1-6 Multiplying and Dividing Real Numbers

Vocabulary

Review

1. How is a *product* different from a *quotient*?

_____

_____

2. Circle the *product* of 12 and 4. Underline the *quotient* of 12 and 4.

3	8	16	48

Vocabulary Builder

reciprocal (noun) **rih SIP ruh kul**

Related Term: multiplicative inverse

Definition: Two numbers are **reciprocals** if their product is 1.

Main Idea: To write the **reciprocal** of a fraction, switch the numerator and denominator of the fraction.

Examples: $\frac{4}{5}$ and $\frac{5}{4}$, $-\frac{7}{8}$ and $-\frac{8}{7}$, 5 and $\frac{1}{5}$, $1\frac{1}{2}$ and $\frac{2}{3}$

reciprocals

$\frac{a}{b}$ and $\frac{b}{a}$, where $a \neq 0$ and $b \neq 0$

Use Your Vocabulary

3. Draw a line from each expression in Column A to its *reciprocal* in Column B.

Column A	Column B
$\frac{3}{4}$	2
$\frac{1}{2}$	$-\frac{3}{5}$
-2	$-\frac{1}{2}$
$1\frac{3}{4}$	$\frac{4}{3}$
$-\frac{5}{3}$	$\frac{4}{7}$

take note

Key Concept Multiplying and Dividing Real Numbers

The product or quotient of two real numbers with different signs is negative.

The product or quotient of two real numbers with the same sign is positive.

The quotient of 0 and any nonzero real number is 0.

The quotient of any real number and 0 is undefined.

4. Write *negative, positive, undefined,* or *zero* for each result.

$5(-9)$ _____ $-8(-2)$ _____ $0 \div 9$ _____ $9 \div 0$ _____

5. Write 4 or (-4) to make each equation true.

$6 \cdot$ ____ $= 24$ $6 \cdot$ ____ $= -24$ $24 \div$ ____ $= -6$ $24 \div$ ____ $= 6$

Problem 1 Multiplying Real Numbers

Got It? **What is each product?**

$6(-15)$ **$12(0.2)$** **$-\frac{7}{10}\left(\frac{3}{5}\right)$** **$(-4)^2$**

6. In $6(-15)$ and $-\frac{7}{10}\left(\frac{3}{5}\right)$, the signs of the numbers are the same / different.

So, the product of 6 and (-15) and the product of $-\frac{7}{10}$ and $\frac{3}{5}$ will be positive / negative.

7. Multiply.

$6(-15) =$ ____ $-\frac{7}{10}\left(\frac{3}{5}\right) =$ ____

8. In $12(0.2)$ and $(-4)(-4)$, the signs of the numbers are the same / different.

9. Multiply.

$12(0.2) =$ ____ $(-4)^2 = (-4)(-4) =$ ____

Problem 2 Simplifying Square Root Expressions

Got It? **What is the simplified form of $\sqrt{100}$?**

10. Circle the equation that uses the positive square root of 100.

$2 \cdot 50 = 100$ $4 \cdot 25 = 100$ $10 \cdot 10 = 100$

11. Will the simplified form of $\sqrt{100}$ be *positive* or *negative*? Explain.

_____

_____

12. The simplified form of $\sqrt{100}$ is ____.

Problem 3 Dividing Real Numbers

Got It? **You make five withdrawals of equal amounts from your bank account. The total amount you withdraw is $360. What is the change in your account balance each time you make a withdrawal?**

13. Complete the model.

Relate	total amount withdrawn	divided by	number of withdrawals	is	change in account balance each time
Write		÷	5	=	

14. The change in the account balance per withdrawal is −$.

take note

Property Inverse Property of Multiplication

For every nonzero real number a, there is a **multiplicative inverse** $\frac{1}{a}$ such that $a\left(\frac{1}{a}\right) = 1$.

The reciprocal of a nonzero number of the form $\frac{a}{b}$ is $\frac{b}{a}$. The product of a number and its reciprocal is 1, so the reciprocal of a number is its multiplicative inverse.

Dividing by a fraction is equivalent to multiplying by the reciprocal of the fraction. In general, $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c}$ for b, c, and $d \neq 0$.

Problem 4 Dividing Fractions

Got It? **What is the value of $\frac{3}{4} \div \left(-\frac{5}{2}\right)$?**

Underline the correct word to complete each sentence.

15. The expression shows multiplication / division .

16. To divide fractions, multiply the first / second fraction by the reciprocal of the first / second fraction.

17. Simplify the expression below.

$\frac{3}{4} \div \left(-\frac{5}{2}\right) = \frac{3}{4} \cdot \left(-\frac{\quad}{\quad}\right)$ Multiply by the reciprocal of $-\frac{5}{2}$.

$= -\frac{\quad}{20}$ Multiply.

$=$ Simplify.

Got It? Reasoning **Is $\frac{3}{4} \div \left(-\frac{5}{2}\right)$ equivalent to $-\left(\frac{3}{4} \div \frac{5}{2}\right)$? Explain.**

18. Dividing a number by $\frac{5}{2}$ is equivalent to multiplying the number by .

19. Simplify $-\left(\frac{3}{4} \div \frac{5}{2}\right)$.

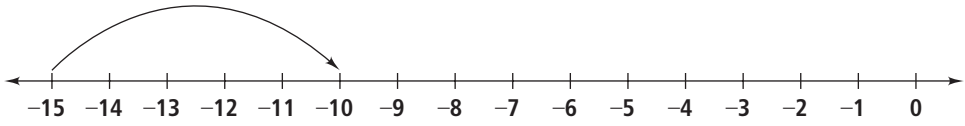
20. Is $\frac{3}{4} \div \left(-\frac{5}{2}\right)$ equivalent to $-\left(\frac{3}{4} \div \frac{5}{2}\right)$? Explain.

Lesson Check • Do you UNDERSTAND?

Reasoning **Use a number line to explain why $-15 \div 3 = -5$.**

21. In words, $-15 \div 3$ means dividing -15 into ____ equal groups.

22. To model $-15 \div 3$ on a number line, start at -15. Then use arrows to show three equal groups. The first equal group is shown.



23. What do the three arrows showing the equal groups represent?

24. Divide: $-15 \div 3 =$ ____.

Math Success

Check off the vocabulary words that you understand.

☐ Inverse Property of Multiplication ☐ multiplicative inverse ☐ reciprocal

Rate how well you can *multiply and divide real numbers.*

Need to review  Now I get it!