6.4 Multiplying Integers

▶ **GOAL: Develop and apply strategies to multiply integers.**

1. Teo is using black (negative) and white (positive) counters to model $(-2) \times (-4)$. He reasons, "I can model $2 \times (-4)$ by adding two groups of four negative counters to 0. So I can model $(-2) \times (-4)$ by subtracting two groups of four negative counters from 0."

   0 – (●●●● ●●●●)

   "Next, I will use the zero principle to add eight negative counters and eight positive counters."

   (○●○●○●○●○●○●○●○●○●○●) – (●●●● ●●●●)

   What should Teo do next? Complete Teo's explanation and solve.

   _____

   _____

   _____

At-Home Help

When multiplying integers, follow these rules to determine the sign of the answer:

- positive integer × positive integer = positive integer
- positive integer × negative integer = negative integer
- negative integer × positive integer = negative integer
- negative integer × negative integer = positive integer

2. Model using counters, and multiply.

   a) $(+3) \times (-5)$

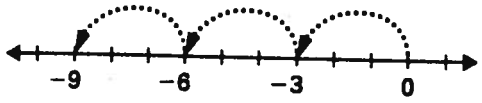
   b) $(-1) \times (-6)$

   c) $(-2) \times (-7)$

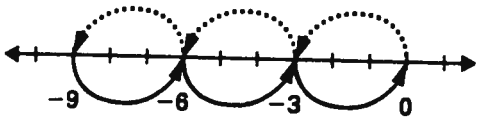
   d) $(+5) \times (-2)$

Do not do #3!

Tamara is using a number line to mo . 3) × (−3). She reasons, "(−3) × (−3) means the opposite of 3 × (−3). To show 3 × (−3), I can draw three dotted arrows going left from 0, with each arrow 3 units. The arrows stop at −9."



"To show the opposite of 3 × (−3), I can draw three solid arrows going right from −9 back to 0."



What should Tamara do next? Complete Tamara's explanation and solve.

_____

_____

_____

4. Model using ~~number lines~~ counters, and multiply.

a) (+5) × (−1)

c) (+7) × (−3)

b) (−4) × (−4)

d) (−6) × (−4)

5. Multiply.

a) 8 × 9 = _____

b) (−8) × (−8) = _____

c) −4(2) = _____

d) −10(−7) = _____

e) −5(−15) = _____

f) 5(−12) = _____

g) −8(−20) = _____

h) 17(−4) = _____

6. Write an integer multiplication sentence for each description, then solve.

a) The water temperature dropped 5°C per minute, for 13 minutes.

_____

b) The temperature soared 8°C per day, for three days.

_____

Quick Review

➤ You can use colour tiles to represent the multiplication of integers.

A black tile models –1. A white tile models +1.

2 groups of 3 black tiles model $2 \times (-3) = -6$

–3:

–3:

➤ Integers have these properties of whole numbers.

- **Multiplying by 0:** $4 \times 0 = 0$ and $0 \times 4 = 0$
  So, $(-4) \times 0 = 0$ and $0 \times (-4) = 0$
- **Multiplying by 1:** $4 \times 1 = 4$ and $1 \times 4 = 4$
  So, $(-4) \times (+1) = -4$ and $(+1) \times (-4) = -4$
- **Order Property:** $4 \times 2 = 8$ and $2 \times 4 = 8$
  So, $(-4) \times (+2) = -8$ and $(+2) \times (-4) = -8$
- **Distributive Property:** $4 \times (2 + 3) = 4 \times 2 + 4 \times 3 = 20$
  So, $(-4) \times [(+2) + (+3)] = (-4) \times (+2) + (-4) \times (+3) = -20$

➤ You can write the product of integers without the use of the × sign.
$(-4) \times (+2)$ can simply be written as: $(-4)(+2)$

➤ When 2 integers with the same sign are multiplied, their product is positive.
$(+2)(+3) = +6$ $(-2)(-3) = +6$

When 2 integers with different signs are multiplied, their product is negative.
$(+2)(-3) = -6$ $(-2)(+3) = -6$

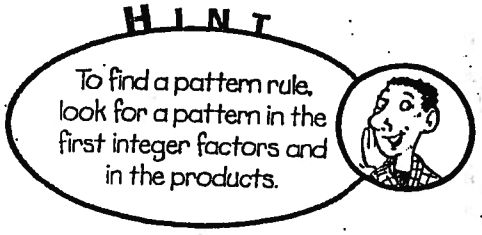
When 2 or more integers are multiplied, count negative signs to find the sign of the product.

An even number of negative signs gives a positive product.
$(-1)(+2)(-3) = +6$
2 negative signs, so the product is positive

An odd number of negative signs gives a negative product.
$(-1)(-2)(-3) = -6$
3 negative signs, so the product is negative

Practice

1. Find a pattern rule for each multiplication pattern. Extend the pattern 3 more rows.



a) $(+3)(+3) = +9$

$(+2)(+3) = +6$

$(+1)(+3) = +3$

$(0)(+3) =$ _____

(_____)$(+3) =$ _____

_____

_____

b) $(-3)(+3) = -9$

$(-3)(+2) = -6$

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

$(-3)(0) =$ _____

_____

_____

_____

2. In this chart, write the sign of each product of multiplying 2 integers.

×	positive integer	negative integer
positive integer		
negative integer		

- When 2 integer factors have the same sign, their product is _____.
- When 2 integer factors have different signs, their product is _____.

3. Find each product. The answers form a magic square.

$(-1)(+7)$	$(+1)(+4)$	$(-6)(0)$	$(-1)(-5)$
$(-7)(-1)$	$(+2)(-1)$	$(-1)(-2)$	$(+5)(-1)$
$(+2)(+3)$	$(+1)(-1)$	$(+3)(+1)$	$(+3)(-2)$
$(-2)(+2)$	$(-1)(-1)$	$(-1)(+3)$	$(-2)(-4)$

Tip

In a magic square, the numbers in each row, column, and diagonal have the same sum. This sum is called the magic sum.

The magic sum is _____.

4. Find each product.

a) $(-2)(+5)$ _____

b) $(+6)(-5)$ _____

c) $(-3)(-4)$ _____

d) $(+5)(+4)(+3)$ _____

e) $(-1)(-2)(-3)$ _____

f) $(+6)(-1)(+1)$ _____

g) $(0)(-1)(-2)(-3)$ _____

h) $(+1)(-1)(+1)(-1)(+1)$ _____

> **Tip**
> *To multiply more than 2 integers, start by multiplying the first 2 integers.*

5. Write each product in expanded form and complete the pattern.

$(-2)^1 = -2$

$(-2)^2 = (-2) \times (-2) =$ _____

$(-2)^3 =$ _____ $\times$ _____ $\times$ _____ $=$ _____

$(-2)^4 = (-2) \times (-2) \times (-2) \times (-2) =$ _____

$(-2)^5 =$ _____ $\times$ _____ $\times$ _____ $\times$ _____ $\times$ _____ $=$ _____

$(-2)^6 =$ _____ $\times$ _____ $\times$ _____ $\times$ _____ $\times$ _____ $\times$ _____ $=$ _____

- When you multiply an odd number of negative integers, the product is _____.
- When you multiply an even number of negative integers, the product is _____.

6. Without multiplying, name the sign of each product.

a) $(-2)(+5)(-7)$ _____

b) $(+6)(-5)(+2)$ _____

c) $(-3)(-4)(-2)$ _____

d) $(-5)(+4)(-3)(+2)$ _____

e) $(-1)(-2)(-3)(-4)$ _____

f) $(+6)(-1)(+1)(+2)$ _____

7. Match each pattern rule with the corresponding pattern. Complete each pattern and pattern rule.

Number Pattern	Pattern Rule
$-3, +9, -27, +81, \ldots$	Start at 2. Multiply by _____ each time.
$+2, -10, +50, -250, \ldots$	Start at 1. Multiply by -10 each time.
$+3, -3,$ _____, _____, $\ldots$	Start at _____. Multiply by -3 each time.
$+1, -10,$ _____, _____, $\ldots$	Start at 3. Multiply by -1 each time.
$-1, -2, -4, -8, -16, \ldots$	Start at -1. Multiply by _____ each time.

Quick Review

- For any multiplication of 2 different factors, there are 2 related division facts:
  For $4 \times 3 = 12$, the related division facts are: $12 \div 3 = 4$ and $12 \div 4 = 3$

  The same rules apply to the product of 2 integers.
  For $(-2)(+5) = -10$, the related division facts are:

  $(-10) \div (-2) = +5$ and $(-10) \div (+5) = -2$

  dividend divisor quotient

- The quotient of 2 integers with the same sign is positive.
  $(+10) \div (+2) = +5$ $(-10) \div (-2) = +5$
- The quotient of 2 integers with different signs is negative.
  $(+10) \div (-2) = -5$ $(-10) \div (+2) = -5$

Practice

1. For each product, complete the 2 related division facts and name the sign of the quotient.

Multiplication Fact	Related Division Facts	Sign of Quotient
$(+2)(+3) = +6$	$(+6) \div (+2) =$ _____	_____
	$(+6) \div (+3) =$ _____	_____
$(-2)(-3) = +6$	$(+6) \div (-2) =$ _____	_____
	$(+6) \div (-3) =$ _____	_____
$(+2)(-3) = -6$	$(-6) \div (+2) =$ _____	_____
	$(-6) \div (-3) =$ _____	_____
$(-2)(+3) = -6$	$(-6) \div (-2) =$ _____	_____
	$(-6) \div (+3) =$ _____	_____

2. Use your results in question 1. Complete these 2 statements.

When 2 integers have the same sign, their quotient is _____.

When 2 integers have different signs, their quotient is _____.

3. Find a pattern rule for each division pattern.
Extend the pattern 3 more rows.

a) $(+6) \div (-2) = -3$

$(+4) \div (-2) = -2$

$(+2) \div (-2) = -1$

$(0) \div (-2) =$ _____

_____

_____

_____

b) $(-12) \div (-4) = +3$

$(-8) \div (-4) = +2$

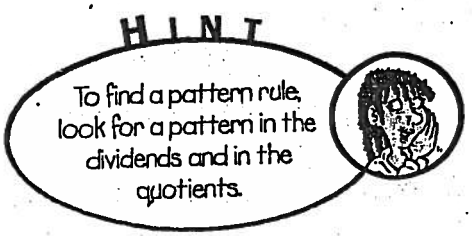
$(-4) \div (-4) = +1$

$(0) \div (-4) =$ _____

_____

_____

_____



Use the last 3 rows of each pattern. Complete these statements.

When both the dividend and divisor are negative, the quotient is _____.

When the dividend is positive and the divisor is negative, the quotient is _____.

4. Complete each pattern or pattern rule.

a) Start at 250. Divide by –5 each time. +250, –50, _____, _____

b) Start at –16. Divide by +2 each time. –16, _____, _____, _____

c) Start at _____. Divide by _____ each time. –192, +48, –12, +3, . . .

d) Start at –2. Divide by –1 each time. _____, _____, _____, _____

e) Start at _____. Divide by _____ each time. +2000, +200, +20, +2, . . .

5. Use 2 of these 5 integers. Write a division fact with each quotient.

–2 +3 +12 –1 +4

a) a quotient of –2 _____

b) the greatest quotient _____

c) the least quotient _____

d) a quotient between –5 and –10 _____

6. Use a calculator to divide.

a) $(+247) \div (-13) =$ _____

b) $(-851) \div (-37) =$ _____

c) $(-748) \div (-68) =$ _____

d) $(-1485) \div (+33) =$ _____

Tip
Look for the [–] or [+/–] key on your calculator to key in negative numbers.

Famous Farming Expression

Complete each of the following integer questions. Shade your answers in the puzzle below, and the famous farming expression will appear.

1. (+6)(-6)
2. (-5) – (-6)
3. (-15) + (-14)
4. $\frac{-16}{-8}$
5. -7(+4)
6. (-4)(-1)
7. (-23) – (+3)
8. (-4) + (+10)
9. $\frac{-21}{-3}$
10. (+4)(-6)
11. -5(-2)
12. (-10) – (+13)
13. (+8) – (-4)
14. 2(-11)
15. -2 + 16
16. -4(5)
17. $\frac{-30}{-2}$
18. 23 + (-4)
19. $\frac{-36}{2}$
20. -7(-3)
21. (-9) – (+8)
22. $\frac{-50}{-2}$
23. (-4)(+4)
24. (-9)x(-3)
25. $\frac{30}{-2}$
26. 30 – (+1)
27. $\frac{-90}{-3}$
28. (+15)–(-16)
29. $\frac{-88}{-2}$
30. (-8)(-4)
31. (-12) + (+3)
32. 30 – (-4)
33. (-6)(-6)
34. $\frac{-15}{3}$
35. 40 - (+3)
36. (+20)+(+18)
37. (-7)+(+4)
38. (-10)(-4)
39. (-6)(-7)
40. (+10)+(-11)
41. 40 - (-3)
42. (+3) – (+3)

-30	-29	-28	-27	-26	-25	-24	-23	-22	-21	-20	-19	-18	-17	-16
-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44

M.Howe LDCSB

Placing Brackets

Where would you place one pair of brackets to obtain: (Explain your reasoning).

A) the largest possible positive number?

$$20 - 3 \times 6 + 4 - 6 \div 3$$

B) the smallest possible negative number?

$$20 - 3 \times 6 + 4 - 6 \div 3$$

C) a fraction?

$$20 - 3 \times 6 + 4 - 6 \div 3$$

D) zero?

$$20 - 3 \times 6 + 4 - 6 \div 3$$

MH LDCSB

At Home / At School

Quick Review

➤ The order of operations with whole numbers also applies to integers.

① Perform operations in brackets first.
② Evaluate exponents.
③ Divide and multiply, in order, from left to right.
④ Add and subtract, in order, from left to right.

Tip
The word BEDMAS can help you remember the order of operations.
B–Brackets
E–Exponents
DM–Divide, Multiply
AS–Add, Subtract

$$\overset{①}{(1+2)^2} - \overset{②}{3} \times \overset{④}{4} \quad \overset{③}{}$$

① **B**	$= (3)^2 - 3 \times 4$
② **E**	$= 9 - 3 \times 4$
③ **DM**	$= 9 - 12$
④ **AS**	$= -3$

➤ A fraction bar indicates division.
It also acts like brackets.
Evaluate the numerator and denominator separately before dividing.

For example, $\frac{12+8}{2-6} = \frac{20}{-4} = -5$

Practice

1. Simplify.

a) $5 - 2 - 6$

$= \_\_\_\_\_ - 6$

$= \_\_\_\_\_$

b) $3(8 - 12)$

$= 3 \times \_\_\_\_\_$

$= \_\_\_\_\_$

Tip
Brackets symbolize multiplication as well as grouping. 3(8 – 12) means 3 × (8 – 12).

c) $-4 + 2 \times 3$

$= -4 + \_\_\_\_\_$

$= \_\_\_\_\_$

d) $21 \div (-7) \times 5$

$= \_\_\_\_\_$

$= \_\_\_\_\_$

e) $10 - [(5 - 3) + 9]$

f) $-8 + 15 \div (-3) + 7$

g) $(-3)(-8) + 24 \div (-2)$

2. Match each expression with its answer.

Expression	Answer
$30 \div (5 - 10) \times 2$	-14
$30 \div (5 - 10 \times 2)$	-12
$(30 \div 5 - 10) \times 2$	-8
$30 \div 5 - 10 \times 2$	-2

3. Simplify.

a) $\frac{3(5-9)}{2}$

$= \frac{3(\quad)}{2}$

$= \_\_\_\_\_$

$= \_\_\_\_\_$

b) $\frac{(-4)^2}{-8}$

$\_\_\_\_\_$

c) $\frac{(-6)(4)+8}{(-2)^3}$

$\_\_\_\_\_$

4. Evaluate each expression. Write the letter for the answer in the corresponding blank at the bottom to find out what one wall said to the other.

$2(-7 + 3)$ $= 2\_\_\_\_\_$ $= \_\_\_\_\_$ A	$-8 + 12 \div 4$ $= -8 + \_\_\_\_\_$ $= \_\_\_\_\_$ C	$3(10 \div 2) - (-4)$ $= 3\_\_\_\_\_ + \_\_\_\_\_$ $= \_\_\_\_\_$ $= \_\_\_\_\_$ E
$(9 - 3)^2 \div (-4)$ H	$4 \times (-3) + 24 \div 2$ M	$-5 + 12 \div 4 \times (-2)$ N
$19 - 3 \times 4 \div (-6)$ O	$\frac{6(-8)}{-12} - 1$ R	$\frac{10-2(-3)}{3^2-1}$ T

0	19	19	2	0	19	−8	2	2	−9	19	−5	21	3	−11	19	3			

6.7 Order of Operations with Integers

▶ **GOAL: Apply the rules for the order of operations with integers.**

1. Calculate.

   a) $(-36) \div [(-6) \div (-6)]$ b) $[(-36) \div (-6)] \div (-6)$

   Why are your answers to (a) and (b) different?

   _____

   _____

2. Calculate.

   a) $(-4) + 16 \div (-4)$ d) $(-8) \div [(-4) + 2]$

   b) $[(-4) + 16] \div (-4)$ e) $(-8) - [(-4) \div 2]$

   c) $(-8) \div (-4) + 2$ f) $[(-8) - (-4)] \div 2$

3. Calculate.

   a) $(-3) + (-3) \times (-3)$ d) $15 - (-9) \div 3$

   b) $12 \div (-4) + (-8)$ e) $[(-4) + (-16) - (-5)] \div (-3)$

   c) $(-2) \times (-7) - (-8)$ f) $(-10) \times (-1) + 6 \times (-4)$

At-Home Help

You can use the memory aid **BEDMAS** to remember the rules for order of operations.

Brackets
Exponents and square roots
Divide and **M**ultiply from left to right
Add and **S**ubtract from left to right

Here are some additional tips to help you.

- If there is more than one set of brackets, do the calculations in the inner brackets first.
- When there is a dividing line separating the numerator (top part) of an expression from the denominator (bottom part), calculate the value of the numerator, then the value of the denominator, and, finally, divide.

4. Nathan and Selena were given the expr $8 \times (-2) - (-5) \times 4$ to calculate. Each student got a different answer.

Nathan's Solution

$$\begin{aligned} 8 \times (-2) - (-5) \times 4 &= (-16) - (-5) \times 4 \\ &= (-11) \times 4 \\ &= (-44) \end{aligned}$$

Selena's Solution

$$\begin{aligned} 8 \times (-2) - (-5) \times 4 &= 8 \times 3 \times 4 \\ &= 96 \end{aligned}$$

a) What error did Nathan make?

_____

b) What error did Selena make?

_____

c) Solve the expression.

5. Calculate.

a) $[(-5 + 7)] \times (-3)$

b) $11 + (-5) \times 5$

c) $(-6) \div [(-8) + 2]$

d) $(-20) \div 2 - (-5) \times (-3)$

e) $[(-1) \times (-2) - (9)] \times (-3)$

f) $(-10) \times (-4) + (-8) - 20$

6. Place brackets in each expression to get the appropriate answer.

a) $(-8) - 12 \div (-4) = 5$

b) $5 - (-5) \times (-4) + 2 = -20$

7. Calculate.

a) $\dfrac{(-12) + (-4)}{(-15) + 11}$

b) $\dfrac{7 - 12 + (-3)}{(-3) \times 6 \div (-9)}$

c) $\dfrac{(-6) + (-2) - (-1)}{5 + (-4)}$

d) $\dfrac{5 \times (-4) - (-10)}{(-8) + 16 - (-2)}$

8. Mineral deposits are found at the following depths: -232 m, -321 m, -225 m, -154 m. Find the average of the depths.

CANADIAN TRIVIA

Integers & Order of Operations

Complete the mathematical solutions to these trivia questions. Once you have completed the mathematics, try to name all the Canadian sites in the questions.

1. **How many provinces have names that have exactly two words?**
   $3(-7 + 8)$

2. **How many time zones are there in Canada?**
   $5(-2) - 4(-4)$

3. **How many provincial capital cities are on islands?**
   $-4 + (-26 + 5) \div (-3)$

4. **In how many provinces is Lake Athabaska?**
   $8(-3) \div [2(-6)]$

5. **How many provinces meet the Atlantic ocean?**
   $(-6 + 8) \times (7 - 4) - 1$

6. **How many provinces have more people than Ontario?**
   $-5(-7 + 6 - 3 + 4)$

7. **How many provinces share a border with the United States?**
   $-1[4 + 2(-6)]$

8. **How many provinces are land locked?**
   $2(-5) - 3(-4)$

9. **How many provinces meet the Pacific Ocean?**
   $$\frac{-7(3) + 4(-1)}{-5(5)}$$

10. **How many provinces have elevations above 1500 m?**
    $$\frac{-22 + 5 - 9}{-39 \div 3}$$

11. **How many provinces are completely north of the 49th parallel?**
    $7(-5) - 6(-8) + 5(-2)$

12. **How many provinces are entirely islands?**
    $(-2)(-8) + 5(-3)$

13. **How many provinces meet Hudson Bay?**
    $$\frac{(-5)(2)(4) - 8}{(-8)(2)}$$

14. **How many provinces are greater in area than Saskatchewan?**
    $$\frac{(-6)(-3) - 7(6) + 9}{-3}$$

A Checking

4. Calculate.

a) $-9 - (-6) \div 6$

b) $4 \times (-8) - (-5)$

c) $-8 \times (-3) - (-8) \div (-4)$

d) $-16 \div [-2 - (-18)] \times (-1)$

B Practising

5. In each expression, which calculation(s) should you do first?

a) $-5 + (-6) \times (-8) \div 2$

b) $-8 \times 6 \div (-2) - [-9 \times (-3)]$

6. Calculate.

a) $-2 + (-3) \times (-8 + 4)$

b) $-9 - (-8) \times 7 + [6 \times (-2)]$

c) $7 \times [8 - (-2) \times (-6)]$

d) $-6 \div (-3) - [-8 \div (-2)]$

e) $0 + (-4) - 7 \times 5$

f) $[-14 + (-23)] - [(-17 - 2) \times 10]$

7. Calculate.

a) $7 \times [-3 - (-5)] \times 8$

b) $-3 - (-4) \times [2 \times (-6)]$

c) $-15 \div (-3) + 2 \times (-8)$

d) $[-2 - (-8)] \times (-5)$

e) $35 + (-4) \times (-8) - 7$

f) $18 \times (-3 - [8 \times (-5)])$

8. There is an error in this solution.

$$\begin{aligned} 3 \times (-8) \div (-2 - 4) &= -24 \div (-2 - 4) \\ &= 12 - 4 \\ &= 8 \end{aligned}$$

a) Find the error.

b) Explain how to correct the error.

9. Calculate.

a) $\dfrac{-6 + (-10)}{(-4)(2)}$

b) $\dfrac{49 \div (-7)}{1 + (-2)(-3)}$

c) $\dfrac{28 \div (-4 - 3)}{(-2 + 4) \times 2}$

d) $\dfrac{27 + (-18) \div (-2)}{(-2 + 5)(-2)}$

e) $\dfrac{-9 + (-16) - 10}{(-7)(10) \div (-2)}$

f) $\dfrac{[6 + (-38)] \div 4 (-2)}{(-2 + 4)(5 - 6)}$

10. Create an integer expression that shows why the rules for the order of operations are needed. Explain how your expression shows this.

11. Using brackets, group the terms in this expression to get the least possible result.

$40 \times 6 - 3 \times 4 - 5$

12. a) Evaluate with a calculator.

$-147 + 156 \div (-4) + 405 \div (-15)$

b) Does your calculator follow the order of operations? Explain how you know.

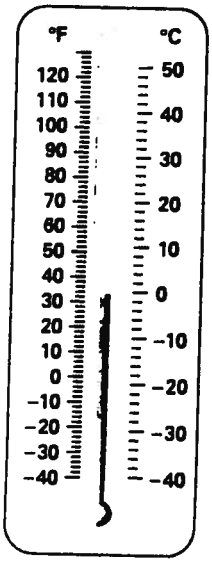
13. The formula for converting temperatures from Fahrenheit (F) to Celsius (C) is $C = (F - 32) \times 5 \div 9$. Use the formula to calculate each temperature in degrees Celsius.

a) 32°F

b) 212°F

c) −4°F

d) −40°F



6.8 Communicating about Calculations

▶ **GOAL: Explain your thinking when solving integer problems.**

Use the Communication Checklist to help you explain your answer to each question.

1. Teo started with $560 in his bank account. During the week, he spent $55 on a pair of shoes, and $123 on a new suit. Then he deposited a cheque for $264. Finally, Teo loaned his sister $45.

   Write an integer to represent the value of Teo's bank account at the end of the week. Explain your thinking.

2. Today's temperature was −2°C. Yesterday, the temperature rose 4°C. Two days ago, the temperature dropped 10°C. What was the original temperature two days ago? Explain your thinking.

3. On a shopping trip, Jordan started in the centre of the mall. She walked 25 m west to Jeans & Things, and then 16 m east to Paradise Shoes. Next, she walked 38 m west to Sara's Dresses. Finally, she walked 19 m east to The Vanity Shop.

   Use an integer to describe Jordan's final position. Explain your thinking.

At-Home Help

Use this Communication Checklist to help you communicate about integer problems.

Communication Checklist

- ☑ Did you identify the information given?
- ☑ Did you show each step in your solution?
- ☑ Did you explain your thinking at each step?
- ☑ Did you check that your answer is reasonable?
- ☑ Did you state your conclusion clearly?

Boggle Your Mind

Use number line or counter model to represent your solution

Name: _____

1. Eli walks to the west at 80m/min.
   - Where will he be after 5 min?
   - Suppose that Eli walked for 18 min. His position would be 18 min x [-80m/min]. How far must he walk to return to his starting position? What direction must he walk?

2. According to *The Guinness Book of Records,* the greatest recorded temperature ranges on Earth occur in Siberia. Temperatures in the Siberian city of Verkhoyansk have reached highs of 37 degrees C and lows of -68 degrees C. What is the difference between these temperatures?