d $1,$ **5**, $25, 125,$ **625**

Name: ..... Date: ..... Period: .....

Problems 4–6: For the following sequences, identify the **type** of sequence, the **first term**, and the **rule** of the following sequences.

4. Sequence 1	5. Sequence 2	6. Sequence 3
<table><tr><th>Term</th><th>Value</th></tr><tr><td>1</td><td>−2</td></tr><tr><td>2</td><td>5</td></tr><tr><td>3</td><td>12</td></tr><tr><td>4</td><td>19</td></tr><tr><td>5</td><td>25</td></tr></table>		
Type: Arithmetic First term: 1 Rule: Add 7 to the previous term	Type: Geometric First term: 1 Rule: Multiply the previous term by 5	Type: Arithmetic First term: −2 Rule: Subtract 2 from the previous term

Problems 7–9: Given the first term and rule:

a. **Circle** if it is an arithmetic sequence, geometric sequence, or neither.

b. **Write** the first 4 terms of each sequence.

7. First Term: 2 **Rule:** Multiply the previous term by 4	8. First Term: 1 **Rule:** Add 1 to the previous number and square it	9. First Term: −12 **Rule:** Add 4 to the previous number
Arithmetic Sequence **Geometric Sequence** **Neither**	**Arithmetic Sequence** **Geometric Sequence** **Neither**	**Arithmetic Sequence** **Geometric Sequence** **Neither**
2, 8, 32, 128	1, 4, 25, 676	−12, −8, −4, 0

Name: Date: Period:

Additional Practice 1.04

1. Determine whether each sequence is arithmetic, geometric, or neither.

Sequence	3, 10, 17, 24	1, 10, 100, 1000	12, 6, 3, $\frac{3}{2}$	1, 4, 9, 25
Arithmetic, Geometric, Or Neither	Arithmetic	Geometric	Geometric	Neither

2. Complete each arithmetic sequence with its missing terms.

a. $-10, -4, \underline{2}, 8, \underline{14}, 20$

b. $14, \underline{114}, 214, \underline{314}, 414$

c. $\underline{3}, 4.25, 5.50, \underline{6.75}, \underline{8}$

d. $12, \underline{5}, -2, -9, \underline{-16}$

3. Complete each geometric sequence with its missing terms.

a. $10, 20, \underline{40}, 80, \underline{160}, 320$

b. $12, \underline{6}, 3, \underline{\frac{3}{2}}, \frac{3}{4}$

c. $\underline{\frac{4}{3}}, 4, 12, \underline{36}, \underline{108}$

d. $1, \underline{5}, 25, 125, \underline{625}$

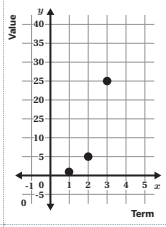
Name: Date: Period:

Problems 4–6: For the following sequences, identify the **type** of sequence, the **first term**, and the **rule** of the following sequences.

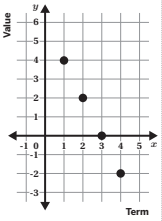
4. Sequence 1

Term	Value
1	−2
2	5
3	12
4	19
5	25

5. Sequence 2



6. Sequence 3



Type: Arithmetic	Type: Geometric	Type: Arithmetic
First term: 1	First term: 1	First term: −2
Rule: Add 7 to the previous term	Rule: Multiply the previous term by 5	Rule: Subtract 2 from the previous term

Problems 7–9: Given the first term and rule:

a. **Circle** if it is an arithmetic sequence, geometric sequence, or neither.

b. **Write** the first 4 terms of each sequence.

7. First Term: 2 Rule: Multiply the previous term by 4	8. First Term: 1 Rule: Add 1 to the previous number and square it	9. First Term: −12 Rule: Add 4 to the previous number
Arithmetic Sequence **Geometric Sequence** Neither	Arithmetic Sequence Geometric Sequence **Neither**	**Arithmetic Sequence** Geometric Sequence Neither
2, 8, 32, 128	1, 4, 25, 676	−12, −8, −4, 0

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSF.LE.A.1B, HSF.LE.A.1C
2	2	HSF.LE.A.2
3	2	HSF.LE.A.2
4	2	HSF.LE.A.1B
5	2	HSF.LE.A.1C
6	2	HSF.LE.A.1B
7	1	HSF.LE.A.2
8	1	HSF.LE.A.2
9	1	HSF.LE.A.2

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 1.05

1. Hannah's family decides to save money for a vacation. They start by saving $\$100$ in the first month, and each subsequent month they save 1.5 times the amount they saved the previous month. Select *all* the expressions that represent how much money they will save in the 5th month.

- ☐ **A.** $100 + 1.5^5$
- ☐ **B.** $100 + 1.5 + 1.5 + 1.5 + 1.5 + 1.5$
- ☐ **C.** $100 \cdot 5^{1.5}$
- ☑ **D.** $100 \cdot 1.5 \cdot 1.5 \cdot 1.5 \cdot 1.5 \cdot 1.5$
- ☑ **E.** $100 \cdot 1.5^5$

2. The tables below show the number of red and yellow globs each day.

Day	0	1	2	3	4
Red Globs	50	70	90	110	**130**

Day	0	1	2	3	4
Yellow Globs	5	10	20	40	**80**

a Determine how many globs there will be on Day 4 and complete each table. Show or explain your thinking.

Explanations vary. **In the first table, the number of red globs is increasing by adding 20 to the previous day. In the second table, the number of yellow globs is increasing by multiplying each previous day by 2, or doubling it.**

b Will there be more red or yellow globs on Day 10? Show or explain your thinking.

Explanations vary. **There will be more yellow globs on Day 10 because these numbers are growing at a faster rate.**

c Which group of globs grows by a *constant difference*? Show or explain your thinking.

Explanations vary. **Table 1 is growing by a constant difference because it is increasing by the same number added to the previous number each day.**

3. In a body of water, each foot of water screens out 60% of the light above it. The equation $l = 1 \cdot 0.40^d$ represents this situation.

a Explain what the 1 and the 0.40 represent in this situation.

Explanations vary. **The 1 represents the starting value of 1 foot under water. The 0.40 represents the light visible after 60% of it has been screened out.**

b What percent of light is available after passing through 5 feet of water? Show your thinking.

Explanations vary. $l = 1 \cdot 0.40^5 = 0.01204$ **or 1.024%**

Name: ..... Date: ..... Period: .....

Problems 4–5: Here is a table representing a pattern.

x	y
0	50
1	40
2	30
3	20
4	10

4. Circle the equation that represents the table.

A. $y = 50 + 10x$

B. $y = 50 \cdot 10x$

C. $y = 50 - 10x$

D. $y = 50 \cdot \left(\frac{1}{10}\right)^x$

5. Explain your thinking.

Explanations vary. **The starting value is 50 and the common difference is −10.**

6. Kai is saving pennies in a jar that already contained 20 pennies.The first day he saves 6 more pennies. The second day, he saves 12 more pennies. The third day, he saves 24 more pennies, and so on.

a Complete the table to show the amount of pennies in the jar, after n days.

Day n	0	1	2	3	...	n
Number of Pennies	20	$20 + 6 = 23$	$20 + 12 = 32$	$20 + 24 = 44$	...	$20 + 3(2)^n$

b Write an explicit expression for this situation. $20 + 3(2)^n$

c Use your expression to determine how many pennies are in the jar on the 8th day? Show or explain your thinking.

Explanations vary. $20 + 3(2)^8 = 20 + 3(256) = 788$ **pennies**

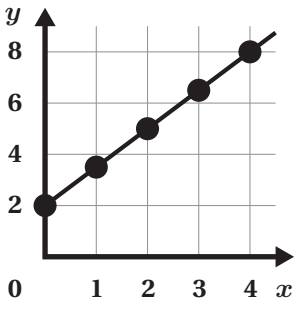
7. Determine whether each table or graph shows a constant difference or a constant ratio. Circle your choice.

x	y
0	4
1	8
2	16
3	32

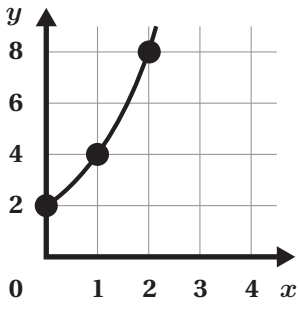
Constant Difference
Constant Ratio

x	y
0	4
1	8
2	12
3	16

Constant Difference
Constant Ratio



Constant Difference
Constant Ratio



Constant Difference
Constant Ratio

Name: Date: Period:

Additional Practice 1.05

1. Hannah's family decides to save money for a vacation. They start by saving $100 in the first month, and each subsequent month they save 1.5 times the amount they saved the previous month. Select *all* the expressions that represent how much money they will save in the 5th month.

- ☐ A. $100 + 1.5^5$
- ☐ B. $100 + 1.5 + 1.5 + 1.5 + 1.5 + 1.5$
- ☐ C. $100 \cdot 5^{1.5}$
- ☑ D. $100 \cdot 1.5 \cdot 1.5 \cdot 1.5 \cdot 1.5 \cdot 1.5$
- ☑ E. $100 \cdot 1.5^5$

2. The tables below show the number of red and yellow globs each day.

Day	0	1	2	3	4
Red Globs	50	70	90	110	**130**

Day	0	1	2	3	4
Yellow Globs	5	10	20	40	**80**

a. Determine how many globs there will be on Day 4 and complete each table. Show or explain your thinking.

Explanations vary. **In the first table, the number of red globs is increasing by adding 20 to the previous day. In the second table, the number of yellow globs is increasing by multiplying each previous day by 2, or doubling it.**

b. Will there be more red or yellow globs on Day 10? Show or explain your thinking.

Explanations vary. **There will be more yellow globs on Day 10 because these numbers are growing at a faster rate.**

c. Which group of globs grows by a *constant difference*? Show or explain your thinking.

Explanations vary. **Table 1 is growing by a constant difference because it is increasing by the same number added to the previous number each day.**

3. In a body of water, each foot of water screens out 60% of the light above it. The equation $l = 1 \cdot 0.40^d$ represents this situation.

a. Explain what the 1 and the 0.40 represent in this situation.

Explanations vary. **The 1 represents the starting value of 1 foot under water. The 0.40 represents the light visible after 60% of it has been screened out.**

b. What percent of light is available after passing through 5 feet of water? Show your thinking.

Explanations vary. $l = 1 \cdot 0.40^5 = 0.01204$ **or 1.024%**

Name: Date: Period:

Problems 4–5: Here is a table representing a pattern.

x	y
0	50
1	40
2	30
3	20
4	10

4. Circle the equation that represents the table.

- A. $y = 50 + 10x$
- B. $y = 50 \cdot 10x$
- (C.) $y = 50 - 10x$
- D. $y = 50 \cdot \left(\frac{1}{10}\right)^x$

5. Explain your thinking.

Explanations vary. **The starting value is 50 and the common difference is −10.**

6. Kai is saving pennies in a jar that already contained 20 pennies.The first day he saves 6 more pennies. The second day, he saves 12 more pennies. The third day, he saves 24 more pennies, and so on.

a. Complete the table to show the amount of pennies in the jar, after n days.

Day n	0	1	2	3	...	n
Number of Pennies	20	$20 + 6 = 23$	$20 + 12 = 32$	$20 + 24 = 44$	...	$20 + 3(2)^n$

b. Write an explicit expression for this situation. $20 + 3(2)^n$

c. Use your expression to determine how many pennies are in the jar on the 8th day? Show or explain your thinking.

Explanations vary. $20 + 3(2)^8 = 20 + 3(256) = 788$ **pennies**

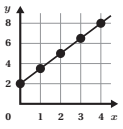
7. Determine whether each table or graph shows a constant difference or a constant ratio. Circle your choice.

x	y
0	4
1	8
2	16
3	32

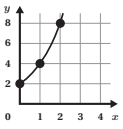
Constant Difference
(Constant Ratio)

x	y
0	4
1	8
2	12
3	16

(Constant Difference)
Constant Ratio



(Constant Difference)
Constant Ratio



Constant Difference
(Constant Ratio)

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSA.SSE.A.1, HSA.SSE.A.1A, HSF.LE.A.1C
2	2	HSF.LE.A.1C, HSF.LE.A.1B, HSF.BF.A.1A, HSF.LE.A.3
3	2	HSF.BF.A.1A, HSA.SSE.A.1, HSA.SSE.A.1A
4	1	HSA.SSE.A.1, HSA.SSE.A.1A, HSF.LE.A.1B
5	1	HSA.SSE.A.1, HSA.SSE.A.1A
6	2	HSF.LE.A.2, HSF.BF.A.1A
7	1	HSF.LE.A.1C, HSF.LE.A.1B

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 1.06

1. Match each sequence to its explicit expression.

Sequence		Explicit Expression
a.	$3, 12, 48, 192$	c $3 \cdot 2^{(n-1)}$
b.	$3, 4, 7, 11$	a $3 \cdot 4^{(n-1)}$
c.	$3, 6, 12, 24$	d $3 + 4(n-1)$
d.	$3, 7, 11, 15$	b $3 + 2(n-1)$

2. Determine whether each table represents a line relationship, an exponential relationship, or neither. Circle your choice.

x	y
0	1
1	3
2	5
3	7
4	9

(Linear Relationship) Exponential Relationship Neither

x	y
0	1
1	3
2	9
3	19
4	33

Linear Relationship Exponential Relationship (Neither)

x	y
0	1
1	3
2	9
3	27
4	81

Linear Relationship (Exponential Relationship) Neither

3. Select *all* the expressions that could represent the number of tiles in Figure n of this pattern

- ☑ **A.** $3 + 2n$
- ☐ **B.** $4 + 1(n-1)$
- ☐ **C.** $6n - 1$
- ☑ **D.** $5 + 2(n-1)$
- ☐ **E.** $4n + 1$

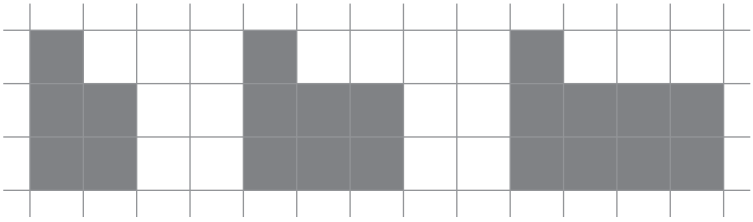


Figure 1 **Figure 2** **Figure 3**

4. The first four terms in a sequence are $2, 6, 18, 54$.

a Is this an arithmetic sequence or a geometric sequence? Explain your thinking.

Explanations vary. **This is a geometric sequence because each number is multiple of the one before it.**

b What is the common difference (if arithmetic sequence) or common ratio (if geometric sequence)? How did you determine this value?

Explanations vary. **The common ratio of this sequence is 3 because each term is multiplied by 3 to get the next term.**

c Write an explicit expression for term n of this sequence?

$2 \cdot 3^{(n-1)}$ (or equivalent)

Problems 5–7: Here is a visual pattern.

5. Complete the table with the number of tiles in Figures $1–4$.

Figure	# of Tiles
1	**7**
2	**10**
3	**13**
4	**16**
...	...
12	**40**

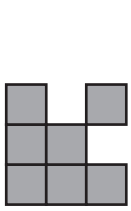


Figure 1

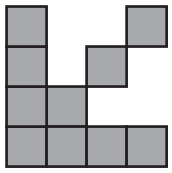


Figure 2

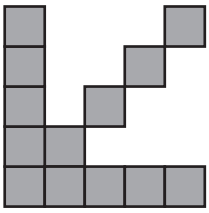


Figure 3

6. Write *two* explicit expressions for the number of tiles in Figure n.

- **$4 + 3n$ (or equivalent)**
- **$7 + 3(n - 1)$ (or equivalent)**

7. Use one of your expressions to determine the number of tiles in Figure 12. Show or explain your thinking.

Sample Answers:

$4 + 3(12) = 4 + 36 = 40$

$7 + 3(12 - 1) = 7 + 3(11) = 7 + 33 = 40$

Name: Date: Period:

Additional Practice 1.06

1. Match each sequence to its explicit expression.

Sequence	Explicit Expression
a. 3, 12, 48, 192	c $3 \cdot 2^{(n-1)}$
b. 3, 4, 7, 11	a $3 \cdot 4^{(n-1)}$
c. 3, 6, 12, 24	d $3 + 4(n-1)$
d. 3, 7, 11, 15	b $3 + 2(n-1)$

2. Determine whether each table represents a line relationship, an exponential relationship, or neither. Circle your choice.

x	y
0	1
1	3
2	5
3	7
4	9

(Linear Relationship) Exponential Relationship Neither

x	y
0	1
1	3
2	9
3	19
4	33

Linear Relationship Exponential Relationship (Neither)

x	y
0	1
1	3
2	9
3	27
4	81

Linear Relationship (Exponential Relationship) Neither

3. Select *all* the expressions that could represent the number of tiles in Figure n of this pattern

- ☑ **A.** $3 + 2n$
- ☐ **B.** $4 + 1(n-1)$
- ☐ **C.** $6n - 1$
- ☑ **D.** $5 + 2(n-1)$
- ☐ **E.** $4n + 1$

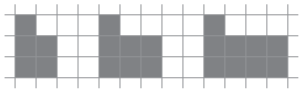


Figure 1 Figure 2 Figure 3

Name: Date: Period:

4. The first four terms in a sequence are $2, 6, 18, 54$.

a. Is this an arithmetic sequence or a geometric sequence? Explain your thinking.

Explanations vary. **This is a geometric sequence because each number is multiple of the one before it.**

b. What is the common difference (if arithmetic sequence) or common ratio (if geometric sequence)? How did you determine this value?

Explanations vary. **The common ratio of this sequence is 3 because each term is multiplied by 3 to get the next term.**

c. Write an explicit expression for term n of this sequence?

$2 \cdot 3^{(n-1)}$ (or equivalent)

Problems 5–7: Here is a visual pattern.

5. Complete the table with the number of tiles in Figures $1–4$.

Figure	# of Tiles
1	7
2	10
3	13
4	16
...	...
12	40

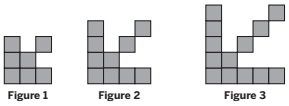


Figure 1 Figure 2 Figure 3

6. Write *two* explicit expressions for the number of tiles in Figure n.

- **$4 + 3n$ (or equivalent)**
- **$7 + 3(n-1)$ (or equivalent)**

7. Use one of your expressions to determine the number of tiles in Figure 12. Show or explain your thinking.

Sample Answers:

$4 + 3(12) = 4 + 36 = 40$

$7 + 3(12-1) = 7 + 3(11) = 7 + 33 = 40$

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSF.LE.A.1B, HSF.B.A.1A, HSA.SSE.A.1, HSA.SSE.A.1A
2	1	HSF.LE.A.1B, HSF.LE.A.1C
3	2	HSA.SSE.A.1, HSA.SSE.A.1A
4	2	HSF.LE.A.1C, HSF.LE.A.2, HSF.B.A.1A
5	1	HSF.LE.A.1B
6	2	HSF.B.A.1A, HSF.LE.A.2
7	1	HSF.B.A.1A

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 2.10

1. Which value of x is a solution to the inequality $-x - 4 > 0$?

A. $x = -5$

B. $x = -1$

C. $x = 0$

D. $x = 2$

2. Which is the solution to the inequality $2x - 3 \leq x$?

A. $x \geq 3$

B. $x \leq 3$

C. $x \geq -3$

D. $x \leq -3$

3. Consider the inequality $\frac{8x - 5}{3} \geq 2x + 1$. Select *all* of the values that are a solution to the inequality.

- ☐ **A.** $x = -1$
- ☐ **B.** $x = 0$
- ☐ **C.** $x = 2$
- ☑ **D.** $x = 4$
- ☑ **E.** $x = 5$
- ☑ **F.** $x = 6$

4. Lin is solving the inequality $8x - 6 < 3x + 19$. She solves the equation $8x - 6 = 3x + 19$ and gets $x = 5$. Which statements show how the solution to the equation $8x - 6 = 3x + 19$ helps Lin solve the inequality $8x - 6 < 3x + 19$? Select *all* that apply.

- ☐ **A.** She can substitute 5 into the inequality to determine the correct solution.
- ☑ **B.** She can substitute 4 or 6 into the inequality to determine the correct solution.
- ☐ **C.** She can substitute -1 or 1 into the inequality to determine the correct solution.
- ☑ **D.** She knows that the solution must be either all the values less than 5 or all the values greater than 5.
- ☐ **E.** She knows that the solution must be either all the values less than or equal to 5 or all the values greater than or equal to 5.

5. Solve the inequality $\frac{1}{4}(-7x - 8) \geq \frac{5x + 16}{4}$. Show your thinking.

$x \leq -2$

6. Solve each inequality for the variable y. Show your thinking.

a $-3y + 1 \leq 4(x - 5)$

$y \geq -\frac{4}{3}x + 7$ (or equivalent)

b $2x - 1 - 8x > 3(3 - 2y)$

$y > x + \frac{5}{3}$ (or equivalent)

c $-\frac{4}{3}\left(\frac{1}{8}y + 6\right) \geq 4x - 5$

$y \leq -24x - 18$ (or equivalent)

7. Consider the inequality $-2x + 1 < \frac{1}{2}x - 14$.

a What value of x makes $-2x + 1$ and $\frac{1}{2}x - 14$ equal?

$x = 6$

b For what values of x is $-2x + 1$ less than $\frac{1}{2}x - 14$? Greater than $\frac{1}{2}x - 14$?

$x > 6$; $x < 6$

c What is the solution to $-2x + 1 < \frac{1}{2}x - 14$? Explain your thinking.

$x > 6$; Sample reasoning: $-2x + 1$ is less than $\frac{1}{2}x - 14$ for values of x that are greater than 6, so the solution is $x > 6$.

8. Tyler argues that $x = 0$ is a solution to the inequality $-4x < -24$ because it is possible to divide both sides by -4 and get $x < 4$. Diego argues that $x = 0$ is not a solution to the inequality. Who is correct? Explain your thinking.

Diego; Sample response: Substituting 0 into the original inequality results in $0 < -24$, which is not a true statement.

Name: Date: Period:

Additional Practice 2.10

1. Which value of x is a solution to the inequality $-x - 4 > 0$?

A. $x = -5$ C. $x = 0$

B. $x = -1$ D. $x = 2$

2. Which is the solution to the inequality $2x - 3 \leq x$?

A. $x \geq 3$ C. $x \geq -3$

B. $x \leq 3$ D. $x \leq -3$

3. Consider the inequality $\frac{8x - 5}{3} \geq 2x + 1$. Select *all* of the values that are a solution to the inequality.

☐ A. $x = -1$ ☑ D. $x = 4$

☐ B. $x = 0$ ☑ E. $x = 5$

☐ C. $x = 2$ ☑ F. $x = 6$

4. Lin is solving the inequality $8x - 6 < 3x + 19$. She solves the equation $8x - 6 = 3x + 19$ and gets $x = 5$. Which statements show how the solution to the equation $8x - 6 = 3x + 19$ helps Lin solve the inequality $8x - 6 < 3x + 19$? Select *all* that apply.

☐ A. She can substitute 5 into the inequality to determine the correct solution.

☑ B. She can substitute 4 or 6 into the inequality to determine the correct solution.

☐ C. She can substitute -1 or 1 into the inequality to determine the correct solution.

☑ D. She knows that the solution must be either all the values less than 5 or all the values greater than 5.

☐ E. She knows that the solution must be either all the values less than or equal to 5 or all the values greater than or equal to 5.

Name: Date: Period:

5. Solve the inequality $\frac{1}{4}(-7x - 8) \geq \frac{5x + 16}{4}$. Show your thinking.

$x \leq -2$

6. Solve each inequality for the variable y. Show your thinking.

a. $-3y + 1 \leq 4(x - 5)$

$y \geq -\frac{4}{3}x + 7$ (or equivalent)

b. $2x - 1 - 8x > 3(3 - 2y)$

$y > x + \frac{5}{3}$ (or equivalent)

c. $-\frac{4}{3}\left(\frac{1}{8}y + 6\right) \geq 4x - 5$

$y \leq -24x - 18$ (or equivalent)

7. Consider the inequality $-2x + 1 < \frac{1}{2}x - 14$.

a. What value of x makes $-2x + 1$ and $\frac{1}{2}x - 14$ equal?

$x = 6$

b. For what values of x is $-2x + 1$ less than $\frac{1}{2}x - 14$? Greater than $\frac{1}{2}x - 14$?

$x > 6$; $x < 6$

c. What is the solution to $-2x + 1 < \frac{1}{2}x - 14$? Explain your thinking.

$x > 6$; Sample reasoning: $-2x + 1$ is less than $\frac{1}{2}x - 14$ for values of x that are greater than 6, so the solution is $x > 6$.

8. Tyler argues that $x = 0$ is a solution to the inequality $-4x < -24$ because it is possible to divide both sides by -4 and get $x < 4$. Diego argues that $x = 0$ is not a solution to the inequality. Who is correct? Explain your thinking.

Diego; Sample response: Substituting 0 into the original inequality results in $0 < -24$, which is not a true statement.

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSA.REI.B.3
2	1	HSA.REI.B.3
3	2	HSA.REI.B.3
4	2	HSA.REI.B.3
5	2	HSA.REI.B.3
6	2	HSA.REI.B.3
7	3	HSA.REI.B.3
8	3	HSA.REI.B.3

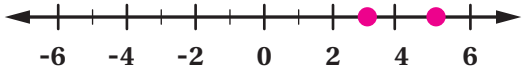
Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 2.11

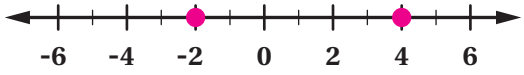
Problems 1–3. Graph all the solutions to each equation.

1. $|x - 4| = 1$



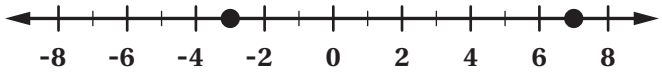
2. $|x - 3| = 2$

3. $|x - 1| = 3$

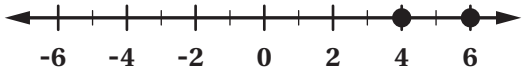


4. What value of t would make $|x - t| = 5$ match the graph?

$t = 2$



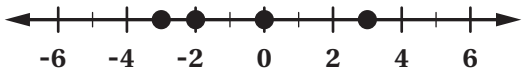
5. Which equations solutions are shown by the graph?



- ☐ **A.** $|x - 1| = 5$
- ☑ **B.** $|x - 5| = 1$
- ☐ **C.** $|x + 5| = 1$
- ☐ **D.** $|x + 1| = 5$

Name: ..... Date: ..... Period: .....

6. Piper is thinking of a number somewhere between -6 and 6. Here are some guesses from their friends. No guess was more than 3 away. Only one guess was correct. What is Piper's number? Explain your thinking.



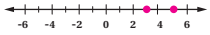
Explanations vary. Piper's friends guessed -3, -2, 0, 1, and 3. The only number is no more than 3 away from the other numbers is 0. Piper is thinking of the number 0.

Name: Date: Period:

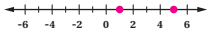
Additional Practice 2.11

Problems 1–3. Graph all the solutions to each equation.

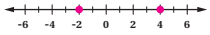
1. $|x - 4| = 1$



2. $|x - 3| = 2$

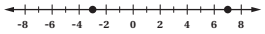


3. $|x - 1| = 3$

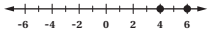


4. What value of t would make $|x - t| = 5$ match the graph?

$t = 2$



5. Which equations solutions are shown by the graph?



- ☐ A. $|x - 1| = 5$
- ☑ B. $|x - 5| = 1$
- ☐ C. $|x + 5| = 1$
- ☐ D. $|x + 1| = 5$

Name: Date: Period:

6. Piper is thinking of a number somewhere between -6 and 6. Here are some guesses from their friends. No guess was more than 3 away. Only one guess was correct. What is Piper's number? Explain your thinking.

Explanations vary. Piper's friends guessed -3, -2, 0, 1, and 3. The only number is no more than 3 away from the other numbers is 0. Piper is thinking of the number 0.

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSA.REI.B.3
2	1	HSA.REI.B.3
3	1	HSA.REI.B.3
4	2	HSA.CED.A.1
5	1	HSA.CED.A.1
6	2	HSA.CED.A.1

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 2.13

Problems 1–3: Selena can spend up to $\$25$ on bagels and croissants at the bakery. A bagel costs $\$2$ and a croissant costs $\$3$.

- b is the number of bagels.
- c is the number of croissants.

1. Which inequality represents the situation?

A. $2b + 3c \leq 25$

B. $2b + 3c \geq 25$

C. $3b + 2c \leq 25$

D. $3b + 2c \geq 25$

2. Explain how you know that $b = 2$ and $c = 3$ are solutions to this situation.

Explanations vary. **When I plug $b = 2$ and $c = 3$ into $2b + 3c \leq 25$, I get $2(2) + 3(3)$ is less than or equal to 25. Since 13 is less than 25, $b = 2$ and $c = 3$ are solutions.**

3. Determine another option for the number of bagels and the number of croissants that Selena can buy at the bakery.

Answers vary. **When I plug $b = 3$ and $c = 2$ into $2b + 3c \leq 25$, I get $2(3) + 3(2)$ is less than or equal to 25. Since 12 is less than 25, $b = 3$ and $c = 2$ are solutions. Selena could also buy 3 bagels and 2 croissants at the bakery.**

4. Write an ordered pair for a point that is not a solution to $x + 5y \geq 42$.

Answers vary. **When I plug $x = 1$ and $y = 9$ into the inequality $x + 5y \geq 42$, I get $1 + 45 \geq 42$, which is not true. Since 46 is not greater than or equal to 42, the ordered pair (1,9) is not a solution to the inequality.**

5. Anthony is at an art store and needs to buy red and green paint tubes for a project. A red paint tube costs $\$6$ and a green paint tube costs $\$7$. Anthony cannot spend more than $\$49$ on red and green paint at the art store.

- g is the number of green paint tubes
- r is the number of red paint tubes

Anthony says that the inequality $6g + 7r \geq 49$ represents all the green and red paint tubes that he can buy at the art store for his project. Do you agree with him? Explain your thinking.

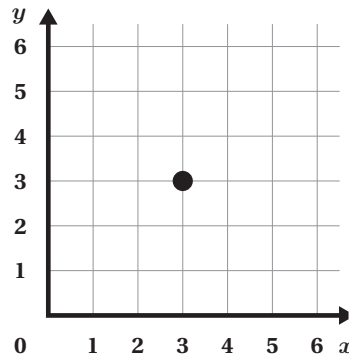
Explanations vary. **No, I do not agree with Anthony. The inequality should be $6g + 7r \leq 49$. Anthony cannot spend at least $\$49$. Rather, Anthony can spend up to and including $\$49$ for the paints at the art store.**

6. Determine if each ordered pair in the table is a solution to the inequality. Circle Yes or No in the table.

$$2x + 7y \leq 67$$

Ordered Pair	Is the ordered pair a solution?
$(2,4)$	(Yes) or No
$(3,7)$	(Yes) or No
$(4,9)$	Yes or (No)

7. Is the point in the graph below a solution to the inequality $x + 0.5y \geq 4$? Circle one.



(Yes) No Maybe

Name: Date: Period:

Additional Practice 2.13

Problems 1–3: Selena can spend up to $25 on bagels and croissants at the bakery. A bagel costs $2 and a croissant costs $3.

- b is the number of bagels.
- c is the number of croissants.

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A. $2b + 3c \leq 25$

B. $2b + 3c \geq 25$

C. $3b + 2c \leq 25$

D. $3b + 2c \geq 25$

2. Explain how you know that $b = 2$ and $c = 3$ are solutions to this situation.

Explanations vary. **When I plug $b = 2$ and $c = 3$ into $2b + 3c \leq 25$, I get $2(2) + 3(3)$ is less than or equal to 25. Since 13 is less than 25, $b = 2$ and $c = 3$ are solutions.**

3. Determine another option for the number of bagels and the number of croissants that Selena can buy at the bakery.

Answers vary. **When I plug $b = 3$ and $c = 2$ into $2b + 3c \leq 25$, I get $2(3) + 3(2)$ is less than or equal to 25. Since 12 is less than 25, $b = 3$ and $c = 2$ are solutions. Selena could also buy 3 bagels and 2 croissants at the bakery.**

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Answers vary. **When I plug $x = 1$ and $y = 9$ into the inequality $x + 5y \geq 42$, I get $1 + 45 \geq 42$, which is not true. Since 46 is not greater than or equal to 42, the ordered pair (1,9) is not a solution to the inequality.**

Name: Date: Period:

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Anthony says that the inequality $6g + 7r \geq 49$ represents all the green and red paint tubes that he can buy at the art store for his project. Do you agree with him? Explain your thinking.

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$$2x + 7y \leq 67$$

Ordered Pair	Is the ordered pair a solution?
(2,4)	(Yes) or No
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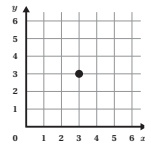
(4,9)	Yes or (No)

7. Is the point in the graph below a solution to the inequality $x + 0.5y \geq 4$? Circle one.



(Yes) No Maybe

Practice Problem Analysis

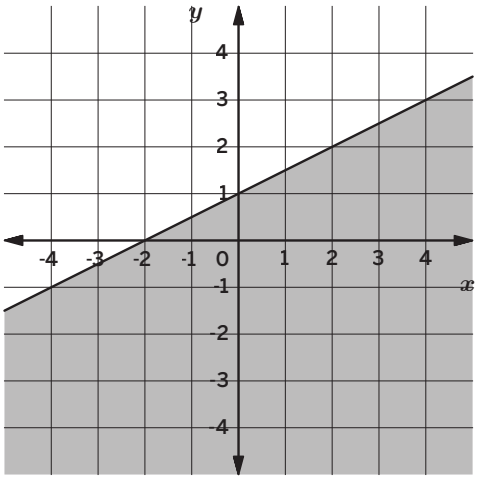
Problem	DOK	Standard(s)
1	2	HSA.CED.A.2
2	2	HSN.Q.A.2
3	2	HSN.Q.A.2
4	2	HSN.Q.A.2
5	2	HSA.CED.A.2
6	2	HSN.Q.A.2
7	2	HSA.REI.D.12

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 2.14

1. Refer to the graph of the inequality $x - 2y \geq -2$. Select *all* the points that are solutions to the inequality.

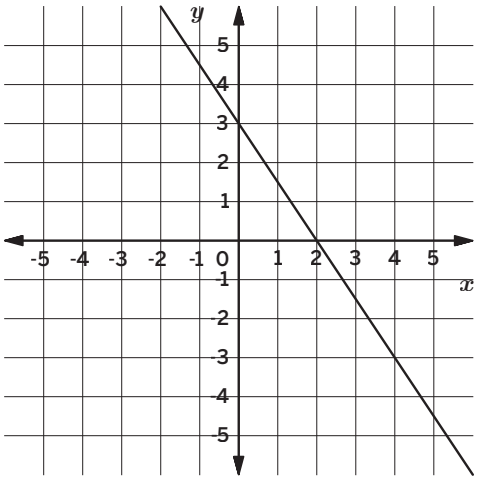


- ☐ A. $(-3, 4)$
- ☑ B. $(-1, -2)$
- ☑ C. $(0, 0)$
- ☐ D. $(1, 3)$
- ☑ E. $(2, 2)$
- ☑ F. $(4, -1)$

2. Which of the following ordered pairs makes the value of the expression $6x - 3y$ *less than* 10?

- A. $(0, -5)$
- (B.) $(1, 3)$
- C. $(2, -1)$
- D. $(4, 0)$

3. Refer to the graph of the equation $2y + 3x = 6$.



a. Are either of the points $(1, 1.5)$ or $(3, -1)$ solutions to the equation? Explain your thinking.

Yes, (1, 1.5) is a solution. Sample response: If I substitute these values into the equation, both sides of the equation equal 6. If I substitute the values of (3, −1) into the equation, the left side of the equation equals 7 and the right side equals 6.

b. Select *all* the points that are solutions to the inequality $2y + 3x \leq 6$.

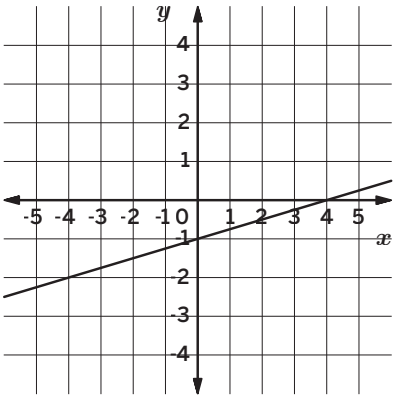
- ☑ A. $(-1, 1)$
- ☑ B. $(2, 0)$
- ☑ C. $(0, 2)$
- ☐ D. $(4, 3)$
- ☐ E. $(5, -4)$

4. Select *all* the ordered pairs that are solutions to the inequality $8x - 3y > 24$.

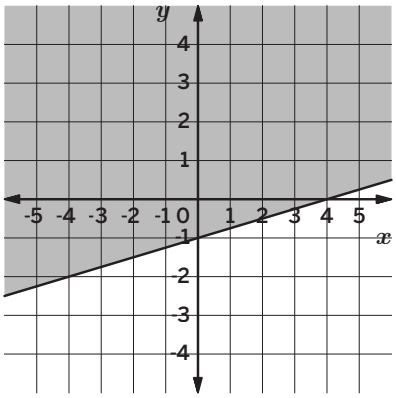
- ☐ A. $(0, 0)$
- ☐ B. $(0, 3)$
- ☐ C. $(1, -1)$
- ☑ D. $(3, -8)$
- ☐ E. $(3, 0)$
- ☑ F. $(4, 1)$

Name: ..... Date: ..... Period: .....

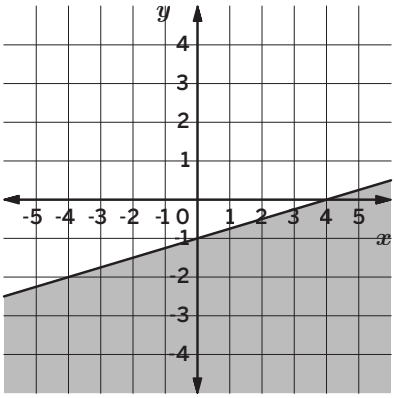
5. Refer to the graph of the equation $x - 4y = 4$. Which of the following represents the solution set to the inequality $x - 4y \leq 4$?



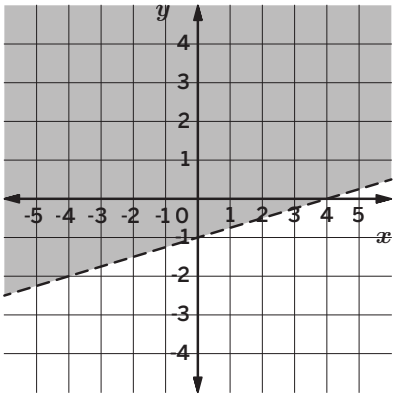
A.



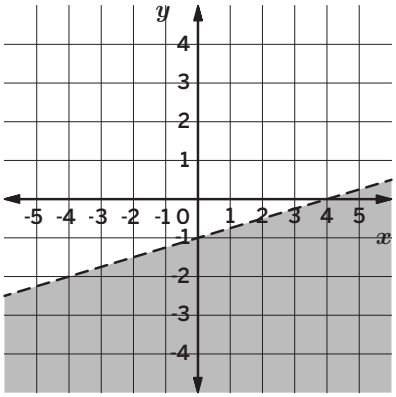
C.



B.



D.



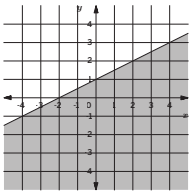
6. Consider the inequality $3x + 7y > -6$. Priya argues that $(-4, 2)$ is a solution to the inequality and Shawn argues that $(3, -2)$ is a solution. Who is correct? Explain your thinking.

Both are correct; Sample response: I substituted the values of both points into the inequality: $3(-4) + 7(2) = 2$ is greater than -6 and $3(3) + 7(-2) = -5$ is greater than -6.

Name: Date: Period:

Additional Practice 2.14

1. Refer to the graph of the inequality $x - 2y \geq -2$. Select *all* the points that are solutions to the inequality.



- ☐ A. $(-3, 4)$
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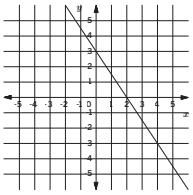
- ☑ C. $(0, 0)$
- ☐ D. $(1, 3)$
- ☑ E. $(2, 2)$
- ☑ F. $(4, -1)$

2. Which of the following ordered pairs makes the value of the expression $6x - 3y$ *less than* 10?

- A. $(0, -5)$
- C. $(2, -1)$
- (B.) $(1, 3)$
- D. $(4, 0)$

3. Refer to the graph of the equation $2y + 3x = 6$.



a. Are either of the points $(1, 1.5)$ or $(3, -1)$ solutions to the equation? Explain your thinking.

Yes, (1, 1.5) is a solution. Sample response: If I substitute these values into the equation, both sides of the equation equal 6. If I substitute the values of $(3, -1)$ into the equation, the left side of the equation equals 7 and the right side equals 6.

b. Select *all* the points that are solutions to the inequality $2y + 3x \leq 6$.

- ☑ A. $(-1, 1)$
- ☑ B. $(2, 0)$
- ☑ C. $(0, 2)$
- ☐ D. $(4, 3)$
- ☐ E. $(5, -4)$

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- ☐ A. $(0, 0)$
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Name: Date: Period:

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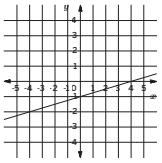
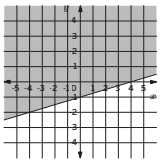
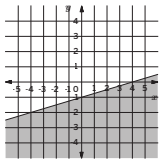


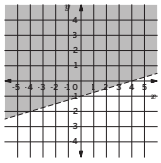
(A.)



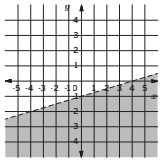
C.



B.



D.



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Both are correct; Sample response: I substituted the values of both points into the inequality: $3(-4) + 7(2) = 2$ is greater than -6 and $3(3) + 7(-2) = -5$ is greater than -6.

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSA.REI.D.12
2	1	HSA.REI.D.12
3	2	HSA.REI.D.12
4	2	HSA.REI.D.12
5	2	HSA.REI.D.12
6	3	HSA.REI.D.12

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 3.01

1. Which would *not* be a good survey question?

A. How many servings of fruits and vegetables do you eat daily?

B. What are your favorite healthy snacks?

C. Why do people dislike eating healthy foods?

D. How much water do you drink daily?

2. Determine which type of data these questions produce.

Question	Categorical or Quantitative?
What is your favorite type of music?	Categorical
How many cups of coffee or tea do you drink daily?	Quantitative
What is your average screen time in hours per day?	Quantitative

3. Select *all* the questions that would produce categorical data.

- ☑ **A.** What mode of transportation do you use most often?
- ☐ **B.** How many cups of coffee or tea do you drink daily?
- ☑ **C.** Which season do you prefer the most?
- ☑ **D.** Where do you spend your time after school?
- ☐ **E.** How many pets do you have?

4. Maya claims that students who play musical instruments have better grades than those who do not. Write two survey questions that Maya could ask to investigate the claim.

1. Sample Answer: Do you play a musical instrument?
2. Sample Answer: What was your GPA last semester?

5. Liam wants to know about the types of movies his classmates prefer. Write a survey question that would give him *categorical* data about his classmates' movie preferences.

Sample Answer: Which is your favorite type of movie? (Comedy, Action, Romance, Science Fiction, Horror, Documentary, or Other)

6. A survey asks students how many hours they spend on homework each week and whether they prefer group work or individual work. Identify what data is collected and whether it is categorical or quantitative.

Hours spent on homework – Quantitative

Prefer working in Groups or as Individuals - Categorical

Problems 7–8: Here are some responses to the question: *What is your grade level in school?*

9th Grade 10th grade 8th grade

7. Brett is not sure whether the data is categorical or quantitative. Explain why this type of data is unclear.

Explanations vary. Although grade level in school is a numerical value, it represents a category in this case. Therefore, it is categorical data.

8. What is another question that might generate data that is unclear?

Sample Answer: What place did you get in the track meet on Saturday?

Name: Date: Period:

Additional Practice 3.01

1. Which would *not* be a good survey question?

- **A.** How many servings of fruits and vegetables do you eat daily?
- **B.** What are your favorite healthy snacks?
- **C.** Why do people dislike eating healthy foods?
- **D.** How much water do you drink daily?

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Question	Categorical or Quantitative?
What is your favorite type of music?	Categorical
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- ☑ **A.** What mode of transportation do you use most often?
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- ☐ **E.** How many pets do you have?

4. Maya claims that students who play musical instruments have better grades than those who do not. Write two survey questions that Maya could ask to investigate the claim.

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Name: Date: Period:

5. Liam wants to know about the types of movies his classmates prefer. Write a survey question that would give him *categorical* data about his classmates' movie preferences.

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6. A survey asks students how many hours they spend on homework each week and whether they prefer group work or individual work. Identify what data is collected and whether it is categorical or quantitative.

Hours spent on homework – Quantitative

Prefer working in Groups or as Individuals - Categorical

Problems 7–8: Here are some responses to the question: *What is your grade level in school?*

9th Grade 10th grade 8th grade

7. Brett is not sure whether the data is categorical or quantitative. Explain why this type of data is unclear.

Explanations vary. Although grade level in school is a numerical value, it represents a category in this case. Therefore, it is categorical data.

8. What is another question that might generate data that is unclear?

Sample Answer: What place did you get in the track meet on Saturday?

Practice Problem Analysis

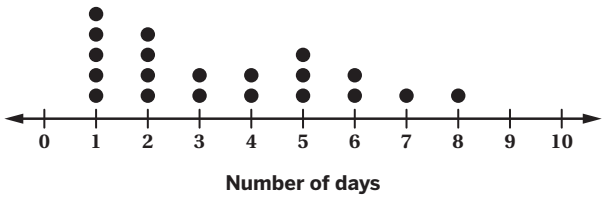
Problem	DOK	Standard(s)
1	1	6.SP.A.1
2	1	HSS.ID.A, HSS.ID.B
3	1	HSS.ID.B
4	2	6.SP.A.1
5	2	6.SP.A.1
6	1	HSS.ID.A, HSS.ID.B
7	2	HSS.ID.A, HSS.ID.B
8	2	HSS.ID.A, HSS.ID.B

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 3.04

1. The dot plot shows the number of days in May that a city had a low temperature less than 40°F, for each year from 2010 to 2024. In how many years was the low temperature in May less than 40°F for 5 days or more?



A. 3

B. 5

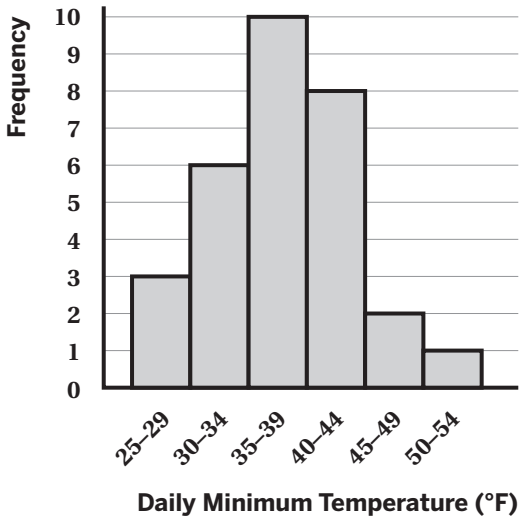
C. 7

D. 8

Problems 2–3: Elena created a histogram about the different minimum temperature in his hometown of Hartford, Connecticut, in degrees Fahrenheit, for each day in March 2020. The histogram below shows how many days the temperatures were in each temperature range.

2. Select *all* of the statements that must be true.

- ☐ A. There were 5 days when the minimum temperature was in the range of 30–34°F.
- ☑ B. There were 11 days when the minimum temperature was 40°F or higher.
- ☑ C. The most common minimum temperature range was 35-39°F.
- ☐ D. There are 31 days of minumum temperature data collected.



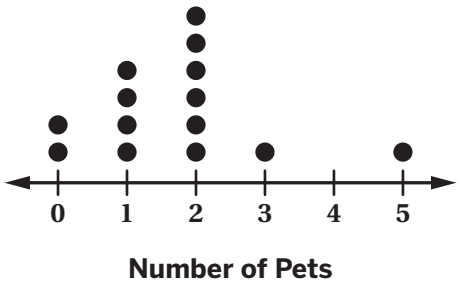
3. Elena claims that half the minimum temperatures are 37°F or less and half are 37°F or greater. Tyler claims that half of the minimum temperatures are 39°F or less and half are 40°F or greater.

Who do you agree with, if either? Explain your thinking.

Explanations vary. I don't agree with either. We can't tell how many of each specific temperature are within each bin of the histogram, so we can't be sure if Elena is right. Tyler is incorrect because there are 19 temperatures that are less than 39°F and only 11 that are 40°F or greater.

Name: ..... Date: ..... Period: .....

Problems 4–6: Sharla asked her scout troop about the number of family pets they each had. She collected the data on the dot plot shown below.



4. How many members of Sharla's scout troop were surveyed?

14

5. How many of the surveyed members have two or more pets?

8

6. Write one true statement that can be answered using the dot plot above that is different from Problems 4 and 5.

Sample Answer: The number of troop members who have 2 pets is 2 less than the number of other troop members combined.

7. Jerome collected the data below about the length of the stop light cycle, in seconds, at three different intersections in his town over the course of an hour.

60	62	85	120	75	106
90	110	90	90	78	120
80	82	115	95	92	95

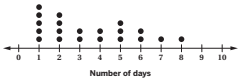
Would this data be best displayed using a dot plot or histogram?
Explain your thinking.

Explanations vary. I would use a histogram due to the large data set and the range of times from 60 to 120 seconds.

Name: Date: Period:

Additional Practice 3.04

1. The dot plot shows the number of days in May that a city had a low temperature less than 40°F, for each year from 2010 to 2024. In how many years was the low temperature in May less than 40°F for 5 days or more?

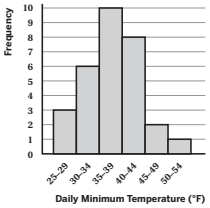


A. 3
B. 5
C. 7
D. 8

Problems 2–3: Elena created a histogram about the different minimum temperature in his hometown of Hartford, Connecticut, in degrees Fahrenheit, for each day in March 2020. The histogram below shows how many days the temperatures were in each temperature range.

2. Select *all* of the statements that must be true.

- ☐ A. There were 5 days when the minimum temperature was in the range of 30–34°F.
- ☑ B. There were 11 days when the minimum temperature was 40°F or higher.
- ☑ C. The most common minimum temperature range was 35-39°F.
- ☐ D. There are 31 days of minumum temperature data collected.



3. Elena claims that half the minimum temperatures are 37°F or less and half are 37°F or greater. Tyler claims that half of the minimum temperatures are 39°F or less and half are 40°F or greater.

Who do you agree with, if either? Explain your thinking.

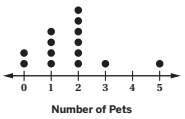
Explanations vary. I don't agree with either. We can't tell how many of each specific temperature are within each bin of the histogram, so we can't be sure if Elena is right. Tyler is incorrect because there are 19 temperatures that are less than 39°F and only 11 that are 40°F or greater.

Name: Date: Period:

Problems 4–6: Sharla asked her scout troop about the number of family pets they each had. She collected the data on the dot plot shown below.

4. How many members of Sharla's scout troop were surveyed?

14



5. How many of the surveyed members have two or more pets?

8

6. Write one true statement that can be answered using the dot plot above that is different from Problems 4 and 5.

Sample Answer: The number of troop members who have 2 pets is 2 less than the number of other troop members combined.

7. Jerome collected the data below about the length of the stop light cycle, in seconds, at three different intersections in his town over the course of an hour.

60	62	85	120	75	106
90	110	90	90	78	120
80	82	115	95	92	95

Would this data be best displayed using a dot plot or histogram? Explain your thinking.

Explanations vary. I would use a histogram due to the large data set and the range of times from 60 to 120 seconds.

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSS.ID.A.1
2	1	HSS.ID.A.1
3	2	HSS.ID.A.1
4	1	HSS.ID.A.1
5	1	HSS.ID.A.1
6	2	HSS.ID.A.1
7	2	HSS.ID.A.1

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 3.05

1. The following data set represents the number of minutes ten students spend walking to school each morning. What is the median?

7, 9, 9, 10, 15, 15, 16, 18, 18, 20

15 minutes

2. What is the IQR of the following data set?

32, 35, 36, 41, 41, 44, 46, 52, 56, 61

A. 16

B. 24

C. 42.5

D. 52

3. A food truck owner tracks the number of customers they have each hour they are open for a month. They determine the median number of customers per hour is 62. What information does this tell the food truck owner about the number of customers per hour?

A. The average number of customers per hour for the food truck is 62.

B. Most of the time, the food truck has 62 customers per hour.

C. Twenty-five percent of the time, the food truck has 62 customers per hour.

D. Half of the time, the food truck has 62 or fewer customers per hour, and half the time, the food truck has 62 or more customers per hour.

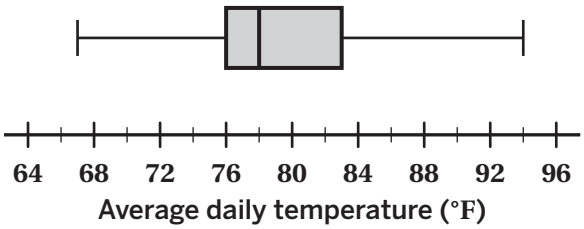
4. Calculate the median of the following data set.

32, 35, 35, 41, 42, 44, 49, 51, 56, 60

43

Name: ..... Date: ..... Period: .....

5. The box plot represents the distribution of average daily temperatures of a town during 20 days of summer. Determine the five-number summary that represents this data.



a Minimum
67

b Q1
76

c Median
78

d Q3
83

e Maximum
94

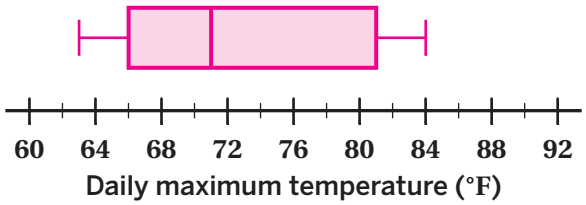
6. The table summarizes the daily maximum temperatures of Charlotte, North Carolina, in degrees Fahrenheit, for the first 18 days of May 2020.

70	75	84	82	70	72	66	63	64
70	66	64	70	81	81	84	82	79

a Determine the five-number summary of the data.

Minimum: 63 Q1: 66 Median: 71 Q3: 81 Maximum: 84

b Create a box plot that represents the data.



Name: Date: Period:

Additional Practice 3.05

1. The following data set represents the number of minutes ten students spend walking to school each morning. What is the median?

7, 9, 9, 10, 15, 15, 16, 18, 18, 20

15 minutes

2. What is the IQR of the following data set?

32, 35, 36, 41, 41, 44, 46, 52, 56, 61

A. 16

B. 24

C. 42.5

D. 52

3. A food truck owner tracks the number of customers they have each hour they are open for a month. They determine the median number of customers per hour is 62. What information does this tell the food truck owner about the number of customers per hour?

A. The average number of customers per hour for the food truck is 62.

B. Most of the time, the food truck has 62 customers per hour.

C. Twenty-five percent of the time, the food truck has 62 customers per hour.

D. Half of the time, the food truck has 62 or fewer customers per hour, and half the time, the food truck has 62 or more customers per hour.

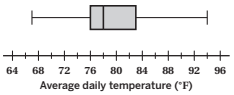
4. Calculate the median of the following data set.

32, 35, 35, 41, 42, 44, 49, 51, 56, 60

43

Name: Date: Period:

5. The box plot represents the distribution of average daily temperatures of a town during 20 days of summer. Determine the five-number summary that represents this data.



a. Minimum: 67

b. Q1: 76

c. Median: 78

d. Q3: 83

e. Maximum: 94

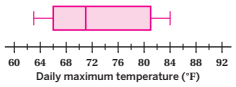
6. The table summarizes the daily maximum temperatures of Charlotte, North Carolina, in degrees Fahrenheit, for the first 18 days of May 2020.

70	75	84	82	70	72	66	63	64
70	66	64	70	81	81	84	82	79

a. Determine the five-number summary of the data.

Minimum: 63 Q1: 66 Median: 71 Q3: 81 Maximum: 84

b. Create a box plot that represents the data.



Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSS.ID.A.2
2	1	HSS.ID.A.2
3	2	HSS.ID.A.2
4	1	HSS.ID.A.1
5	2	HSS.ID.A.1
6	2	HSS.ID.A.1

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 3.06

1. Which distribution shape has a long right tail?

A. Bell-shaped

B. Bimodal

C. Skewed

D. Uniform

2. A dot plot has a uniform distribution. Which of the following is always *true*?

A. There are more data values near the center.

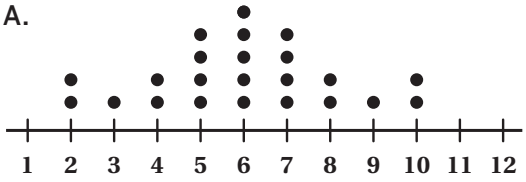
B. The data values are distributed equally for the same frequency.

C. There are more data values on the left or on the right side of the center.

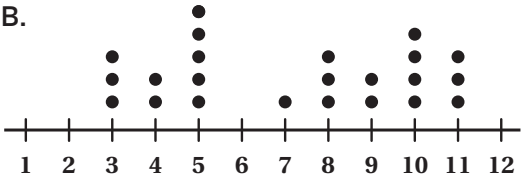
D. There are few data values near the center of the data, with two peaks on the left and right of the center.

3. Select *all* dot plots that have a symmetric, or approximately symmetric, distribution.

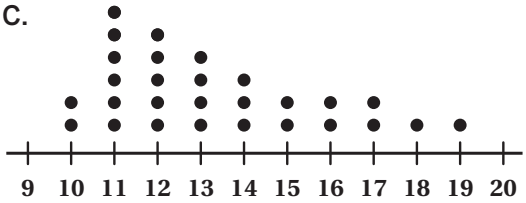
☑ **A.**



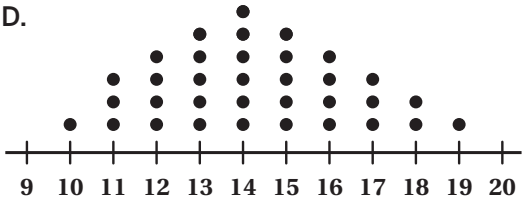
☐ **B.**



☐ **C.**



☑ **D.**



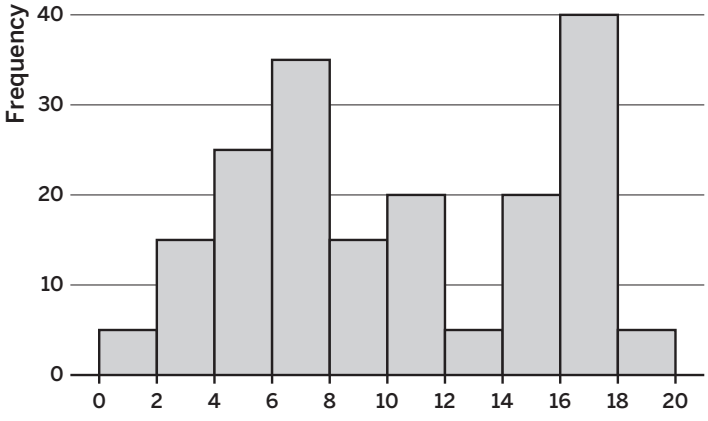
4. Which describes the shape of the distribution of data shown in the histogram?

A. Bimodal

B. Bell-shaped

C. Skewed

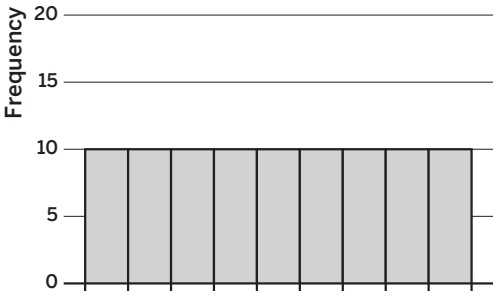
D. Symmetric



Name: ..... Date: ..... Period: .....

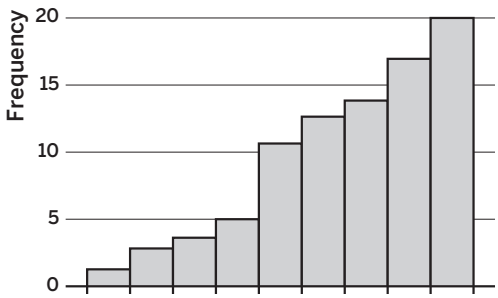
5. Describe the shape of each distribution shown.

a



This data set is uniformly distributed and symmetric.

b

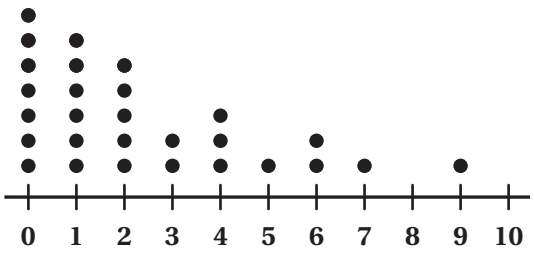


This data set is skewed.

6. A histogram has a symmetric distribution. Which of the following could be possible shapes of the distribution? Select *all* that apply.

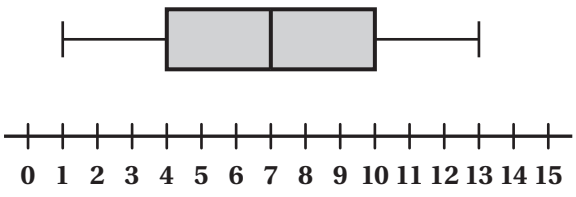
- ☑ **A.** Bell-shaped
- ☑ **B.** Bimodal
- ☐ **C.** Skewed
- ☑ **D.** Uniform

7. Which statements correctly describe how the data is distributed in the given dot plot? Select *all* that apply.



- ☐ **A.** The data is bimodal
- ☑ **B.** The data is skewed.
- ☐ **C.** The data is distributed symmetrically.
- ☑ **D.** The data is bunched mostly in the lower values of 0–2.
- ☐ **E.** The data is uniform.

8. Consider the box plot shown. Lin claims that the distribution of the data is both symmetric and uniform. Andre argues that the distribution is symmetric, but not uniform. Who is correct? Explain your thinking.



Explanations vary. Andre is correct. The data is not uniform because there are values from 1–13 with 50% of them within the range of the values of 4–10.

Name: Date: Period:

Additional Practice 3.06

1. Which distribution shape has a long right tail?

- **A.** Bell-shaped
- **B.** Bimodal
- **C.** Skewed
- **D.** Uniform

2. A dot plot has a uniform distribution. Which of the following is always *true*?

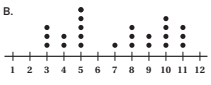
- **A.** There are more data values near the center.
- **B.** The data values are distributed equally for the same frequency.
- **C.** There are more data values on the left or on the right side of the center.
- **D.** There are few data values near the center of the data, with two peaks on the left and right of the center.

3. Select *all* dot plots that have a symmetric, or approximately symmetric, distribution.

- ☑ **A.**

- ☐ **C.**

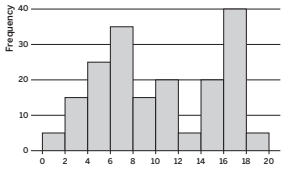
- ☐ **B.**



- ☑ **D.**

4. Which describes the shape of the distribution of data shown in the histogram?

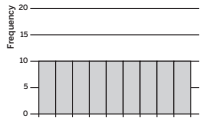
- **A.** Bimodal
- **B.** Bell-shaped
- **C.** Skewed
- **D.** Symmetric



Name: Date: Period:

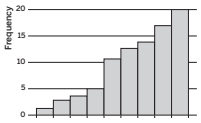
5. Describe the shape of each distribution shown.

a



This data set is uniformly distributed and symmetric.

b

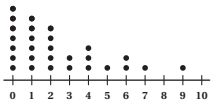


This data set is skewed.

6. A histogram has a symmetric distribution. Which of the following could be possible shapes of the distribution? Select *all* that apply.

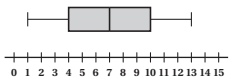
- ☑ **A.** Bell-shaped
- ☑ **B.** Bimodal
- ☐ **C.** Skewed
- ☑ **D.** Uniform

7. Which statements correctly describe how the data is distributed in the given dot plot? Select *all* that apply.



- ☐ **A.** The data is bimodal
- ☑ **B.** The data is skewed.
- ☐ **C.** The data is distributed symmetrically.
- ☑ **D.** The data is bunched mostly in the lower values of 0–2.
- ☐ **E.** The data is uniform.

8. Consider the box plot shown. Lin claims that the distribution of the data is both symmetric and uniform. Andre argues that the distribution is symmetric, but not uniform. Who is correct? Explain your thinking.



Explanations vary. Andre is correct. The data is not uniform because there are values from 1–13 with 50% of them within the range of the values of 4–10.

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSS.ID.A.1
2	1	HSS.ID.A.1
3	1	HSS.ID.A.1
4	1	HSS.ID.A.1
5	1	HSS.ID.A.1
6	1	HSS.ID.A.1
7	1	HSS.ID.A.1
8	2	HSS.ID.A.1

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 3.07

1. Consider the following data set: 13, 22, 5, 4, 7, 13, 8, 11, 10, 41. What is the mean?

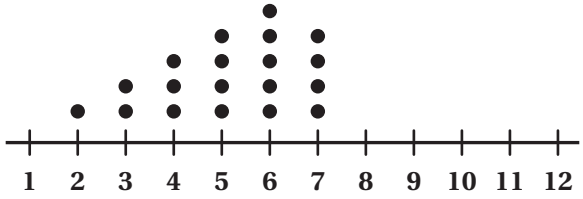
A. 10

B. 10.5

C. 13

D. 13.4

2. Consider the data shown in the dot plot. What is the median?



A. 4

B. 4.5

C. 5

D. 6

3. For each distribution shape, determine whether it is more appropriate to use the mean or median as a measure of center.

a Uniform

Mean

b Skewed

Median

c Symmetric

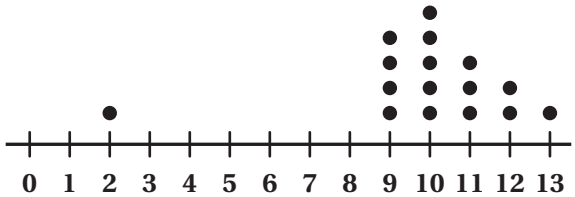
Mean

d Bell-shaped

Mean

4. The number of days that it rained in one month for several cities is displayed in the dot plot. Which is greater, the mean or the median? Explain your thinking using the shape of the distribution.

Median; Sample response: Because the distribution is skewed left, the mean will be less than the median.



5. The data set represents the scores of Han's assignments. Is 56 an outlier? Explain your thinking.

56, 78, 78, 80, 83, 85, 88, 94, 97, 100

No; Sample response: Q1 – 1.5 • IQR = 78 – 1.5(16) = 54, so any values that are less than 54 are considered outliers. Because 56 > 54, it is not an outlier.

6. The following data set represents the number of pounds of paper recycled by 12 different classrooms in a school year. What effect does eliminating the least value, 8, from the data set have on the mean and the median?

8, 45, 48, 51, 52, 58, 60, 64, 65, 68, 69, 70

A. Only the mean will increase.

B. Only the median will increase.

C. Both the mean and median will increase, and the mean will increase more.

D. Both the mean and median will increase, and the median will increase more.

7. Consider the following data set: 2, 13, 4, 9, 1, 0, 11, 5, 5, 24, 2, 8. Mai claims that there is an outlier in this data set. Han thinks that there are no outliers. Who is correct? Explain your thinking.

Mai; Sample response: Q3 + 1.5 • IQR = 10 + 1.5(8) = 22, so any values that are greater than 22 are considered outliers. Because 24 > 22, it is an outlier.

8. Consider the following data set: 45, 45, 46, 46, 50, 50, 50. Shawn claims that the values 50, 55, 55, 60, and 10 are added to the data set, the median will be greater than the mean. Do you agree? Explain your thinking.

Yes; Sample response: The new data set is skewed left with an outlier of 10, which has a greater effect on the median than the mean. The median of the new data set is 50 and the mean is about 46.8.

Name: Date: Period:

Additional Practice 3.07

1. Consider the following data set: 13, 22, 5, 4, 7, 13, 8, 11, 10, 41. What is the mean?

A. 10

B. 10.5

C. 13

D. 13.4 ✓

2. Consider the data shown in the dot plot. What is the median?

A. 4

B. 4.5

C. 5 ✓

D. 6

3. For each distribution shape, determine whether it is more appropriate to use the mean or median as a measure of center.

a. Uniform — Mean

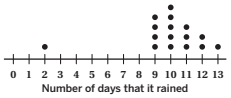
b. Skewed — Median

c. Symmetric — Mean

d. Bell-shaped — Mean

4. The number of days that it rained in one month for several cities is displayed in the dot plot. Which is greater, the mean or the median? Explain your thinking using the shape of the distribution.

Median; Sample response: Because the distribution is skewed left, the mean will be less than the median.



Name: Date: Period:

5. The data set represents the scores of Han's assignments. Is 56 an outlier? Explain your thinking.

56, 78, 78, 80, 83, 85, 88, 94, 97, 100

No; Sample response: $Q1 - 1.5 \cdot IQR = 78 - 1.5(16) = 54$, so any values that are less than 54 are considered outliers. Because $56 > 54$, it is not an outlier.

6. The following data set represents the number of pounds of paper recycled by 12 different classrooms in a school year. What effect does eliminating the least value, 8, from the data set have on the mean and the median?

8, 45, 48, 51, 52, 58, 60, 64, 65, 68, 69, 70

A. Only the mean will increase.

B. Only the median will increase.

C. Both the mean and median will increase, and the mean will increase more. ✓

D. Both the mean and median will increase, and the median will increase more.

7. Consider the following data set: 2, 13, 4, 9, 1, 0, 11, 5, 5, 24, 2, 8. Mai claims that there is an outlier in this data set. Han thinks that there are no outliers. Who is correct? Explain your thinking.

Mai; Sample response: $Q3 + 1.5 \cdot IQR = 10 + 1.5(8) = 22$, so any values that are greater than 22 are considered outliers. Because $24 > 22$, it is an outlier.

8. Consider the following data set: 45, 45, 46, 46, 50, 50, 50. Shawn claims that the values 50, 55, 55, 60, and 10 are added to the data set, the median will be greater than the mean. Do you agree? Explain your thinking.

Yes; Sample response: The new data set is skewed left with an outlier of 10, which has a greater effect on the median than the mean. The median of the new data set is 50 and the mean is about 46.8.

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSS.ID.A.2
2	1	HSS.ID.A.2
3	2	HSS.ID.A.2
4	2	HSS.ID.A.2
5	2	HSS.ID.A.2
6	2	HSS.ID.A.2
7	3	HSS.ID.A.2
8	3	HSS.ID.A.2

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 3.08

1. The data set represents the grams of protein in all the breakfast bars in a box.

8, 8, 8, 8, 8, 8, 8, 8

a What is the mean?

8

b What is the standard deviation?

0

2. Which of the following data sets has the same mean as the data set 3, 3, 3, 3, 3, 3?

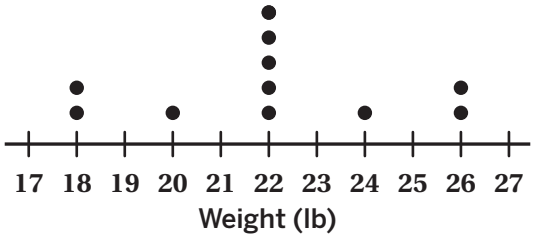
A. −3, −3, −3, −3, −3, −3

B. −2, −2, −2, 4, 4, 4

C. 1, 1, 1, 5, 5, 5

D. 1, 4, 1, 4, 1, 4

3. The dot plot represents the weights of 11 watermelons. Determine which of the following *best* estimates the standard deviation of the weights of the watermelons.



A. 2 lb

B. 10 lb

C. 22 lb

D. 44 lb

4. The mean of Data set A is 30.1 and the standard deviation is 4.3. The mean of Data set B is 15.9 and the standard deviation is 2.5.

a Which data set shows greater variability? Explain your thinking.

Data set A; Sample response: The standard deviation is greater for Data set A than it is for Data set B.

b Complete each statement to describe what differences you would expect to see when comparing dot plots of the two data sets.

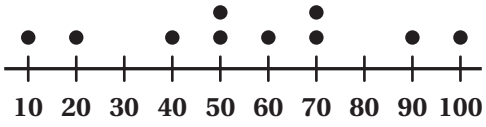
Data set A's dot plot will have most of the data centered around **30.1** with the data, on average, **4.3** units above or below that value.

Data set B's dot plot will have most of the data centered around **15.9** with the data, on average, **2.5** units above or below that value.

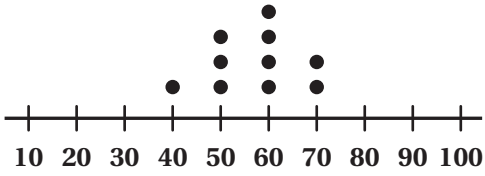
Name: ..... Date: ..... Period: .....

5. Refer to the two dot plots. Which dot plot shows greater variability? Explain your thinking.

Dot plot A



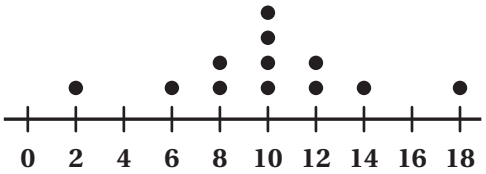
Dot plot B



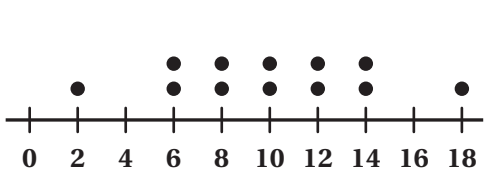
Dot plot A has greater variability because the values are not clustered together; they are spread out from 10 to 100. The values of Dot plot B are all clustered from 40 to 70.

6. Which of the following statements is true about Dot plots J and K?

Dot plot J



Dot plot K



A. The dot plots have the same mean and the same standard deviation.

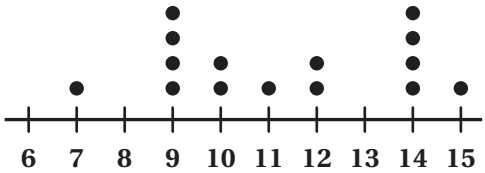
B. The dot plots have the same mean, but different standard deviations.

C. The dot plots have the same standard deviation, but different means.

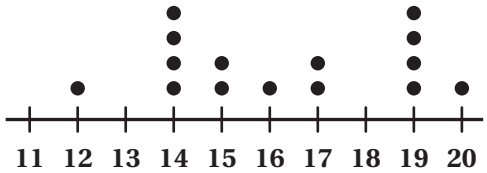
D. The dot plots have different means and different standard deviations.

7. Refer to the two dot plots. Priya claims that the standard deviation of the data in Dot plot D is greater than the standard deviation of the data in Dot plot C. Do you agree with Priya? Explain your thinking.

Dot plot C



Dot plot D



No; Sample response: All the data values in Dot plot D are 5 units greater than the values in Dot plot C, but the distribution is otherwise the same for the two sets of data.

Name: Date: Period:

Additional Practice 3.08

1. The data set represents the grams of protein in all the breakfast bars in a box.

8, 8, 8, 8, 8, 8, 8, 8

a. What is the mean?

8

b. What is the standard deviation?

0

2. Which of the following data sets has the same mean as the data set 3, 3, 3, 3, 3, 3?

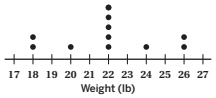
A. −3, −3, −3, −3, −3, −3

B. −2, −2, −2, 4, 4, 4

C. 1, 1, 1, 5, 5, 5

D. 1, 4, 1, 4, 1, 4

3. The dot plot represents the weights of 11 watermelons. Determine which of the following *best* estimates the standard deviation of the weights of the watermelons.



A. 2 lb

B. 10 lb

C. 22 lb

D. 44 lb

4. The mean of Data set A is 30.1 and the standard deviation is 4.3. The mean of Data set B is 15.9 and the standard deviation is 2.5.

a. Which data set shows greater variability? Explain your thinking.

Data set A; Sample response: The standard deviation is greater for Data set A than it is for Data set B.

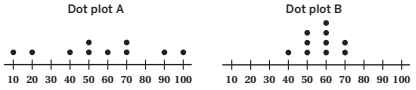
b. Complete each statement to describe what differences you would expect to see when comparing dot plots of the two data sets.

Data set A's dot plot will have most of the data centered around 30.1 with the data, on average, 4.3 units above or below that value.

Data set B's dot plot will have most of the data centered around 15.9 with the data, on average, 2.5 units above or below that value.

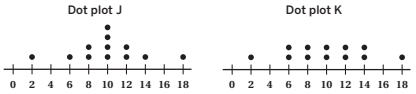
Name: Date: Period:

5. Refer to the two dot plots. Which dot plot shows greater variability? Explain your thinking.



Dot plot A has greater variability because the values are not clustered together; they are spread out from 10 to 100. The values of Dot plot B are all clustered from 40 to 70.

6. Which of the following statements is true about Dot plots J and K?



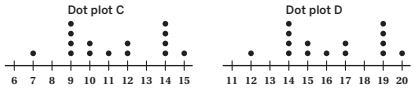
A. The dot plots have the same mean and the same standard deviation.

B. The dot plots have the same mean, but different standard deviations.

C. The dot plots have the same standard deviation, but different means.

D. The dot plots have different means and different standard deviations.

7. Refer to the two dot plots. Priya claims that the standard deviation of the data in Dot plot D is greater than the standard deviation of the data in Dot plot C. Do you agree with Priya? Explain your thinking.



No; Sample response: All the data values in Dot plot D are 5 units greater than the values in Dot plot C, but the distribution is otherwise the same for the two sets of data.

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSS.ID.A.2
2	1	HSS.ID.A.2
3	2	HSS.ID.A.2
4	2	HSS.ID.A.2
5	2	HSS.ID.A.2
6	2	HSS.ID.A.2
7	3	HSS.ID.A.2

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 3.10

1. A set of data has values that are clustered closely near the center. Which of the following is a *true* statement?

A. The distribution is uniform.

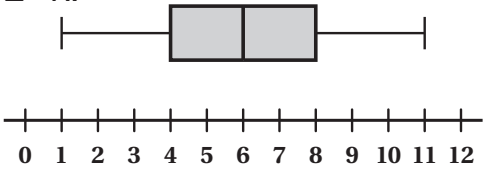
B. The distribution is skewed.

C. The distribution has high variability.

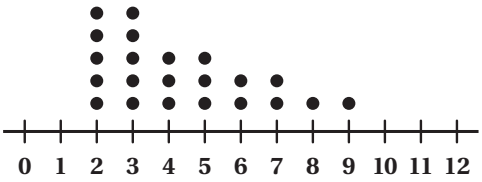
D. The distribution has low variability.

2. Which of the following distributions are symmetric? Select *all* that apply.

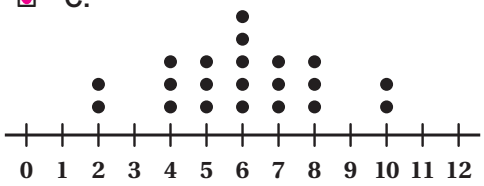
A.



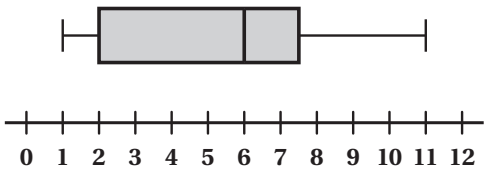
B.



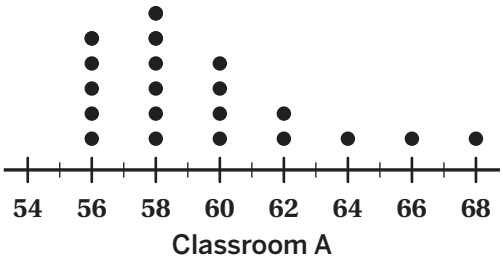
C.

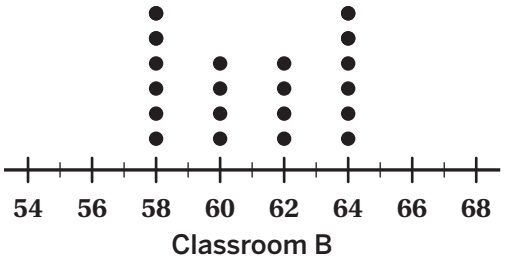


D.



3. The heights, in inches, of 20 students from two different classrooms are shown in the dot plots.





a What are the appropriate measures of center and variability to use with each data set? Explain your thinking.

Classroom A: Median and IQR; Classroom B: Mean and standard deviation; Sample response: The median and IQR are most appropriate for the Classroom A data set because the distribution is skewed. The mean and standard deviation are most appropriate for the Classroom B data set because the distribution is symmetric.

b Which classroom shows a greater typical height? Explain your thinking.

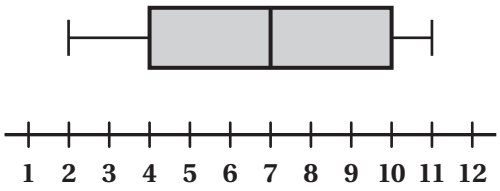
Classroom B; Sample response: The data for Classroom B has a greater mean.

c Which classroom shows a greater variability? Explain your thinking.

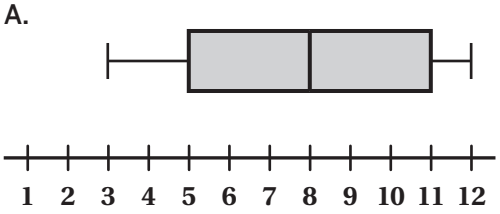
Classroom A; Sample response: It has a greater standard deviation.

Name: ..... Date: ..... Period: .....

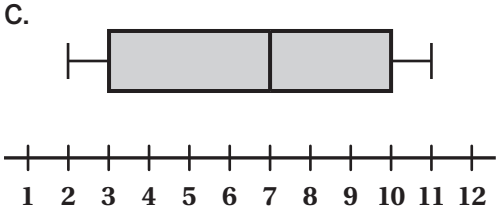
4. Consider the box plot shown. Which of the following box plots has a smaller measure of variability but the same minimum and maximum values?



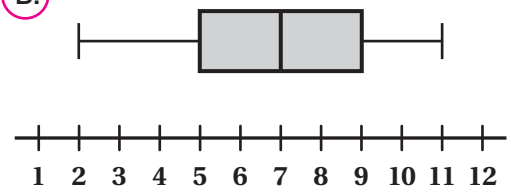
A.



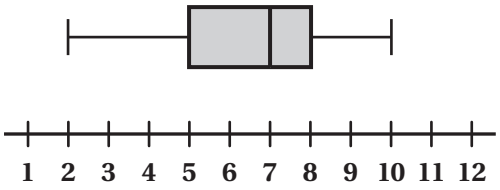
C.



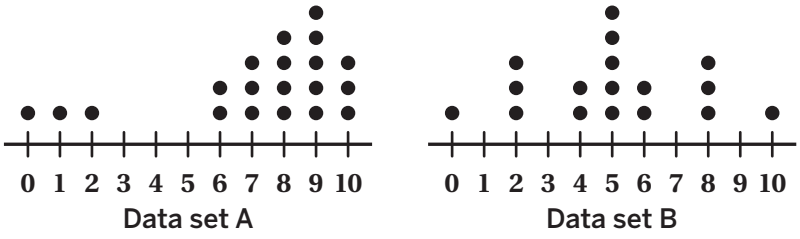
B.



D.



5. Consider the two graphs.



a For which data set would the most appropriate measure of center be the mean? Explain your thinking.

Data Set B; Sample response: The mean is the appropriate measure of center for Data Set B because the distribution is symmetric.

b For which data set would the most appropriate measure of variability be the IQR? Explain your thinking.

Data Set A; Sample response: The IQR is the appropriate measure of variability for Data Set A because the distribution is skewed.

6. The mean height of 30 trees in one orchard is 20.4 ft with a standard deviation of 0.8 ft. The mean height of 30 trees in a second orchard is 20.1 ft with a standard deviation of 4.5 ft. Both distributions are close to being symmetric in shape. Trees that are 20 ft or taller need to be pruned. Which orchard do you think has more trees that need pruning? Explain your thinking.

First orchard; Sample response: Both orchards have a mean height greater than 20 ft. However, the first orchard has a smaller standard deviation, 0.8. Therefore, the majority of trees in that orchard are more than 20 ft tall and need pruning. The second orchard has much greater variability than the first orchard. So, a significant number of those trees are less than 20 ft tall.

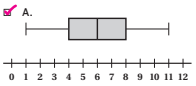
Name: Date: Period:

Additional Practice 3.10

1. A set of data has values that are clustered closely near the center. Which of the following is a *true* statement?

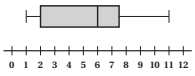
A. The distribution is uniform.
B. The distribution is skewed.
C. The distribution has high variability.
D. The distribution has low variability.

2. Which of the following distributions are symmetric? Select *all* that apply.

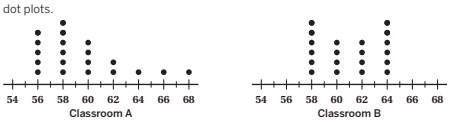
A. 

B. 

C. 

D. 

3. The heights, in inches, of 20 students from two different classrooms are shown in the dot plots.



a. What are the appropriate measures of center and variability to use with each data set? Explain your thinking.

Classroom A: Median and IQR; Classroom B: Mean and standard deviation; Sample response: The median and IQR are most appropriate for the Classroom A data set because the distribution is skewed. The mean and standard deviation are most appropriate for the Classroom B data set because the distribution is symmetric.

b. Which classroom shows a greater typical height? Explain your thinking.

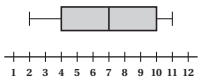
Classroom B; Sample response: The data for Classroom B has a greater mean.

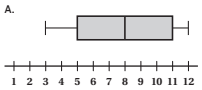
c. Which classroom shows a greater variability? Explain your thinking.

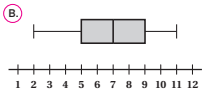
Classroom A; Sample response: It has a greater standard deviation.

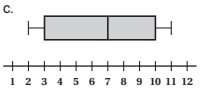
Name: Date: Period:

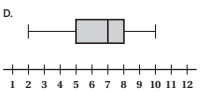
4. Consider the box plot shown. Which of the following box plots has a smaller measure of variability but the same minimum and maximum values?



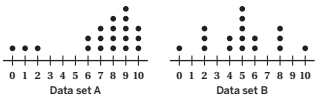
A. 

B. 

C. 

D. 

5. Consider the two graphs.



a. For which data set would the most appropriate measure of center be the mean? Explain your thinking.

Data Set B; Sample response: The mean is the appropriate measure of center for Data Set B because the distribution is symmetric.

b. For which data set would the most appropriate measure of variability be the IQR? Explain your thinking.

Data Set A; Sample response: The IQR is the appropriate measure of variability for Data Set A because the distribution is skewed.

6. The mean height of 30 trees in one orchard is 20.4 ft with a standard deviation of 0.8 ft. The mean height of 30 trees in a second orchard is 20.1 ft with a standard deviation of 4.5 ft. Both distributions are close to being symmetric in shape. Trees that are 20 ft or taller need to be pruned. Which orchard do you think has more trees that need pruning? Explain your thinking.

First orchard; Sample response: Both orchards have a mean height greater than 20 ft. However, the first orchard has a smaller standard deviation, 0.8. Therefore, the majority of trees in that orchard are more than 20 ft tall and need pruning. The second orchard has much greater variability than the first orchard. So, a significant number of those trees are less than 20 ft tall.

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSS.ID.A.2
2	1	HSS.ID.A.2
3	2	HSS.ID.A.2
4	2	HSS.ID.A.2
5	2	HSS.ID.A.2
6	3	HSS.ID.A.2

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 3.11

1. Consider this data set: 0, 0, 1, 1, 2, 4, 4, 5, 6, 20. Which measure of center is greater: the mean or the median?

Mean

2. Consider this data set: 30, 30, 32, 33, 35, 35, 35, 36, 38, 90.

a Determine the mean and median.

39.4; 35

b Eliminate the greatest value, 90, from the data set. Determine the mean and median.

about 33.8; 35

c Was the mean or median affected by eliminating the greatest value?

Mean

3. Consider this data set: 70, 70, 70, 75, 75, 75, 78, 78, 79, 80.

a Do the mean and standard deviation of the data set increase or decrease if the 80 is changed to an 8?

The mean decreases from 75 to 67.8 and the standard deviation increases from about 3.86 to about 21.29.

b If the 80 is changed to an 8, would the median or the mean be a more appropriate measure of center? Explain your thinking.

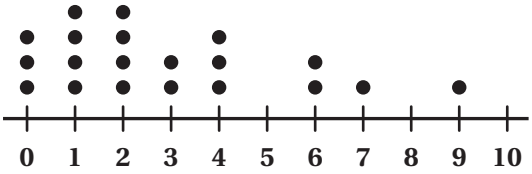
Median; Sample response: The data set with the 8 is a skewed distribution.

4. Consider this data set: −8, 5, 5, 6, 8, 8, 9, 10, 10, 10. If the least value is eliminated from the data set, which measure is affected more: the mean or the median? Explain your thinking.

Mean; Sample response: If −8 is eliminated, the mean increases from 6.3 to about 7.9, but the median does not change.

Name: ..... Date: ..... Period: .....

5. Refer to the dot plot.



a Which measure of center do you think is more appropriate for this data set? Explain your thinking.

Median; Sample response: The median is a more appropriate measure of center because the distribution appears to be skewed.

b Which measure of variability do you think is more appropriate for this data set? Explain your thinking.

IQR; Sample response: the IQR is a more appropriate measure of variability because the distribution appears to be skewed.

c If the maximum value is replaced by a value that is twice as large, which measures of center and variability would change? Explain your thinking.

Mean and standard deviation; Sample response: The values of the mean and standard deviation would increase, but the values of the median and IQR would remain the same.

Name: Date: Period:

Additional Practice 3.11

1. Consider this data set: 0, 0, 1, 1, 2, 4, 4, 5, 6, 20. Which measure of center is greater: the mean or the median?

Mean

2. Consider this data set: 30, 30, 32, 33, 35, 35, 35, 36, 38, 90.

a. Determine the mean and median.

39.4; 35

b. Eliminate the greatest value, 90, from the data set. Determine the mean and median.

about 33.8; 35

c. Was the mean or median affected by eliminating the greatest value?

Mean

3. Consider this data set: 70, 70, 70, 75, 75, 75, 78, 78, 79, 80.

a. Do the mean and standard deviation of the data set increase or decrease if the 80 is changed to an 8?

The mean decreases from 75 to 67.8 and the standard deviation increases from about 3.86 to about 21.29.

b. If the 80 is changed to an 8, would the median or the mean be a more appropriate measure of center? Explain your thinking.

Median; Sample response: The data set with the 8 is a skewed distribution.

4. Consider this data set: −8, 5, 5, 6, 8, 8, 9, 10, 10, 10. If the least value is eliminated from the data set, which measure is affected more: the mean or the median? Explain your thinking.

Mean; Sample response: If −8 is eliminated, the mean increases from 6.3 to about 7.9, but the median does not change.

Name: Date: Period:

5. Refer to the dot plot.

a. Which measure of center do you think is more appropriate for this data set? Explain your thinking.

Median; Sample response: The median is a more appropriate measure of center because the distribution appears to be skewed.

b. Which measure of variability do you think is more appropriate for this data set? Explain your thinking.

IQR; Sample response: the IQR is a more appropriate measure of variability because the distribution appears to be skewed.

c. If the maximum value is replaced by a value that is twice as large, which measures of center and variability would change? Explain your thinking.

Mean and standard deviation; Sample response: The values of the mean and standard deviation would increase, but the values of the median and IQR would remain the same.

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSS.ID.A.2
2	1	HSS.ID.A.3
3	2	HSS.ID.A.2
4	2	HSS.ID.A.3
5	3	HSS.ID.A.2, HSS.ID.A.3

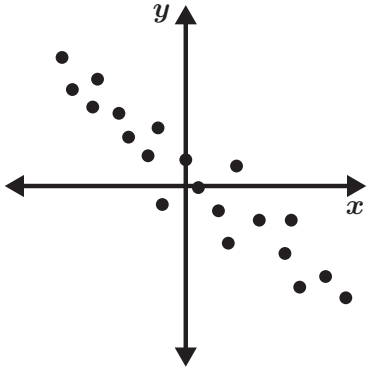
Notes:

Name: ..... Date: ..... Period: .....

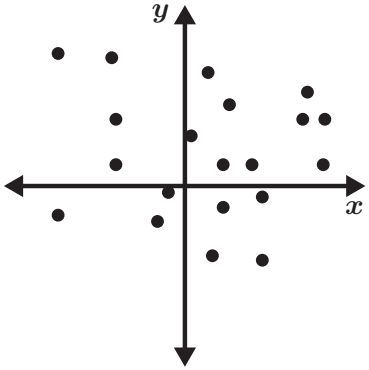
Additional Practice 3.13

Problems 1–4: Determine whether each scatterplot has a strong linear relationship, weak linear relationship, or no linear relationship. Circle your choices for each problem.

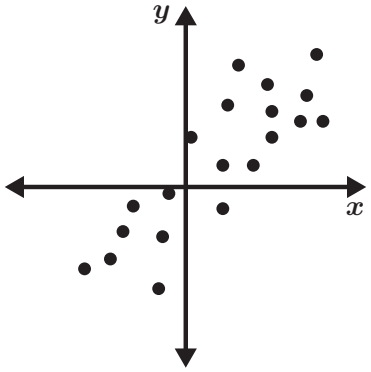
1. (Strong) Weak None



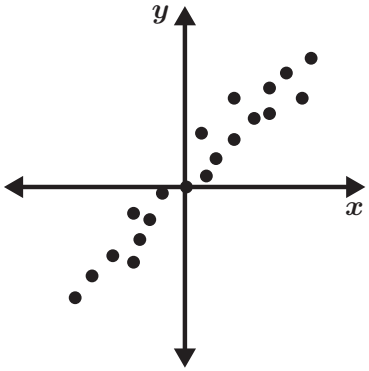
2. Strong Weak (None)



3. Strong (Weak) None



4. (Strong) Weak None



5. A scatter plot is found to have a correlation coefficient of $r = 0.88$. What does this tell you about the data? Select *all* that apply.

- ☐ **A.** The data has a weak association.
- ☑ **B.** The data has a strong association.
- ☑ **C.** The trend of the data has a positive association.
- ☐ **D.** The trend of the data has a negative association.

6. Which correlation coefficient indicates the *weakest* association?

A. $r = 0.75$

B. $r = 0.23$

C. $r = -0.32$

D. $r = -0.94$

7. Merilyn was talking about the strength of linear associations. She said that all data with negative r-values are weak associations and all data with positive r-values are strong associations. What is incorrect about Merilyn's thinking? How would you convince her otherwise?

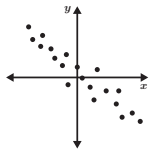
Explanations vary: **Merilyn is incorrect because the closer the correlation coefficient, r, is to -1 or 1, the stronger the association. So, you can have a strong negative association r-value, like $r = -.99$, and a weak positive association, like $r = .50$.**

Name: Date: Period:

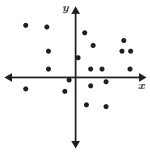
Additional Practice 3.13

Problems 1–4: Determine whether each scatterplot has a strong linear relationship, weak linear relationship, or no linear relationship. Circle your choices for each problem.

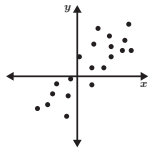
1. (Strong) Weak None



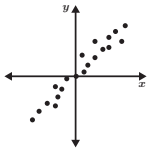
2. Strong Weak (None)



3. Strong (Weak) None



4. (Strong) Weak None



5. A scatter plot is found to have a correlation coefficient of $r = 0.88$. What does this tell you about the data? Select *all* that apply.

- ☐ **A.** The data has a weak association.
- ☑ **B.** The data has a strong association.
- ☑ **C.** The trend of the data has a positive association.
- ☐ **D.** The trend of the data has a negative association.

Name: Date: Period:

6. Which correlation coefficient indicates the *weakest* association?

- **A.** $r = 0.75$
- (**B.**) $r = 0.23$
- **C.** $r = -0.32$
- **D.** $r = -0.94$

7. Merilyn was talking about the strength of linear associations. She said that all data with negative r-values are weak associations and all data with positive r-values are strong associations. What is incorrect about Merilyn's thinking? How would you convince her otherwise?

Explanations vary: **Merilyn is incorrect because the closer the correlation coefficient, r, is to -1 or 1, the stronger the association. So, you can have a strong negative association r-value, like $r = -.99$, and a weak positive association, like $r = .50$.**

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSS.ID.A.1, HSS.ID.A.3
2	1	HSS.ID.A.1, HSS.ID.A.3
3	1	HSS.ID.A.1, HSS.ID.A.3
4	1	HSS.ID.A.1, HSS.ID.A.3
5	1	HSS.ID.C.8
6	1	HSS.ID.C.8
7	2	HSS.ID.C.8

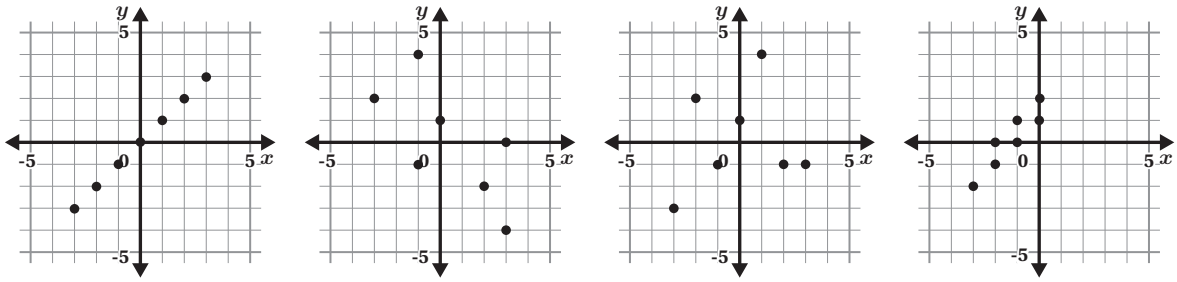
Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 3.14

1. Match each scatter plot to its correlation coefficient, r.

A. $r = 0.92$. **B.** $r = 0.16$ **C.** $r = 1$ **D.** $r = -0.68$



C D B A

2. A scatter plot is found to have a correlation coefficient of $r = -0.49$. Select *all* the conclusions you can make about the data.

- ☑ **A.** There is a weak association between the two variables.
- ☐ **B.** There is a strong association between the two variables.
- ☐ **C.** There is no association between the two variables.
- ☐ **D.** As one variable increases, the other increases.
- ☑ **E.** As one variable increases, the other decreases.

3. The data in the table represents the number of cans students collected during a school food drive. Elena graphs the data and claims the correlation coefficient for the data would likely be a number between 0.5 and 1. Lin argues that the correlation coefficient would likely be a number between 0 and 0.5. Who do you agree with? Explain your thinking.

Day	1	2	3	4	5	6	7	8
Number of Cans	20	50	45	53	60	62	71	80

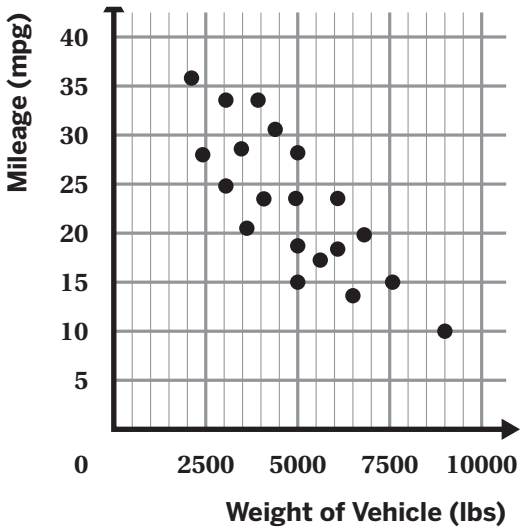
Explanations vary. Elena is correct. As the days progress, the number of cans increases. There are some data points, like (2, 50), that fall out of the positive pattern but overall, this pattern would result in a r-value between 0.5 and 1.

Name: ..... Date: ..... Period: .....

Problems 4–6: Marcus is interested in buying a new car that gets good gas mileage. He found data about two variables:

- Weight of vehicle (in pounds)
- Mileage of vehicle (miles/gallon)
- $r = -0.78$

Here is a scatter plot for the data.



4. The point $(2200, 36)$ represents a Honda Civic. What do the coordinates tell us about the Honda Civic?

The Honda Civic weighs about 2200 pounds and gets a gas mileage of about 36 mpg.

5. Based on the r-value of $r = -0.88$, what relationship is there between the variables? Circle one.

Positive (Negative) Neither

6. What is the strength of the relationship? Circle one.

Weak (Strong)

7. Which of the following claims can be made about the relationship between the weight of a car and its average mileage?

A. The lighter the vehicle, the better its gas mileage.

B. The heavier the vehicle, the better its gas mileage.

C. There is a negative association between the weight of a vehicle and its average gas mileage.

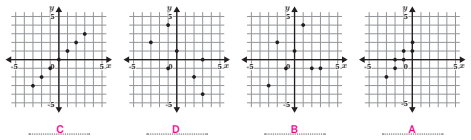
D. There is a positive association between the weight of a vehicle and its average gas mileage.

Name: Date: Period:

Additional Practice 3.14

1. Match each scatter plot to its correlation coefficient, r.

A. $r = 0.92$. B. $r = 0.16$ C. $r = 1$ D. $r = -0.68$



C D B A

2. A scatter plot is found to have a correlation coefficient of $r = -0.49$. Select *all* the conclusions you can make about the data.

- ☑ **A.** There is a weak association between the two variables.
- ☐ **B.** There is a strong association between the two variables.
- ☐ **C.** There is no association between the two variables.
- ☐ **D.** As one variable increases, the other increases.
- ☑ **E.** As one variable increases, the other decreases.

3. The data in the table represents the number of cans students collected during a school food drive. Elena graphs the data and claims the correlation coefficient for the data would likely be a number between 0.5 and 1. Lin argues that the correlation coefficient would likely be a number between 0 and 0.5. Who do you agree with? Explain your thinking.

Day	1	2	3	4	5	6	7	8
Number of Cans	20	50	45	53	60	62	71	80

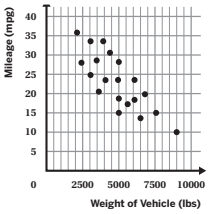
Explanations vary. Elena is correct. As the days progress, the number of cans increases. There are some data points, like (2, 50), that fall out of the positive pattern but overall, this pattern would result in a r-value between 0.5 and 1.

Name: Date: Period:

Problems 4–6: Marcus is interested in buying a new car that gets good gas mileage. He found data about two variables:

- Weight of vehicle (in pounds)
- Mileage of vehicle (miles/gallon)
- $r = -0.78$

Here is a scatter plot for the data.



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Positive (Negative) Neither

6. What is the strength of the relationship? Circle one.

Weak (Strong)

7. Which of the following claims can be made about the relationship between the weight of a car and its average mileage?

- **A.** The lighter the vehicle, the better its gas mileage.
- **B.** The heavier the vehicle, the better its gas mileage.
- (**C.**) There is a negative association between the weight of a vehicle and its average gas mileage.
- **D.** There is a positive association between the weight of a vehicle and its average gas mileage.

Practice Problem Analysis

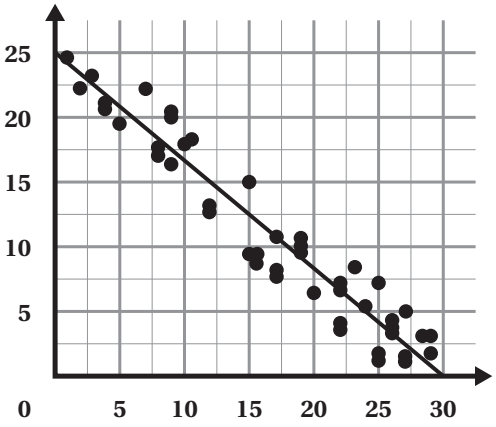
Problem	DOK	Standard(s)
1	1	HSS.ID.C.8
2	1	HSS.ID.C.8
3	2	HSS.ID.C.8, HSS.ID.A.3
4	2	HSS.ID.C.8
5	1	HSS.ID.C.8
6	1	HSS.ID.C.8
7	2	HSS.ID.C.8, HSS.ID.A.3

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 3.15

1. Which is the best estimate for the slope of the line?



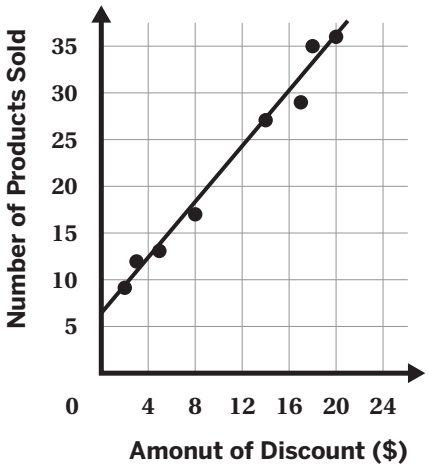
A. $-\frac{5}{6}$

B. $-\frac{1}{2}$

C. $\frac{1}{2}$

D. $\frac{5}{6}$

Problems 2–5. The scatter plot shows the amount of a discount on a product and the number of products that are sold in Store A owned by a company.



2. The scatter plot includes a point at (8, 17). Describe what this point means in context.

Explanations vary. The point (8, 17) means that when the discount is $8, then 17 products are sold.

3. What is another point that would fit this trend line? What does it represent?

Explanations vary. The point (12, 24) means that when the discount is $12, then 24 products are sold.

4. The equation for the line that best fits this data is $y = 1.48x + 6.15$. What do the numbers 1.48 and 6.15 mean in this context?

Explanations vary. The 1.48 means that for every $1 discount, 1.48 products are sold. The 6.15 means that about 6 products are sold without any discounts.

5. The company decides to collect the same data at their other two stores. The equation of their lines of best fit are shown in the table.

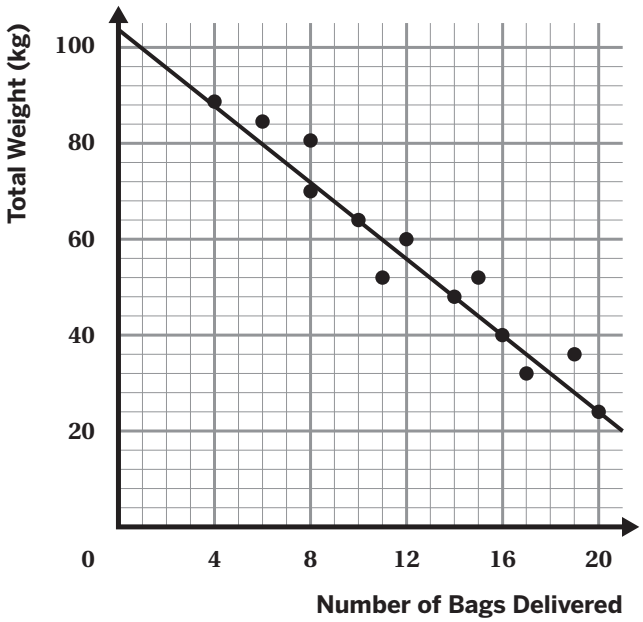
Store	Line of Best Fit
A	$y = 1.4x + 6.15$
B	$y = 0.85x + 5$
C	$y = 1.72x + 5.5$

Which store is the *least* profitable, or sells the *least* amount of products with each $1 of discount? Explain your thinking.

Explanations vary. Store C. They sell one product for every $1.72 discount. The other stores have a lower discount rate to sell one product.

Name: Date: Period:

6. The scatter plot shows the total weight of bags of groceries to be delivered to customers and the number of bags delivered. The equation for the line of fit is given by $y = -4x + 105.6$, where y represents the total weight in kilograms and x represents the number of bags that are delivered. The slope of the line is -4 and the y-intercept is 105.6.



Which of the following statements are *true*?
Select *all* that apply.

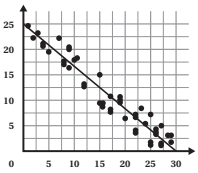
- ☐ **A.** Each additional bag delivered increases the total weight by about 4 kilograms.
- ☑ **B.** Each additional bag delivered decreases the total weight by about 4 kilograms.
- ☐ **C.** Each additional bag delivered decreases the total weight by about 105.6 kilograms.
- ☑ **D.** Before any bags are delivered, the total weight of the groceries is 105.6 kilograms.
- ☐ **E.** After about 106 bags are delivered, the total weight is 0 kilograms.

Name: Date: Period:

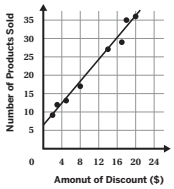
Additional Practice 3.15

1. Which is the best estimate for the slope of the line?

- A. $-\frac{5}{6}$
- B. $-\frac{1}{2}$
- C. $\frac{1}{2}$
- D. $\frac{5}{6}$



Problems 2–5. The scatter plot shows the amount of a discount on a product and the number of products that are sold in Store A owned by a company.



2. The scatter plot includes a point at (8, 17). Describe what this point means in context.

Explanations vary. The point (8, 17) means that when the discount is $8, then 17 products are sold.

3. What is another point that would fit this trend line? What does it represent?

Explanations vary. The point (12, 24) means that when the discount is $12, then 24 products are sold.

4. The equation for the line that best fits this data is $y = 1.48x + 6.15$. What do the numbers 1.48 and 6.15 mean in this context?

Explanations vary. The 1.48 means that for every $1 discount, 1.48 products are sold. The 6.15 means that about 6 products are sold without any discounts.

5. The company decides to collect the same data at their other two stores. The equation of their lines of best fit are shown in the table.

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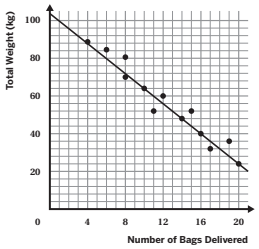
Which store is the *least* profitable, or sells the *least* amount of products with each $1 of discount? Explain your thinking.

Explanations vary. Store C. They sell one product for every $1.72 discount. The other stores have a lower discount rate to sell one product.

Name: Date: Period:

6. The scatter plot shows the total weight of bags of groceries to be delivered to customers and the number of bags delivered. The equation for the line of fit is given by $y = -4x + 105.6$, where y represents the total weight in kilograms and x represents the number of bags that are delivered. The slope of the line is -4 and the y-intercept is 105.6.



Which of the following statements are *true*?
Select *all* that apply.

- ☐ A. Each additional bag delivered increases the total weight by about 4 kilograms.
- ☑ B. Each additional bag delivered decreases the total weight by about 4 kilograms.
- ☐ C. Each additional bag delivered decreases the total weight by about 105.6 kilograms.
- ☑ D. Before any bags are delivered, the total weight of the groceries is 105.6 kilograms.
- ☐ E. After about 106 bags are delivered, the total weight is 0 kilograms.

Practice Problem Analysis

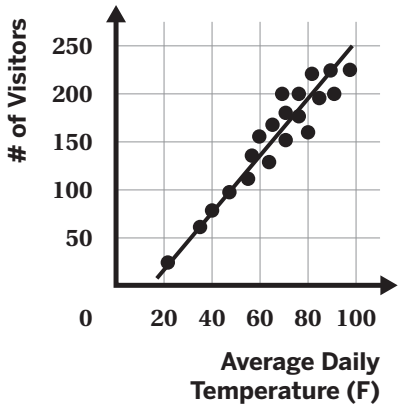
Problem	DOK	Standard(s)
1	1	HSS.ID.B.6
2	1	HSS.ID.C.7
3	1	HSS.ID.C.6A
4	1	HSS.ID.C.7
5	2	HSS.ID.C.7
6	2	HSS.ID.C.7

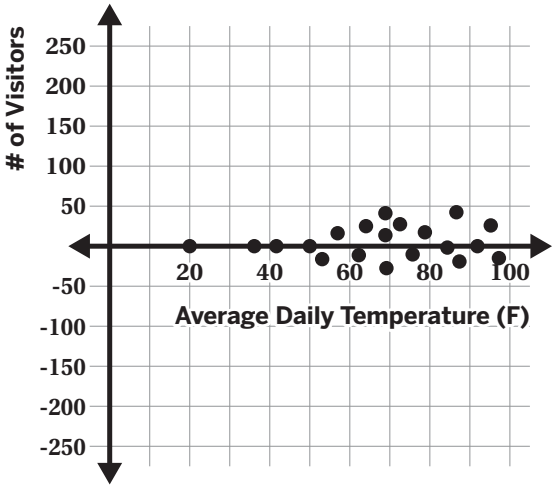
Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 3.16

Problems 1–2: The scatterplot shows the number of visitors to a local beach, the average daily temperature, and a line that best fits the data. The residual plot is also shown.





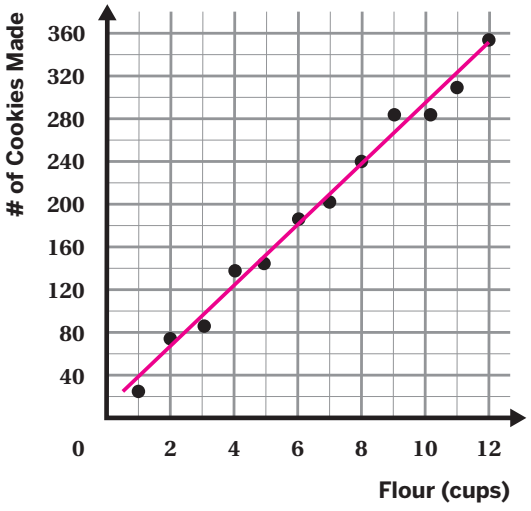
1. Predict the number of visitors at the beach when it is 70°F.

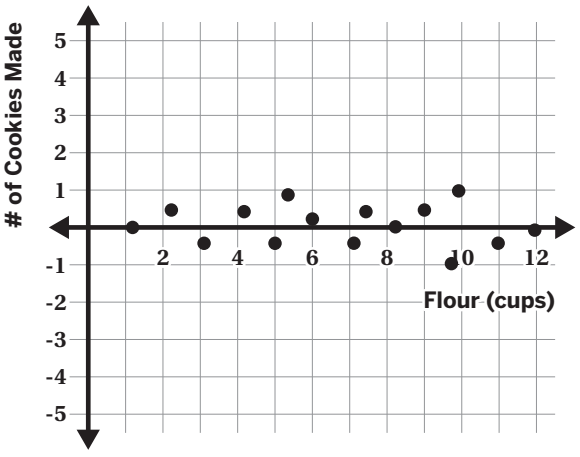
Responses vary. Around 160 visitors.

2. How can you tell that the graphed line is a good fit for the data? Use the residual plot if it helps your thinking.

Explanations vary. The line of best fit follows the same direction as the data and the data fit closely around the line, both on the scatterplot and in the residual plot.

3. Here is a scatter plot and its corresponding residual plot.
Draw a line of fit on the scatter plot that corresponds to the residual plot.

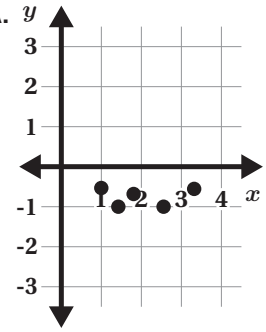




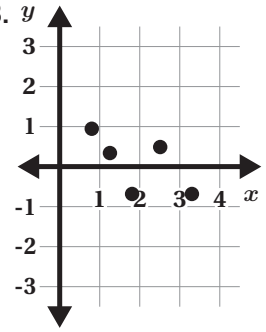
Name: Date: Period:

4. These residual plots are from the same set of data, but each one represents a different line of fit. Which residual plot shows the best line of fit?

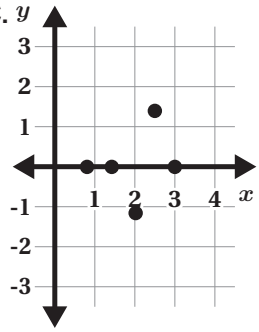
A.



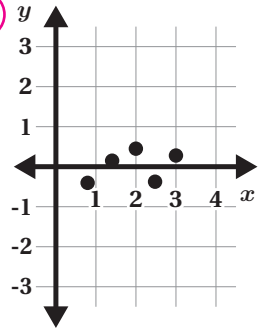
B.



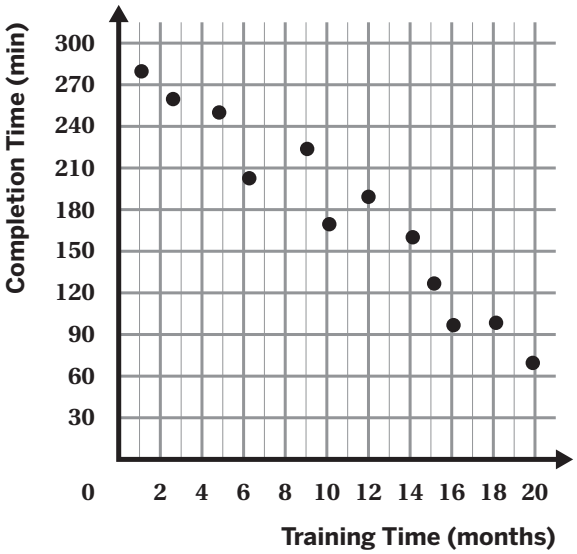
C.



D.



Problems 5–6: This scatter plot shows the relationship between the number of months training for a marathon to the completion time (in minutes).



5. Which r-value could represent the correlation coefficient for this data?

A. 0.82

B. -0.82

C. 0.26

D. -0.26

6. Which equation could represent the line of best fit?

A. $y = 290x + 12$

B. $y = 12x + 290$

C. $y = -290x + 12$

D. $y = -12x + 290$

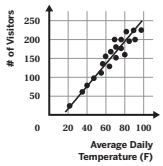
Explain your thinking.

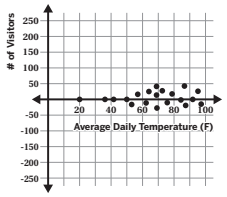
Explanations vary. The y-intercept of the line of best fit is between 270 and 300 and the slope of the line is negative.

Name: Date: Period:

Additional Practice 3.16

Problems 1–2: The scatterplot shows the number of visitors to a local beach, the average daily temperature, and a line that best fits the data. The residual plot is also shown.





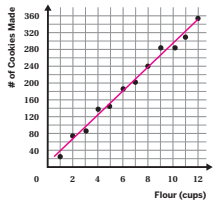
1. Predict the number of visitors at the beach when it is 70°F.

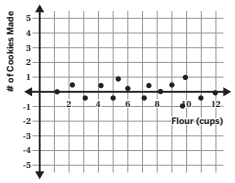
   Responses vary. Around 160 visitors.

2. How can you tell that the graphed line is a good fit for the data? Use the residual plot if it helps your thinking.

   Explanations vary. The line of best fit follows the same direction as the data and the data fit closely around the line, both on the scatterplot and in the residual plot.

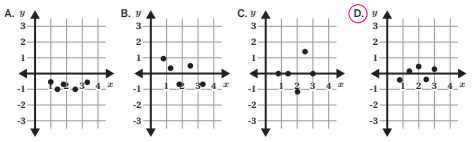
3. Here is a scatter plot and its corresponding residual plot.
   Draw a line of fit on the scatter plot that corresponds to the residual plot.



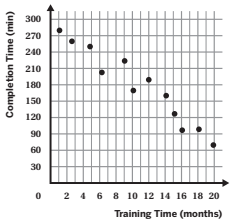


Name: Date: Period:

4. These residual plots are from the same set of data, but each one represents a different line of fit. Which residual plot shows the best line of fit?



Problems 5–6: This scatter plot shows the relationship between the number of months training for a marathon to the completion time (in minutes).



5. Which r-value could represent the correlation coefficient for this data?

   A. 0.82 B. -0.82

   C. 0.26 D. -0.26

6. Which equation could represent the line of best fit?

   A. $y = 290x + 12$ B. $y = 12x + 290$

   C. $y = -290x + 12$ D. $y = -12x + 290$

   Explain your thinking.

   Explanations vary. The y-intercept of the line of best fit is between 270 and 300 and the slope of the line is negative.

Practice Problem Analysis

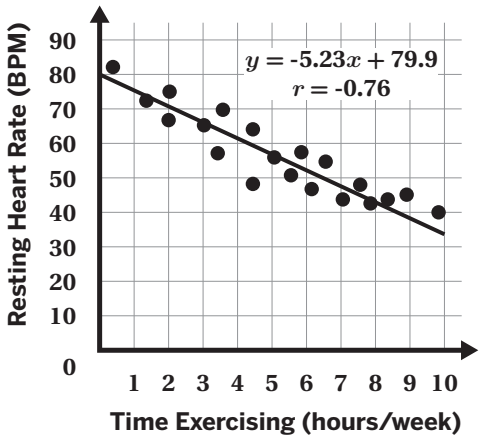
Problem	DOK	Standard(s)
1	2	HSS.ID.B.6a
2	2	HSS.ID.B.6b
3	2	HSS.ID.B.6c
4	1	HSS.ID.B.6b
5	1	HSS.ID.C.8
6	1	HSS.ID.C.7

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 3.17

Problems 1–3: This scatter plot shows the relationship between the number of hours a person exercises each week and their resting heart rate, in beats per minute.



1. The equation for the line of best fit is $y = -5.23x + 79.9$.

a What does the 79.9 mean in this situation?

Explanations vary. The resting heart rate of someone who doesn't exercise.

b What does the -5.23 mean in this situation?

Explanations vary. The decrease in resting heart rate expected with every extra hour of exercise a week.

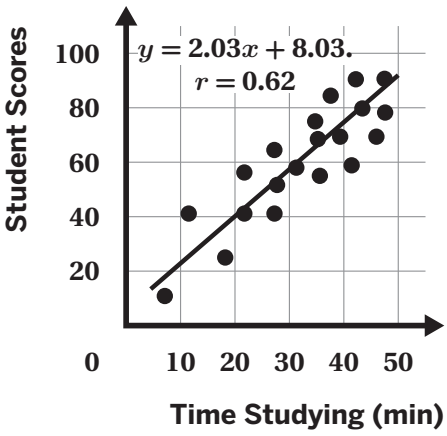
2. Nina exercised for 4 hours this week. Use the equation of line of best fit to predict her resting heart rate.

$y = -5.23(4) + 79.9 = 58.98$ BPM

3. Do you think the prediction is accurate? Use the r-value to explain your thinking.

Explanations vary. Looking at the data for 4 hours of exercise, there is almost 20 BPM difference between those two values. However, I think it is a close estimate to the line of best fit, since the r-value is pretty strong.

Problems 4–6: The scatter plot shows the relationship between the amount of time spent studying for a recent math test (in minutes) and the scores the students earned on the test.



4. The equation for the best fit line is $y = 2.03x + 8.03$. What does the 2.03 mean in this situation?

For every one minutes spent studying, you will raise your test score by 2.03 points.

5. Rajah studied for this test for 40 minutes. Use the equation of line of best fit to predict his score on the test.

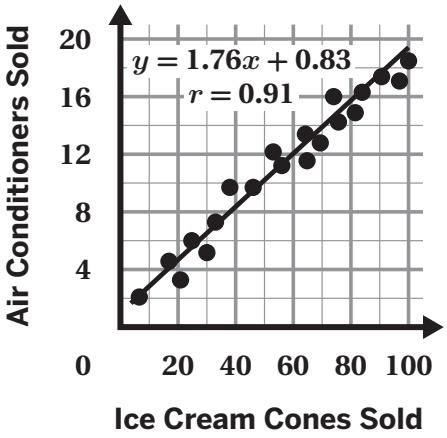
$y = 2.03(40) + 8.03 = 89.23$ points

6. Do you think the prediction is accurate? Use the r-value to explain your thinking.

Explanations vary. Looking at the data for 40 minutes of studying, there is almost a 15 point difference between those two values. However, I think it is a close estimate to the line of best fit, since the r-value is strong.

Name: ..... Date: ..... Period: .....

Problems 7–9: The scatter plot shows the relationship between the number of ice cream cones and the number of air conditioners sold in a month.



7. Describe the relationship between the number of ice cream cones sold and the number of air conditioners sold in a month.

Explanations vary. *There is a strong positive association between the number of ice cream cones and the number of air conditioners sold in a month.*

8. Do you think one variable causes the other? Explain your thinking.

Explanations vary. No.The buying of ice cream cones does not cause the buying of air conditioners.

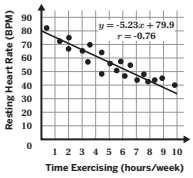
9. What else might affect this relationship? Explain your thinking.

Explanations vary. The temperature. Both of these sales increase when the temperature rises in the summer months.

Name: Date: Period:

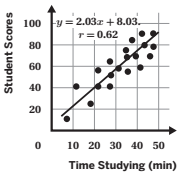
Additional Practice 3.17

Problems 1–3: This scatter plot shows the relationship between the number of hours a person exercises each week and their resting heart rate, in beats per minute.



1. The equation for the line of best fit is $y = -5.23x + 79.9$.
   a. What does the 79.9 mean in this situation?
   Explanations vary. The resting heart rate of someone who doesn't exercise.
   b. What does the -5.23 mean in this situation?
   Explanations vary. The decrease in resting heart rate expected with every extra hour of exercise a week.
2. Nina exercised for 4 hours this week. Use the equation of line of best fit to predict her resting heart rate.
   $y = -5.23(4) + 79.9 = 58.98$ BPM
3. Do you think the prediction is accurate? Use the r-value to explain your thinking.
   Explanations vary. Looking at the data for 4 hours of exercise, there is almost 20 BPM difference between those two values. However, I think it is a close estimate to the line of best fit, since the r-value is pretty strong.

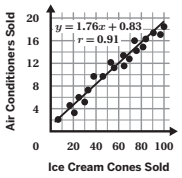
Problems 4–6: The scatter plot shows the relationship between the amount of time spent studying for a recent math test (in minutes) and the scores the students earned on the test.



4. The equation for the best fit line is $y = 2.03x + 8.03$. What does the 2.03 mean in this situation?
   For every one minutes spent studying, you will raise your test score by 2.03 points.
5. Rajah studied for this test for 40 minutes. Use the equation of line of best fit to predict his score on the test.
   $y = 2.03(40) + 8.03 = 89.23$ points
6. Do you think the prediction is accurate? Use the r-value to explain your thinking.
   Explanations vary. Looking at the data for 40 minutes of studying, there is almost a 15 point difference between those two values. However, I think it is a close estimate to the line of best fit, since the r-value is strong.

Name: Date: Period:

Problems 7–9: The scatter plot shows the relationship between the number of ice cream cones and the number of air conditioners sold in a month.



7. Describe the relationship between the number of ice cream cones sold and the number of air conditioners sold in a month.
   Explanations vary. *There is a strong positive association between the number of ice cream cones and the number of air conditioners sold in a month.*
8. Do you think one variable causes the other? Explain your thinking.
   Explanations vary. No.The buying of ice cream cones does not cause the buying of air conditioners.
9. What else might affect this relationship? Explain your thinking.
   Explanations vary. The temperature. Both of these sales increase when the temperature rises in the summer months.

Practice Problem Analysis

Problem	DOK	Standard(s)
1	2	HSS.ID.C.7
2	1	HSS.ID.B.6.A
3	2	HSS.ID.C.8
4	2	HSS.ID.C.7
5	1	HSS.ID.B.6.A
6	2	HSS.ID.C.8
7	2	HSS.ID.B.6
8	2	HSS.ID.B.6
9	2	HSS.ID.C.9

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 4.01

1. Here is Rule A. Rule A takes a number and assigns the number a letter as output.

Rule A

Input	2	3	2	6
Output	A	C	B	F

Is Rule A a function? Explain your thinking.

Explanations vary. Rule A is not a function because each input has multiple outputs.The input 2 has an output of A and B.

Problems 2–3: Here is Rule B. Rule B takes a number and assigns a number as output.

Rule B

Input	3	6	9	12
Output	2	4	6	?

2. Is Rule B a function? Explain your thinking.

Explanations vary. Rule B is a function. Each input has exactly one output.

3. Predict what the output could be when the input is 12.

The output could be 8.

Name: ..... Date: ..... Period: .....

Problems 4–5: Here is Rule C. A machine uses Rule C to turn inputs into outputs. Rule C adds 3 to the input and then multiplies by 2 to get the output.

Rule C

Input	1	9	11	20
Output	8	?	28	46

4. Is Rule C a function? Explain your thinking.

Explanations vary. Rule C is a function. Each input has exactly one output.

5. Predict what the output could be when the input is 9.

The output could be 24.

6. Here is Rule D. Rule D takes a number and assigns a random number that is greater as the output.

Rule D

Input	2	2	3	4
Output	3	4	4	6

Is Rule D a function? Explain your thinking.

Explanations vary. Rule D is not a function because each input has multiple outputs.The input 2 has an output of 3 and 4.

Name: Date: Period:

Additional Practice 4.01

1. Here is Rule A. Rule A takes a number and assigns the number a letter as output.

Rule A

Input	2	3	2	6
Output	A	C	B	F

Is Rule A a function? Explain your thinking.

Explanations vary. Rule A is not a function because each input has multiple outputs.The input 2 has an output of A and B.

Problems 2–3: Here is Rule B. Rule B takes a number and assigns a number as output.

Rule B

Input	3	6	9	12
Output	2	4	6	?

2. Is Rule B a function? Explain your thinking.

Explanations vary. Rule B is a function. Each input has exactly one output.

3. Predict what the output could be when the input is 12.

The output could be 8.

Name: Date: Period:

Problems 4–5: Here is Rule C. A machine uses Rule C to turn inputs into outputs. Rule C adds 3 to the input and then multiplies by 2 to get the output.

Rule C

Input	1	9	11	20
Output	8	?	28	46

4. Is Rule C a function? Explain your thinking.

Explanations vary. Rule C is a function. Each input has exactly one output.

5. Predict what the output could be when the input is 9.

The output could be 24.

6. Here is Rule D. Rule D takes a number and assigns a random number that is greater as the output.

Rule D

Input	2	2	3	4
Output	3	4	4	6

Is Rule D a function? Explain your thinking.

Explanations vary. Rule D is not a function because each input has multiple outputs.The input 2 has an output of 3 and 4.

Practice Problem Analysis

Problem	DOK	Standard(s)
1	2	HSF.IF.A.1
2	1	HSF.IF.A.1
3	2	HSF.IF.A.1
4	2	HSF.IF.A.1
5	1	HSF.IF.A.1
6	2	HSF.IF.A.1

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 4.02

1. The function notation statement $C(3) = 21$ means, "The cost of 3 tickets is \$21." What is the input value? The output value?

3; 21

2. The table shows the distance in meters that Elena walks her dog for different times. Which equation represents her walking the dog 280 m in 4 minutes?

Time (minutes)	Distance (m)
2	140
4	280

A. $f(2) = 140$

C. $f(140) = 2$

B. $f(4) = 280$

D. $f(280) = 4$

3. The function R represents the number of feet above the loading platform that a roller coaster is n, as a function of time t, in seconds. Match each verbal statement with its corresponding function notation. Not all of the function notation equations will be used.

Verbal statement

a. At the start, the roller coaster is at the loading platform.

b. The roller coaster is n ft above the loading platform after t seconds.

c. After 75 seconds, the roller coaster is 130 ft above the loading platform.

d. The roller coaster is 75 ft above the loading platform after 130 seconds.

e. After 110 seconds, the roller coaster is at the same height as the loading platform.

Function notation

e $R(110) = 0$

a $R(0) = 0$

c $R(75) = 130$

..... $R(0) = 110$

d $R(130) = 75$

b $R(t) = n$

..... $R(n) = t$

Name: _____ Date: _____ Period: _____

4. Suppose a function D takes a date in October as its input and tells whether a student has a soccer game as its output.

a Complete the following to use function notation to represent the statement, "A student has a soccer game on October 12."

$D($ 12 $) =$ soccer game

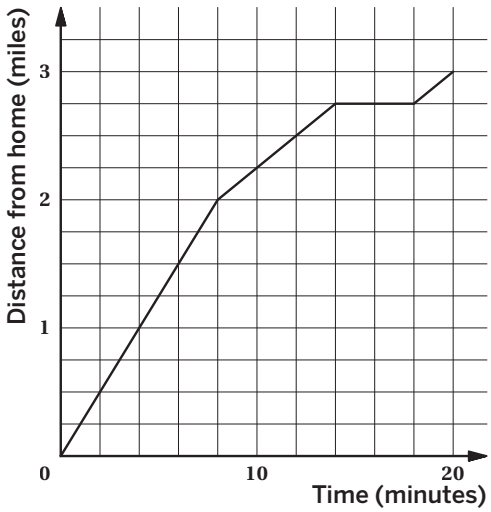
b Write a statement to describe the meaning of $D(25) =$ *No soccer game*.

A student does not have a soccer game on October 25.

5. The function C gives the cost, in dollars, of buying n packs of gum. Which of the following statements are true? Select *all* that apply.

- ☐ **A.** $C(4) = 6$ means 6 packs of gum cost \$4.
- ☑ **B.** $C(4) = 6$ means 4 packs of gum cost \$6.
- ☑ **C.** $C(3)$ represents the cost of 3 packs of gum.
- ☐ **D.** $C(3)$ represents the packs of gum that cost \$3.
- ☑ **E.** The equation $C(5) = 7.5$ means that five packs of gum cost \$7.50.

6. Shawn is riding a bike to a friend's house. The graph represents the function D, Shawn's distance from home, in miles, after t minutes.



a How far away from home is Shawn after 10 minutes?

2.25 miles

b After 20 minutes, Shawn is 3 miles from home. Lin writes this verbal statement in function notation as $D(3) = 20$. Is she correct? Explain your thinking.

No; Sample response: Lin switched the input and output values. The correct statement in function notation is $D(20) = 3$.

c Kiran claims that distance is a function of time, and time is a function of distance. Do you agree? Explain your thinking.

No; Sample response: Distance is a function of time, because for each input, there is exactly one output. Time is not a function of distance because there are multiple output values when the input is 2.75 miles.

Name: Date: Period:

Additional Practice 4.02

1. The function notation statement $C(3) = 21$ means, "The cost of 3 tickets is \$21." What is the input value? The output value?

3; 21

2. The table shows the distance in meters that Elena walks her dog for different times. Which equation represents her walking the dog 280 m in 4 minutes?

Time (minutes)	Distance (m)
2	140
4	280

A. $f(2) = 140$ C. $f(140) = 2$

B. $f(4) = 280$ D. $f(280) = 4$

3. The function R represents the number of feet above the loading platform that a roller coaster is n, as a function of time t, in seconds. Match each verbal statement with its corresponding function notation. Not all of the function notation equations will be used.

Verbal statement	Function notation
a. At the start, the roller coaster is at the loading platform.	e. $R(110) = 0$
b. The roller coaster is n ft above the loading platform after t seconds.	a. $R(0) = 0$
c. After 75 seconds, the roller coaster is 130 ft above the loading platform.	c. $R(75) = 130$
d. The roller coaster is 75 ft above the loading platform after 130 seconds.	$R(0) = 110$
e. After 110 seconds, the roller coaster is at the same height as the loading platform.	d. $R(130) = 75$
	b. $R(t) = n$
	$R(n) = t$

Name: Date: Period:

4. Suppose a function D takes a date in October as its input and tells whether a student has a soccer game as its output.

a. Complete the following to use function notation to represent the statement, "A student has a soccer game on October 12."

$D($ 12 $) =$ soccer game

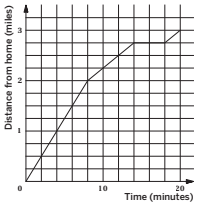
b. Write a statement to describe the meaning of $D(25) =$ *No soccer game*.

A student does not have a soccer game on October 25.

5. The function C gives the cost, in dollars, of buying n packs of gum. Which of the following statements are true? Select *all* that apply.

- ☐ A. $C(4) = 6$ means 6 packs of gum cost \$4.
- ☑ B. $C(4) = 6$ means 4 packs of gum cost \$6.
- ☑ C. $C(3)$ represents the cost of 3 packs of gum.
- ☐ D. $C(3)$ represents the packs of gum that cost \$3.
- ☑ E. The equation $C(5) = 7.5$ means that five packs of gum cost \$7.50.

6. Shawn is riding a bike to a friend's house. The graph represents the function D, Shawn's distance from home, in miles, after t minutes.



a. How far away from home is Shawn after 10 minutes?

2.25 miles

b. After 20 minutes, Shawn is 3 miles from home. Lin writes this verbal statement in function notation as $D(3) = 20$. Is she correct? Explain your thinking.

No; Sample response: Lin switched the input and output values. The correct statement in function notation is $D(20) = 3$.

c. Kiran claims that distance is a function of time, and time is a function of distance. Do you agree? Explain your thinking.

No; Sample response: Distance is a function of time, because for each input, there is exactly one output. Time is not a function of distance because there are multiple output values when the input is 2.75 miles.

Practice Problem Analysis

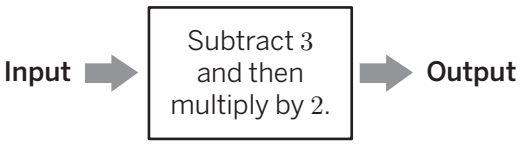
Problem	DOK	Standard(s)
1	1	HSF.IF.A.2
2	1	HSF.IF.A.2
3	2	HSF.IF.A.2
4	2	HSF.IF.A.2
5	2	HSF.IF.A.2
6	3	HSF.IF.A.2

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 4.03

1. Use the function machine to complete the table.



Input	Output
-2	**-10**
4	**2**
1.5	**-3**
6	**6**

2. Match each statement with a description of the function it represents.

Statement	Description
a. $f(x) = 5x - 3$	**c** To get the output value, subtract 3 from the input value, and then multiply the result by 5.
b. $g(x) = 3(x - 5)$	**b** To get the output value, subtract 5 from the input value, and then multiply the result by 3.
c. $h(x) = 5(x - 3)$	**a** To get the output value, multiply the input value by 5, and then subtract 3 from the result.
d. $j(x) = 3x - 5$	**d** To get the output value, multiply the input value by 3, and then subtract 5 from the result.

3. One tomato plant costs \$6. The function C represents the cost, in dollars, of x tomato plants, where the cost of 1 tomato plant is \$6.

a Complete the table.

x	0	1	2	3	4	5	6
C	**0**	**6**	**12**	**18**	**24**	**30**	**36**

b Write a function notation statement to represent the function C.

$C(x) = 6x$

Name: _____ Date: _____ Period: _____

4. Consider the function $B(x) = 7.5x + 30$. What is the value of $B(4)$?

A. 30

B. 40.5

C. 41.5

D. 60

5. A local swimming pool offers membership Plans Q and R as described in the table. The function representing each plan gives the total cost, in dollars, for m months of membership.

Plan Q	Plan R
\$50 per month, plus a \$25 application fee $Q(m) = 50m + 25$	\$400 per year $R(m) = 400$

a Complete the following to describe the meaning of the statement $Q(3) = 175$.

The total cost of Plan **Q** is \$ **175** after **3** months.

b Which is greater, $Q(6)$ or $R(6)$?

$Q(6)$

c Which is less, $Q(10)$ or $R(10)$?

$R(10)$

6. A dolphin is swimming at a constant speed of 3 mph. The total distance the dolphin has traveled in t hours can be represented by the function $D(t) = 3t$.

Determine the value of $D(2.5)$ and explain what it means is in this situation.

$D(2.5) = 7.5$; Sample response: The total distance traveled by the dolphin after 2.5 hours is 7.5 miles.

Name: Date: Period:

Additional Practice 4.03

1. Use the function machine to complete the table.

Input → Subtract 3 and then multiply by 2. → Output

Input	Output
−2	−10
4	2
1.5	−3
6	6

2. Match each statement with a description of the function it represents.

Statement		Description
a. $f(x) = 5x - 3$	c	To get the output value, subtract 3 from the input value, and then multiply the result by 5.
b. $g(x) = 3(x - 5)$	b	To get the output value, subtract 5 from the input value, and then multiply the result by 3.
c. $h(x) = 5(x - 3)$	a	To get the output value, multiply the input value by 5, and then subtract 3 from the result.
d. $j(x) = 3x - 5$	d	To get the output value, multiply the input value by 3, and then subtract 5 from the result.

3. One tomato plant costs \$6. The function C represents the cost, in dollars, of x tomato plants, where the cost of 1 tomato plant is \$6.

a. Complete the table.

x	0	1	2	3	4	5	6
C	0	6	12	18	24	30	36

b. Write a function notation statement to represent the function C.

$C(x) = 6x$

Name: Date: Period:

4. Consider the function $B(x) = 7.5x + 30$. What is the value of $B(4)$?

A. 30
B. 40.5
C. 41.5
D. 60

5. A local swimming pool offers membership Plans Q and R as described in the table. The function representing each plan gives the total cost, in dollars, for m months of membership.

Plan Q	Plan R
\$50 per month, plus a \$25 application fee $Q(m) = 50m + 25$	\$400 per year $R(m) = 400$

a. Complete the following to describe the meaning of the statement $Q(3) = 175$.

The total cost of Plan Q is \$ 175 after 3 months.

b. Which is greater, $Q(6)$ or $R(6)$?

$Q(6)$

c. Which is less, $Q(10)$ or $R(10)$?

$R(10)$

6. A dolphin is swimming at a constant speed of 3 mph. The total distance the dolphin has traveled in t hours can be represented by the function $D(t) = 3t$.

Determine the value of $D(2.5)$ and explain what it means is in this situation.

$D(2.5) = 7.5$; Sample response: The total distance traveled by the dolphin after 2.5 hours is 7.5 miles.

Practice Problem Analysis

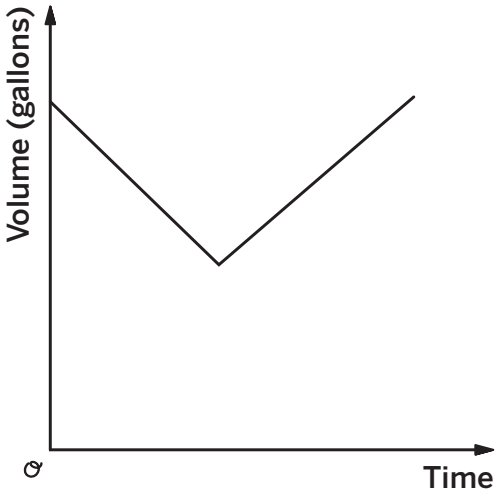
Problem	DOK	Standard(s)
1	1	HSF.IF.A.1
2	2	HSF.BF.A.1.A
3	2	HSF.BF.A.1.A, HSF.IF.A.1
4	1	HSF.IF.A.2
5	2	HSF.IF.A.2
6	3	HSF.IF.A.2

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 4.04

1. The graph represents the volume of water in a tank as a function of time. Which of the descriptions matches the graph?



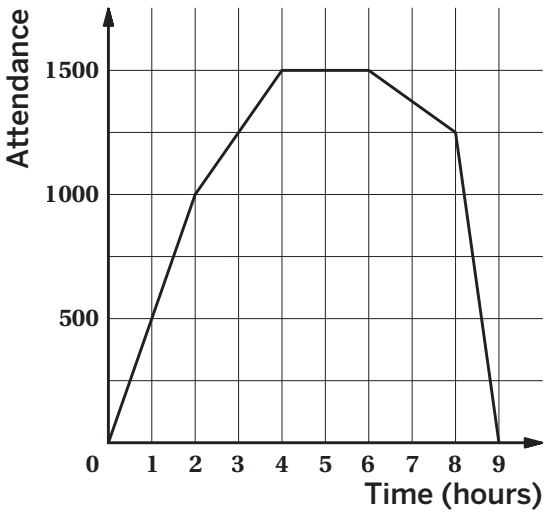
A. A 2,000-gallon water tank starts out empty. It is filled for 5 hours, slowly at first, and faster later.

B. A full 10-gallon water tank is drained for 30 seconds until it is half full. Afterwards, it gets refilled.

C. An empty 20-gallon water tank is filled at a constant rate for 3 minutes until it is half full. Then it is emptied at a constant rate for 3 minutes.

D. An empty 100-gallon water tank is filled in 50 minutes. Then a dog jumps in and splashes around for 10 minutes, letting 7 gallons of water out. The tank is refilled afterwards.

2. The graph shows the attendance at an arts festival as a function of time in hours. Which of the following statements about the graph are true? Select *all* that apply.



☑ **A.** The number of people increases the first 4 hours, then stays the same for 2 hours, and then decreases the last 3 hours.

☐ **B.** The number of people decreases the first 4 hours, then stays the same for 2 hours, and then increases the last 3 hours.

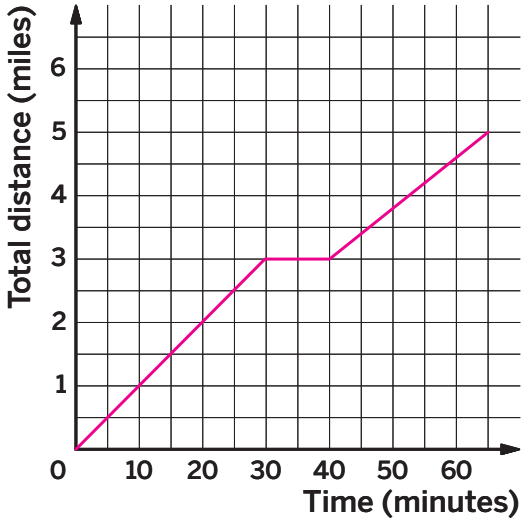
☐ **C.** The average rate of change of the function for the interval $[0, 5]$ is 375 people per hour.

☑ **D.** The interval $[0, 9]$ represents the hours during which the festival attendance varied.

☑ **E.** The average rate of change of the function for the interval $[6, 9]$ is -500 people per hour.

Name: ..... Date: ..... Period: .....

3. Lin runs for 30 minutes at a constant rate and goes a total distance of 3 miles. She stops and rests for 10 minutes. She then runs for 25 more minutes at a constant rate and during that time goes 2 more miles.



a Sketch a graph to represent this scenario.

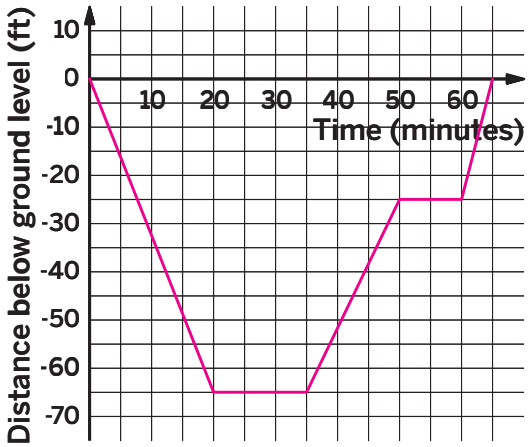
b What is the domain of this scenario and what does it represent?

[0, 65]; Sample response: This represents the time Lin spent running and resting over the course of 65 minutes.

c What is the range of this scenario and what does it represent?

[0, 5]; Sample response: This represents the total number of miles that Lin ran.

4. Priya goes on a tour of a cave. The tour starts at ground level and then descends for 20 minutes to a depth of 65 ft below ground level. The tour stays at this level for 15 minutes, and then ascends for 15 minutes to a depth of 25 ft below ground level. The tour stays at this level for 10 minutes, and then spends the last 5 minutes ascending to ground level.



a Sketch a possible graph describing Priya's distance relative to ground level as a function of time.

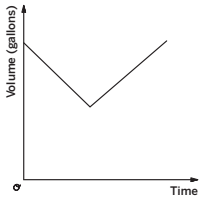
b Kiran and Mai are arguing about which time interval represents the "fastest" ascent or descent of the tour. Kiran says that the descent on the interval $[0, 20]$ was the fastest. Mai claims that the ascent on the interval $[60, 65]$ was the fastest. Who is correct? Explain your thinking.

Mai; Sample response: The average rate of change on the interval $[0, 20]$ was -3.25 ft per minute. The average rate of change on the interval $[60, 65]$ was 5 ft per minute.

Name: Date: Period:

Additional Practice 4.04

1. The graph represents the volume of water in a tank as a function of time. Which of the descriptions matches the graph?



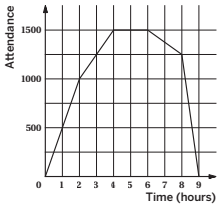
A. A 2,000-gallon water tank starts out empty. It is filled for 5 hours, slowly at first, and faster later.

B. A full 10-gallon water tank is drained for 30 seconds until it is half full. Afterwards, it gets refilled.

C. An empty 20-gallon water tank is filled at a constant rate for 3 minutes until it is half full. Then it is emptied at a constant rate for 3 minutes.

D. An empty 100-gallon water tank is filled in 50 minutes. Then a dog jumps in and splashes around for 10 minutes, letting 7 gallons of water out. The tank is refilled afterwards.

2. The graph shows the attendance at an arts festival as a function of time in hours. Which of the following statements about the graph are true? Select *all* that apply.



☑ **A.** The number of people increases the first 4 hours, then stays the same for 2 hours, and then decreases the last 3 hours.

☐ **B.** The number of people decreases the first 4 hours, then stays the same for 2 hours, and then increases the last 3 hours.

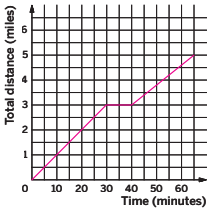
☐ **C.** The average rate of change of the function for the interval $[0, 5]$ is 375 people per hour.

☑ **D.** The interval $[0, 9]$ represents the hours during which the festival attendance varied.

☑ **E.** The average rate of change of the function for the interval $[6, 9]$ is -500 people per hour.

Name: Date: Period:

3. Lin runs for 30 minutes at a constant rate and goes a total distance of 3 miles. She stops and rests for 10 minutes. She then runs for 25 more minutes at a constant rate and during that time goes 2 more miles.



a. Sketch a graph to represent this scenario.

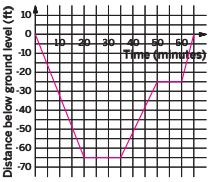
b. What is the domain of this scenario and what does it represent?

[0, 65]; Sample response: This represents the time Lin spent running and resting over the course of 65 minutes.

c. What is the range of this scenario and what does it represent?

[0, 5]; Sample response: This represents the total number of miles that Lin ran.

4. Priya goes on a tour of a cave. The tour starts at ground level and then descends for 20 minutes to a depth of 65 ft below ground level. The tour stays at this level for 15 minutes, and then ascends for 15 minutes to a depth of 25 ft below ground level. The tour stays at this level for 10 minutes, and then spends the last 5 minutes ascending to ground level.



a. Sketch a possible graph describing Priya's distance relative to ground level as a function of time.

b. Kiran and Mai are arguing about which time interval represents the "fastest" ascent or descent of the tour. Kiran says that the descent on the interval $[0, 20]$ was the fastest. Mai claims that the ascent on the interval $[60, 65]$ was the fastest. Who is correct? Explain your thinking.

Mai; Sample response: The average rate of change on the interval $[0, 20]$ was -3.25 ft per minute. The average rate of change on the interval $[60, 65]$ was 5 ft per minute.

Practice Problem Analysis

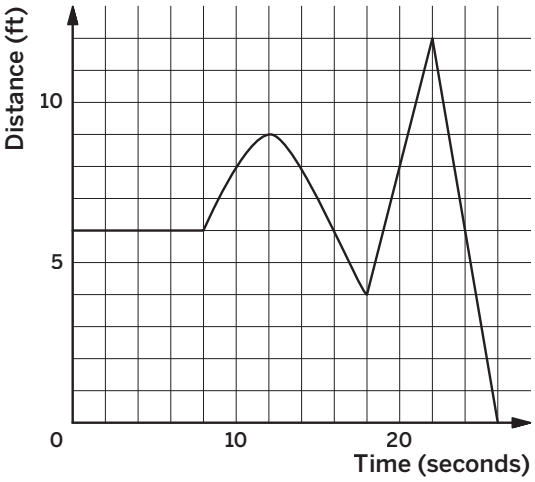
Problem	DOK	Standard(s)
1	1	HSF.IF.B.4
2	2	HSF.IF.B.4, HSF.IF.B.6
3	2	HSF.IF.B.4, HSF.IF.B.6
4	3	HSF.IF.B.4, HSF.IF.B.6

Notes:

Name: ..... Date: ..... Period: .....

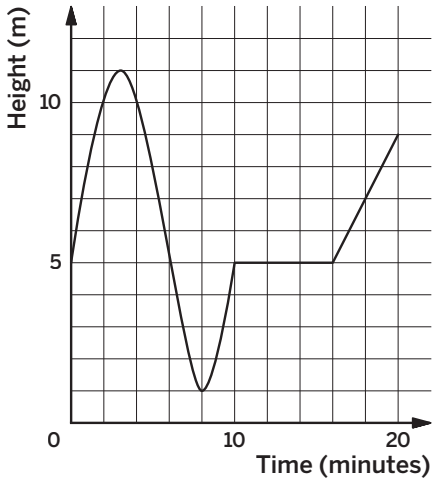
Additional Practice 4.05

1. The graph represents Clare's distance from her front door as she gets ready to go to school. Determine which of the following statements are true. Select *all* that apply.



- ☐ **A.** The minimum of the graph is located at $(18, 4)$.
- ☑ **B.** The graph has one horizontal intercept.
- ☑ **C.** From 12 seconds to 18 seconds, Clare is moving closer to her front door.
- ☑ **D.** The graph has two local maximums.
- ☐ **E.** Clare was farthest from her front door after about 26 seconds.

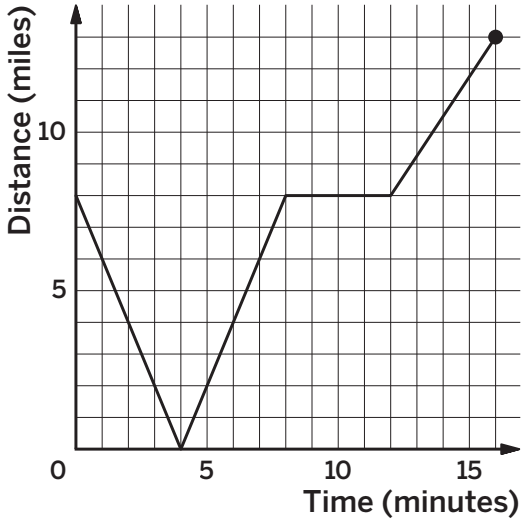
2. Consider the graph of the function shown. Match each feature of the graph with a corresponding statement in function notation.



Feature	Statement
a. Starting height	b $h(8) = 1$
b. Minimum height	a $h(0) = 5$
c. Maximum height	d $h(t) = 5$, between $t = 10$ and $t = 16$
d. Height remains constant	c $h(3) = 11$

Name: ..... Date: ..... Period: .....

3. The graph represents the function D, which gives the distance that Kiran is away from home as a function of time t. For what time interval does Kiran's distance from home decrease?



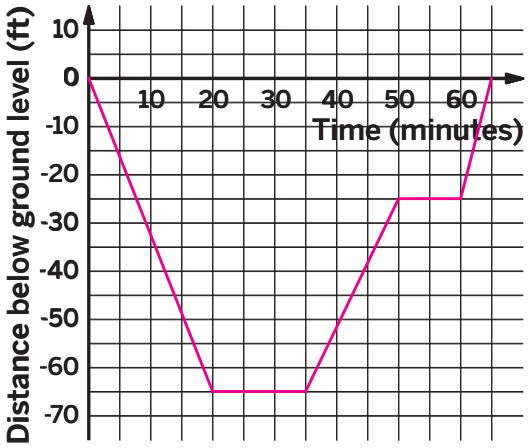
A. $[0, 4]$

B. $[4, 7]$

C. $[7, 12]$

D. $[12, 15]$

4. Priya goes on a tour of a cave. The tour starts at ground level and then descends for 20 minutes to a depth of 65 ft below ground level. The tour stays at this level for 15 minutes, and then ascends for 15 minutes to a depth of 25 ft below ground level. The tour stays at this level for 10 minutes, and then spends the last 5 minutes ascending to ground level.



a Sketch a possible graph describing Priya's distance relative to ground level as a function of time.

b Kiran and Mai are arguing about which time interval represents the "fastest" ascent or descent of the tour. Kiran says that the descent on the interval $[0, 20]$ was the fastest. Mai claims that the ascent on the interval $[60, 65]$ was the fastest. Who is correct? Explain your thinking.

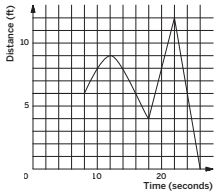
Mai; Sample response: The average rate of change on the interval $[0, 20]$ was -3.25 ft per minute. The average rate of change on the interval $[60, 65]$ was 25 ft per minute.

Name: Date: Period:

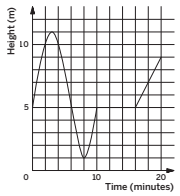
Additional Practice 4.05

1. The graph represents Clare's distance from her front door as she gets ready to go to school. Determine which of the following statements are true. Select *all* that apply.

- ☐ **A.** The minimum of the graph is located at $(18, 4)$.
- ☑ **B.** The graph has one horizontal intercept.
- ☑ **C.** From 12 seconds to 18 seconds, Clare is moving closer to her front door.
- ☑ **D.** The graph has two local maximums.
- ☐ **E.** Clare was farthest from her front door after about 26 seconds.



2. Consider the graph of the function shown. Match each feature of the graph with a corresponding statement in function notation.

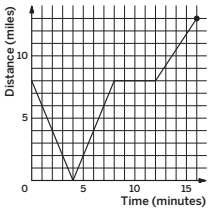


Feature	Statement
a. Starting height	b. $h(8) = 1$
b. Minimum height	a. $h(0) = 5$
c. Maximum height	d. $h(t) = 5$, between $t = 10$ and $t = 16$
d. Height remains constant	c. $h(3) = 11$

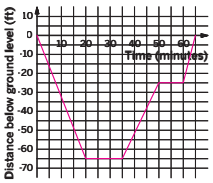
Name: Date: Period:

3. The graph represents the function D, which gives the distance that Kiran is away from home as a function of time t. For what time interval does Kiran's distance from home decrease?

- **A.** $[0, 4]$
- **B.** $[4, 7]$
- **C.** $[7, 12]$
- **D.** $[12, 15]$



4. Priya goes on a tour of a cave. The tour starts at ground level and then descends for 20 minutes to a depth of 65 ft below ground level. The tour stays at this level for 15 minutes, and then ascends for 15 minutes to a depth of 25 ft below ground level. The tour stays at this level for 10 minutes, and then spends the last 5 minutes ascending to ground level.



a. Sketch a possible graph describing Priya's distance relative to ground level as a function of time.

b. Kiran and Mai are arguing about which time interval represents the "fastest" ascent or descent of the tour. Kiran says that the descent on the interval $[0, 20]$ was the fastest. Mai claims that the ascent on the interval $[60, 65]$ was the fastest. Who is correct? Explain your thinking.

Mai; Sample response: The average rate of change on the interval $[0, 20]$ was -3.25 ft per minute. The average rate of change on the interval $[60, 65]$ was 25 ft per minute.

Practice Problem Analysis

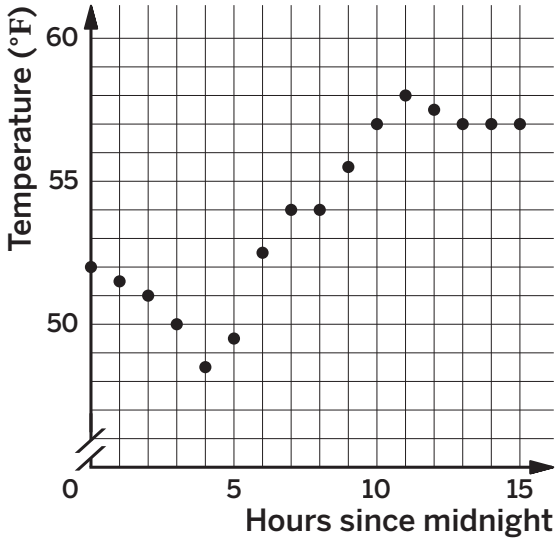
Problem	DOK	Standard(s)
1	1	HSF.IF.B.4
2	2	HSF.IF.B.4
3	1	HSF.IF.B.4
4	3	HSF.IF.B.4, HSF.IF.B.6

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 4.06

1. The temperature was recorded at several times during the day. The function T represents the temperature in degrees Fahrenheit given the number of hours since midnight n. Use the graph to determine if the average rate of change for each interval is *positive*, *negative*, or *zero*.



a $n = 0$ to $n = 4$

Negative

b $n = 7$ to $n = 8$

Zero

c $n = 11$ to $n = 13$

Negative

d $n = 13$ to $n = 15$

Zero

e $n = 4$ to $n = 7$

Positive

2. Refer to the graph in Problem 1. Determine each value.

a $f(3)$

50

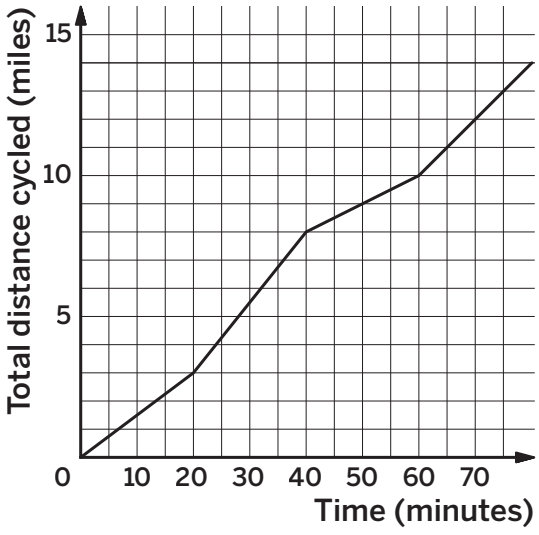
b $f(6)$

52.5

c $f(11)$

58

3. The graph shows the total distance, in miles, that Kiran cycled as a function of time, in minutes.



a Was Kiran cycling faster between 20 and 35 minutes or between 50 and 65 minutes? Explain your thinking.

Between 20 and 35 minutes because Kiran's average rate of change was greater.

b Was Kiran cycling faster between 30 and 50 minutes or between 50 and 80 minutes? Explain your thinking.

Between 50 and 80 minutes because Kiran's average rate of change was greater.

Name: ..... Date: ..... Period: .....

4. The heights of a tree from when it was first planted through Year 21 are shown in the table. The function H gives the height of the tree in Year t.

Year	0	3	6	9	12	15	18	21
Height (ft)	2	4.5	8.1	11.4	15.6	19.2	23.1	26.4

a Determine the average rate of change for H between Years 3 and 9.

1.15 ft per year

b Is the average rate of change for H between Years 12 and 21 *greater than*, *less than*, or *equal to* the rate of change between Years 3 and 9? Explain your thinking.

Greater than; Sample response: The average rate of change between Years 12 and 21 is 1.2 ft per year, which is greater than 1.15 ft per year.

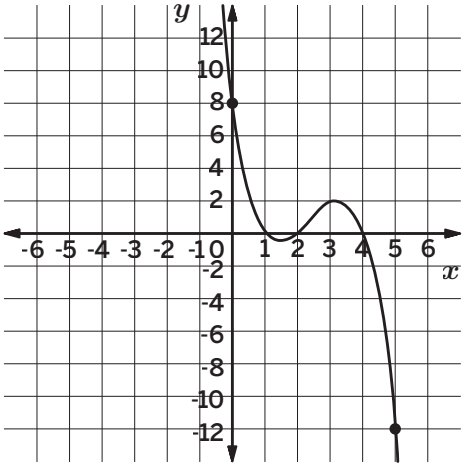
5. Use the graph to determine the average rate of change between $x = 0$ and $x = 5$.

A. -4

B. 4

C. -5

D. 5



6. The number of people who visited an aquarium each day for a week is shown in the table. The function N gives the number of visitors on Day d. Shawn claims that the average rate of change between Days 1 and 3 is greater than the average rate of change between Days 3 and 6. Do you agree? Explain your thinking.

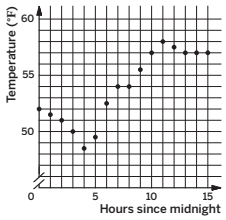
Day	1	2	3	4	5	6	7
Visitors (thousands)	4.5	4.8	5.2	3.9	4.4	5.6	6.1

Yes; Sample response: The average rate of change between Days 1 and 3 is an increase of 350 people per day. The average rate of change between Days 3 and 6 is an increase of about 133 people per day.

Name: Date: Period:

Additional Practice 4.06

1. The temperature was recorded at several times during the day. The function T represents the temperature in degrees Fahrenheit given the number of hours since midnight n. Use the graph to determine if the average rate of change for each interval is *positive*, *negative*, or *zero*.



a. $n = 0$ to $n = 4$
Negative

b. $n = 7$ to $n = 8$
Zero

c. $n = 11$ to $n = 13$
Negative

d. $n = 13$ to $n = 15$
Zero

e. $n = 4$ to $n = 7$
Positive

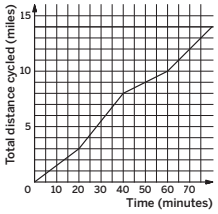
2. Refer to the graph in Problem 1. Determine each value.

a. $f(3)$
50

b. $f(6)$
52.5

c. $f(11)$
58

3. The graph shows the total distance, in miles, that Kiran cycled as a function of time, in minutes.



a. Was Kiran cycling faster between 20 and 35 minutes or between 50 and 65 minutes? Explain your thinking.
Between 20 and 35 minutes because Kiran's average rate of change was greater.

b. Was Kiran cycling faster between 30 and 50 minutes or between 50 and 80 minutes? Explain your thinking.
Between 50 and 80 minutes because Kiran's average rate of change was greater.

Name: Date: Period:

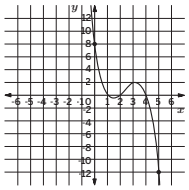
4. The heights of a tree from when it was first planted through Year 21 are shown in the table. The function H gives the height of the tree in Year t.

Year	0	3	6	9	12	15	18	21
Height (ft)	2	4.5	8.1	11.4	15.6	19.2	23.1	26.4

a. Determine the average rate of change for H between Years 3 and 9.
1.15 ft per year

b. Is the average rate of change for H between Years 12 and 21 *greater than*, *less than*, or *equal to* the rate of change between Years 3 and 9? Explain your thinking.
Greater than; Sample response: The average rate of change between Years 12 and 21 is 1.2 ft per year, which is greater than 1.15 ft per year.

5. Use the graph to determine the average rate of change between $x = 0$ and $x = 5$.



A. -4

B. 4

C. -5

D. 5

6. The number of people who visited an aquarium each day for a week is shown in the table. The function N gives the number of visitors on Day d. Shawn claims that the average rate of change between Days 1 and 3 is greater than the average rate of change between Days 3 and 6. Do you agree? Explain your thinking.

Day	1	2	3	4	5	6	7
Visitors (thousands)	4.5	4.8	5.2	3.9	4.4	5.6	6.1

Yes; Sample response: The average rate of change between Days 1 and 3 is an increase of 350 people per day. The average rate of change between Days 3 and 6 is an increase of about 133 people per day.

Practice Problem Analysis

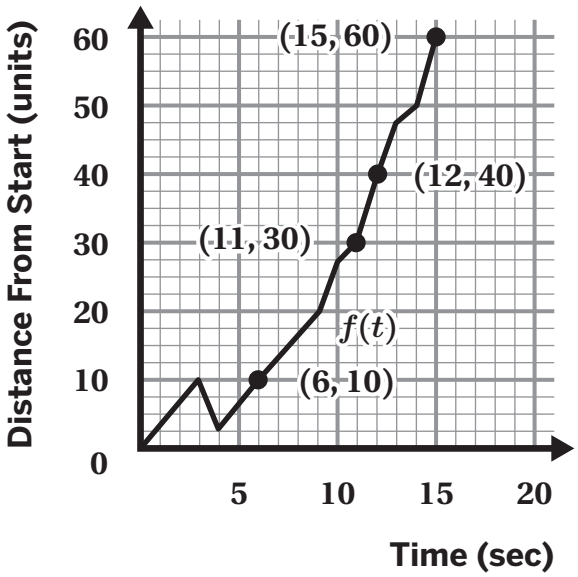
Problem	DOK	Standard(s)
1	1	HSF.IF.B.6
2	1	HSF.IF.B.6
3	2	HSF.IF.B.6
4	2	HSF.IF.B.6
5	2	HSF.IF.B.6
6	3	HSF.IF.B.6

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 4.07

Problems 1–2: Fatima built a model train for a competition in her technology class. $f(t)$ represents the distance of Fatima's model train, in meters, after t seconds.



1. Use the graph to determine the missing value in each function statement.

$f(11) =$ 30

$f($ 6 $) = 10$

$f(12) =$ 40

$f($ 15 $) = 60$

2. Over what interval did Fatima's model train travel the slowest?

a. 0 to 3 seconds

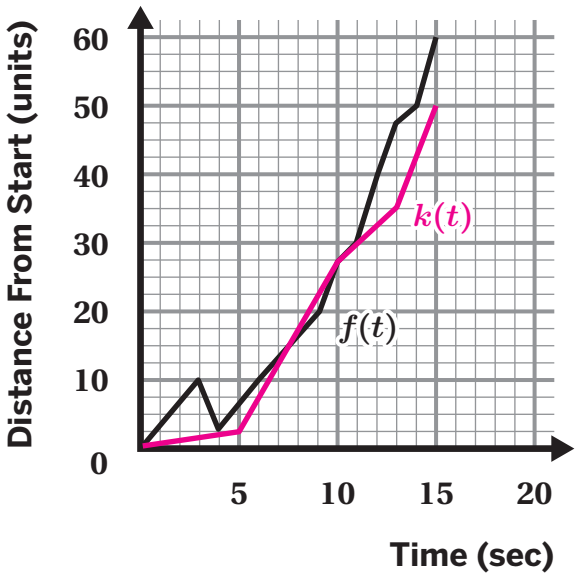
b. 4 to 6 seconds

c. 11 to 12 seconds

d. 12 to 15 seconds

3. Kyler built a model train to race against Fatima. Use this information to make a graph that could represent the distance of Kyler's model train, $k(t)$, after t seconds:

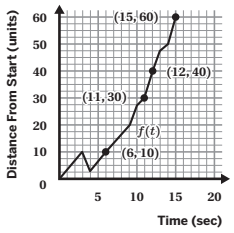
- $k(5) < f(5)$
- $k(10) = f(10)$
- The average rate of change of $k(t)$ and $f(t)$ is the same from $t = 10$ to $t = 11$.
- $f(t)$ has a greater maximum than $k(t)$.



Name: Date: Period:

Additional Practice 4.07

Problems 1–2: Fatima built a model train for a competition in her technology class. $f(t)$ represents the distance of Fatima's model train, in meters, after t seconds.



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   $f(11) =$ 30

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   $f(12) =$ 40

   $f($ 15 $) = 60$

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Name: Date: Period:

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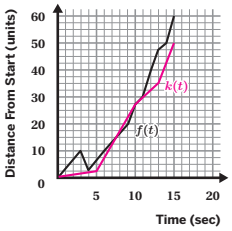
   - $f(t)$ has a greater maximum than $k(t)$.



Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSA.REI.D.11, HSF.IF.A.2, HSF.IF.B.4, HSF.IF.B.6
2	1	HSA.REI.D.11, HSF.IF.A.2, HSF.IF.B.4, HSF.IF.B.6
3	2	HSA.REI.D.11, HSF.IF.A.2, HSF.IF.B.4, HSF.IF.B.6

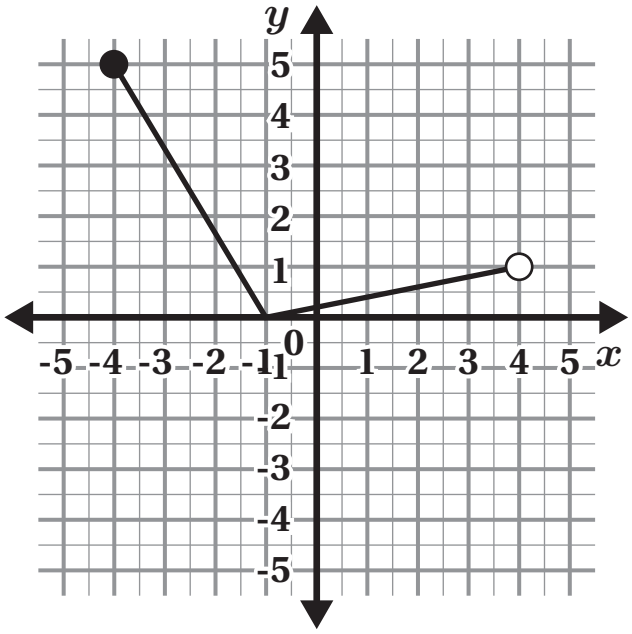
Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 4.09

Problems 1–2: Carlos and Madeline disagree about the domain of $f(x)$.

- Carlos says the domain is $0 \leq x \leq 5$
- Madeline says the domain is $-4 < x \leq 4$



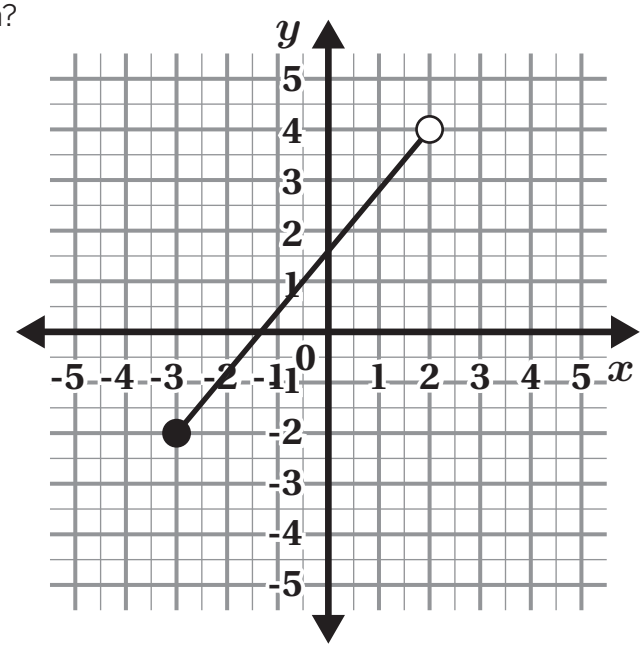
1. Whose answer is correct? Circle one.

Carlos Madeline (Neither)

2. Explain why either (or both) of the students are incorrect.

Explanations vary. Carlos is incorrect because he identified the range, or the outputs of the function. Madeline is incorrect because she has incorrectly written the inequality symbols for the domain; it should be $-4 \leq x < 4$.

Problems 3–4: You are given the graph of a function.



3. What is the domain of the function shown?

A. $-3 < x \leq 2$

(B.) $-3 \leq x < 2$

C. $-2 \leq x < 4$

D. $-2 < x \leq 4$

4. What is the range of the function shown?

A. $-3 < x \leq 2$

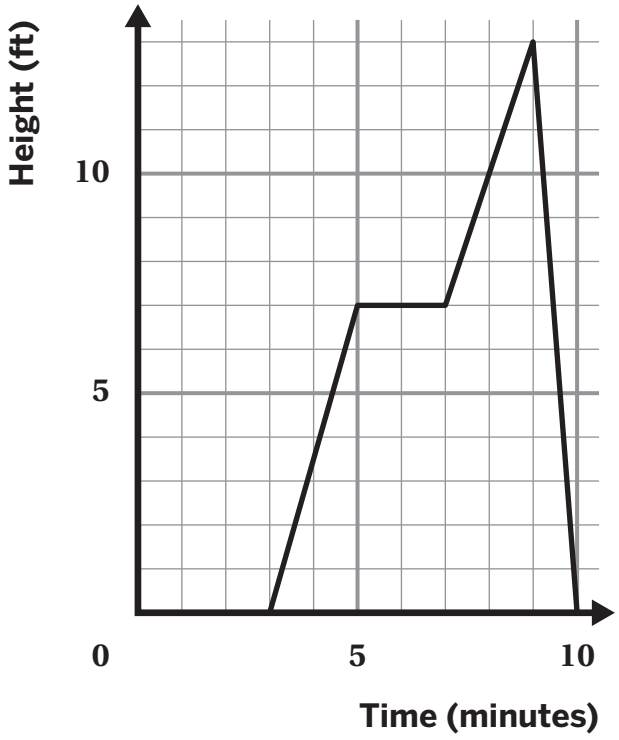
B. $-3 \leq x < 2$

(C.) $-2 \leq x < 4$

D. $-2 < x \leq 4$

Name: ..... Date: ..... Period: .....

Problems 5–8: A squirrel is searching for food on the ground and in trees. The graph represents the function, $h(t)$, which represents the height of the squirrel as a function of time t.



5. Write a compound inequality to describe the domain of $h(t)$.

$3 \leq t \leq 10$

6. What does the domain represent in this situation?

The domain represents the time the squirrel is searching for food.

7. Write a compound inequality to describe the range of $h(t)$.

$0 \leq h(t) \leq 13$

8. What does the range represent in this situation?

The range represents the heights, or distances from the ground, at which the squirrel is located.

Name: Date: Period:

Additional Practice 4.09

Problems 1–2: Carlos and Madeline disagree about the domain of $f(x)$.

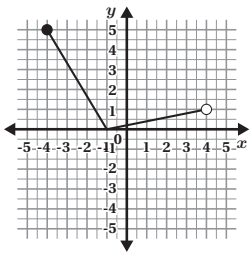
- Carlos says the domain is $0 \leq x \leq 5$
- Madeline says the domain is $-4 < x \leq 4$

1. Whose answer is correct? Circle one.

   Carlos Madeline (Neither)

2. Explain why either (or both) of the students are incorrect.

   Explanations vary. Carlos is incorrect because he identified the range, or the outputs of the function. Madeline is incorrect because she has incorrectly written the inequality symbols for the domain; it should be $-4 \leq x < 4$.



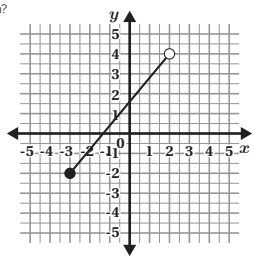
Problems 3–4: You are given the graph of a function.

3. What is the domain of the function shown?

   A. $-3 < x \leq 2$
   (B.) $-3 \leq x < 2$
   C. $-2 \leq x < 4$
   D. $-2 < x \leq 4$

4. What is the range of the function shown?

   A. $-3 < x \leq 2$
   B. $-3 \leq x < 2$
   (C.) $-2 \leq x < 4$
   D. $-2 < x \leq 4$



Unit 4 Lesson 9 101

Name: Date: Period:

Problems 5–8: A squirrel is searching for food on the ground and in trees. The graph represents the function, $h(t)$, which represents the height of the squirrel as a function of time t.

5. Write a compound inequality to describe the domain of $h(t)$.

   $3 \leq t \leq 10$

6. What does the domain represent in this situation?

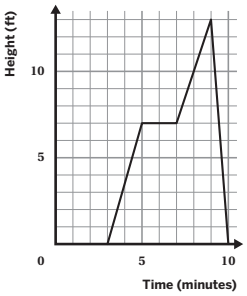
   The domain represents the time the squirrel is searching for food.

7. Write a compound inequality to describe the range of $h(t)$.

   $0 \leq h(t) \leq 13$

8. What does the range represent in this situation?

   The range represents the heights, or distances from the ground, at which the squirrel is located.



Unit 4 Lesson 9 102 Additional Practice

Practice Problem Analysis

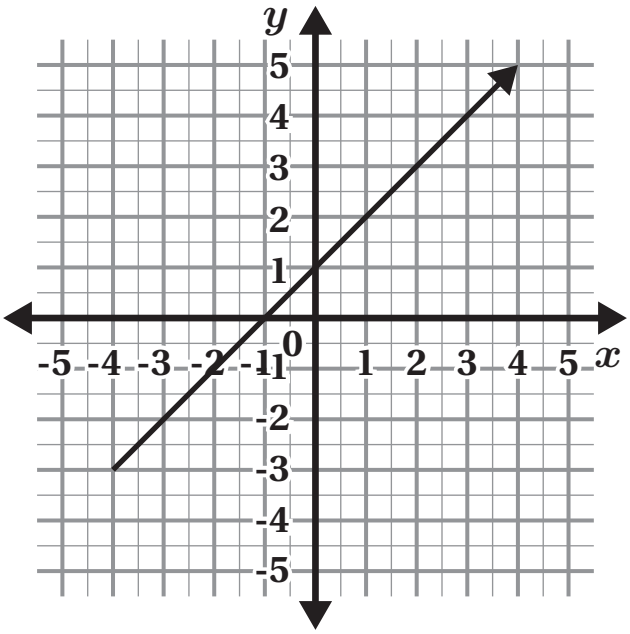
Problem	DOK	Standard(s)
1	2	HSF.IF.B.5
2	2	HSF.IF.B.5
3	1	HSF.IF.B.5
4	1	HSF.IF.B.5
5	1	HSF.IF.B.5
6	2	HSF.IF.B.5
7	1	HSF.IF.B.5
8	2	HSF.IF.B.5

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 4.10

Problems 1–2: See the graph of $f(x)$.



1. What is the domain of $f(x)$?

a. $x \geq 0$

b. $x \geq -4$

c. $x \leq 0$

d. $x \leq -4$

2. What is the range of $f(x)$?

a. $f(x) \geq -3$

b. $f(x) \geq 0$

c. $f(x) \leq 3$

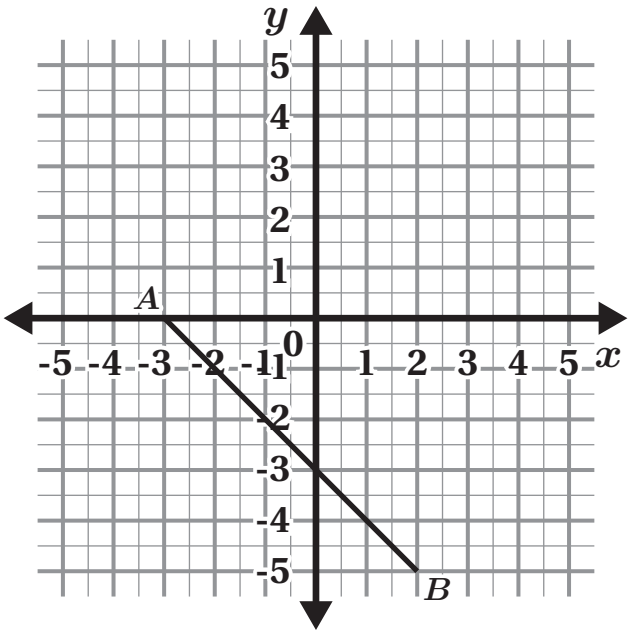
d. $f(x) \leq 0$

Name: ..... Date: ..... Period: .....

3. Fill in the blanks for the domain and range of $y = -x - 3$ from point A to point B.

$-3 \leq x \leq 2$

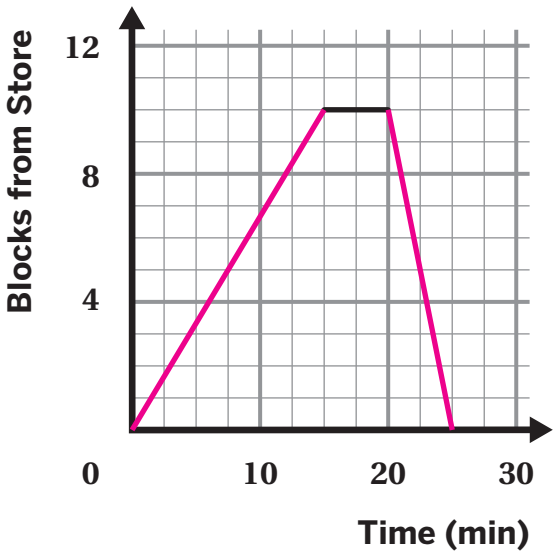
$-5 \leq y \leq 0$



4. Lia leaves her home to go to the grocery store. This is her path:

- She walks to the store, which is 10 blocks away, at a speed of half a block per minute.
- She is in the store for 5 minutes.
- She runs back home at a speed of 2 blocks per minute.

The graph shows part of her path. Sketch the graph of the missing pieces of Lia's path.



Name: Date: Period:

Additional Practice 4.10

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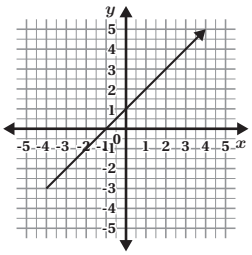


1. What is the domain of $f(x)$?

a. $x \geq 0$

b. $x \geq -4$

c. $x \leq 0$

d. $x \leq -4$

2. What is the range of $f(x)$?

a. $f(x) \geq -3$

b. $f(x) \geq 0$

c. $f(x) \leq 3$

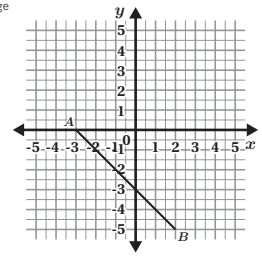
d. $f(x) \leq 0$

Name: Date: Period:

3. Fill in the blanks for the domain and range of $y = -x - 3$ from point A to point B.

$-3 \leq x \leq 2$

$-5 \leq y \leq 0$



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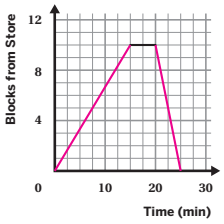


Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSF.IF.B.5
2	1	HSF.IF.B.5
3	1	HSF.IF.B.5
4	2	HSF.IF.B.5

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 4.11

Problems 1–3: Determine the value of each piecewise-defined function, $f(x)$.

1. $f(0) =$ 1

2. $f(4) =$ 9

3. $f(6) =$ 9

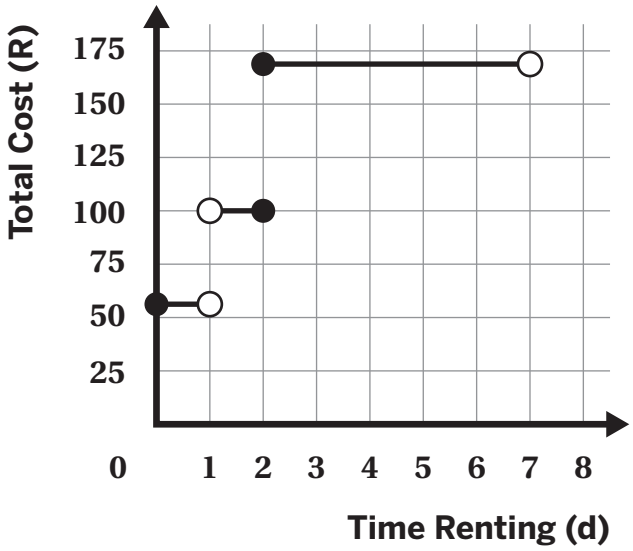
$$f(x) = \begin{cases} 2x + 1, & 0 \le x < 4 \\ 9, & x \ge 4 \end{cases}$$

Problems 4–5: A car rental company charges \$55 to rent a car for the first day, \$110 for up to two days, and \$170 for more than two days but less than a week. Let R represent the dollar price of renting a car for d days. Complete the table.

4. Complete the table.

Time renting (d)	0	0.75	1	1.25	2.5
Total cost (R)	0	55	55	110	170

5. The rental company tried to represent their pricing with this graph. What is correct and what should change to make the graph more accurate?



Responses vary.

- The horizontal lines for the time range for renting for 0–1 day and over 2 days are on the correct line. However, the point at (1, 55) should be filled in, and the one at (2, 170) should be open.

- The horizontal line at $y = 100$ is incorrect; it should be at $y = 110$.

Name: ..... Date: ..... Period: .....

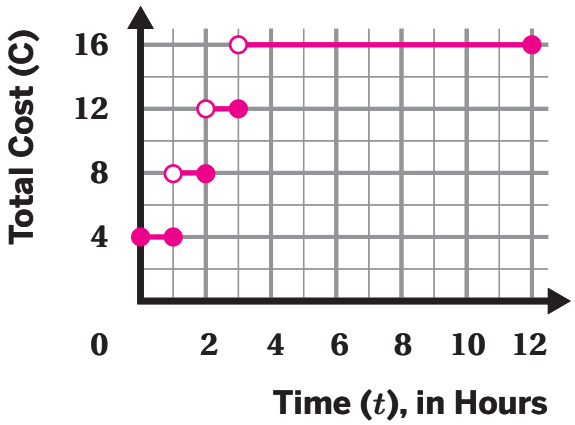
Problems 6–7: The cost of parking at the beach is \$4 for the first hour, \$8 for up to two hours, \$12 for up to three hours, and \$16 for more than three hours.

Let C represent the dollar price of parking for t hours.

6. Complete the table.

Hours parking (t)	Total cost (C)
0	0
0.75	4
1	4
1.25	8
2	8
2.5	12
4	16

7. Graph the function C for $0 \le t \le 12$



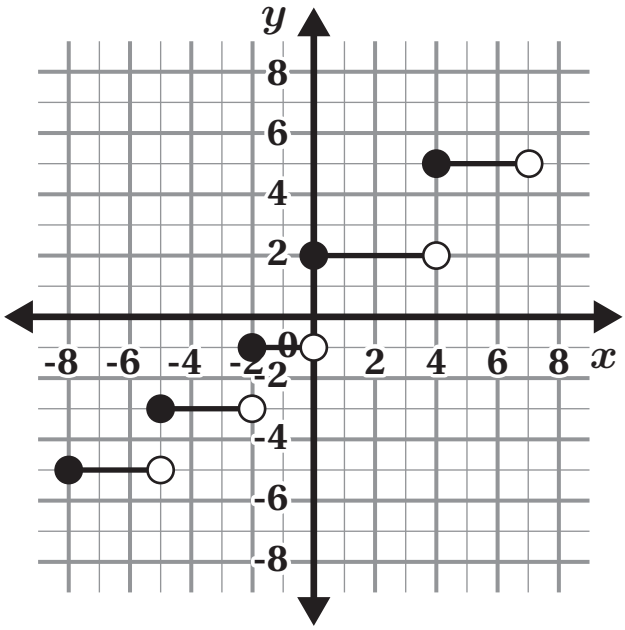
Problems 8–9: A graph of a piecewise-defined function is given.

8. Determine the following values:

a. $r(-5) =$ −3

b. $r(0) =$ 2

c. $r(8) =$ undefined



9. Complete $r(x)$ so that it matches the graph

$$r(x)\begin{cases} -5, & -8 \le x < -5 \\ -3, & -5 \le x < -2 \\ -1, & -2 \le x < 0 \\ 2, & 0 \le x < 4 \\ 5, & 4 \le x < 7 \end{cases}$$

Name: Date: Period:

Additional Practice 4.11

Problems 1–3: Determine the value of each piecewise-defined function, $f(x)$.

$$f(x) = \begin{cases} 2x+1, & 0 \le x < 4 \\ 9, & x \ge 4 \end{cases}$$

1. $f(0) =$ 1
2. $f(4) =$ 9
3. $f(6) =$ 9

Problems 4–5: A car rental company charges \$55 to rent a car for the first day, \$110 for up to two days, and \$170 for more than two days but less than a week. Let R represent the dollar price of renting a car for d days. Complete the table.

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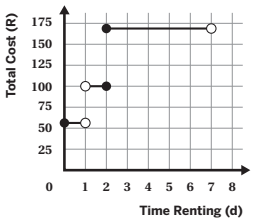


Responses vary.

- The horizontal lines for the time range for renting for 0–1 day and over 2 days are on the correct line. However, the point at (1, 55) should be filled in, and the one at (2, 170) should be open.
- The horizontal line at $y = 100$ is incorrect; it should be at $y = 110$.

Name: Date: Period:

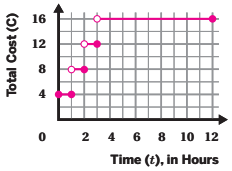
Problems 6–7: The cost of parking at the beach is \$4 for the first hour, \$8 for up to two hours, \$12 for up to three hours, and \$16 for more than three hours.

Let C represent the dollar price of parking for t hours.

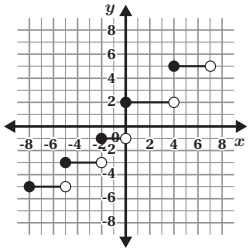
6. Complete the table.

Hours parking (t)	Total cost (C)
0	0
0.75	4
1	4
1.25	8
2	8
2.5	12
4	16

7. Graph the function C for $0 \le t \le 12$



Problems 8–9: A graph of a piecewise-defined function is given.



8. Determine the following values:
   a. $r(-5) =$ −3
   b. $r(0) =$ 2
   c. $r(8) =$ undefined

9. Complete $r(x)$ so that it matches the graph

$$r(x) \begin{cases} -5, & -8 \le x < -5 \\ -5, & -5 \le x < -2 \\ -1, & -2 \le x < 0 \\ 0, & 0 \le x < 4 \\ 5, & 4 \le x < 7 \end{cases}$$

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSF.IF.A.1
2	1	HSF.IF.A.1
3	1	HSF.IF.A.1
4	1	HSF.IF.C.7.B
5	2	HSF.IF.C.7.B
6	1	HSF.IF.C.7.B
7	1	HSF.IF.C.7.B
8	1	HSF.IF.A.1
9	1	HSF.IF.C.7.B

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 4.12

Problems 1–2: UPS charges shipping fees depending on the weight of the package.

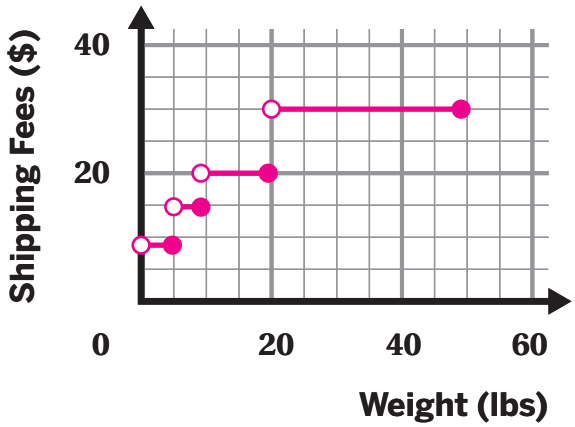
- Packages weighing more than 0 to 5 pounds cost $8.
- Packages weighing from more than 5 pounds to 10 pounds cost $15.
- Packages weighing more than 10 pounds to 20 pounds cost $20.
- Packages weighing more than 20 to 50 pounds cost $30.

Let $c(x)$ represent the shipping fee for an order that weighs x pounds.

1. Complete the table.

Weight in lbs (x)	Shipping Fee ($)
0	0
3	8
5	8
10	15
19	20
20	20
30	30
40	30
50	30

2. Make a graph that represents the function $T(x)$.



3. Sandra is an electrician who charges the following for her services:

- $75 for coming to the property
- $50 for more than 0 minutes to 1 hour
- $60 for the second hour, or any part of it
- $75 an hour for any time over 2 hours

$$f(x) = \begin{cases} 75 & x = 0 \\ 125 & 0 < x < 1 \\ 185 & 1 < x < 2 \\ 75x & x \geq 1 \end{cases}$$

Sandra wrote this piecewise-defined function to represent her charges. Identify at least two things that are incorrect in Sandra's function. Explain your thinking.

Responses vary. The 2nd inequality should be written $0 < x \leq 1$, because this time frame includes 1 hour. The 3rd inequality should be written $1 < x \leq 2$, because this time frame includes 2 hours. The 4th equation should be $75x + 185$, because the client has to pay for the previous hours as well. Also, the inequality should be written as $x > 2$.

Name: ..... Date: ..... Period: .....

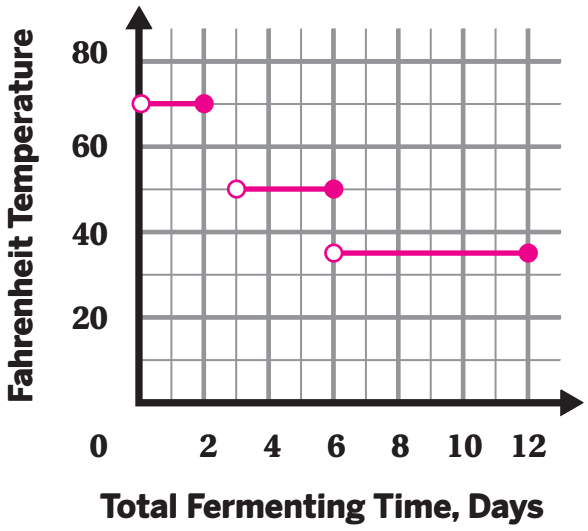
Problems 4–7: Bethany is making kimchi, a tangy cabbage dish, with her grandmother. The directions for making kimchi are:

- Ferment the cabbage for the first 3 days at a temperature of $70°F$
- Store the dish at a temperature of $50°$ F for the next 3 days
- Store the dish in a $35°F$ refrigerator for the next 6 days

4. Here is part of the piecewise function, F, and the graph that models this situation. Fill in the missing numbers and symbols.

$$F(t) = \begin{cases} \mathbf{70} & 0 \leq t \leq 3 \\ 50 & \mathbf{3} < t \leq 6 \\ 35 & \mathbf{6 < t \leq 12} \end{cases}$$

5. Complete the graph to represent this situation.



6. What does $F(9)$ represent in this situation?

$F(9)$ represent the temperature the kimchi is stored at on the 9th day.

7. What is the value of $F(9)$?

35° F

Name: Date: Period:

Additional Practice 4.12

Problems 1–2: UPS charges shipping fees depending on the weight of the package.

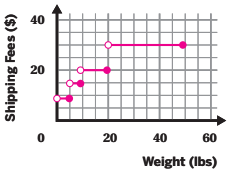
- Packages weighing more than 0 to 5 pounds cost $8.
- Packages weighing from more than 5 pounds to 10 pounds cost $15.
- Packages weighing more than 10 pounds to 20 pounds cost $20.
- Packages weighing more than 20 to 50 pounds cost $30.

Let $c(x)$ represent the shipping fee for an order that weighs x pounds.

1. Complete the table.

Weight in lbs (x)	Shipping Fee ($)
0	0
3	8
5	8
10	15
19	20
20	20
30	30
40	30
50	30

2. Make a graph that represents the function $T(x)$.



3. Sandra is an electrician who charges the following for her services:

- $75 for coming to the property
- $50 for more than 0 minutes to 1 hour
- $60 for the second hour, or any part of it
- $75 an hour for any time over 2 hours

$$f(x) = \begin{cases} 75 & x = 0 \\ 125 & 0 < x < 1 \\ 185 & 1 < x < 2 \\ 75x & x \geq 1 \end{cases}$$

Sandra wrote this piecewise-defined function to represent her charges. Identify at least two things that are incorrect in Sandra's function. Explain your thinking.

Responses vary. The 2nd inequality should be written $0 < x \leq 1$, because this time frame includes 1 hour. The 3rd inequality should be written $1 < x \leq 2$, because this time frame includes 2 hours. The 4th equation should be $75x + 185$, because the client has to pay for the previous hours as well. Also, the inequality should be written as $x > 2$.

Name: Date: Period:

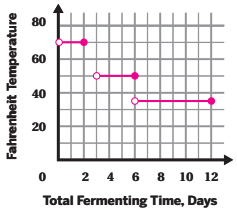
Problems 4–7: Bethany is making kimchi, a tangy cabbage dish, with her grandmother. The directions for making kimchi are:

- Ferment the cabbage for the first 3 days at a temperature of 70°F
- Store the dish at a temperature of 50° F for the next 3 days
- Store the dish in a 35°F refrigerator for the next 6 days

4. Here is part of the piecewise function, F, and the graph that models this situation. Fill in the missing numbers and symbols.

$$F(t) = \begin{cases} 70 & 0 \leq t \leq 3 \\ 50 & 3 < t \leq 6 \\ 35 & 6 < t \leq 12 \end{cases}$$

5. Complete the graph to represent this situation.



6. What does $F(9)$ represent in this situation?

$F(9)$ represent the temperature the kimchi is stored at on the 9th day.

7. What is the value of $F(9)$?

35° F

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSF.IF.C.7.B
2	1	HSF.IF.C.7.B
3	2	HSF.IF.C.7.B
4	1	HSF.IF.C.7.B
5	1	HSF.IF.C.7.B
6	2	HSF.IF.A.1
7	1	HSF.IF.A.1

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 4.13

Problems 1–3: Let $p(n)$ represent the value of term n in this sequence: 3, 8, 13, 18, 23, ... Write the number that makes each equation true.

1. $p(1) =$ 3

2. $p(9-1) =$ 38

3. $p(n) = p(n-1) +$ 5

4. Match each sequence with one of the definitions.

Sequence		Definition
a. 2, 6, 18, 54, ...	b	$f(1) = 2$ $f(n) = f(n-1) + 15$
b. 2, 17, 32, 47, ...	c	$f(1) = 2$ $f(n) = \frac{3}{2} \cdot f(n-1)$
c. $2, 3, \frac{9}{2}, \frac{27}{4}, \ldots$	a	$f(1) = 2$ $f(n) = 3 \cdot f(n-1)$

Problems 5–6: Write the first four terms of each sequence.

5. $a(1) = \frac{1}{4}$
$a(n) = 2 \cdot a(n-1)$
$\frac{1}{4}$, $\frac{1}{2}$, 1, 2

6. $c(1) = \frac{1}{4}$
$c(n) = c(n-1) + 2$
$\frac{1}{4}$, $2\frac{1}{4}$, $4\frac{1}{4}$, $6\frac{1}{4}$

Problems 7–8: Here are the first five terms of some sequences. Write a recursive definition for each one.

7. 30, 25, 20, 15, 10
$f(1) = 30$
$f(n) = f(n-1) - 5$

8. 4, 12, 36, 108, 324
$g(1) = 4$
$g(n) = 3 \cdot g(n-1)$

Name: ..... Date: ..... Period: .....

9. An arithmetic sequence $a(n)$ and geometric sequence $g(n)$ both have the same first and third term. Determine a recursive definition for each.

Arithmetic Sequence	Geometric Sequence
$a(1) = 2$	$g(1) = 2$
$a(n) = f(n-1) + 3$	$g(n) = 2 \cdot g(n-1)$

10. Write a recursive definition that will make the values of the table shown.

$f(1) =$ **500**

$f(n) =$ $\frac{1}{2} f(n-1)$

Terms, n	Value
1	500
2	250
3	125
4	62.5
5	31.25

Name: Date: Period:

Additional Practice 4.13

Problems 1–3: Let $p(n)$ represent the value of term n in this sequence: 3, 8, 13, 18, 23, ... Write the number that makes each equation true.

1. $p(1) =$ 3 **2.** $p(9-1) =$ 38 **3.** $p(n) = p(n-1) +$ 5

4. Match each sequence with one of the definitions.

Sequence		Definition
a. 2, 6, 18, 54, ...	b	$f(1) = 2$ $f(n) = f(n-1) + 15$
b. 2, 17, 32, 47, ...	c	$f(1) = 2$ $f(n) = \frac{3}{2} \cdot f(n-1)$
c. $2, 3, \frac{9}{2}, \frac{27}{4}, \ldots$	a	$f(1) = 2$ $f(n) = 3 \cdot f(n-1)$

Problems 5–6: Write the first four terms of each sequence.

5. $a(1) = \frac{1}{4}$
$a(n) = 2 \cdot a(n-1)$
$\frac{1}{4}$, $\frac{1}{2}$, 1, 2

6. $c(1) = \frac{1}{4}$
$c(n) = c(n-1) + 2$
$\frac{1}{4}$, $2\frac{1}{4}$, $4\frac{1}{4}$, $6\frac{1}{4}$

Problems 7–8: Here are the first five terms of some sequences. Write a recursive definition for each one.

7. 30, 25, 20, 15, 10
$f(1) = 30$
$f(n) = f(n-1) - 5$

8. 4, 12, 36, 108, 324
$g(1) = 4$
$g(n) = 3 \cdot g(n-1)$

Name: Date: Period:

9. An arithmetic sequence $a(n)$ and geometric sequence $g(n)$ both have the same first and third term. Determine a recursive definition for each.

Arithmetic Sequence	Geometric Sequence
$a(1) = 2$	$g(1) = 2$
$a(n) = f(n-1) + 3$	$g(n) = 2 \cdot g(n-1)$

10. Write a recursive definition that will make the values of the table shown.

$f(1) =$ 500
$f(n) =$ $\frac{1}{2} f(n-1)$

Terms, n	Value
1	500
2	250
3	125
4	62.5
5	31.25

Practice Problem Analysis

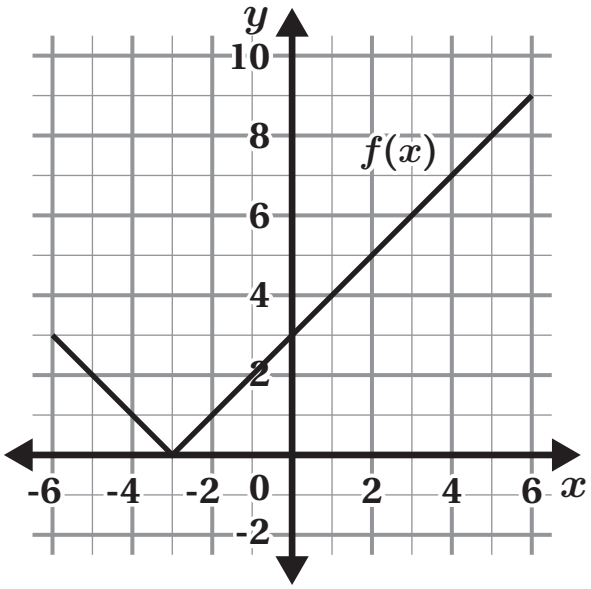
Problem	DOK	Standard(s)
1	1	HSF.IF.A.3
2	1	HSF.IF.A.3
3	1	HSF.BF.A.2
4	2	HSF.BF.A.2
5	1	HSF.BF.A.2
6	1	HSF.BF.A.2
7	2	HSF.BF.A.2
8	2	HSF.BF.A.2
9	2	HSF.BF.A.2
10	2	HSF.BF.A.2

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 4.15

Problems 1–3: Use the graph of $f(x)$ to determine each value.

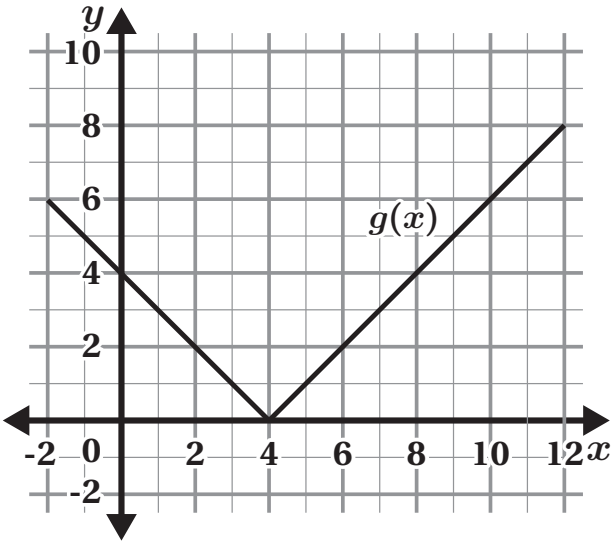


1. $f(0) =$ 3

2. $f(2) =$ 5

3. $f(-3) =$ 0

4. Which equation represents the graph of $g(x)$? Circle your choice.



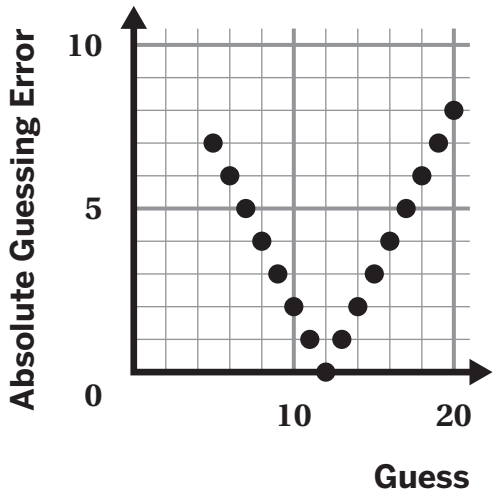
   A. $g(x) = |x - 4|$
   B. $g(x) = |x + 4|$
   C. $g(x) = |x| - 4$
   D. $g(x) = |x| + 4$

Name: ..... Date: ..... Period: .....

5. A group of 8 friends played a number guessing game. They were asked to select a number between 1 and 15.
The graph shows the guesses made by each of the 8 friends.
The actual number was 11.

Which is the greatest absolute guessing error?

9

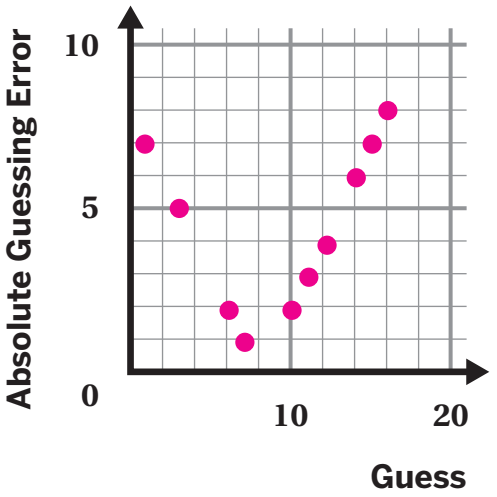


Problems 6–8: A group of 10 friends played a number guessing game. They were asked to select a number between 1 and 20. The person closest to the target number wins. The table below shows the guesses made by each of the 10 friends.

6. The actual number was 8. Complete the table with the absolute guessing errors.

Guess	15	3	10	14	16	12	1	7	6	11
Absolute Guessing Error	**7**	**5**	**2**	**6**	**8**	**4**	**7**	**1**	**2**	**3**

7. Graph each guess, x, and its corresponding absolute guessing error, $g(x)$ on the coordinate plane.



8. Nadine writes $g(20) = 12$.

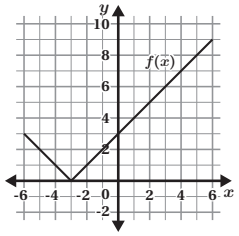
What does her equation mean?

If someone guessed the number 20, they were 12 away from the actual number.

Name: Date: Period:

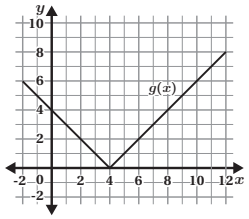
Additional Practice 4.15

Problems 1–3: Use the graph of $f(x)$ to determine each value.



1. $f(0) =$ 3
2. $f(2) =$ 5
3. $f(-3) =$ 0

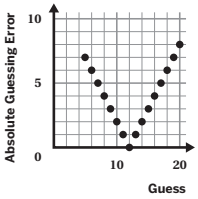
4. Which equation represents the graph of $g(x)$? Circle your choice.



   A. $g(x) = |x - 4|$
   B. $g(x) = |x + 4|$
   C. $g(x) = |x| - 4$
   D. $g(x) = |x| + 4$

Name: Date: Period:

5. A group of 8 friends played a number guessing game. They were asked to select a number between 1 and 15.
The graph shows the guesses made by each of the 8 friends.
The actual number was 11.



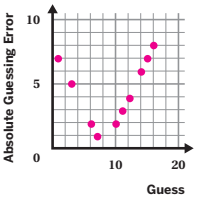
Which is the greatest absolute guessing error?
9

Problems 6–8: A group of 10 friends played a number guessing game. They were asked to select a number between 1 and 20. The person closest to the target number wins. The table below shows the guesses made by each of the 10 friends.

6. The actual number was 8. Complete the table with the absolute guessing errors.

Guess	15	3	10	14	16	12	1	7	6	11
Absolute Guessing Error	7	5	2	6	8	4	7	1	2	3

7. Graph each guess, x, and its corresponding absolute guessing error, $g(x)$ on the coordinate plane.



8. Nadine writes $g(20) = 12$.
   What does her equation mean?
   If someone guessed the number 20, they were 12 away from the actual number.

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSF.IF.A.2
2	1	HSF.IF.A.2
3	1	HSF.IF.A.2
4	1	HSF.IF.C.7.B
5	1	HSF.IF.C.7.B
6	1	HSF.IF.C.7.B
7	1	HSF.IF.C.7.B
8	2	HSF.IF.A.2

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 4.16

Problems 1–3: Write each expression as a single integer.

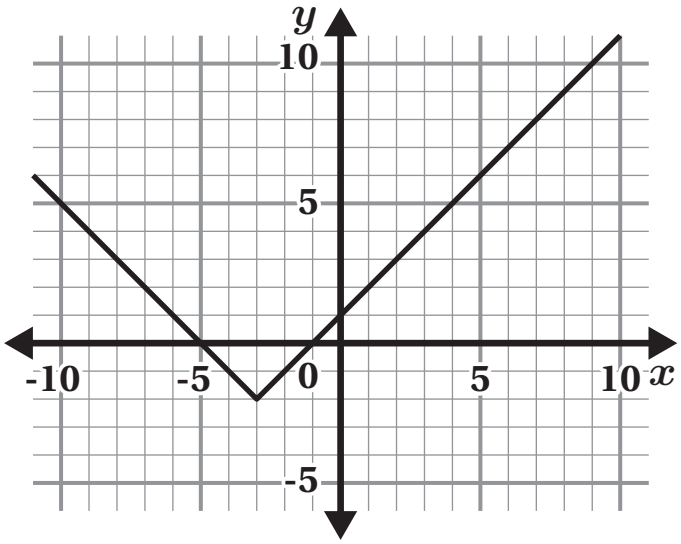
1. $|-5|$ 5

2. $|12| - 4$ 8

3. $|-6| + 3$ 9

4. Graph $f(x) = |x + 3| - 2$. Use the table if it helps your thinking.

x	$f(x)$
-5	0
-3	-2
0	1
1	2
2	3

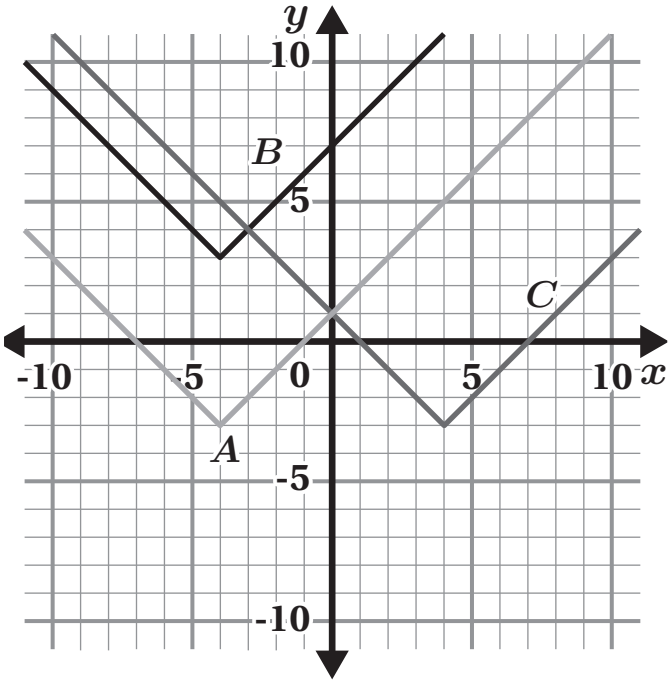


5. Match each function with its graph.

$f(x) = |x - 4| - 3$ C

$f(x) = |x + 4| + 3$ B

$f(x) = |x + 4| - 3$ A

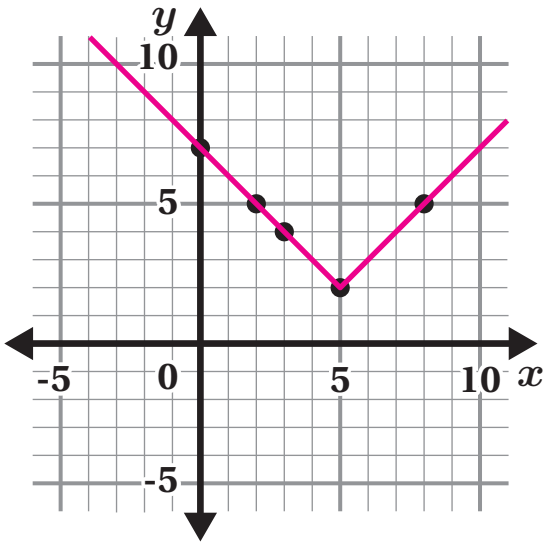


Name: ..... Date: ..... Period: .....

6. Here are some points on the graph of $g(x) = |x - 5| + 2$.

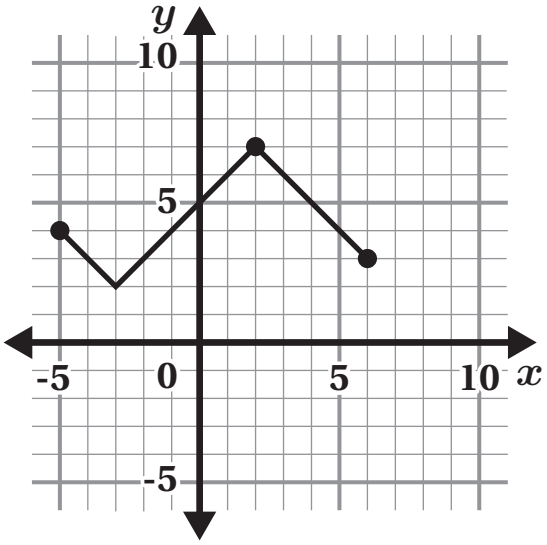
- Sketch a graph of $g(x)$.
- Describe the graph using some of these terms:

positive	maximum	increasing	domain
negative	minimum	decreasing	range
symmetry	piecewise-defined function		



Responses vary. This graph has a minimum of 2 when $x = 5$. The domain is all numbers and the range is all numbers greater than or equal to 2. The graph is increasing when $x > 5$ and decreasing when $x < 5$.

7. Determine two different piecewise-defined functions that could represent this graph.



Responses vary.

$$f(x) = \begin{cases} |x+3|+2 & -5 \le x < 2 \\ |x-2|+7 & 2 \le x \le 6 \end{cases}$$

$$f(x) = \begin{cases} |x+3|+2 & -5 \le x \le 2 \\ x+9 & 2 < x \le 6 \end{cases}$$

Name: Date: Period:

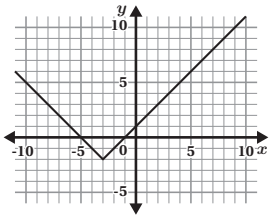
Additional Practice 4.16

Problems 1–3: Write each expression as a single integer.

1. $|-5|$ 5
2. $|12| - 4$ 8
3. $|-6| + 3$ 9

4. Graph $f(x) = |x + 3| - 2$. Use the table if it helps your thinking.

x	$f(x)$
–5	0
–3	–2
0	1
1	2
2	3

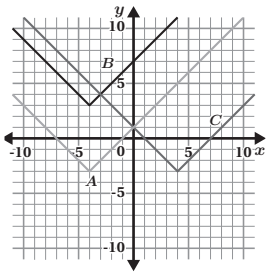


5. Match each function with its graph.

$f(x) = |x - 4| - 3$ C

$f(x) = |x + 4| + 3$ B

$f(x) = |x + 4| - 3$ A



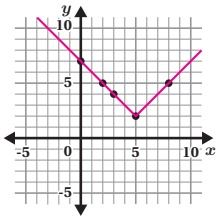
Unit 4 Lesson 16 115

Name: Date: Period:

6. Here are some points on the graph of $g(x) = |x - 5| + 2$.
   - Sketch a graph of $g(x)$.
   - Describe the graph using some of these terms:

positive	maximum	increasing	domain
negative	minimum	decreasing	range
symmetry	piecewise-defined function		

Responses vary. This graph has a minimum of 2 when $x = 5$. The domain is all numbers and the range is all numbers greater than or equal to 2. The graph is increasing when $x > 5$ and decreasing when $x < 5$.

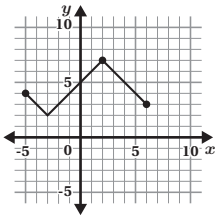


7. Determine two different piecewise-defined functions that could represent this graph.

Responses vary.

$f(x) = \begin{cases} |x+3|+2 & -5 \le x < 2 \\ |x-2|+7 & 2 \le x \le 6 \end{cases}$

$f(x) = \begin{cases} |x+3|+2 & -5 \le x \le 2 \\ x+9 & 2 < x \le 6 \end{cases}$



Unit 4 Lesson 16 116 Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	6.NS.C.7
2	1	6.NS.C.7
3	1	6.NS.C.7
4	1	HSF.IF.C.7.B
5	1	HSF.IF.C.7.B
6	2	HSF.IF.C.7.B, HSF.IF.B.4
7	2	HSF.IF.C.7.B

Notes:

Name: ..... Date: ..... Period: .....

Additional Practice 4.18

1. The graph of function $k(x)$ passes through the point at $(-9, 4)$. The graph of the inverse of $k(x)$ must pass through which of the following points?

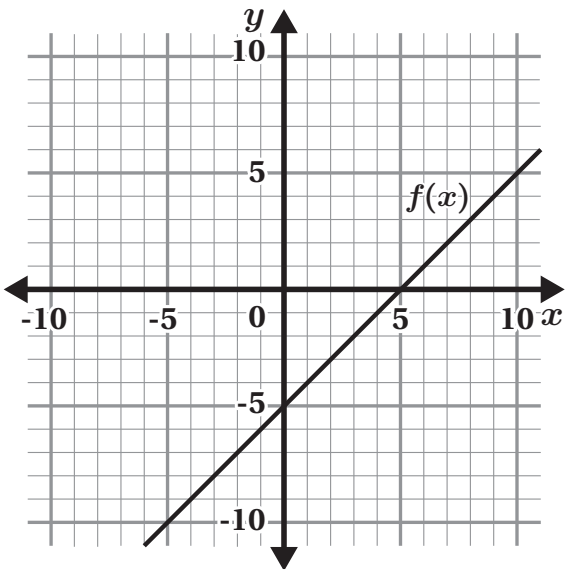
A. $(-9, 4)$

B. $(9, -4)$

C. $(4, -9)$

D. $(-4, 9)$

2. Use the graph of $f(x) = x - 5$ to determine the equation for the inverse function.



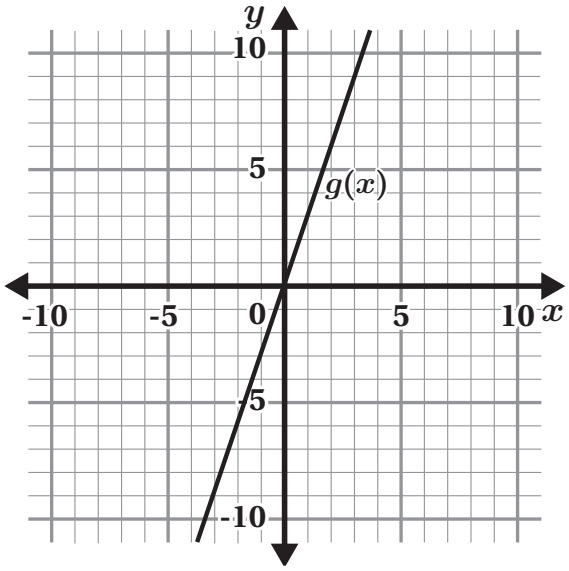
A. $a(x) = -5x$

B. $b(x) = x + 5$

C. $c(x) = -x + 5$

D. $d(x) = 5 - x$

3. Use the graph of $g(x) = 3x$ to determine the equation for the inverse function.



A. $a(x) = -3x$

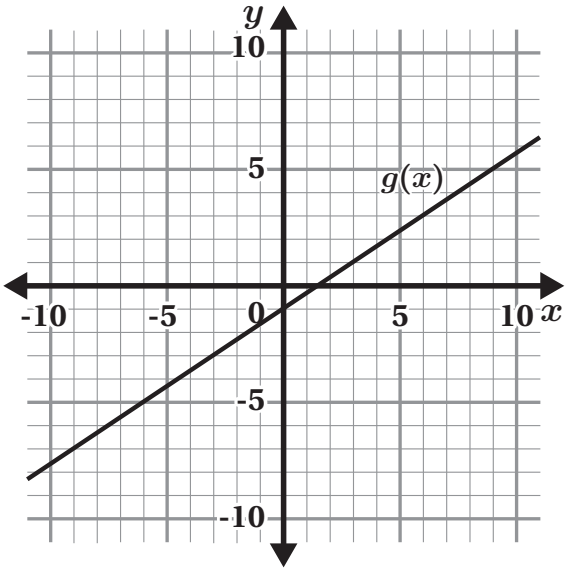
B. $b(x) = x - 3$

C. $c(x) = -x + 3$

D. $d(x) = \frac{1}{3}x$

Name: ..... Date: ..... Period: .....

Problems 4–6: Here is the graph of $g(x) = \frac{2}{3}x - 1$.



4. List two points that the inverse function $n(x)$ will pass through.

Responses vary. (−1, 0) and (1, 3)

5. Write an equation for the inverse function $n(x)$.

$y = \frac{3}{2}(x + 1)$ or equivalent.

6. Which of the functions will pass through point $(-3, -3)$? Circle your choice.

$g(x)$ $n(x)$ (Both) Neither

Explain your reasoning.

Explanations vary. I substituted $(-3, -3)$ into the equation for $g(x)$ and $n(x)$ to see if they were true statements. Since both $g(-3) = -3$ and $n(-3) = -3$, they both pass through the point $(-3, -3)$.

7. Kendra attempts to determine the inverse of the function $h(x) = -4x + 12$. She graphs the inverse of $h(x)$ and determines the graph of the inverse is a line with a slope of 4 and a vertical intercept of -12, because the inverse is found by reversing the operations of the original function. Do you agree? Explain your thinking.

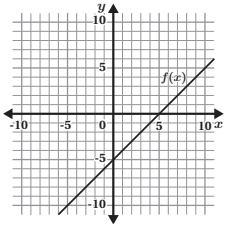
Explanations vary. Kendra is incorrect. Two functions are inverses of each other if their input-output pairs are reversed, not if the operations are reversed.

Name: Date: Period:

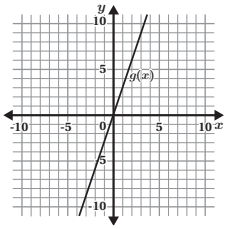
Additional Practice 4.18

1. The graph of function $k(x)$ passes through the point at $(-9, 4)$. The graph of the inverse of $k(x)$ must pass through which of the following points?
   - A. $(-9, 4)$
   - B. $(9, -4)$
   - C. $(4, -9)$
   - D. $(-4, 9)$

2. Use the graph of $f(x) = x - 5$ to determine the equation for the inverse function.
   - A. $a(x) = -5x$
   - B. $b(x) = x + 5$
   - C. $c(x) = -x + 5$
   - D. $d(x) = 5 - x$

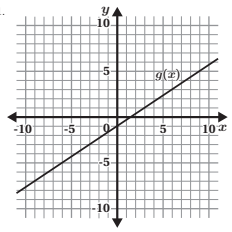


3. Use the graph of $g(x) = 3x$ to determine the equation for the inverse function.
   - A. $a(x) = -3x$
   - B. $b(x) = x - 3$
   - C. $c(x) = -x + 3$
   - D. $d(x) = \frac{1}{3}x$



Name: Date: Period:

Problems 4–6: Here is the graph of $g(x) = \frac{2}{3}x - 1$.



4. List two points that the inverse function $n(x)$ will pass through.
   Responses vary. (−1, 0) and (1, 3)

5. Write an equation for the inverse function $n(x)$.
   $y = \frac{3}{2}(x + 1)$ or equivalent.

6. Which of the functions will pass through point $(-3, -3)$? Circle your choice.
   $g(x)$ $n(x)$ (Both) Neither

   Explain your reasoning.
   Explanations vary. I substituted $(-3, -3)$ into the equation for $g(x)$ and $n(x)$ to see if they were true statements. Since both $g(-3) = -3$ and $n(-3) = -3$, they both pass through the point $(-3, -3)$.

7. Kendra attempts to determine the inverse of the function $h(x) = -4x + 12$. She graphs the inverse of $h(x)$ and determines the graph of the inverse is a line with a slope of 4 and a vertical intercept of -12, because the inverse is found by reversing the operations of the original function. Do you agree? Explain your thinking.
   Explanations vary. Kendra is incorrect. Two functions are inverses of each other if their input-output pairs are reversed, not if the operations are reversed.

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	HSF.BF.B.4
2	1	HSF.BF.B.4
3	1	HSF.BF.B.4
4	1	HSF.BF.B.4
5	2	HSF.BF.B.4
6	2	HSF.BF.B.4
7	2	HSF.BF.B.4

Notes: