8.2 Multiplying Integers

***MathLinks 8*, pages 293–299**

Suggested Timing
50–60 minutes

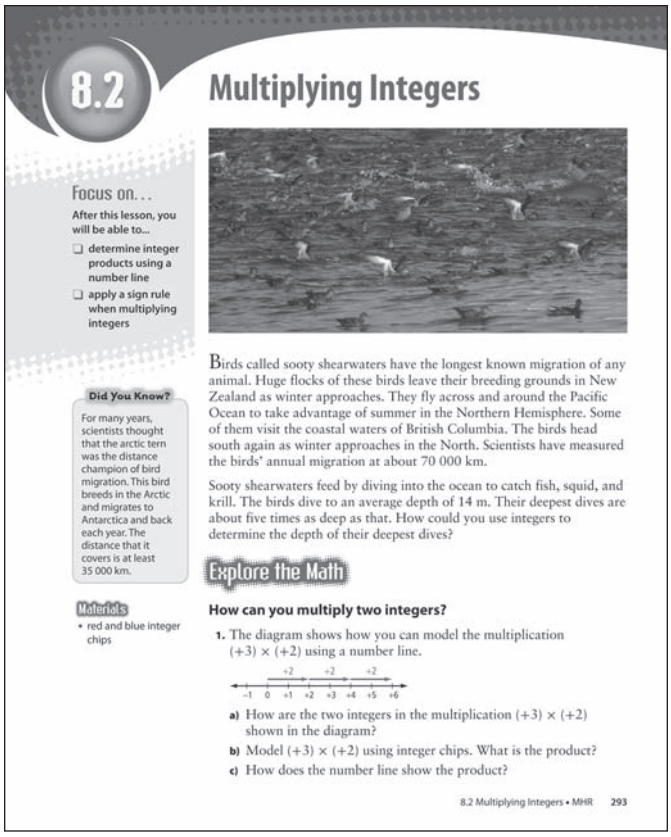
Materials
- red and blue integer chips
- coloured pencils
- red and blue construction paper (optional)
- scissors (optional)
- transparent plastic strips (optional)
- red and blue markers (optional)
- calculator (optional)

Blackline Masters
Master 3 Integer Number Lines
Master 4 Vertical and Horizontal Number Lines
Master 19 Multiplication Chart
BLM 8–3 Chapter 8 Warm-Up
BLM 8–6 Section 8.2 Extra Practice
BLM 8–7 Section 8.2 Math Link

Mathematical Processes
- ☑ Communication (C)
- ☑ Connections (CN)
- ☑ Mental Mathematics and Estimation (ME)
- ☑ Problem Solving (PS)
- ☑ Reasoning (R)
- ☐ Technology (T)
- ☑ Visualization (V)

Specific Outcomes
N7 Demonstrate an understanding of multiplication and division of integers, concretely, pictorially and symbolically.

Category	Question Numbers
Essential (minimum questions to cover the outcomes)	1–4, 6, 8, 10, 12, 23, Math Link
Typical	1–4, 6, 8, 10, 12–24, Math Link
Extension/Enrichment	1–3, 25–29



8.2 Multiplying Integers

Focus on...
After this lesson, you will be able to...
- ❑ determine integer products using a number line
- ❑ apply a sign rule when multiplying integers

Did You Know?
For many years, scientists thought that the arctic tern was the distance champion of bird migration. This bird breeds in the Arctic and migrates to Antarctica and back each year. The distance that it covers is at least 35 000 km.

Birds called sooty shearwaters have the longest known migration of any animal. Huge flocks of these birds leave their breeding grounds in New Zealand as winter approaches. They fly across and around the Pacific Ocean to take advantage of summer in the Northern Hemisphere. Some of them visit the coastal waters of British Columbia. The birds head south again as winter approaches in the North. Scientists have measured the birds' annual migration at about 70 000 km.

Sooty shearwaters feed by diving into the ocean to catch fish, squid, and krill. The birds dive to an average depth of 14 m. Their deepest dives are about five times as deep as that. How could you use integers to determine the depth of their deepest dives?

Explore the Math

Materials
- red and blue integer chips

How can you multiply two integers?

1. The diagram shows how you can model the multiplication $(+3) \times (+2)$ using a number line.

a) How are the two integers in the multiplication $(+3) \times (+2)$ shown in the diagram?
b) Model $(+3) \times (+2)$ using integer chips. What is the product?
c) How does the number line show the product?

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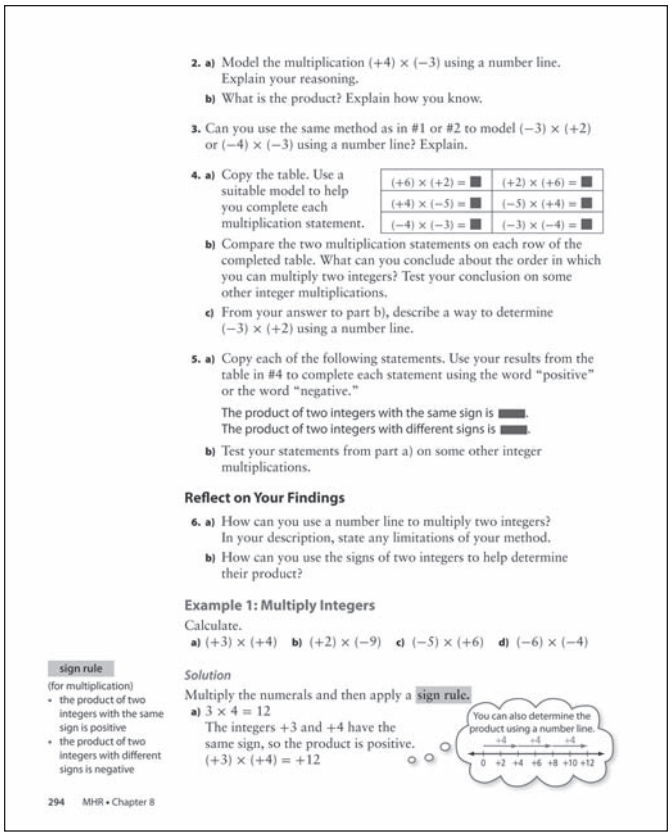
Planning Notes

Have students complete the warm-up questions on **BLM 8–3 Chapter 8 Warm-Up** to reinforce material learned in previous sections.

As a class, read and discuss the information about the migration of sooty shearwaters. To provide some insight into the astonishing distances that these birds cover, mention that the circumference of the Earth is about 40 000 km. The sooty shearwater migrates a distance that is almost twice the circumference of the Earth each year.



2. a) Model the multiplication $(+4) \times (-3)$ using a number line. Explain your reasoning.
   b) What is the product? Explain how you know.

3. Can you use the same method as in #1 or #2 to model $(-3) \times (+2)$ or $(-4) \times (-3)$ using a number line? Explain.

4. a) Copy the table. Use a suitable model to help you complete each multiplication statement.

$(+6) \times (+2) =$ ■	$(+2) \times (+6) =$ ■
$(+4) \times (-5) =$ ■	$(-5) \times (+4) =$ ■
$(-4) \times (-3) =$ ■	$(-3) \times (-4) =$ ■

   b) Compare the two multiplication statements on each row of the completed table. What can you conclude about the order in which you can multiply two integers? Test your conclusion on some other integer multiplications.
   c) From your answer to part b), describe a way to determine $(-3) \times (+2)$ using a number line.

5. a) Copy each of the following statements. Use your results from the table in #4 to complete each statement using the word "positive" or the word "negative."
   The product of two integers with the same sign is ■.
   The product of two integers with different signs is ■.
   b) Test your statements from part a) on some other integer multiplications.

Reflect on Your Findings

6. a) How can you use a number line to multiply two integers? In your description, state any limitations of your method.
   b) How can you use the signs of two integers to help determine their product?

Example 1: Multiply Integers

Calculate.
a) $(+3) \times (+4)$ b) $(+2) \times (-9)$ c) $(-5) \times (+6)$ d) $(-6) \times (-4)$

sign rule
(for multiplication)
- the product of two integers with the same sign is positive
- the product of two integers with different signs is negative

Solution

Multiply the numerals and then apply a sign rule.
a) $3 \times 4 = 12$
The integers +3 and +4 have the same sign, so the product is positive.
$(+3) \times (+4) = +12$

You can also determine the product using a number line.
+4 +4 +4
0 +2 +4 +6 +8 +10 +12

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Have students describe and discuss how they could use integers to determine the depths of the deepest dives of sooty shearwaters. Students' typical description will include representing the depth of the average dive by the integer −14. The deepest dives are about five times as deep. Students' descriptions of the rest of the process may vary. Some students may suggest modelling with integer chips. If so, ask if there are any concerns with this approach. (It requires quite a large number of integer chips.) Other students may suggest the use of repeated addition. You may also find that some students have already moved toward a generalization of what happens in integer multiplication (multiply 5 and 14 and predict the sign of the product as being negative).

Later in the lesson, after students have determined and applied the sign rules, you might again ask the class to consider how integers could be used to determine the depth of the deepest dives of sooty shearwaters. Have students compare their methods with the ones they originally chose.

Explore the Math

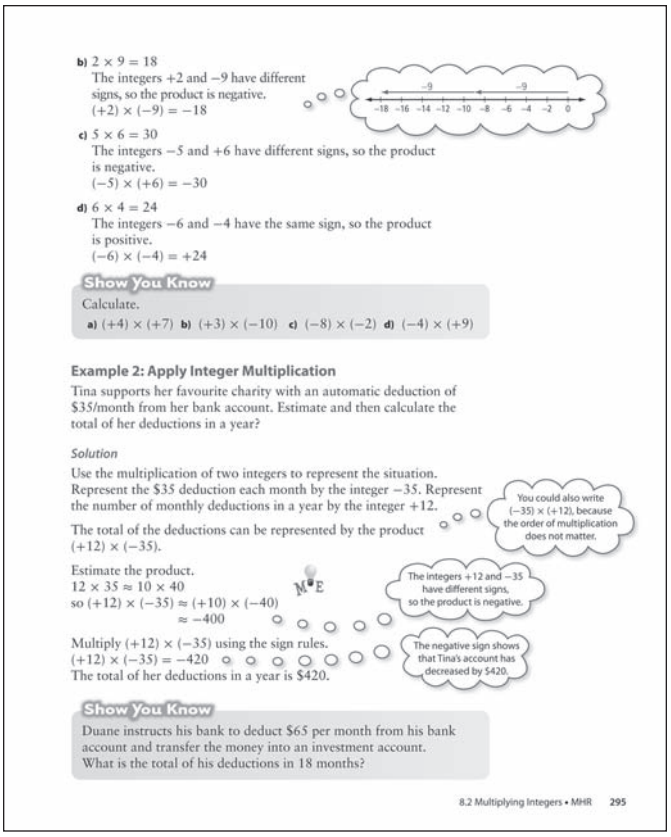
In this exploration, students use a number line to multiply two integers.

Method 1 Have students work in pairs or small groups and discuss their answers. Give each pair of students a supply of red and blue integer chips (at least 20 of each colour) or other suitable manipulatives, so that students can use a concrete method wherever necessary and can compare this method with the semi-concrete representations shown on a number line.

Provide students with copies of **Master 3 Integer Number Lines**. Have students cut out paper strips of appropriate lengths to represent integers on the number lines, with red strips representing positive integers and blue strips representing negative integers. Have students draw an arrow along the length of each strip and label each strip with the appropriate integer, so that the positive values are right side up when the arrow points to the right and negative values are right side up when the arrow points to the left. Have students model the additions in #1 and #2 to become familiar with using the strips. Then, have students use the strips to model the multiplications in #4, where possible.

It is important to make sure that the table is accurate before students make generalizations in #4b) and #5a). Students need to realize that the two statements on each line of the table give the same product, and therefore two integers can be multiplied in either order to determine the product.

Method 2 As in Method 1, have students work in pairs or small groups, and supply them with integer chips. Alternatively, have students draw coloured diagrams of integer chips. To use number lines to model integer multiplication, students can draw coloured diagrams. You may wish to provide students with **Master 4 Vertical and Horizontal Number Lines**.



b) $2 \times 9 = 18$
The integers +2 and −9 have different signs, so the product is negative.
$(+2) \times (-9) = -18$

c) $5 \times 6 = 30$
The integers −5 and +6 have different signs, so the product is negative.
$(-5) \times (+6) = -30$

d) $6 \times 4 = 24$
The integers −6 and −4 have the same sign, so the product is positive.
$(-6) \times (-4) = +24$

Show You Know
Calculate.
a) $(+4) \times (+7)$ b) $(+3) \times (-10)$ c) $(-8) \times (-2)$ d) $(-4) \times (+9)$

Example 2: Apply Integer Multiplication
Tina supports her favourite charity with an automatic deduction of $35/month from her bank account. Estimate and then calculate the total of her deductions in a year?

Solution
Use the multiplication of two integers to represent the situation.
Represent the $35 deduction each month by the integer −35. Represent the number of monthly deductions in a year by the integer +12.
The total of the deductions can be represented by the product $(+12) \times (-35)$.
Estimate the product.
$12 \times 35 \approx 10 \times 40$
so $(+12) \times (-35) \approx (+10) \times (-40)$
≈ -400
Multiply $(+12) \times (-35)$ using the sign rules.
$(+12) \times (-35) = -420$
The total of her deductions in a year is $420.
You could also write $(-35) \times (+12)$, because the order of multiplication does not matter.
The integers +12 and −35 have different signs, so the product is negative.
The negative sign shows that Tina's account has decreased by $420.

Show You Know
Duane instructs his bank to deduct $65 per month from his bank account and transfer the money into an investment account. What is the total of his deductions in 18 months?

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Example 1

Example 1 shows students how to use the sign rules to multiply two integers. Reinforce the concrete or semi-concrete models of the same multiplications, and the idea that the result is the same if the integers are multiplied in either order.

Some students may find it beneficial to continue to use a number line to complete the Show You Know questions.

Example 2

Example 2 shows an application of integer multiplication. Make sure that students understand the use of the integer −35 to represent the monthly $35 deduction and the use of the integer +12 to represent the number of months in a year.

Point out that this example includes estimating the product. Students can apply their estimation techniques from the multiplication of whole numbers, except for the additional step of determining the sign of an integer product.

Stress the importance of the summary statement at the end of the solution to Example 2. Some students may expect to write the final line of the solution as −$420, but a complete solution requires an explanation of the negative sign in the context of the problem.

You could also include the use of technology to show the completion of the calculation in Example 2 and to prepare students for calculator use in the division of two-digit by two-digit integers in section 8.4. The following key sequence is for the TI-30Xa calculator:

C 12 × 35 +/− =

Students using other calculators may need to explore the method for entering negative integers on their calculators and may need assistance with this. Make it clear that, on most calculators, the integer sign key and the subtraction key are not the same.

After discussing Example 2, have students complete the Show You Know question to make sure that they are ready to move on.

Meeting Student Needs

- Have students compare the migration of local animals, such as whales, eagles, hawks, or any other local bird. The students can compare the depth of dives of local birds with that of the sooty shearwater.
- Make a poster for display in the classroom showing the sign rules for multiplying integers.
- You may need to remind some students of the meaning of the ≈ symbol, which is used in the estimation of the product in Example 2.

ELL

- Ensure that students understand the following words: *migration*, *deep/deepest*, *annual*, and *monthly*.
- Example 2 refers to Tina who supports her favourite charity with an *automatic deduction*. Explain that this means that $35 comes out of her bank account each month; in other words, she is giving money.

Common Errors

- Some students may have difficulty modelling integer multiplication on a number line.

R_x Encourage the continued use of integer chips or diagrams of chips for as long as necessary. Assist students in comparing the integer-chip and number-line models in simple cases, e.g., $(+3) \times (+2)$. Point out the resemblance between the models, i.e., the representation of multiplication as repeated addition.

- Some students may not recognize when the number-line model shown in the exploration is inappropriate to use for integer multiplication.

R_x Remind students that this model represents repeated addition. Therefore, they can use the number-line method whenever they can rewrite the multiplication as a repeated addition (i.e., whenever there is at least one positive integer in the multiplication).

Answers

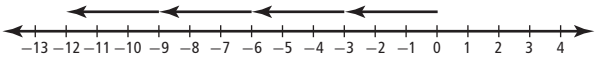
Explore the Math

1. a) Answers may vary. Example: The integers are shown as three arrows that are each two units long and pointed in the positive direction on the number line.

b) The model would consist of three groups of two red chips each. The product is six.

c) Answers may vary. Example: The product is represented by the point reached by moving two units in the positive direction three times.

2. a) Answers may vary. Example: Move three units to the left four times. Since each move represents –2, the point reached after all four moves shows the product.



b) The product is –12. Explanations may vary. Example: The four moves to the left finish at –12 on the number line.

3. Answers may vary. Example: The method used in #1 and #2 will not work because it is not possible to have a negative number of moves.

4. a) $(+6) \times (+2) = +12$ $(+2) \times (+6) = +12$
$(+4) \times (-5) = -20$ $(-5) \times (+4) = -20$
$(-4) \times (-3) = +12$ $(-3) \times (-4) = +12$

b) Answers may vary. Example: The order of multiplying two integers does not affect the product. For example, $(+6) \times (-5) = (-5) \times (+6)$ and $(-2) \times (-11) = (-11) \times (-2)$.

c) Answers may vary. Example: Change the order to $(+2) \times (-3)$, then use the same method as in #1 and #2.

5. a) The product of two integers with the same sign is positive. The product of two integers with different signs is negative.

b) Answers may vary. Example: $(-3) \times (-7) = 21$, $(-8) \times (-9) = 72$, $(-5) \times (+3) = -15$, and $(+7) \times (-7) = -49$.

6. Answers may vary. Example:

a) Move to the right or left of zero in steps that correspond to the number of units in the second factor. The first factor indicates the number of steps. This method can be used only when the first factor is positive.

b) If both factors have the same sign, the product is positive. If the factors have different signs, the product is negative.

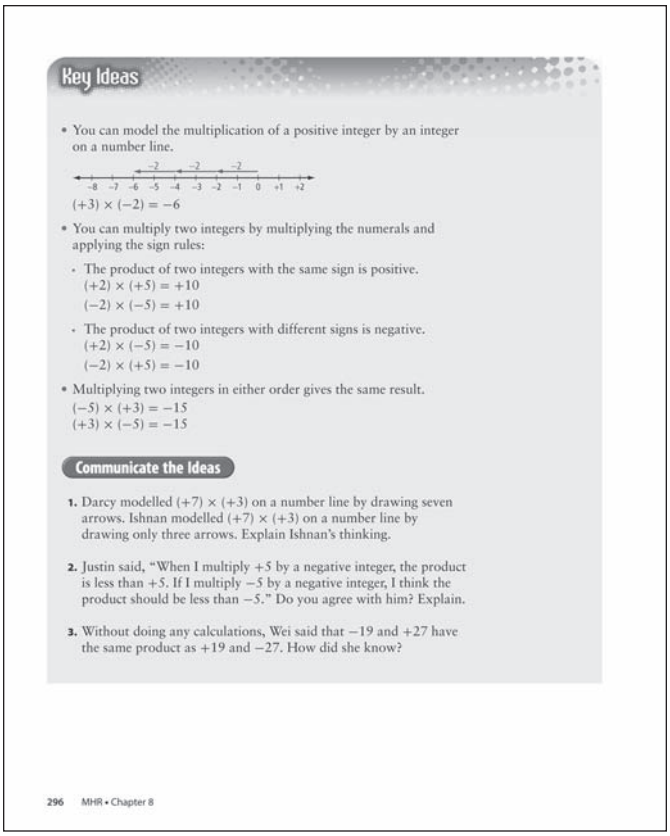
Show You Know: Example 1

a) 28 **b)** –30 **c)** 16 **d)** –36

Show You Know: Example 2

The deductions in 18 months total $1170.

Assessment	Supporting Learning
Assessment *as* Learning	
Reflect on Your Findings Listen as students discuss the answers to #6a) and b). Clarify any misunderstandings.	• Some students may need assistance generalizing the number-line method in #6a). Have them model their understanding with integer chips and compare their work to a number line. Have them verbalize the similarities and differences between the two methods. • Students who need assistance with #6b) should be referred back to #5.
Assessment *for* Learning	
Example 1 Have students do the Show You Know related to Example 1.	• Have students work with a partner and talk through their thinking. • Have students use the number line and integer chips to assist them in their thinking. • Coach students through the sign rules developed previously. Reinforce the idea that the result is the same if integers are multiplied in either order.
Example 2 Have students do the Show You Know related to Example 2.	• Have students work with a partner and talk through their thinking. • Help students recall the terminology used to assign signs to integer values. • Students may benefit from writing out the problem and underlining the words that reflect integer values or writing the words and the mathematical equivalent beside it. • Some students may find using a calculator beneficial. It may be necessary to help students recall the correct keystrokes.



Key Ideas

- You can model the multiplication of a positive integer by an integer on a number line.

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

- You can multiply two integers by multiplying the numerals and applying the sign rules:
  - The product of two integers with the same sign is positive.
    $(+2) \times (+5) = +10$
    $(-2) \times (-5) = +10$
  - The product of two integers with different signs is negative.
    $(+2) \times (-5) = -10$
    $(-2) \times (+5) = -10$
- Multiplying two integers in either order gives the same result.
  $(-5) \times (+3) = -15$
  $(+3) \times (-5) = -15$

Communicate the Ideas

1. Darcy modelled $(+7) \times (+3)$ on a number line by drawing seven arrows. Ishnan modelled $(+7) \times (+3)$ on a number line by drawing only three arrows. Explain Ishnan's thinking.
2. Justin said, "When I multiply $+5$ by a negative integer, the product is less than $+5$. If I multiply -5 by a negative integer, I think the product should be less than -5." Do you agree with him? Explain.
3. Without doing any calculations, Wei said that -19 and $+27$ have the same product as $+19$ and -27. How did she know?

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Communicate the Ideas

You may wish to have students complete these questions in groups and discuss their answers. In #1, students need to consider both the use of a number line as a model and the order in which two integers are multiplied. This question provides an opportunity to reinforce the fact that multiplying two integers in either order gives the same product. Use #2 and #3 to prompt discussion of the sign rules.

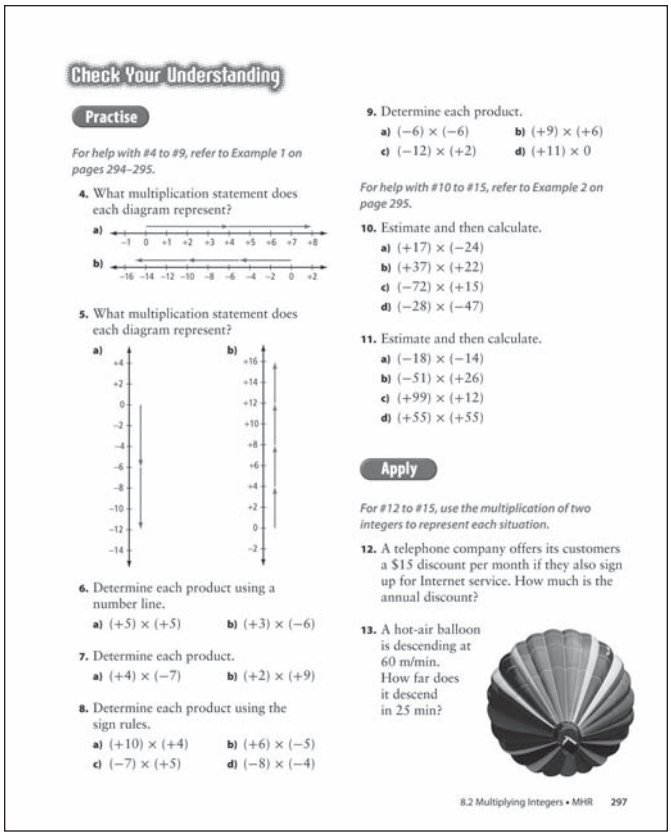
Answers

Communicate the Ideas

1. Answers may vary. Example: Ishnan rewrote the product as $(+3) \times (+7)$. This product can be represented by three arrows that are each seven units long.
2. No, the product of two negative integers is a positive integer. A positive integer is greater than -5.
3. Answers may vary. Example: She knew that the product of two numbers with different signs results in a negative number. So, the product is the same negative integer no matter which of the two factors has the negative sign.

Have students read and review the Key Ideas. Emphasize the importance of knowing how to model the multiplication of two integers on a number line if at least one of the integers is positive, but not if both integers are negative.

Assessment	Supporting Learning
Assessment *as* Learning	
Communicate the Ideas Have all students complete #1 to #3.	• Encourage students who need assistance with #1 to refer to the Explore the Math #4a) and review their thinking. • Encourage students who need assistance with #2 to use number lines and integer chips to model an example such as $(+5) \times (-2)$. • Encourage students who need assistance with #3 to model the question using smaller values before making any corrections. Have them complete examples, such as $(-3) \times (+2)$ and $(+4) \times (-1)$. • Reinforce the sign rules. Students could write the sign rules in chart form and use the chart as a quick reference. • Students who need coaching in multiplying integers may benefit from using **Master 19 Multiplication Chart**.



Check Your Understanding

Practise

For help with #4 to #9, refer to Example 1 on pages 294–295.

4. What multiplication statement does each diagram represent?

a)

b)

5. What multiplication statement does each diagram represent?

a)

b)

6. Determine each product using a number line.

a) $(+5) \times (+5)$ b) $(+3) \times (-6)$

7. Determine each product.

a) $(+4) \times (-7)$ b) $(+2) \times (+9)$

8. Determine each product using the sign rules.

a) $(+10) \times (+4)$ b) $(+6) \times (-5)$

c) $(-7) \times (+5)$ d) $(-8) \times (-4)$

9. Determine each product.

a) $(-6) \times (-6)$ b) $(+9) \times (+6)$

c) $(-12) \times (+2)$ d) $(+11) \times 0$

For help with #10 to #15, refer to Example 2 on page 295.

10. Estimate and then calculate.

a) $(+17) \times (-24)$

b) $(+37) \times (+22)$

c) $(-72) \times (+15)$

d) $(-28) \times (-47)$

11. Estimate and then calculate.

a) $(-18) \times (-14)$

b) $(-51) \times (+26)$

c) $(+99) \times (+12)$

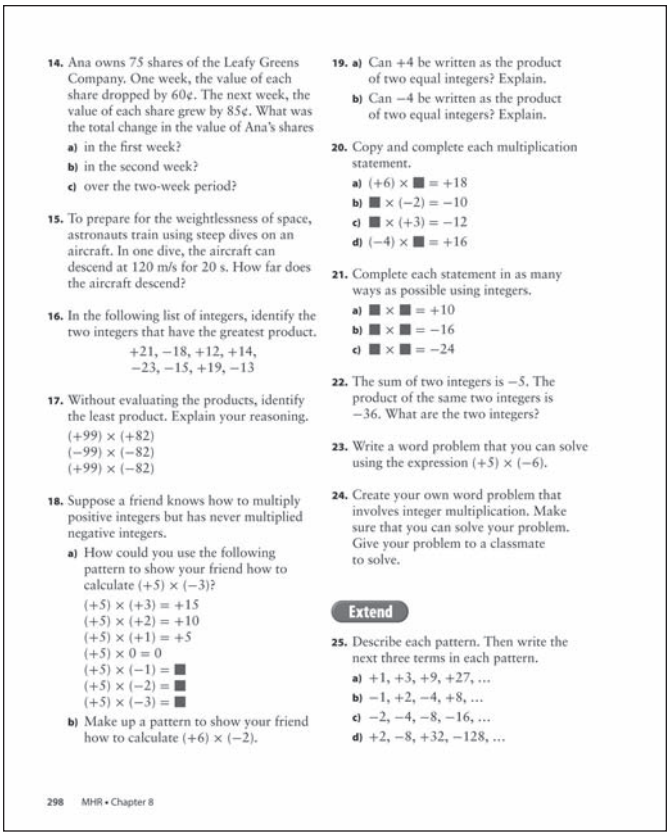
d) $(+55) \times (+55)$

Apply

For #12 to #15, use the multiplication of two integers to represent each situation.

12. A telephone company offers its customers a $15 discount per month if they also sign up for Internet service. How much is the annual discount?

13. A hot-air balloon is descending at 60 m/min. How far does it descend in 25 min?



14. Ana owns 75 shares of the Leafy Greens Company. One week, the value of each share dropped by 60¢. The next week, the value of each share grew by 85¢. What was the total change in the value of Ana's shares

a) in the first week?

b) in the second week?

c) over the two-week period?

15. To prepare for the weightlessness of space, astronauts train using steep dives on an aircraft. In one dive, the aircraft can descend at 120 m/s for 20 s. How far does the aircraft descend?

16. In the following list of integers, identify the two integers that have the greatest product.

+21, −18, +12, +14,
−23, −15, +19, −13

17. Without evaluating the products, identify the least product. Explain your reasoning.

$(+99) \times (+82)$
$(-99) \times (-82)$
$(+99) \times (-82)$

18. Suppose a friend knows how to multiply positive integers but has never multiplied negative integers.

a) How could you use the following pattern to show your friend how to calculate $(+5) \times (-3)$?

$(+5) \times (+3) = +15$
$(+5) \times (+2) = +10$
$(+5) \times (+1) = +5$
$(+5) \times 0 = 0$
$(+5) \times (-1) = \blacksquare$
$(+5) \times (-2) = \blacksquare$
$(+5) \times (-3) = \blacksquare$

b) Make up a pattern to show your friend how to calculate $(+6) \times (-2)$.

19. a) Can +4 be written as the product of two equal integers? Explain.

b) Can −4 be written as the product of two equal integers? Explain.

20. Copy and complete each multiplication statement.

a) $(+6) \times \blacksquare = +18$

b) $\blacksquare \times (-2) = -10$

c) $\blacksquare \times (+3) = -12$

d) $(-4) \times \blacksquare = +16$

21. Complete each statement in as many ways as possible using integers.

a) $\blacksquare \times \blacksquare = +10$

b) $\blacksquare \times \blacksquare = -16$

c) $\blacksquare \times \blacksquare = -24$

22. The sum of two integers is −5. The product of the same two integers is −36. What are the two integers?

23. Write a word problem that you can solve using the expression $(+5) \times (-6)$.

24. Create your own word problem that involves integer multiplication. Make sure that you can solve your problem. Give your problem to a classmate to solve.

Extend

25. Describe each pattern. Then write the next three terms in each pattern.

a) +1, +3, +9, +27, ...

b) −1, +2, −4, +8, ...

c) −2, −4, −8, −16, ...

d) +2, −8, +32, −128, ...

Check Your Understanding

Practise

Students will differ in the extent to which they continue to rely on concrete or semi-concrete models to multiply integers. Some students may already be very comfortable with symbolic representations and the use of the sign rules. Assign Practise questions accordingly, and support students as necessary. Some students may benefit from working with a partner or in a group.

You may wish to have students discuss their estimates in #10 and #11 and their strategies for arriving at them. If students do not mention them, help them recall the use of front-end and relative-size estimation.

Apply

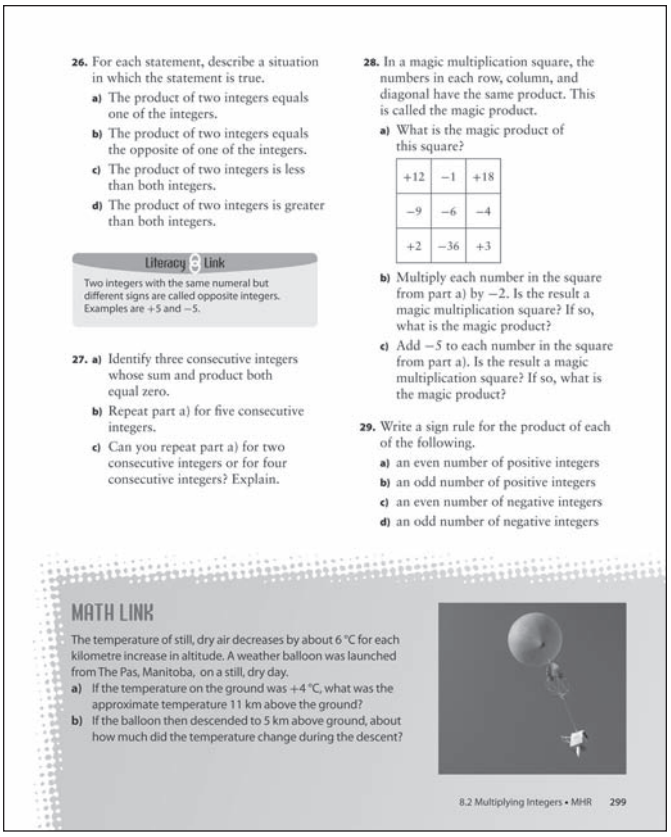
For #12 to #15, students need to model the real-world applications mathematically. For these questions, stress that the final line of the solution should be a summary statement that explains the meaning of the integer product.

In #18, a different approach to multiplication involving negative integers is introduced: the use of patterns. Patterning will also be used with integer division in the next section, and #18 may provide useful preparation.

For #19, some students may identify +2 as an integer that can be multiplied by itself to give the product +4, but they may overlook −2 as the other possibility. To extend #19, discuss the answers to parts a) and b) in the context of square roots.

In #20, the pre-algebraic determination of missing integers in multiplication statements is included. Some students may complete this question by systematic trial, whereas others may be able to think more abstractly. At this stage, you may wish to point out connections to integer division.

Students will differ in their ability to create word problems in #23 and #24. Encourage students who are having difficulty to model their problems on previous examples or questions. As students gain more confidence, encourage creativity.



26. For each statement, describe a situation in which the statement is true.

a) The product of two integers equals one of the integers.

b) The product of two integers equals the opposite of one of the integers.

c) The product of two integers is less than both integers.

d) The product of two integers is greater than both integers.

Literacy Link

Two integers with the same numeral but different signs are called opposite integers. Examples are +5 and −5.

27. a) Identify three consecutive integers whose sum and product both equal zero.

b) Repeat part a) for five consecutive integers.

c) Can you repeat part a) for two consecutive integers or for four consecutive integers? Explain.

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

a) What is the magic product of this square?

+12	−1	+18
−9	−6	−4
+2	−36	+3

b) Multiply each number in the square from part a) by −2. Is the result a magic multiplication square? If so, what is the magic product?

c) Add −5 to each number in the square from part a). Is the result a magic multiplication square? If so, what is the magic product?

29. Write a sign rule for the product of each of the following.

a) an even number of positive integers

b) an odd number of positive integers

c) an even number of negative integers

d) an odd number of negative integers

MATH LINK

The temperature of still, dry air decreases by about 6 °C for each kilometre increase in altitude. A weather balloon was launched from The Pas, Manitoba, on a still, dry day.

a) If the temperature on the ground was +4 °C, what was the approximate temperature 11 km above the ground?

b) If the balloon then descended to 5 km above ground, about how much did the temperature change during the descent?

Extend

Students are required to determine the product of three integers for #26. Some students may do this by multiplying two of the integers and then multiplying the product and the third integer. Other students may think in more general terms about the sign rules for multiplying three integers.

Literacy Link For #26, draw students' attention to the Literacy Link, which explains the meaning of *opposite integers*.

Math Link

In this Math Link, students explore how to use integers to solve problems that involve temperature changes. Clarify the meaning of the term *altitude* (i.e., height above sea level). Give examples with pictures on the chalkboard. Encourage students to use integer chips or a number line to model the problem.

Meeting Student Needs

- Provide **BLM 8–6 Section 8.2 Extra Practice** to students who would benefit from more practice.

ELL

- For #12, ensure students understand the terms *annual* and *discount*.
- For #13, ensure students understand that *descending* means going down (the numbers are decreasing, getting smaller, becoming less).
- For #27, provide students with oral and written examples of consecutive numbers.

Common Errors

- Some students may ignore the sign rules for multiplying integers.

R_x Emphasize the need to consider the sign of the product in all integer multiplication problems. If necessary, use concrete or semi-concrete models to demonstrate that some products of integer multiplications are positive and others are negative.

- Some students may forget the sign rules for multiplying integers.

R_x Encourage students to visualize models of examples of integer multiplications that illustrate the sign rules. You might also post the sign rules for integer multiplication in the classroom until students are thoroughly familiar with them.

- Some students may provide incomplete solutions to application problems by failing to explain the meaning of the integer product.

R_x Stress the need to include a summary statement at the end of the solution to an application problem.

Web Link

Have students explore another way to model multiplication of integers. Note that the website model uses red to represent negative integers and blue to represent positive integers. Go to www.mathlinks8.ca and follow the links.

Answers

Math Link

a) −62 °C **b)** The temperature increased by 36 °C.

Assessment	Supporting Learning
Assessment *for* Learning	
Practise and Apply Have students do #4, #6, #8, #10 and #12. Students who have no problems with these questions can go on to the rest of the Apply questions.	• Coach students who need assistance with #4a). Have them verbalize their understanding. Encourage students to use integer chips to explain the mathematical processes and then translate the process to the meaning of arrows on a number line. Have students try #5 before going on. • Encourage students who need assistance with #6 to verbalize their thinking. They may find it beneficial to refer to a multiplication table such as the one on **Master 19 Multiplication Chart**. Coach students through the sign rules relating to integers. Have students complete #7a) before beginning #8. • Students who need assistance with #10 may benefit from being coached through the rules that apply to estimation. A calculator may be of assistance for the estimation and actual calculation. You may need to help students recall the correct keystrokes. • Students who need assistance with #12 may benefit from recalling what they know about the meaning of mathematical words and how they translate into mathematical expressions and operations. Make a list of words along with their mathematical meanings, and have students record them in their chapter Foldable. Have students try #13 before moving on.
Math Link The Math Link on page 299 is intended to help students work toward the chapter problem wrap-up titled Wrap It Up! on page 321.	• You may wish to have students complete the Math Link in order to apply their understanding of integer multiplication. Listen to any discussion about how the students solve the problem or for any terminology that may cause confusion. • Some students may benefit from using **BLM 8–7 Section 8.2 Math Link**, which provides scaffolding for this activity.
Assessment *as* Learning	
Math Learning Log Have students reflect on how well they succeeded in multiplying integers by completing the following questions: • What methods can you use to multiply two integers? • What method do you like best? Why?	• Depending on students' learning style, have them provide oral or written answers. • Encourage students to use the What I Need to Work On section of their chapter Foldable to note what they continue to have difficulty with.