

Chapter
1**Integers**

Dear Family,

Hiking can be good exercise and a nice opportunity to talk with your family. Whether you walk to a nearby park, or travel to a favorite hiking trail, you usually plan to end up where you start. How far have you traveled on your walk, then? In a sense, you have gone nowhere—you have traveled zero distance.

This isn't the whole story, though. What also happens is that you travel a certain distance there and then the same distance back. The two distances are in opposite directions, so they bring you back to your starting point. But if you want to know how far you have walked, you talk about the distance without regard to direction—the *absolute value*. If the park is a mile away, you walk one mile there and one mile back—two miles in total.

The same reasoning applies when you walk up a hill. If you climb a 300-foot hill, you are going up 300 feet. If you want to end up back at the bottom, you must eventually climb down 300 feet. How much have you climbed in total?

While you are walking, keep track of how far you have traveled. You might talk with your student about the following:

- When is it helpful to assign direction (positive or negative) to each part of the walk?
- When is it helpful to ignore direction and just use the absolute value of the distance?

Usually we express the up direction as a positive number and the down direction as a negative number. Talk with your student about why that might be the case. With your student, think of situations where the reverse might be more convenient.

Enjoy the sunshine while you walk and talk with your student!

Capítulo**1****Números enteros**

Estimada Familia:

Salir de excursión puede ser un buen ejercicio y una buena oportunidad para conversar con su familia. Ya sea que caminen a un parque cercano o viajen a su sendero de excursión favorito, generalmente planean terminar donde empezaron. Entonces, ¿cuánto han recorrido en su caminata? En cierto sentido, no han ido a ningún lugar—han recorrido una distancia cero.

Sin embargo, aquí no acaba todo. Lo que también sucede es que recorrieron una cierta distancia hacia allá y luego recorrieron la misma distancia de regreso. Las dos distancias están en direcciones opuestas, así que los traen de vuelta a su punto de partida. Pero si desean saber cuánto han caminado, se habla sobre la distancia sin considerar la dirección—es decir, el *valor absoluto*. Si el parque queda a una milla de distancia, ustedes caminan una milla hacia allá y una milla de regreso—dos millas, en total.

El mismo razonamiento se aplica cuando se trepa por una colina. Si trepa una colina de 300 pies, está ascendiendo 300 pies. Si desea terminar de regreso en la parte inferior, eventualmente tendrá que bajar 300 pies. ¿Cuánto ha trepado en total?

Mientras está caminando, lleve un registro de la distancia que ha recorrido. Querrá hablar con su estudiante acerca de lo siguiente:

- ¿Cuándo es útil asignar una dirección (positiva o negativa) a cada parte de la caminata?
- ¿Cuándo es útil ignorar una dirección y sólo usar el valor absoluto de la distancia?

Generalmente expresamos la dirección ascendente con un número positivo y la descendente con un número negativo. Converse con su estudiante acerca de por qué sería ese el caso. Con su estudiante, piense en situaciones en donde lo inverso podría ser más conveniente.

¡Disfrute de la luz solar mientras camina y conversa con su estudiante!

Activity
1.1**Start Thinking!**

For use before Activity 1.1

Explain how football is like solving a math problem.

Activity
1.1**Warm Up**

For use before Activity 1.1

Copy and complete the statement using < or >.

1. $12 \underline{\quad ? \quad} 14$

2. $36 \underline{\quad ? \quad} 26$

3. $-2 \underline{\quad ? \quad} -5$

4. $-15 \underline{\quad ? \quad} -8$

5. $13 \underline{\quad ? \quad} -10$

6. $-20 \underline{\quad ? \quad} 19$

Start Thinking!

For use before Lesson 1.1

When you go to school in the morning, you travel in one direction. Then returning home, you travel in the other direction. How does this compare to a number line where one direction is positive and the other is negative? Do you ever travel in a negative direction?

Warm Up

For use before Lesson 1.1

Find the absolute value.

1. $|15|$

2. $|-23|$

3. $|7|$

4. $|-35|$

5. $|-43|$

6. $|0|$

7. $|39|$

8. $|-212|$

1.1 Practice A

Find the absolute value.

1. $|-7|$ 2. $|12|$ 3. $|-13|$ 4. $|0|$

Copy and complete the statement using $<$, $>$, or $=$.

5. $|-4|$ $\underline{\quad ? \quad}$ 2 6. 7 $\underline{\quad ? \quad}$ $|-7|$ 7. $|8|$ $\underline{\quad ? \quad}$ 5

8. While playing a game, you move back 5 spaces with your roll of the number cube. Your friend moves forward 3 spaces. Write each amount as an integer.

Order the values from least to greatest.

9. $-1, |5|, |4|, 8, |-1|$ 10. $|2|, 0, |5|, 6, |3|$

Simplify the expression.

11. $|-19|$ 12. $-|-8|$ 13. $-|13|$

14. You are kite sailing on the ocean. The table gives your height at different times.

Time (seconds)	0	1	2	3
Height (feet)	2	4	6	8

- a. How many feet do you move each second?
- b. What is your speed? Give the units.
- c. Is your velocity positive or negative?
- d. What is your velocity? Give the units.
15. Use a number line.
- a. Graph and label the following points on a number line: $T = 1$, $L = -8$, $E = 4$, $A = -5$. What word do the letters spell?
- b. Graph and label the absolute value of each point in part (a). What word do the letters spell now?
16. Write an integer whose absolute value is greater than itself.

1.1 Practice B

Copy and complete the statement using $<$, $>$, or $=$.

1. $|-23|$? 23 2. $|-142|$? $|-157|$ 3. $-|-78|$? 52
4. You and your friend are swimming against the current. You move forward 15 feet. Your friend is not a strong swimmer, so he moves back 6 feet. Write each amount as an integer.

Order the values from least to greatest.

5. 14, $|-25|$, $-|-34|$, 28, $|0|$ 6. $|-16|$, 10, $|25|$, -16, $|-43|$

Simplify the expression.

7. $|-249|$ 8. $-|183|$ 9. $-|-153|$
10. The boiling point of a liquid is the temperature at which the vapor pressure of the liquid equals the environmental pressure surrounding the liquid.

Substance	Hydrogen	Oxygen	Iodine	Phosphorus
Boiling Point ($^{\circ}\text{C}$)	-253	-183	184	280

- a. Which substance in the table has the highest boiling point?
- b. Is the boiling point of oxygen or iodine closer to 0°C ?
11. You are riding on a rollercoaster.
- a. Your velocity is 13 feet per second. Are you moving up or moving down?
- b. What is your speed in part (a)? Give the units.
- c. Your velocity is -17 feet per second. Are you moving up or moving down?
- d. What is your speed in part (c)? Give the units.
12. There is one integer for which there does not exist another integer with the same absolute value. What is that integer?

Determine whether the statement is *true* or *false*. Explain your reasoning.

13. The absolute value of 3 above par is the same as the absolute value of 3 below par.
14. If $x < 0$, then $|x| < x$.

1.1 Enrichment and Extension

Reasoning with Integers

Assume $a > 0$ and $b < 0$. Determine whether the statement is *always*, *sometimes*, or *never* true.

- | | | | |
|--------------|--------------|------------------|----------------|
| 1. $a > b$ | 2. $a < b$ | 3. $ a > b $ | 4. $ a < b $ |
| 5. $-a > -b$ | 6. $-a < -b$ | 7. $- a < - b $ | 8. $-a < -b$ |

Let n be an integer. Determine whether the possible values of n are *all integers*, *all positive integers*, *all negative integers*, *all positive integers and zero*, *all negative integers and zero*, or *none*.

- | | | | |
|----------------------|------------------------|----------------------|------------------------|
| 9. $n < 0$ | 10. $n > 0$ | 11. $ n < 0$ | 12. $ n \geq 0$ |
| 13. $ -n < 0$ | 14. $ -n \geq 0$ | 15. $- n \leq 0$ | 16. $- n > 0$ |
| 17. $- -n \leq 0$ | 18. $- -n > 0$ | 19. $ n = -n$ | 20. $- n = n$ |
| 21. $ n = n$ | 22. $ -n = n$ | 23. $- -n = -n$ | 24. $- -n = n$ |
| 25. $ n < n$ | 26. $ n > n$ | 27. $ n > -n$ | 28. $- n < n$ |
| 29. $ n > -n $ | 30. $ n \geq - n $ | 31. $- -n < n$ | 32. $- -n \leq n $ |
| 33. $ n + n < 2n$ | 34. $ n + n = 2 n $ | 35. $- n + n = 0$ | 36. $- -n + -n = 0$ |

For each exercise number, use your answers and the key below to color the cell. Do not color the cells that have a zero in them.

Always = Orange

Sometimes = Green

Never = Brown

All Integers = Brown

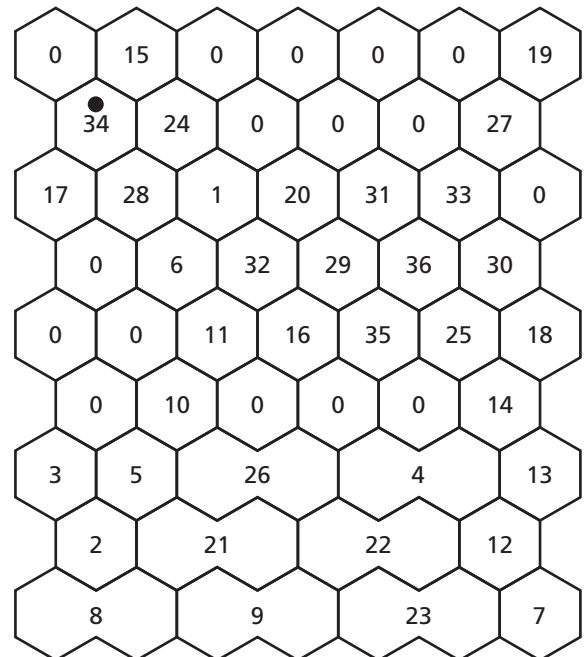
All Positive Integers = Brown

All Negative Integers = Green

All Positive Integers and Zero = Green

All Negative Integers and Zero = Brown

None = Brown



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Puzzle Time

What Can You Serve, But Never Eat?

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

Find the absolute value.

1. $|12|$

2. $|-9|$

3. $|20|$

4. $|-10|$

Complete the statement using $<$, $>$, or $=$.

5. $3 \underline{\quad ? \quad} |-8|$

6. $4 \underline{\quad ? \quad} |-4|$

7. $|-6| \underline{\quad ? \quad} -6$

Simplify the expression.

8. $-|-13|$

9. $|-55|$

10. $-|2|$

11. A fishfinder is an instrument on a boat that indicates where fish are located. Are the fish closest to the surface of the water at -20 feet or -30 feet?

Answers

S. 10

B. -13

E. -2

T. 20

G. -55

A. 9

I. 12

F. 2

S. -20

B. -9

H. -12

D. 13

L. 55

R. -10

A. $<$

N. $>$

L. $=$

N. -20 feet

P. -30 feet

5		3	10	11	7	1	4		8	2	9	6
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**Activity
1.2****Start Thinking!**

For use before Activity 1.2

Explain how playing a round of golf is like solving an integer problem.

**Activity
1.2****Warm Up**

For use before Activity 1.2

Add.

1. $10 + 12$

2. $14 + 28$

3. $26 + 32 + 19$

4. $47 + 35 + 68$

5. $12 + 33 + 59 + 18$

6. $82 + 13 + 29 + 97$

**Lesson
1.2****Start Thinking!**

For use before Lesson 1.2

The temperature first rises 10 degrees and then falls 12 degrees. Is the end temperature greater than or less than the starting temperature? How does this compare to adding integers?

**Lesson
1.2****Warm Up**

For use before Lesson 1.2

Add.

1. $9 + 4$

2. $-5 + (-1)$

3. $-8 + 13$

4. $12 + (-8)$

5. $-10 + 6$

6. $-14 + 14$

1.2 Practice A

Add.

1. $8 + 2$ 2. $-5 + (-3)$ 3. $-9 + (-3)$ 4. $6 + (-6)$
5. $4 + (-4)$ 6. $9 + (-6)$ 7. $5 + (-2)$ 8. $7 + (-13)$
9. $-18 + 1$ 10. $-12 + (-5)$ 11. $0 + (-7)$ 12. $12 + (-15)$

13. Your bank account has a balance of $-\$21$. You deposit $\$50$. What is your new balance?

Tell how the Commutative and Associative Properties of Addition can help you find the sum mentally. Then find the sum.

14. $8 + (-5) + (-8)$ 15. $-4 + 9 + 4$ 16. $-5 + 12 + (-7)$

Add.

17. $7 + 5 + (-2)$ 18. $-13 + 7 + (-3)$ 19. $17 + (-5) + (-1)$
20. $4 + 8 + (-8)$ 21. $-12 + (-4) + 9$ 22. $-10 + 10 + (-3)$
23. $(-11) + 5 + (-12)$ 24. $7 + 15 + (-7)$ 25. $-12 + (-5) + (-10)$

Use mental math to solve the equation.

26. $n + (-8) = 5$ 27. $4 + c = 0$ 28. $-6 + k = -14$

29. In golf, a golfer must have a score of 0 in order to be at par. A golfer scores 2 above par on the first hole, 1 below par on the second hole, and 2 below par on the third hole. Which expression can be used to decide whether the golfer is at par after the first three holes?

$$\boxed{(-2) + 1 + 2}$$

$$\boxed{2 + (-1) + 2}$$

$$\boxed{2 + (-1) + (-2)}$$

30. Copy and complete the magic square so that each row and column has a magic sum of 0. Use each integer from -4 to 4 exactly once.

3		-2
		2

1.2 Practice B**Add.**

1. $15 + 24$ 2. $-13 + (-35)$ 3. $29 + (-29)$ 4. $31 + (-72)$
5. The elevation of your plot of land is 2 feet below sea level. You add 7 feet of dirt to your land. What is the new elevation of your land?

Tell how the Commutative and Associative Properties of Addition can help you find the sum mentally. Then find the sum.

6. $18 + (-25) + (-18)$ 7. $-22 + 45 + (-8)$ 8. $28 + (-12) + 4$

Add.

9. $17 + (-33) + (-12)$ 10. $(-41) + 25 + 19$ 11. $(-43) + (-27) + 43$
12. $71 + 27 + (-42)$ 13. $(-63) + 81 + 0$ 14. $(-39) + (-21) + (-19)$
15. $52 + (-38) + 23$ 16. $101 + (-51) + (-36)$ 17. $(-117) + 125 + (-67)$

Use mental math to solve the equation.

18. $n + (-20) = 5$ 19. $c + (-71) = 0$ 20. $-30 + k = -110$
21. Write three integers that do not all have the same sign that have a sum of -20 . Write three integers that do not all have the same sign that have a sum of 10.
22. The temperature at 6 A.M. is -12°F . During the next twelve hours, the temperature increases 25°F . During the following 5 hours, the temperature decreases 23°F . What is the temperature at 11 P.M.?
23. Copy and complete the magic square so that each row and column has a magic sum of 0. Use integers from -9 to 9, without repeating an integer.

9		-3
		2

1.2 Enrichment and Extension

Magic Squares with Integers

According to a legend, the Chinese Emperor Yu-Huang saw a magic square on the back of a turtle. In a *magic square*, the sum of the numbers in each row, column, and diagonal are the same. This sum is called the magic sum.

This magic square uses integers -6 to 2 exactly once. The magic sum is -6 .

1	-6	-1
-4	-2	0
-3	2	-5

$$\text{Diagonal 1: } -3 + (-2) + (-1) = -6$$

$$\text{Row 1: } 1 + (-6) + (-1) = -6$$

$$\text{Row 2: } -4 + (-2) + 0 = -6$$

$$\text{Row 3: } -3 + 2 + (-5) = -6$$

$$\text{Diagonal 2: } 1 + (-2) + (-5) = -6$$

$$\text{Column 1: } 1 + (-4) + (-3) = -6$$

$$\text{Column 2: } -6 + (-2) + 2 = -6$$

$$\text{Column 3: } -1 + 0 + (-5) = -6$$

Complete the magic square using each integer only once. The magic sum is given.

1. Use -9 to -1 ; Magic Sum = -15

-8		-4
	-7	

2. Use -5 to 3 ; Magic Sum = -3

-2		
		1
	-5	

3. Use -7 to 8 ; Magic Sum = 2

	7		-4
		-1	
0		3	-3
	-5		

4. Use -10 to 5 ; Magic Sum = -10

-4	1		
-9		-3	0
	-8		-6
		4	

5. Create your own magic square with integers having the magic sum 6.

1.2 Puzzle Time

Why Did The Golfer Wear Two Pairs Of Pants?

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

Add.

- | | |
|--------------------------|------------------------|
| 1. $12 + 5$ | 2. $7 + (-7)$ |
| 3. $-10 + 2$ | 4. $9 + (-6)$ |
| 5. $-15 + 27$ | 6. $23 + (-23)$ |
| 7. $-17 + 12$ | 8. $13 + (-15)$ |
| 9. $-9 + (-9)$ | 10. $-14 + (-11)$ |
| 11. $12 + (-10) + 16$ | 12. $15 + (-15) + 12$ |
| 13. $-22 + 30 + (-26)$ | 14. $-8 + (-8) + (-9)$ |
| 15. $37 + (-21) + (-16)$ | 16. $-42 + 8 + 17$ |
| 17. $-30 + 34 + (-9)$ | 18. $14 + (-21) + 7$ |
| 19. $-25 + 17 + 6$ | 20. $-4 + (-8) + (-6)$ |

Answers	
S. 18	N. -18
O. 12	C. -8
L. -17	H. -25
I. -5	E. 0
T. 17	G. 3
A. -2	

21. A roller coaster climbs 84 feet on the first hill then drops 60 feet down. On the second hill the roller coaster climbs another 32 feet then drops 44 feet. What is the height at the end of the second hill?

7	13		3	8	11	15		14	18		4	21	1		19		10	12	16	2
17	9		5	20	6															

**Activity
1.3****Start Thinking!**

For use before Activity 1.3

You plan a hiking trip. Discuss with a partner the math involved when hiking from one point to the next.

**Activity
1.3****Warm Up**

For use before Activity 1.3

Subtract.

1. $45 - 11$

2. $87 - 23$

3. $91 - 14$

4. $76 - 69$

5. $87 - 29 - 13$

6. $65 - 52 - 11$

**Lesson
1.3****Start Thinking!**

For use before Lesson 1.3

How can you tell if the difference of two integers is positive?

How can you tell if the difference of two integers is negative?

How can you tell if the difference of two integers is zero?

**Lesson
1.3****Warm Up**

For use before Lesson 1.3

Subtract.

1. $5 - 8$

2. $12 - (-3)$

3. $-5 - (-6)$

4. $-4 - 6$

5. $9 - 16$

6. $-7 - 10$

1.3 Practice A

Subtract.

1. $3 - 8$
 2. $4 - (-5)$
 3. $-6 - 4$
 4. $-9 - (-6)$
 5. $10 - (-9)$
 6. $12 - 4$
 7. $-15 - 7$
 8. $-6 - (-14)$
 9. $-1 - (-3)$
 10. $15 - (-7)$
 11. $20 - (-10)$
 12. $-31 - 14$
13. You are scuba diving at -8 feet. You dive 5 feet deeper. What is your position in the water?
14. Write $7 - 3$ using addition.
15. Write $5 + (-3)$ using subtraction.

Evaluate the expression.

16. $8 - 12 - (-6)$
17. $8 - (-8) - 3$
18. $0 - (-4) - 8$
19. $9 - (-4) + 1$
20. $7 - 12 - (-4)$
21. $-11 - (-8) - (-3)$
22. $-14 - 6 - (-2)$
23. $8 + 0 - (-11)$
24. $8 + 13 - (-5)$

Use mental math to solve the equation.

25. $a - 7 = 3$
 26. $b - (-8) = -3$
 27. $6 - c = 10$
28. Write two different pairs of negative integers, x and y , that make the statement $x - y = 2$ true.

29. The table shows the highest and lowest elevations for two cities.

City	Highest elevation (feet)	Lowest elevation (feet)
Long Beach, CA	360	-7
New Orleans, LA	25	-8

- a. Find the range of elevations for Long Beach.
- b. Find the range of elevations for New Orleans.
- c. One of the cities has an average elevation of about 2 feet below sea level. Which city is it?

1.3 Practice B

Subtract.

1. $8 - 13$
2. $18 - (-11)$
3. $-14 - 35$
4. $-51 - (-36)$
5. $100 - (-91)$
6. $-82 - 64$
7. $35 - 47$
8. $-36 - (-54)$
9. A dolphin is at -28 feet. It swims up and jumps out of the water to a height of 8 feet. Write a subtraction expression for the vertical distance the dolphin travels.

Evaluate the expression.

10. $15 - 42 - (-36)$
11. $17 - (-22) - 22$
12. $0 - (-41) - 28$
13. $87 - (-34) + 13$
14. $-35 - 27 - (-14)$
15. $-51 - (-23) + (-16)$
16. $-14 - 63 - (-52)$
17. $-28 + 10 - (-121)$
18. $8 - (-103) - (-95)$

Use mental math to solve the equation.

19. $a - 24 = 47$
20. $26 - b = 9$
21. $c - (-15) = 38$
22. $-5 - k = -12$
23. $t - (-14) = -24$
24. $-25 - m = 28$
25. The table shows the record monthly high and low temperatures in International Falls, Minnesota.

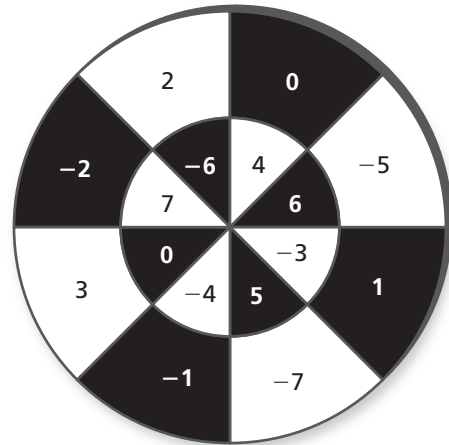
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High (°F)	48	58	76	93	95	99	98	95	95	88	73	57
Low (°F)	-46	-45	-38	-14	11	23	34	30	20	2	-32	-41

- a. Find the range of temperatures for each month.
- b. What are the all-time high and all-time low temperatures?
- c. What is the range of the temperatures in part (b)?
26. For what values of a and b is the statement $|a - b| = |a| - |b|$ false?

1.3 Enrichment and Extension

Dart Subtraction Strategy

To play the Dart Subtraction Game, you throw two darts and find your score by subtracting the value of the second dart from the value of the first dart. It is possible to land on the same value twice.



1. What is the highest possible score? What would have to be the value of the first dart? the second dart?
2. What is the lowest possible score? What would have to be the value of the first dart? the second dart?
3. List all the ways to get a score of 4. There are 11 different possibilities.

First Dart											
Second Dart											

4. List all the ways to get a score of -6 .
5. How many ways could you get a score of 0? a score of 14? a score of -14 ?
6. If you are trying to get the *lowest* score, should you try to land on a positive or negative integer with your first dart? with your second dart? Explain your reasoning.
7. Play the game with a partner for ten rounds. Use paper punches as your darts. Hold your hand about 12 inches from the paper and drop the paper punches onto the target. Record your score after each round. Add up the score from each round to get your total score. Did you use any particular strategy? Describe.



Puzzle Time

What Did The Sea Say To The Sand?

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

Subtract.

- | | |
|-----------------|------------------|
| 1. $3 - 11$ | 2. $-5 - 12$ |
| 3. $14 - (-10)$ | 4. $-9 - (-7)$ |
| 5. $25 - (-8)$ | 6. $-13 - (-13)$ |

Evaluate the expression.

- | | |
|----------------------|----------------------|
| 7. $-6 + 15 - (-4)$ | 8. $11 - 22 - (-8)$ |
| 9. $-14 - 7 - (-25)$ | 10. $17 + 8 - (-15)$ |
| 11. $-9 - (-4) - 2$ | 12. $-16 + 5 - 12$ |

Answers	
J. 24	H. 12
W. -8	G. 40
O. 33	E. -7
D. -2	I. 0
S. 25	N. -17
V. -3	A. -23
U. 13	T. 4

13. The high temperature for a day in January was 7 degrees Fahrenheit. The low temperature that day was -5 degrees Fahrenheit. What is the difference in temperatures?
14. The top of a sailboat mast is 22 feet above the water surface. The bottom of the sailboat is 3 feet below the water surface. What is the difference in the elevations?

2	5	9	13	6	2	10		6	9		3	7	14	9		1	12	8	11	4
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**Activity
1.4****Start Thinking!**

For use before Activity 1.4

How are deposits and withdrawals at a bank similar to adding integers?

**Activity
1.4****Warm Up**

For use before Activity 1.4

Add.

1. $9 + 9$

2. $-7 + (-7)$

3. $-3 + (-3) + (-3)$

4. $5 + 5 + 5$

5. $6 + 6 + 6 + 6$

6. $-4 + (-4) + (-4) + (-4)$

Without using your notes from Activity 1.4, explain to a partner how repeated addition is like multiplication.

Multiply.

1. $7 \cdot 2$

2. $9(-7)$

3. $-6(8)$

4. $-8(-10)$

5. $6 \cdot (-5)$

6. $-5 \cdot (-12)$

1.4 Practice A

Multiply.

1. $4 \cdot (-3)$
2. $-6 \cdot 5$
3. $-8(-2)$
4. $9 \cdot 6$
5. $0 \cdot (-7)$
6. $-12(-3)$
7. $11 \cdot 7$
8. $5(-5)$
9. $-13 \cdot 7$
10. $-1 \cdot 9$
11. $2(-12)$
12. $-9 \cdot (-9)$

13. A water tank leaks 5 gallons of water each day. What integer represents the change in the number of gallons of water in the tank after 7 days?

Multiply.

14. $2 \cdot (-3) \cdot 5$
15. $-5(-4)(-1)$
16. $7 \cdot 2 \cdot (-3)$
17. $0 \cdot (-8) \cdot 6$
18. $-6 \cdot 4 \cdot (-2)$
19. $5(-4)(-5)$

Evaluate the expression.

20. $(-3)^2$
21. -3^2
22. $(-2)^3$
23. -5^2
24. $-3 \cdot (-4)^2$
25. $(-7)^2 \cdot 2$
26. $|-3| \cdot (-6)$
27. $-5(-2) - 3(-4)$
28. $2 \cdot (-3)^2 - 5^2$

Find the next two numbers in the pattern.

29. 6, -12, 24, -48, ...
30. 9, -27, 81, -243, ...

31. An elevator is 180 feet above the first floor. Each second it descends 12 feet.

a. What integer is the change in the height of the elevator each second?

b. Copy and complete the table.

Time	3 sec	6 sec	9 sec
Height			

c. Estimate how many seconds it takes the elevator to get to the first floor. Explain your reasoning.

d. From the first floor, it takes 4 seconds to reach the basement floor. What is the height of the basement floor with respect to the first floor?

1.4 Practice B**Multiply.**

1. $(-8)(-12)$ 2. $10 \cdot (-14)$ 3. $-21 \cdot 4$ 4. $-15 \cdot (-8)$
5. The water in a pool evaporates at a rate of 16 gallons per week. What integer represents the change in the number of gallons of water in the pool after 24 weeks?

Multiply.

6. $5 \cdot (-11) \cdot (-4)$ 7. $-15(-3)(-6)$ 8. $-9 \cdot 0 \cdot (-3)$
9. $13 \cdot 2 \cdot (-6)$ 10. $-16 \cdot 2 \cdot (-3)$ 11. $-9(-9)(-9)$

Evaluate the expression.

12. $(-12)^2$ 13. -12^2 14. $(-7)^3$
15. $-(-2)^3$ 16. $(-2)^3 \cdot (-3)^2$ 17. $(-11)^2 \cdot 7$
18. $-|-3| \cdot (-6)$ 19. $11(-3) - (-2)(7)$ 20. $-5 \cdot 8 - (-4)^3$

21. The gym offers a discount when more than one member of the family joins. The first member ($n = 0$) pays \$550 per year. The second member to join ($n = 1$) gets a discount of \$75 per year. The third member ($n = 2$) gets an additional \$75 discount. The price for the n th member is given by $550 + (-75n)$.

- a. What is the price for the fourth member to join ($n = 3$)?
- b. For a large family, is it possible that a member would join for free? If so, which member would it be? Explain your reasoning.
- c. Other than \$0, what is the lowest amount that a member would pay to join? Which member would it be? Explain your reasoning.
22. Two integers, a and b , have a product of -48 .
- a. What is the greatest possible sum of a and b ?
- b. Is it possible for a and b to have a sum of 13? If so, what are the integers?
- c. What is the least possible difference of a and b ?

1.4 Enrichment and Extension

Multiplying Negative Integers

In Exercises 1–4, find the product.

- $-3 \cdot (-7) \cdot (-15) \cdot (-5)$
- $-6 \cdot (-8) \cdot (-1) \cdot (-9)$
- $-7 \cdot (-18) \cdot (-5) \cdot (-6) \cdot (-3)$
- $-5 \cdot (-5) \cdot (-4) \cdot (-2) \cdot (-10)$

In Exercises 5–8, use the table.

$(-3)^2$	$=$	$(-3)(-3)$	$=$	$(-3)^1(-3)$	$=$	9
$(-3)^3$	$=$	$(-3)(-3)(-3)$	$=$	$(-3)^2(-3)$	$=$	-27
$(-3)^4$	$=$		$=$		$=$	
$(-3)^5$	$=$		$=$		$=$	
$(-3)^6$	$=$		$=$		$=$	
$(-3)^7$	$=$		$=$		$=$	
$(-3)^8$	$=$		$=$		$=$	

- Complete the table.
- Describe the pattern in the products.
- Will $(-3)^{18}$ be a positive or negative integer? Explain.
- Will $(-3)^{45}$ be a positive or negative integer? Explain.



Puzzle Time

When Do Kangaroos Celebrate Their Birthdays?

A	B	C	D	E	F		G	H	I	J		K	L	M	N
---	---	---	---	---	---	--	---	---	---	---	--	---	---	---	---

Complete each exercise. Find the answer in the answer column. Write the letter under the answer in the box containing the exercise letter.

36
G
12
O
-105
E
25
P
50
C
-60
D
72
S
45
N
-25
T
-42
U
49
P
-36
H
52
W
110
R

Multiply.

A. $5 \cdot (-12)$

B. $-14 \cdot 3$

C. $-10(-11)$

D. $8 \cdot (-7)$

E. $-9 \cdot (-5)$

F. $6(-2)(-3)$

G. $-4 \cdot 5 \cdot (-4)$

H. $(-7)(-3)(-5)$

I. $-15 \cdot 0 \cdot (-12)$

J. $(-5)^2$

K. -7^2

L. $-3^2 \cdot 8$

M. $(-4)^3$

N. You are making a necklace that is 9 inches long. You use 6 beads for each inch. What integer is the change in your supply of beads after making the necklace?

0
A
-25
M
-49
Y
-64
A
80
L
-50
U
100
B
64
F
-56
I
-110
J
66
S
-54
R
-72
E
54
K

**Activity
1.5****Start Thinking!**

For use before Activity 1.5

What are the different ways you can multiply two integers?

**Activity
1.5****Warm Up**

For use before Activity 1.5

Multiply.

1. $-10 \cdot 5$

2. $-5 \cdot (-6)$

3. $8 \cdot (-9)$

4. $-15 \cdot 7$

5. $-22 \cdot (-8)$

6. $32 \cdot (-4)$

**Lesson
1.5****Start Thinking!**

For use before Lesson 1.5

Find the next 2 numbers in the pattern: 12, 6, 24, 12, 48, Explain your reasoning.

**Lesson
1.5****Warm Up**

For use before Lesson 1.5

Divide.

1. $12 \div (-3)$

2. $-32 \div 4$

3. $-56 \div (-8)$

4. $\frac{-45}{9}$

5. $\frac{81}{-9}$

6. $\frac{-144}{-12}$

1.5 Practice A

Divide, if possible.

1. $8 \div (-4)$
2. $-15 \div (-3)$
3. $\frac{-10}{5}$
4. $0 \div (-7)$
5. $-35 \div 7$
6. $\frac{18}{-6}$
7. $-72 \div 9$
8. $-5 \div 5$
9. $\frac{15}{0}$
10. $12 \div (-2)$
11. $\frac{-56}{-8}$
12. $21 \div (-3)$

13. Your team dives for 28 lobsters over 7 days. What is the average daily lobster catch?

Find the mean of the integers.

14. 5, -7, 12, -10, 15
15. -16, -27, 21, -19, 14, -3

Evaluate the expression.

16. $6 - 12 \div (-3)$
17. $|-16| \div (-2)^2 - 4^2$
18. $\frac{-10 + (-2)^3}{-3}$

Find the next two numbers in the pattern.

19. -96, 48, -24, 12, ...
20. 12,500, -2500, 500, -100, ...

21. A skateboarder descends on a ramp from 172 feet to 67 feet in 15 seconds. What is the average change in height per second?

22. The velocity (in feet per second) of a bouncing ball was recorded every second. The table shows the velocity for each second.

Time (sec)	1	2	3	4	5
Velocity (ft/sec)	-15	-6	2	10	-11

- a. What is the average velocity of the bouncing ball over the 5 seconds?
- b. What is the highest recorded speed of the bouncing ball? Is the ball going up or down at this speed?
- c. During the 5 second period, did the ball spend more time going up or going down? Explain your reasoning.
- d. Between which two seconds did the ball change from going up to going down? Explain your reasoning.

1.5 Practice B

Divide, if possible.

1. $51 \div (-3)$
2. $\frac{-63}{21}$
3. $\frac{0}{25}$
4. $\frac{-144}{-9}$
5. $105 \div (-5)$
6. $-82 \div 0$
7. $-96 \div 8$
8. $-15 \div (-15)$
9. $\frac{99}{-9}$
10. $225 \div (-25)$
11. $\frac{-156}{3}$
12. $-48 \div (-3)$
13. Your team catches 42 Mahi Mahi over 2 weeks. What is the average daily Mahi Mahi catch?

Evaluate the expression.

14. $-10 + 16 \div (-2) + 7$
15. $(-68) \div (-4) + 5 \cdot (-3)$
16. $10 - 12^2 \div (-2)^3$
17. $-|-16| \div (-8) \cdot 5^2$
18. $\frac{3 + 7 \cdot (-3^2)}{-5}$
19. PI-Squared and Euler Circles are in a math competition consisting of 10 two-part questions. Both parts correct earns 5 points, one part correct earns 2 points, and no parts correct earns -1 point.

- a. What is the mean points per question for PI-Squared?
- b. What is the mean points per question for Euler Circles?

Team	Both	One	None
PI-Squared	4	2	4
Euler Circles	2	6	2

- c. Which team should win the competition? Explain your reasoning.

20. A 155-pound person burns about 500 calories per hour playing racquetball.
 - a. One pound is equal to 3500 calories. How long will it take to burn 1 pound playing racquetball?
 - b. How long will it take to burn 5 pounds playing racquetball? Explain your reasoning.
 - c. If the person were to rest 5 minutes for every 30 minutes of playing, how long would it take to burn 1 pound?

1.5

Enrichment and Extension

Absolute Value and Integers

Assume $a > 0$ and $b < 0$. Determine whether the statement is *always*, *sometimes*, or *never* true.

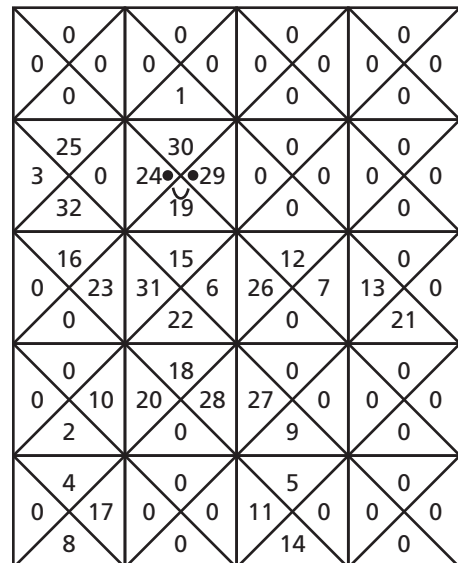
- | | | | |
|--------------------|---------------------|-----------------------|------------------------|
| 1. $a + b > 0$ | 2. $a + b < 0$ | 3. $ a + b < 0$ | 4. $ a + b > 0$ |
| 5. $a - b > 0$ | 6. $a - b < 0$ | 7. $b - a > 0$ | 8. $b - a < 0$ |
| 9. $ a - b > 0$ | 10. $ a - b < 0$ | 11. $- a - b < 0$ | 12. $ a - (- b) < 0$ |
| 13. $ab > 0$ | 14. $ab < 0$ | 15. $\frac{a}{b} < 0$ | 16. $\frac{a}{b} > 0$ |

Assume $a, b,$ and n are integers, with $a > 0$ and $b < 0$. Determine whether the possible values of n are *all integers*, *all positive integers and zero*, *all negative integers and zero*, or *none*.

- | | | | |
|--|-------------------------|----------------------------|--|
| 17. $- -n - n > 0$ | 18. $- n + -n = 0$ | 19. $ n + (-n) = 0$ | 20. $-n + n = 0$ |
| 21. $an \geq 0$ | 22. $an \leq 0$ | 23. $\frac{n}{b} \geq 0$ | 24. $\frac{n}{b} \leq 0$ |
| 25. $ a + n = a + n$ | 26. $ a + n = a - n$ | 27. $ an = a \cdot n $ | 28. $\left \frac{n}{b}\right = \frac{ n }{ b }$ |
| 29. $\left \frac{n}{a}\right = \frac{n}{a}$ | 30. $ an = an$ | 31. $ bn = bn$ | 32. $\left \frac{n}{b}\right = \frac{n}{b}$ |

For each exercise number, use your answers and the key below to color the cell. Do not color the cells that have a zero in them.

- Always = Purple**
- Sometimes = Blue**
- Never = Red**
- All Integers = Blue**
- All Positive Integers and Zero = Orange**
- All Negative Integers and Zero = Red**
- None = Purple**



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1.5 Puzzle Time

What Did The Baseball Mitt Say To The Ball?

Circle the letter of each correct answer in the boxes below. The circled letters will spell out the answer to the riddle.

Divide.

1. $6 \div (-3)$

2. $-52 \div (-4)$

3. $-27 \div 3$

4. $-36 \div 2$

5. $56 \div (-8)$

6. $-24 \div (-3)$

7. $\frac{-18}{6}$

8. $\frac{25}{-5}$

9. $\frac{-16}{-4}$

10. $\frac{-66}{11}$

Evaluate the expression.

11. $32 \div (-2) + (-25) \div 5$

12. $4 \cdot (-3) + 12 \div (-4)$

13. You improve your time running a course by 5 seconds in week one, by 3 seconds in week two, and by 4 seconds in week three. What is the average weekly change in your running time?

B	C	A	R	T	S	C	H	E	Y	D	O	U	N	L	A	S	T	E	O	R
14	-21	4	12	13	2	8	-9	20	-7	15	-15	-3	9	-6	-18	-8	-2	-5	-13	-4

Chapter 1

Technology Connection

For use after Section 1.2

Entering Negative Numbers on a Calculator

You can use the $\boxed{+ | -}$ key on a calculator to enter negative numbers.

EXAMPLE 1 How does your calculator display negative numbers? Find the value of $0 - 3$.

SOLUTION

Press $0 \boxed{-} 3 \boxed{=}$.

The integer that is 3 less than 0 is -3 . Study the calculator display and determine where the negative sign is displayed. It may be immediately to the left of the 3, or it may be at the far left of the display.

Displays

$\boxed{-} 3$ or $\boxed{-} \boxed{3}$

Now clear the display and try entering -2 using the $\boxed{+ | -}$ key, also called the change-sign key. Press $2 \boxed{+ | -}$. The display should be similar to the one you found in the first example. A negative sign displayed to the far left can be easy to miss if you are not looking for it; this will make a big difference in your calculations.

EXAMPLE 2 The temperature is -2° . It rises 6° . What is the new temperature?

SOLUTION

You need to find $-2 + 6$.

Press $2 \boxed{+ | -} + 6 \boxed{=}$. The answer is 4.

Use the $\boxed{+ | -}$ key on a calculator to evaluate the expression.

1. $0 - 8$

2. $-5 + 5$

3. $-1 + 0$

4. $1 - 2$

5. $0 - 7$

6. $-4 + 2$

7. What do you think happens when you subtract 1 from a negative number? Explain your reasoning. Check your answer with a calculator.