

## Lesson 12: Division of Integers

In this lesson you will use the relationship between multiplication and division to discover the rules for dividing integers.

### Classwork

#### Exercise 1: Recalling the Relationship Between Multiplication and Division

Record your group's number sentences in the space on the left below.



**Example 1**

**Integers**

- List examples of division problems that produced a quotient that is a negative number.
- If the quotient is a negative number, what must be true about the signs of the dividend and divisor?
- List your examples of division problems that produced a quotient that is a positive number.
- If the quotient is a positive number, what must be true about the signs of the dividend and divisor?

[Type here]

Rules for Dividing Two Integers:

- A quotient is negative if the divisor and the dividend have \_\_\_\_\_ signs.
- A quotient is positive if the divisor and the dividend have \_\_\_\_\_ signs.

**Exercise 2: Is the Quotient of Two Integers Always an Integer**

Is the quotient of two integers always an integer? Use the work space below to create quotients of integers. Answer the question and use examples or a counterexample to support your claim.

Work Space:

Answer:

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[Type here]

**Exercise 3: Different Representation of the Same Quotient**

Are the answers to the three quotients below the same or different? Why or why not?

a.  $-14 \div 7$

b.  $14 \div (-7)$

c.  $-(14 \div 7)$

**Exercise 4 (2 minutes): Fact Fluency—Integer Division**

Hand-out provided by your teacher.

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### Lesson Summary

The rules for dividing integers are similar to the rules for multiplying integers (when the divisor is not zero). The quotient is positive if the divisor and dividend have the same signs, and negative if they have opposite signs.

The quotient of any two integers (with a non-zero divisor) will be a rational number. If  $p$  and  $q$  are integers, then.

$$-\left(\frac{p}{q}\right) = \frac{-p}{q} = \frac{p}{-q}.$$

### Problem Set

- Find the missing values in each column:

#### Column A

$$\begin{aligned} 48 \div 4 &= \\ -48 \div (-4) &= \\ -48 \div 4 &= \\ 48 \div (-4) &= \end{aligned}$$

#### Column B

$$\begin{aligned} 24 \div 4 &= \\ -24 \div (-4) &= \\ -24 \div 4 &= \\ 24 \div (-4) &= \end{aligned}$$

#### Column C

$$\begin{aligned} 63 \div 7 &= \\ -63 \div (-7) &= \\ -63 \div 7 &= \\ 63 \div (-7) &= \end{aligned}$$

#### Column D

$$\begin{aligned} 21 \div 7 &= \\ -21 \div (-7) &= \\ -21 \div 7 &= \\ 21 \div (-7) &= \end{aligned}$$

- Describe the pattern you see in each column's answers, relating it to the problems' divisors and dividends. Why is this so?
- Describe the pattern you see between the answers for Columns A and B. (For instance, compare the first answer in Column A to the first answer in Column B; compare the second answer in Column A to the second answer in Column B; etc.) Why is this so?
- Describe the pattern you see between the answers for Columns C and D. Why is this so?

[Type here]