Dividing Integers and Rational Numbers

Explore ideas and representations

Name _____ **Date** _____ **Score** _____ / 10

QUICK REVIEW

Divide by a nonzero fraction by multiplying by its reciprocal. Equal signs give a positive quotient; different signs give a negative quotient. $(-3/4) \div (1/2) = (-3/4)(2) = -3/2$. Check quotient times divisor equals dividend.

Worked example

Evaluate $(-\frac{3}{2}) \div (\frac{1}{2})$. Show an exact fraction or integer.

1. Reciprocal of the divisor: $1/(\frac{1}{2}) = 2$.
2. $(-\frac{3}{2}) \div (\frac{1}{2}) = (-\frac{3}{2}) \times (2) = -3$.
3. Check: $(-3)(\frac{1}{2}) = -\frac{3}{2}$.
Answer: -3.

Practice Problems

Show your thinking.

1. Evaluate $(-\frac{7}{2}) \div (1)$. Show an exact fraction or integer.

2. Represent $(\frac{5}{3}) \div (-\frac{9}{4})$ as a signed-factor equation and find the value.

3. Find the missing number: $(-\frac{3}{2}) \div x = \frac{3}{2}$.

4. Find $(4) \div (-\frac{4}{3})$ and its opposite. Which is greater, or are they equal?

5. Evaluate $[(-1) \div (\frac{7}{4})] + (-1)$. Keep the intermediate result visible.

6. Predict whether $(1) \div (-3)$ is positive, negative, or zero. Then compute to justify the prediction.

7. A check for $(-4) \div (\frac{5}{3})$ uses the result $-\frac{12}{5}$. Write a numerical inverse-operation check.

8. Find $(3) \div (-\frac{3}{4})$, then write the number that must be added to that result to make 0.

9. Evaluate $[(-\frac{17}{5}) \div (\frac{11}{6})] + (-\frac{17}{5})$. Keep the intermediate result visible.

10. Reconstruct x from $x \div (-\frac{7}{12}) = -\frac{57}{14}$. Check by substitution.

Answer Key

1. $-\frac{7}{2}$.
2. $-\frac{20}{27}$.
3. $x = -1$.
4. -3 and 3; greater 3.
5. $-\frac{11}{7}$.
6. $-\frac{1}{3}$, negative.
7. $(-\frac{12}{5})(\frac{5}{3}) = -4$.
8. Result -4; add 4.
9. $-\frac{289}{55}$.
10. $x = \frac{19}{8}$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Reciprocal of the divisor: $1/(1) = 1$.
2. $(-\frac{7}{2}) \div (1) = (-\frac{7}{2}) \times (1) = -\frac{7}{2}$.
3. Check: $(-\frac{7}{2})(1) = -\frac{7}{2}$.

Problem 2

1. Reciprocal of the divisor: $1/(-\frac{9}{4}) = -\frac{4}{9}$.
2. $(\frac{5}{3}) \div (-\frac{9}{4}) = (\frac{5}{3}) \times (-\frac{4}{9}) = -\frac{20}{27}$.
3. Check: $(-\frac{20}{27})(-\frac{9}{4}) = \frac{5}{3}$.

Problem 3

1. The dividend is the divisor times the quotient. Divide the dividend by the quotient.
2. Reciprocal of the divisor: $1/(\frac{3}{2}) = \frac{2}{3}$.
3. $x = (-\frac{3}{2}) \div (\frac{3}{2}) = -1$.
4. Check in the original: $(-\frac{3}{2}) \div (-1) = \frac{3}{2}$.

Problem 4

1. Reciprocal of the divisor: $1/(-\frac{4}{3}) = -\frac{3}{4}$.
2. $(4) \div (-\frac{4}{3}) = (4) \times (-\frac{3}{4}) = -3$.
3. Check: $(-3)(-\frac{4}{3}) = 4$.
4. The opposite of -3 is 3; 3 is farther right on the number line.

Problem 5

1. Reciprocal of the divisor: $1/(\frac{7}{4}) = \frac{4}{7}$.
2. $(-1) \div (\frac{7}{4}) = (-1) \times (\frac{4}{7}) = -\frac{4}{7}$.
3. Check: $(-\frac{4}{7})(\frac{7}{4}) = -1$.
4. Now add (-1): $-\frac{4}{7} + (-1) = -\frac{11}{7}$.

Problem 6

1. The signs differ, so expect a negative value.
2. Reciprocal of the divisor: $1/(-3) = -\frac{1}{3}$.
3. $(1) \div (-3) = (1) \times (-\frac{1}{3}) = -\frac{1}{3}$.
4. Check: $(-\frac{1}{3})(-3) = 1$.

Problem 7

1. Reciprocal of the divisor: $1/(\frac{5}{3}) = \frac{3}{5}$.
2. $(-4) \div (\frac{5}{3}) = (-4) \times (\frac{3}{5}) = -\frac{12}{5}$.
3. Check: $(-\frac{12}{5})(\frac{5}{3}) = -4$.
4. Inverse check: $(-\frac{12}{5})(\frac{5}{3}) = -4$.

Problem 8

1. Reciprocal of the divisor: $1/(-\frac{3}{4}) = -\frac{4}{3}$.
2. $(3) \div (-\frac{3}{4}) = (3) \times (-\frac{4}{3}) = -4$.
3. Check: $(-4)(-\frac{3}{4}) = 3$.
4. $-4 + (4) = 0$, so the additive inverse is 4.

Problem 9

1. Reciprocal of the divisor: $1/(\frac{11}{6}) = \frac{6}{11}$.
2. $(-\frac{17}{5}) \div (\frac{11}{6}) = (-\frac{17}{5}) \times (\frac{6}{11}) = -\frac{102}{55}$.
3. Check: $(-\frac{102}{55})(\frac{11}{6}) = -\frac{17}{5}$.
4. Now add $(-\frac{17}{5})$: $-\frac{102}{55} + (-\frac{17}{5}) = -\frac{289}{55}$.

Problem 10

1. Multiply the quotient by the divisor.
2. The sign is nonnegative because the factors have the same sign or include zero.
3. $x = (-\frac{57}{14}) \times (-\frac{7}{12}) = \frac{19}{8}$.
4. Check in the original: $(\frac{19}{8}) \div (-\frac{7}{12}) = -\frac{57}{14}$.

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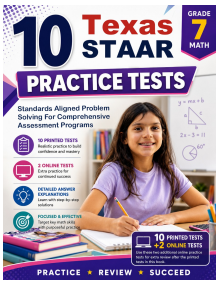

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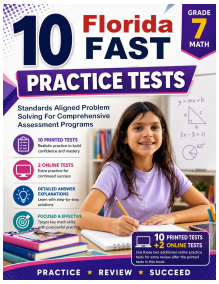

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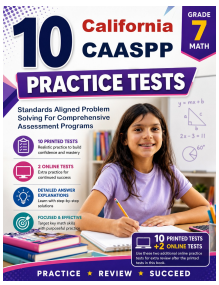

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