

## Objective

Divide integers.

## Common Core State Standards

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 $-(p / q)=(-p) / q=p /(-q)$. Interpret quotients of rational numbers by describing realworld contexts.

## The Number System

## Divide Integers II

To extend their understanding of integers to division of integers, students need to draw on their understanding of multiplication and division as inverse operations. Using the area-array model for multiplication will help students use the Algeblocks ${ }^{\circledR}$ Quadrant Mat effectively.

## Try lit! Perform the Try It! activity on the next page.

## Talk About lt

Discuss the Try It! activity.
■ Ask: What integer would represent a $\$ 14$ loss? Where should we place the 14 unit blocks?
■ Ask: What are the factors of 14 ?

- Ask: Where should we place the divisor of 2?
- Ask: What would the other factor, the quotient, be?


## Solve It

Reread the problem with the students. Help them represent the financial loss on their Algeblocks Quadrant Mats. Suggest that they make groups of two unit blocks, since there are two business partners. The number of groups represents the number of dollars each partner lost. Have students write a math sentence to represent the situation.

## More Ideas

For another way to teach about division of integers-
■ Challenge students to write a number sentence and represent it using the Algeblocks Quadrant Mat and Factor Track for each of the following situations:
a. a positive number divided by a positive number;
b. a positive number divided by a negative number;
c. a negative number divided by a positive number;
d. a negative number divided by a negative number.

## Formative Assessment

Have students try the following problem.
The water level in a swollen river falls 30 cm in 5 hours. What is the average change in its level each hour?
A. 15 cm per hour
B. 6 cm per hour
C. -15 cm per hour
D. -6 cm per hour

## Try |t. 15 minutes | Pairs

Here is a problem about dividing a negative integer.

Jessica and Taylor decided to start a dog-walking business for the summer. After paying for lessons in dog handling and some basic equipment, they began signing up customers. At the end of the summer, they added up the money they had earned, subtracted their expenses, and found that they had actually lost \$14! What is the financial outcome of this business venture for each of the two partners?

Introduce the problem. Then have students do the activity to solve the problem. Distribute the materials.


1. Have students represent on their Algeblocks Quadrant Mat the money lost in the business venture. Ask: What are the factors of 14? Ask: How many business partners were there? Have students place 2 unit blocks on the positive side of the horizontal bar of the Factor Track. Say: Now, arrange 14 unit blocks in Quadrant IV in a rectangle with 2 unit blocks on one side.

2. Have students write a number sentence to represent each partner's loss.

## Materials

- Algeblocks ${ }^{\circledR}$ units
- BLM 6
- Algeblocks Factor Track


2. Ask: How many groups of 2 do you have? Have students place 7 unit blocks on the negative part of the vertical bar of the Factor Track. Say: Now you have shown that each partner lost \$7.

## A Look Out!

Watch for students who are unsure of where to place the 14 unit blocks on the Quadrant Mat. Since the business partners lost \$14, the 14 blocks should go in either of the gray areas. (If students choose to put the blocks in Quadrant II, they should take care to place the two blocks, representing two partners, on the positive area of the Factor Track.) In this example, the 14 blocks were placed in the lower right and the other blocks were placed accordingly.

## Use Algeblocks unit blocks, a Quadrant Mat, and a Factor Track.

 Model each integer division sentence. Find each quotient.1. $15 \div(-3)=$ $\qquad$

2. $-20 \div(5)=$ $\qquad$


Using Algeblocks unit blocks, a Quadrant Mat, and a Factor Track, model each division sentence. Sketch the model. Find each quotient.
3. $-28 \div(-7)=$

4. $45 \div(5)=$


## Find each quotient.

5. $36 \div(-6)=$ $\qquad$ $-6$
6. $-18 \div 3=$ $\qquad$ -6 $-7$
7. $-35 \div 5=$ $\qquad$
8. $-24 \div(-4)=$ $\qquad$ 6
9. $-27 \div(-3)=$
10. $-49 \div 7=$ $\qquad$
11. $12 \div(-2)=$ $\qquad$ $-6$
12. $-5 \div(-5)=$ $\qquad$

## Answer Key

Challenge! How do the rules for adding and subtracting integers differ from the rules for multiplying and dividing integers?

> Challenge: (Sample) When adding or subtracting, the sum or difference depends on the magnitude of the numbers. A positive plus a negative can be either positive or negative. When mutliplying or dividing, the product or quotient of a negative and a positve will always be negative.
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## Use Algeblocks unit blocks, a Quadrant Mat, and a Factor Track. <br> Model each integer division sentence. Find each quotient.

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## Find each quotient.

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6. $-18 \div 3=$ $\qquad$ 8. $-49 \div 7=$ $\qquad$
7. $-35 \div 5=$ $\qquad$
8. $-24 \div(-4)=$ $\qquad$ 12. $-5 \div(-5)=$ $\qquad$
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Name

Challenge! How do the rules for adding and subtracting integers differ from the rules for multiplying and dividing integers?
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