Multiplying and Dividing Integers

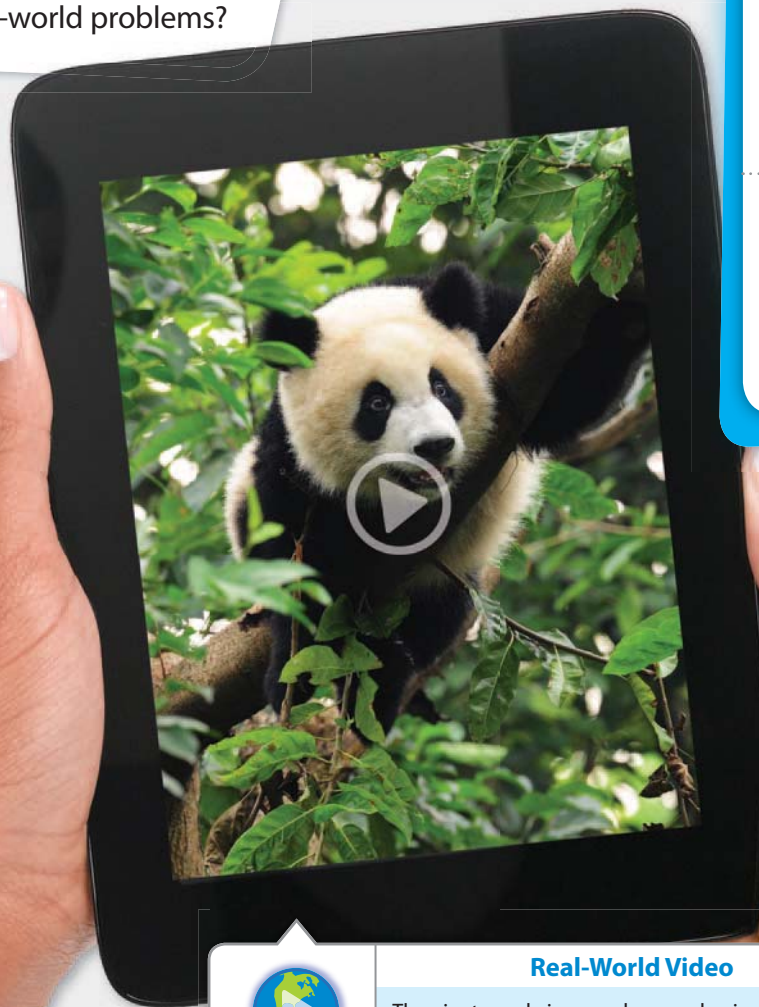## ? ESSENTIAL QUESTION

How can you use multiplication and division of integers to solve real-world problems?

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Real-World Video

The giant panda is an endangered animal. For some endangered species, the population has made a steady decline. This can be represented by multiplying integers with different signs.

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Are YOU Ready?

Complete these exercises to review skills you will need for this module.

Multiplication Facts

EXAMPLES

$7 \times 9 = \blacksquare$

$7 \times 9 = 63$

Use patterns. When you multiply 9 by a number 1 through 9, the digits of the product add up to 9. $6 + 3 = 9$

$12 \times 10 = \blacksquare$

$12 \times 10 = 120$

Products of 10 end in 0.

Multiply.

1. 9×3 _____

2. 7×10 _____

3. 9×8 _____

4. 15×10 _____

5. 6×9 _____

6. 10×23 _____

7. 9×9 _____

8. 10×20 _____

Division Facts

EXAMPLE

$48 \div 6 = \blacksquare$

Think: 6 times what number equals 48? $6 \times 8 = 48$

$48 \div 6 = 8$

So, $48 \div 6 = 8$

Divide.

9. $54 \div 9$ _____

10. $42 \div 6$ _____

11. $24 \div 3$ _____

12. $64 \div 8$ _____

13. $90 \div 10$ _____

14. $56 \div 7$ _____

15. $81 \div 9$ _____

16. $110 \div 11$ _____

Order of Operations

EXAMPLE

$32 - 2(10 - 7)^2$

$32 - 2(3)^2$

To evaluate, first operate within parentheses.

$32 - 2(9)$

Next, simplify exponents.

$32 - 18$

Then multiply and divide from left to right.

14

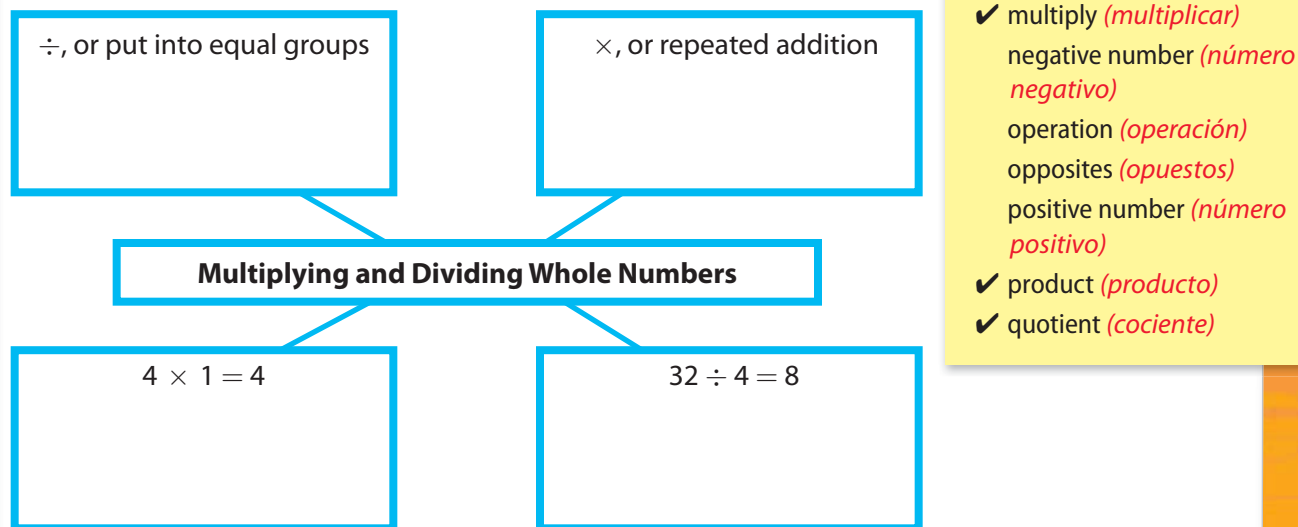Finally add and subtract from left to right.

Evaluate each expression.

17. $12 + 8 \div 2$ _____

18. $15 - (4 + 3) \times 2$ _____

19. $18 - (8 - 5)^2$ _____

20. $6 + 7 \times 3 - 5$ _____

21. $9 + (2^2 + 3)^2 \times 2$ _____

22. $6 + 5 - 4 \times 3 \div 2$ _____

Reading Start-Up

Visualize Vocabulary

Use the ✔ words to complete the chart. You may put more than one word in each box.

$\div$, or put into equal groups	$\times$, or repeated addition

Multiplying and Dividing Whole Numbers

$4 \times 1 = 4$	$32 \div 4 = 8$

Vocabulary

Review Words
- ✔ divide *(dividir)*
- ✔ dividend *(dividendo)*
- ✔ divisor *(divisor)*
-    integers *(enteros)*
- ✔ multiply *(multiplicar)*
-    negative number *(número negativo)*
-    operation *(operación)*
-    opposites *(opuestos)*
-    positive number *(número positivo)*
- ✔ product *(producto)*
- ✔ quotient *(cociente)*

Understand Vocabulary

Complete the sentences using the review words.

1. A _____ is a number that is less than 0. A _____ is a number that is greater than 0.

2. Division problems have three parts. The part you want to divide into groups is called the _____. The number that is divided into another number is called the _____. The answer to a division problem is called the _____.

3. _____ are all whole numbers and their opposites.

Active Reading

Double-Door Fold Create a double-door fold to help you understand the concepts in this module. Label one flap "Multiplying Integers" and the other flap "Dividing Integers." As you study each lesson, write important ideas under the appropriate flap. Include information that will help you remember the concepts later when you look back at your notes.

Unpacking the Standards

COMMON CORE

Understanding the standards and the vocabulary terms in the standards will help you know exactly what you are expected to learn in this module.

COMMON CORE **7.NS.2a**

Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

Key Vocabulary

integer *(entero)*
   A member of the set of whole numbers and their opposites.

What It Means to You

You will use your knowledge of multiplication of whole numbers and addition of negative numbers to multiply integers.

UNPACKING EXAMPLE 7.NS.2a

Show that $(-1)(-1) = 1$.

$0 = -1(0)$	*Multiplication property of 0*
$0 = -1(-1 + 1)$	*Addition property of opposites*
$0 = (-1)(-1) + (-1)(1)$	*Distributive Property*
$0 = (-1)(-1) + (-1)$	*Multiplication property of 1*
So, $(-1)(-1) = 1$.	*Definition of opposites*

In general, a negative number times a negative number is always a positive number.

COMMON CORE **7.NS.2b**

Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-\left(\frac{p}{q}\right) = \frac{(-p)}{q} = \frac{p}{(-q)}$. Interpret quotients of rational numbers by describing real-world contexts.

What It Means to You

You will use your knowledge of division of whole numbers and multiplication of integers to divide integers.

UNPACKING EXAMPLE 7.NS.2b

The temperature in Fairbanks, Alaska, dropped over four consecutive hours from $0°$ F to $-44°$F. If the temperature dropped the same amount each hour, how much did the temperature change each hour?

$$\frac{-44}{4} = -11$$

The quotient of -44 and 4 is the same as the negative quotient of 44 and 4.

A negative number divided by a positive number is negative.

Visit **my.hrw.com** to see all the **Common Core Standards** unpacked.

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LESSON
2.1 Multiplying Integers

COMMON CORE 7.NS.2

Apply and extend previous understandings of multiplication and division... to multiply ... rational numbers. *Also 7.NS.2a*

? ESSENTIAL QUESTION

How do you multiply integers?

EXPLORE ACTIVITY 1 Real World   COMMON CORE 7.NS.2, 7.NS.2a

Multiplying Integers Using a Number Line

You can use a number line to see what happens when you multiply a positive number by a negative number.

A Henry made three withdrawals of $2 each from his savings account. What was the change in his balance?

Find 3(−2).

To graph −2, you would start at 0 and move _____ units to the left.

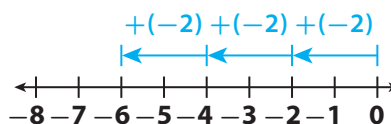3(−2) means (_____) + (_____) + (_____).

To graph 3(−2), start at 0 and move

2 units to the left _____ times.

The result is _____.

$+(−2) +(−2) +(−2)$
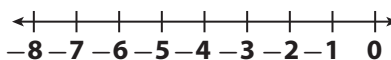
−8 −7 −6 −5 −4 −3 −2 −1 0

The change in Henry's balance was _____

B Lisa plays a video game in which she loses points. She loses 3 points 2 times. What is her score?

Find 2(−3).

2(−3) means (_____) + (_____).
Show this on the number line.

Lisa has a score of _____.

−8 −7 −6 −5 −4 −3 −2 −1 0

Reflect

1. What do you notice about the product of two integers with different signs?

_____

_____
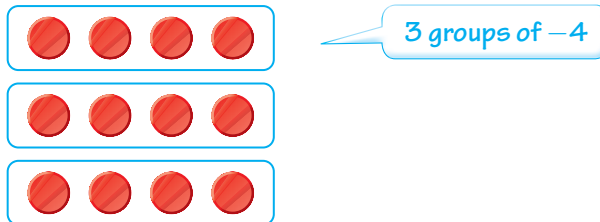
Modeling Integer Multiplication

Counters representing positive and negative numbers can help you understand how to find the product of two negative integers.
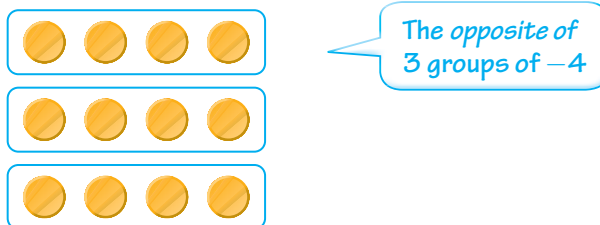
🟡 = +1
🔴 = −1
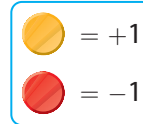
Find the product of −3 and −4.

Write (−3)(−4) as −3(−4), which means the *opposite* of 3(−4).

STEP 1   Use negative counters to model 3(−4).

🔴 🔴 🔴 🔴
🔴 🔴 🔴 🔴   *3 groups of −4*
🔴 🔴 🔴 🔴

STEP 2   Make the same model using positive counters to find the *opposite* of 3(−4).

🟡 🟡 🟡 🟡
🟡 🟡 🟡 🟡   *The opposite of 3 groups of −4*
🟡 🟡 🟡 🟡

STEP 3   Translate the model into a mathematical expression:

(−3)(−4) = _____

The product of −3 and −4 is _____.

Reflect

2. What do you notice about the sign of the product of two negative integers?

_____

3. **Make a Conjecture** What can you conclude about the sign of the product of two integers with the same sign?

_____

_____

_____

_____

Multiplying Integers

The product of two integers with opposite signs is negative. The product of two integers with the same sign is positive. The product of 0 and any other integer is 0.

EXAMPLE 1

COMMON CORE 7.NS.2

A Multiply: $(13)(-3)$.

STEP 1 Determine the sign of the product.

13 is positive and -3 is negative. Since the numbers have opposite signs, the product will be negative.

STEP 2 Find the absolute values of the numbers and multiply them.

$|13| = 13$ $|-3| = 3$

$13 \times 3 = 39$

STEP 3 Assign the correct sign to the product.

$13(-3) = -39$ The product is -39.

B Multiply: $(-5)(-8)$.

STEP 1 Determine the sign of the product.

-5 is negative and -8 is negative. Since the numbers have the same sign, the product will be positive.

STEP 2 Find the absolute values of the numbers and multiply them.

$|-5| = 5$ $|-8| = 8$

$5 \times 8 = 40$

STEP 3 Assign the correct sign to the product.

$(-5)(-8) = 40$ The product is 40.

C Multiply: $(-10)(0)$.

$(-10)(0) = 0$ One of the factors is 0, so the product is 0.

Math Talk
Mathematical Practices

Compare the rules for finding the product of a number and zero and finding the sum of a number and 0.

YOUR TURN

Find each product.

4. $-3(5)$ _____

5. $(-10)(-2)$ _____

6. $7(-6)$ _____

7. $0(-22)$ _____

8. $(-15)(-3)$ _____

9. $8(4)$ _____

Find each product. (Explore Activity 2 and Example 1)

1. −1(9) _____

2. 14(−2) _____

3. (−9)(−6) _____

4. (−2)(50) _____

5. (−4)(15) _____

6. −18(0) _____

7. (−7)(−7) _____

8. −15(9) _____

9. (8)(−12) _____

10. −3(−100) _____

11. 0(−153) _____

12. −6(32) _____

13. Flora made 7 withdrawals of $75 each from her bank account. What was the overall change in her account? (Example 1)

_____

14. A football team lost 5 yards on each of 3 plays. Explain how you could use a number line to find the team's change in field position after the 3 plays. (Explore Activity 1)

_____

_____

15. The temperature dropped 2 °F every hour for 6 hours. What was the total number of degrees the temperature changed in the 6 hours? (Explore Activity 1)

_____

16. The price of one share of Acme Company declined $5 per day for 4 days in a row. How much did the price of one share change in total after the 4 days? (Explore Activity 1)

_____

17. A mountain climber climbed down a cliff 50 feet at a time. He did this 5 times in one day. What was the overall change in his elevation? (Explore Activity 1)

_____

? **ESSENTIAL QUESTION CHECK-IN**

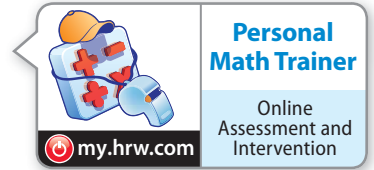**18.** Explain the process for finding the product of two integers.

_____

_____

_____

_____

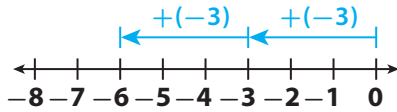# 2.1 Independent Practice

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19. Critique Reasoning Lisa used a number line to model −2(3). Does her number line make sense? Explain why or why not.

_____

_____

_____

20. Represent Real-World Problems Mike got on an elevator and went down 3 floors. He meant to go to a lower level, so he stayed on the elevator and went down 3 more floors. How many floors did Mike go down altogether?

_____

Solve. Show your work.

21. When Brooke buys lunch at the cafeteria, money is withdrawn from a lunch account. The table shows amounts withdrawn in one week. By how much did the amount in Brooke's lunch account change by the end of that week?

Lunch Account			
Week 1	**Lunch**	**Cost**	**Balance**
			$28
Monday	Pizza	$4	
Tuesday	Fish Tacos	$4	
Wednesday	Spaghetti	$4	
Thursday	Sandwich	$4	
Friday	Chicken	$4	

_____

22. Adam is scuba diving. He descends 5 feet below sea level. He descends the same distance 4 more times. What is Adam's final elevation?

_____

_____

23. The price of jeans was reduced $6 per week for 7 weeks. By how much did the price of the jeans change over the 7 weeks?

_____

_____

24. Casey uses some of his savings on batting practice. The cost of renting a batting cage for 1 hour is $6. He rents a cage for 9 hours in each of two months. What is the change in Casey's savings after two months?

_____

_____

_____

25. Volunteers at Sam's school use some of the student council's savings for a special project. They buy 7 backpacks for $8 each and fill each backpack with paper and pens that cost $5. By how much did the student council's savings change because of this project?

_____

_____

_____

26. Communicate Mathematical Ideas Describe a real-world situation that can be represented by the product 8(−20). Then find the product and explain what the product means in terms of the real-world situation.

_____

_____

_____

27. What If? The rules for multiplying two integers can be extended to a product of 3 or more integers. Find the following products by using the Associative Property to multiply 2 numbers at a time.

a. 3(3)(−3) _____   **b.** 3(−3)(−3) _____   **c.** −3(−3)(−3) _____

d. 3(3)(3)(−3) _____   **e.** 3(3)(−3)(−3) _____   **f.** 3(−3)(−3)(−3) _____

g. Make a Conjecture Based on your results, complete the following statements:

When a product of integers has an odd number of negative factors,

then the sign of the product is _____ .

When a product of integers has an even number of negative factors,

then the sign of the product is _____ .

H.O.T. **FOCUS ON HIGHER ORDER THINKING**

28. Multiple Representations The product of three integers is −3. Determine all of the possible values for the three factors.

_____

29. Analyze Relationships When is the product of two nonzero integers less than or equal to both of the two factors?

_____

_____

30. Justify Reasoning The sign of the product of two integers with the same sign is positive. What is the sign of the product of three integers with the same sign? Explain your thinking.

_____

_____

_____

_____

_____

Dividing Integers

? ESSENTIAL QUESTION

How do you divide integers?

EXPLORE ACTIVITY Real World

COMMON CORE 7.NS.2, 7.NS.3

A diver needs to descend to a depth of 100 feet. She wants to do it in 5 equal descents. How far should she travel in each descent?

A Use the number line at the right to find how far the diver should travel in each of the 5 descents.

_____

B To solve this problem, you can set up a division problem: $\dfrac{-100}{\boxed{}} = ?$

C Rewrite the division problem as a multiplication problem.
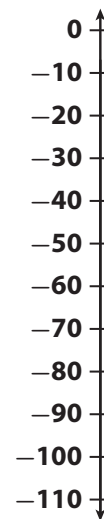Think: Some number multiplied by 5 equals -100.

_____ $\times\ ? = -100$

D Remember the rules for integer multiplication. If the product is negative, one of the factors must be negative. Since _____ is positive, the unknown factor must be $\boxed{\textbf{positive / negative.}}$

E You know that $5 \times$ _____ $= 100$. So, using the rules for integer multiplication you can say that $5 \times$ _____ $= -100$.

The diver should descend _____ feet in each descent.

F Use the process you just learned to find each of the quotients below.

$\dfrac{14}{-7} =$ _____ $\dfrac{-36}{-9} =$ _____ $\dfrac{-55}{11} =$ _____ $\dfrac{-45}{-5} =$ _____

Number line values:
0, −10, −20, −30, −40, −50, −60, −70, −80, −90, −100, −110

Reflect

1. Make a Conjecture Make a conjecture about the quotient of two integers with different signs. Make a conjecture about the quotient of two integers with the same sign.

_____

_____

Dividing Integers

You used the relationship between multiplication and division to make conjectures about the signs of quotients of integers. You can use multiplication to understand why division by zero is not possible.

Think about the division problem below and its related multiplication problem.

$$5 \div 0 = ? \qquad 0 \times ? = 5$$

The multiplication sentence says that there is some number times 0 that equals 5. You already know that 0 times any number equals 0. This means division by 0 is not possible, so we say that division by 0 is undefined.

EXAMPLE 1

A Divide: $24 \div (-3)$

STEP 1 Determine the sign of the quotient.

24 is positive and -3 is negative. Since the numbers have opposite signs, the quotient will be negative.

STEP 2 Divide.

$24 \div (-3) = -8$

B Divide: $-6 \div (-2)$

STEP 1 Determine the sign of the quotient.

-6 is negative and -2 is negative. Since the numbers have the same sign, the quotient will be positive.

STEP 2 Divide: $-6 \div (-2) = 3$

C Divide: $0 \div (-9)$

STEP 1 Determine the sign of the quotient.

The dividend is 0 and the divisor is not 0. So, the quotient is 0.

STEP 2 Divide: $0 \div (-9) = 0$

My Notes

YOUR TURN

Find each quotient.

2. $0 \div (-6)$ _____

3. $38 \div (-19)$ _____

4. $-13 \div (-1)$ _____

Using Integer Division to Solve Problems

You can use integer division to solve real-world problems. For some problems, you may need to perform more than one step. Be sure to check that the sign of the quotient makes sense for the situation.

EXAMPLE 2 · Real World

COMMON CORE · 7.NS.3, 7.NS.2

Jake answers questions in two different online Olympic trivia quizzes. In each quiz, he loses points when he gives an incorrect answer. The table shows the points lost for each wrong answer in each quiz and Jake's total points lost in each quiz. In which quiz did he have more wrong answers?

Olympic Trivia Quiz	Points lost for each wrong answer	Total points lost
Winter Quiz	−3 points	−33 points
Summer Quiz	−7 points	−56 points

STEP 1 Find the number of incorrect answers in the winter quiz.

$-33 \div (-3) = 11$ Divide the total points lost by the number of points lost per wrong answer.

STEP 2 Find the number of incorrect answers Jake gave in the summer quiz.

$-56 \div (-7) = 8$ Divide the total points lost by the number of points lost per wrong answer.

STEP 3 Compare the numbers of wrong answers.

$11 > 8$, so Jake had more wrong answers in the winter quiz.

Math Talk
Mathematical Practices

What is the sign of each quotient in Steps 1 and 2? Why does this make sense for the situation?

YOUR TURN

5. A penalty in Meteor-Mania is −5 seconds. A penalty in Cosmic Calamity is −7 seconds. Yolanda had penalties totaling −25 seconds in a game of Meteor-Mania and −35 seconds in a game of Cosmic Calamity. In which game did Yolanda receive more penalties? Justify your answer.
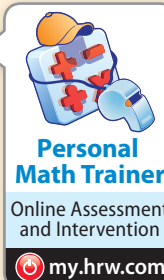
_____

_____

_____

Guided Practice

Find each quotient. (Example 1)

1. $\dfrac{-14}{2}$ _____

2. $21 \div (-3)$ _____

3. $\dfrac{26}{-13}$ _____

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

5. $\dfrac{-45}{-5}$ _____

6. $-30 \div (10)$ _____

7. $\dfrac{-11}{-1}$ _____

8. $-31 \div (-31)$ _____

9. $\dfrac{0}{-7}$ _____

10. $\dfrac{-121}{-11}$ _____

11. $84 \div (-7)$ _____

12. $\dfrac{500}{-25}$ _____

13. $-6 \div (0)$ _____

14. $\dfrac{-63}{-21}$ _____

Write a division expression for each problem. Then find the value of the expression. (Example 2)

15. Clark made four of his truck payments late and was fined four late fees. The total change to his savings from late fees was $-\$40$. How much was one late fee?

_____

16. Jan received -22 points on her exam. She got 11 questions wrong out of 50 questions. How much was Jan penalized for each wrong answer?

_____

17. Allen's score in a video game was changed by -75 points because he missed some targets. He got -15 points for each missed target. How many targets did he miss?

_____

18. Louisa's savings change by $-\$9$ each time she goes bowling. In all, it changed by $-\$99$ during the summer. How many times did she go bowling in the summer?

_____

? ESSENTIAL QUESTION CHECK-IN

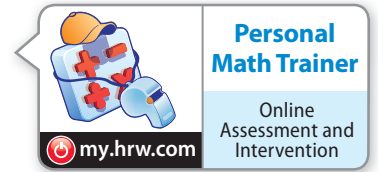19. How is the process of dividing integers similar to the process of multiplying integers?

_____

_____

_____

2.2 Independent Practice

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20. Walter buys a bus pass for $30. Every time he rides the bus, money is deducted from the value of the pass. He rode 12 times and $24 was deducted from the value of the pass. How much does each bus ride cost? ——————

21. **Analyze Relationships** Elisa withdrew $20 at a time from her bank account and withdrew a total of $140. Francis withdrew $45 at a time from his bank account and withdrew a total of $270. Who made the greater number of withdrawals? Justify your answer.

———————————————————————————————

———————————————————————————————

———————————————————————————————

22. **Multistep** At 7 p.m. last night, the temperature was $10°F$. At 7 a.m. the next morning, the temperature was $-2°F$.

a. By how much did the temperature change from 7 p.m. to 7 a.m.?

———————————————————————————————

b. The temperature changed by a steady amount overnight. By how much did it change each hour?

———————————————————————————————

———————————————————————————————

23. **Analyze Relationships** Nola hiked down a trail at a steady rate for 10 minutes. Her change in elevation was -200 feet. Then she continued to hike down for another 20 minutes at a different rate. Her change in elevation for this part of the hike was -300 feet. During which portion of the hike did she walk down at a faster rate? Explain your reasoning.

———————————————————————————————

———————————————————————————————

———————————————————————————————

24. Write a real world description to fit the expression $-50 \div 5$.

———————————————————————————————

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———————————————————————————————

25. **Communicate Mathematical Ideas** Two integers, *a* and *b*, have different signs. The absolute value of integer *a* is divisible by the absolute value of integer *b*. Find two integers that fit this description. Then decide if the product of the integers is greater than or less than the quotient of the integers. Show your work.

_____

_____

_____

Determine if each statement is true or false. Justify your answer.

26. For any two nonzero integers, the product and quotient have the same sign.

_____

_____

_____

27. Any nonzero integer divided by 0 equals 0.

_____

_____

H.O.T. **FOCUS ON HIGHER ORDER THINKING**

28. **Multi-step** A perfect score on a test with 25 questions is 100. Each question is worth the same number of points.

   a. How many points is each question on the test worth? _____

   b. Fred got a score of 84 on the test. Write a division sentence using negative numbers where the quotient represents the number of questions Fred answered incorrectly. _____

29. **Persevere in Problem Solving** Colleen divided integer *a* by -3 and got 8. Then she divided 8 by integer *b* and got -4. Find the quotient of integer *a* and integer *b*. _____

30. **Justify Reasoning** The quotient of two negative integers results in an integer. How does the value of the quotient compare to the value of the original two integers? Explain.

_____

_____

_____

LESSON
2.3

Applying Integer Operations

COMMON CORE 7.NS.3
Solve real-world and mathematical problems involving the four operations with rational numbers. *Also 7.NS.2a, 7.NS.2c, 7.EE.3*

? **ESSENTIAL QUESTION**

How can you use integer operations to solve real-world problems?

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Using the Order of Operations with Integers

The order of operations applies to integer operations as well as positive number operations. Perform multiplication and division first, and then addition and subtraction. Work from left to right in the expression.

EXAMPLE 1 Problem Solving

COMMON CORE 7.NS.2c, 7.NS.2a

Hannah made four withdrawals of $20 from her checking account. She also wrote a check for $215. By how much did the amount in her checking account change?

Analyze Information

You need to find the total *change* in Hannah's account. Since withdrawals and writing a check represent a decrease in her account, use negative numbers to represent these amounts.

Formulate a Plan

Write a product to represent the four withdrawals.

$-20 + (-20) + (-20) + (-20) = 4(-20)$

Add -215 to represent the check that Hannah wrote.

$4(-20) + (-215)$

Solve

Evaluate the expression to find by how much the amount in the account changed.

$4(-20) - 215 = -80 - 215$ Multiply first.
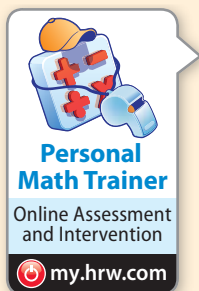
$= -295$ Then subtract.

The amount in the account decreased by $295.

Justify and Evaluate

The value -295 represents a decrease of 295 dollars. This makes sense, since withdrawals and writing checks remove money from the checking account.

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YOUR TURN

1. Reggie lost 3 spaceships in level 3 of a video game. He lost 30 points for each spaceship. When he completed level 3, he earned a bonus of 200 points. By how much did his score change?

   _____

   _____

2. Simplify: $-6(13) - 21$ _____

Using Negative Integers to Represent Quantities

You can use positive and negative integers to solve problems involving amounts that increase or decrease. Sometimes you may need to use more than one operation.

EXAMPLE 2 🌎 Real World

COMMON CORE 7.NS.3, 7.EE.3

Three brothers each have their own savings. They borrow $72 from their parents for concert tickets. Each brother must pay back an equal share of this amount. Also, the youngest brother owes his parents $15. By how much will the youngest brother's savings change after he pays his parents?

STEP 1 Determine the signs of the values and the operations you will use. Write an expression.

Since the money is being paid back, it will *decrease* the amount in each brother's savings. Use -72 and -15.

Since an *equal share* of the $72 will be paid back, use division to determine 3 equal parts of -72. Then add -15 to one of these equal parts.

Change to youngest brother's savings $= (-72) \div 3 + (-15)$

STEP 2 Evaluate the expression.

$(-72) \div 3 + (-15) = -24 + (-15)$ *Divide*

$= -39$ *Add.*

The youngest brother's savings will decrease by $39.

Math Talk

Mathematical Practices

Suppose the youngest brother has $60 in savings. How much will he have left after he pays his parents what he owes?

Reflect

3. **What If?** Suppose there were four brothers in Example 2. How much would the youngest brother need to pay?

   _____

Simplify each expression.

4. $(-12) \div 6 + 2$ _____

5. $-87 \div (-3) - 9$ _____

6. $40 \div (-5) + 30$ _____

7. $-39 \div 3 - 15$ _____

Comparing Values of Expressions

Often, problem situations require making comparisons between two values. Use integer operations to calculate values. Then compare the values.

EXAMPLE 3 Real World

COMMON CORE 7.NS.3, 7.EE.3

Jill and Tony play a board game in which they move counters along a board. Jill moves her counter back 3 spaces four times, and then moves her counter forward 6 spaces. Tony moves his counter back 2 spaces three times, and then moves his player forward 3 spaces one time. Find each player's overall change in position. Who moved farther?

STEP 1 Find each player's overall change in position.

Jill: $4(-3) + 6 = -12 + 6 = -6$ *Jill moves back 6 spaces.*

Tony: $3(-2) + 3 = -6 + 3 = -3$ *Tony moves back 3 spaces.*

STEP 2 Compare the numbers of spaces moved by the players.

$|-6| > |-3|$ *Compare absolute values.*

Jill moves farther back than Tony.

Math Talk
Mathematical Practices

Why do you compare absolute values in Step 2?

8. Amber and Will are in line together to buy tickets. Amber moves back by 3 places three times to talk to friends. She then is invited to move 5 places up in line. Will moved back by 4 places twice, and then moved up in line by 3 places. Overall, who moved farther back in line?

_____

Evaluate each expression. Circle the expression with the greater value.

9. $(-10) \div 2 - 2 =$ _____

$(-28) \div 4 + 1 =$ _____

10. $42 \div (-3) + 9 =$ _____

$(-36) \div 9 - 2 =$ _____

Guided Practice

Evaluate each expression. (Example 1)

1. $-6(-5) + 12$ _____

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

3. $-2(8) + 7$ _____

4. $4(-13) + 20$ _____

5. $(-4)(0) - 4$ _____

6. $-3(-5) - 16$ _____

Write an expression to represent the situation. Evaluate the expression and answer the question. (Example 2)

7. Bella pays 7 payments of $5 each to a game store. She returns one game and receives $20 back. What is the change to the amount of money she has?

_____

8. Ron lost 10 points seven times playing a video game. He then lost an additional 100 points for going over the time limit. What was the total change in his score?

_____

9. Ned took a test with 25 questions. He lost 4 points for each of the 6 questions he got wrong and earned an additional 10 points for answering a bonus question correctly. How many points did Ned receive or lose overall?

_____

10. Mr. Harris has some money in his wallet. He pays the babysitter $12 an hour for 4 hours of babysitting. His wife gives him $10, and he puts the money in his wallet. By how much does the amount in his wallet change?

_____

Compare the values of the two expressions using $<$, $=$, or $>$. (Example 3)

11. $-3(-2) + 3$ _____ $3(-4) + 9$

12. $-8(-2) - 20$ _____ $3(-2) + 2$

13. $-7(5) - 9$ _____ $-3(20) + 10$

14. $-16(0) - 3$ _____ $-8(-2) - 3$

? **ESSENTIAL QUESTION CHECK-IN**

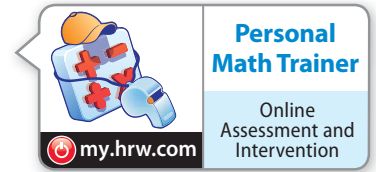**15.** When you solve a problem involving money, what can a negative answer represent?

_____

_____

_____

2.3 Independent Practice

Personal Math Trainer

Online Assessment and Intervention

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Evaluate each expression.

16. $-12(-3) + 7$ _____

17. $-42 \div (-6) + 5 - 8$ _____

18. $10(-60) - 18$ _____

19. $(-11)(-7) + 5 - 82$ _____

20. $35 \div (-7) + 6$ _____

21. $-13(-2) - 16 - 8$ _____

22. Multistep Lily and Rose are playing a game. In the game, each player starts with 0 points and the player with the most points at the end wins. Lily gains 5 points two times, loses 12 points, and then gains 3 points. Rose loses 3 points two times, loses 1 point, gains 6 points, and then gains 7 points.

a. Write and evaluate an expression to find Lily's score.

_____

b. Write and evaluate an expression to find Rose's score.

_____

c. Who won the game?

_____

Write an expression from the description. Then evaluate the expression.

23. 8 less than the product of 5 and -4

_____

24. 9 more than the quotient of -36 and -4.

_____

25. Multistep Arleen has a gift card for a local lawn and garden store. She uses the gift card to rent a tiller for 4 days. It costs $35 per day to rent the tiller. She also buys a rake for $9.

a. Find the change to the value on her gift card.

_____

b. The original amount on the gift card was $200. Does Arleen have enough left on the card to buy a wheelbarrow for $50? Explain.

_____

_____

26. Carlos made up a game where, in a deck of cards, the red cards (hearts and diamonds) are negative and the black cards (spades and clubs) are positive. All face cards are worth 10 points, and number cards are worth their value.

a. Samantha has a king of hearts, a jack of diamonds, and a 3 of spades. Write an expression to find the value of her cards.

_____

b. Warren has a 7 of clubs, a 2 of spades, and a 7 of hearts. Write an expression to find the value of his cards.

_____

c. If the greater score wins, who won?

_____

d. If a player always gets three cards, describe two different ways to receive a score of 7.

_____

_____

H.O.T. **FOCUS ON HIGHER ORDER THINKING**

Work Area

27. Represent Real-World Problems Write a problem that the expression $3(-7) - 10 + 25 = -6$ could represent.

_____

_____

_____

28. Critique Reasoning Jim found the quotient of two integers and got a positive integer. He added another integer to the quotient and got a positive integer. His sister Kim says that all the integers Jim used to get this result must be positive. Do you agree? Explain.

_____

_____

_____

29. Persevere in Problem Solving Lisa is standing on a dock beside a lake. She drops a rock from her hand into the lake. After the rock hits the surface of the lake, the rock's distance from the lake's surface changes at a rate of -5 inches per second. If Lisa holds her hand 5 feet above the lake's surface, how far from Lisa's hand is the rock 4 seconds after it hits the surface?

_____

Ready to Go On?

2.1 Multiplying Integers

Find each product.

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

2. $(-5)(-7)$ _____

3. $(8)(-11)$ _____

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

5. The temperature dropped $3\,°C$ every hour for 5 hours.
Write an integer that represents the change in temperature. _____

2.2 Dividing Integers

Find each quotient.

6. $\dfrac{-63}{7}$ _____

7. $\dfrac{-15}{-3}$ _____

8. $0 \div (-15)$ _____

9. $96 \div (-12)$ _____

10. An elephant at the zoo lost 24 pounds over 6 months.
The elephant lost the same amount of weight each month.
Write an integer that represents the change in the elephant's
weight each month. _____

2.3 Applying Integer Operations

Evaluate each expression.

11. $(-4)(5) + 8$ _____

12. $(-3)(-6) - 7$ _____

13. $-27 \div 9 - 11$ _____

14. $\dfrac{-24}{-3} - (-2)$ _____

ESSENTIAL QUESTION

15. Write and solve a real-world problem that can be represented by the
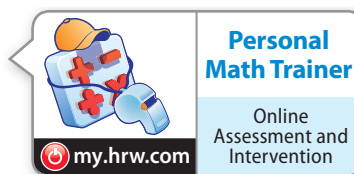expression $(-3)(5) + 10$.

_____

_____

_____

_____

Assessment Readiness

Selected Response

1. A diver is at an elevation of -18 feet relative to sea level. The diver descends to an undersea cave that is 4 times as far from the surface. What is the elevation of the cave?

- (A) -72 feet
- (B) -22 feet
- (C) -18 feet
- (D) -14 feet

2. The football team lost 4 yards on 2 plays in a row. Which of the following could represent the change in field position?

- (A) -12 yards
- (B) -8 yards
- (C) -6 yards
- (D) -2 yards

3. Clayton climbed down 50 meters. He climbed down in 10-meter intervals. In how many intervals did Clayton make his climb?

- (A) 5
- (B) 10
- (C) 40
- (D) 500

4. Which expression results in a negative answer?

- (A) a negative number divided by a negative number
- (B) a positive number divided by a negative number
- (C) a negative number multiplied by a negative number
- (D) a positive number multiplied by a positive number

5. Clara played a video game before she left the house to go on a walk. She started with 0 points, lost 6 points 3 times, won 4 points, and then lost 2 points. How many points did she have when she left the house to go on the walk?

- (A) -20
- (C) 12
- (B) -16
- (D) 20

6. Which expression is equal to 0?

- (A) $\frac{-24}{6} - 4$
- (B) $\frac{-24}{-6} + 4$
- (C) $\frac{24}{6} + 4$
- (D) $\frac{-24}{-6} - 4$

Mini-Task

7. Rochelle and Denae started with the same amount of money in their bank accounts. Rochelle made three withdrawals of $25 and then wrote a $100 check. Denae deposited $5 and then wrote a $200 check.

- **a.** Find the total change in the amount of money in Rochelle's account.

  _____

- **b.** Find the total change in the amount of money in Denae's account.

  _____

- **c.** Compare the amounts of money the two women have in their accounts now.

  _____

  _____

  _____