

2.6

Divide Real Numbers

Goal • Divide real numbers.

Your Notes

VOCABULARY

Multiplicative inverse The reciprocal of a nonzero number a , written $\frac{1}{a}$. $\frac{1}{a}$ is the multiplicative inverse of a .

INVERSE PROPERTY OF MULTIPLICATION

Words

The product of a nonzero number and its multiplicative inverse is 1.

Algebra

$$a \cdot \frac{1}{a} = \underline{1}, a \neq \underline{0}$$

Numbers

$$4 \cdot \frac{1}{4} = \underline{1}$$

Example 1 Find multiplicative inverses of numbers

Identify the multiplicative inverse and justify your answer.

Solution

Number	Multiplicative inverse	Reason
a. 9	$\frac{1}{9}$	$9 \cdot \frac{1}{9} = 1$
b. $-\frac{5}{6}$	$-\frac{6}{5}$	$-\frac{5}{6} \cdot \left(-\frac{6}{5}\right) = 1$

Your Notes

✓ **Checkpoint** Find the multiplicative inverse.

1. $-\frac{2}{3}$ $-\frac{3}{2}$	2. 3 $\frac{1}{3}$
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DIVISION RULE

Words

To divide a number a by a nonzero number b , multiply a by the multiplicative inverse of b .

Algebra

$$a \div b = a \cdot \frac{1}{b}, b \neq 0$$

Numbers

$$7 \div 3 = 7 \cdot \frac{1}{3}$$

You cannot divide a real number by 0, because 0 does not have a multiplicative inverse.

THE SIGN OF A QUOTIENT

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

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

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

Example 2 Divide real numbers

Find the quotient.

Solution

a. $25 \div 5 = 25 \cdot \frac{1}{5} = 5$

b. $-40 \div \frac{2}{3} = -40 \cdot \frac{3}{2} = -60$

Your Notes

✔ **Checkpoint** Find the quotient.

$$3. \frac{1}{2} \div \frac{3}{4}$$
$$\frac{2}{3}$$

$$4. 16 \div \left(-\frac{1}{4}\right)$$
$$-64$$

Example 3 Simplify an expression

Simplify the expression $\frac{48y - 32}{8}$.

Solution

$$\frac{48y - 32}{8} = (48y - 32) \div \underline{8} \quad \text{Rewrite fraction as division.}$$

$$= (48y - 32) \cdot \underline{\frac{1}{8}} \quad \text{Division rule}$$

$$= 48y \cdot \underline{\frac{1}{8}} - 32 \cdot \underline{\frac{1}{8}} \quad \text{Distributive property}$$

$$= \underline{6y - 4} \quad \text{Simplify.}$$

✔ **Checkpoint** Simplify the expression.

$$5. \frac{3a + 4}{2}$$
$$\frac{3}{2}a + 2$$

$$6. \frac{12x - 8}{4}$$
$$3x - 2$$

Homework