

PART I GET STARTED

Today's Mathematics

We will multiply and divide positive and negative rational numbers and interpret products and quotients.

Essential Question

How do sign rules and reciprocals help us multiply and divide rational numbers?

DO NOW

Use integer sign rules and simplify.

1. $(-7)(4)$
2. $(-36) \div (-6)$
3. Write the reciprocal of $-\frac{3}{5}$.
4. Evaluate $\frac{3}{4} \div \frac{1}{2}$.

SEE IT

Predict first. Then calculate to test the prediction.

1. What sign should $(-1.6)(2.5)$ have? Why?
2. What sign should $(-\frac{3}{4}) \div (-\frac{5}{8})$ have? Why?
3. Explain why dividing by $\frac{2}{3}$ is equivalent to multiplying by $\frac{3}{2}$.

QUICK WRITE | 2 MINUTES

State a sign rule for products and quotients that works for all rational numbers.

PART II INVESTIGATE

TRACK THE SIGNS AND MAGNITUDES

Complete the table. Write fractions in simplest form and describe the sign pattern.

Expression	Sign	Unsigned calculation	Result
$(-\frac{3}{5})(\frac{10}{9})$			
$(-1.4)(-2.5)$			
$(-\frac{7}{8}) \div (\frac{1}{4})$			
$2\frac{1}{3} \div (-\frac{7}{9})$			

THINK LIKE A MATHEMATICIAN

1. Why do two negative factors produce a positive product?
2. Why does multiplying by a reciprocal undo division?
3. How can estimation help catch a misplaced decimal in a product or quotient?

CREATE

Create a three-factor product whose value is negative and whose magnitude is 6. Show how you know.

PART III MAKE SENSE AND PRACTICE

WHAT WE CAN CONCLUDE

1. Like signs give a positive product or quotient; unlike signs give a negative result. 2. To divide by a nonzero fraction, multiply by its reciprocal. 3. Convert mixed numbers to improper fractions before multiplying or dividing. 4. Multiply and divide from left to right when the operations have equal priority.

WORKED MODEL

Evaluate $-2\frac{1}{4} \div \frac{3}{5}$. $-2\frac{1}{4} \div \frac{3}{5} = -\frac{9}{4} \times \frac{5}{3} = -\frac{45}{12} = -\frac{15}{4} = -3\frac{3}{4}$. Reasonableness: $-2.25 \div 0.6$ is a little greater than -4 , so -3.75 is reasonable.

FOCUSED PRACTICE

1. Evaluate $(-\frac{5}{6})(1\frac{4}{5})$.
2. Evaluate $-3.2 \div (-0.8)$.
3. A submarine changes depth by -2.75 meters per minute for 4.5 minutes. Find and interpret the total change.

MATH WRITE | 5 MINUTES

A student says that dividing always makes a number smaller. Explain why this is false and give two different counterexamples.

PART IV PUZZLE PRACTICE

Homework Name _____ Date _____

WHAT ADVICE DOES THE SIGN EXPERT GIVE?

Solve each problem. Match each result to the answer bank. Write its letter in the corresponding code box.

1. $(-3/4)(2/5)$
2. $(-1.2)(-3.5)$
3. $7/9 \div (-14/15)$
4. $-2 \frac{1}{2} \div 5/6$
5. $(-0.08)(25)$
6. $6.3 \div (-0.9)$
7. $(-5/12)(-18/5)$
8. $-4.8 \div (-1.6)$
9. $(-2/3)(3/5)(-5/4)$
10. $9/10 \div (-3/20)$
11. $(-1.5)(0.6)(-4)$
12. A loss of \$2.25 occurs each day for 6 days. Find the total change.

ANSWER BANK

C	-3/10	H	4.2	E	-5/6
C	-3	K	-2	T	-7
H	3/2	E	3	S	1/2
I	-6	G	3.6	N	-\$13.50

CODE BOXES

1	2	3	4	5	6
7	8	9	10	11	12