Dividing Integers and Rational Numbers

Spot mistakes, reason, and work backward

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. Morgan claims $(-\frac{7}{2}) \div (1) = \frac{7}{2}$. Locate the sign error and give the correct value.

2. For $(\frac{5}{3}) \div (-\frac{9}{4})$, a student adds magnitudes and writes $\frac{47}{12}$. Correct the operation as well as the value.

3. Reconstruct x from $x \div (-1) = \frac{3}{2}$. Check by substitution.

4. Test whether $((4) \div (-\frac{4}{3})) + (3) = 0$. Show the numerical cancellation.

5. Find $(-1) \div (\frac{7}{4})$. Is the result strictly between -1 and 1?

6. In $[(1) \div (-3)] - (1)$, a student skips the brackets and reports $-\frac{1}{3}$. Finish the missing subtraction.

7. Find x if $-x = (-4) \div (\frac{5}{3})$. Explain why the final sign must change.

8. Compare $2[(3) \div (-\frac{3}{4})]$ with $(3) \div (-\frac{3}{4})$. Find both and state their difference.

9. In $[(-\frac{17}{5}) \div (\frac{11}{6})] - (-\frac{17}{5})$, a student skips the brackets and reports $-\frac{102}{55}$. Finish the missing subtraction.

10. Find x if $-x = (\frac{19}{8}) \div (-\frac{7}{12})$. Explain why the final sign must change.

Answer Key

1. $-\frac{7}{2}$, not $\frac{7}{2}$.
2. $-\frac{20}{27}$.
3. $x = -\frac{3}{2}$.
4. Yes; the sum is 0.
5. $-\frac{4}{7}$; yes.
6. $-\frac{4}{3}$.
7. $x = \frac{12}{5}$.
8. -8 and -4; first minus second -4.
9. $\frac{17}{11}$.
10. $x = \frac{57}{14}$.

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: $(-\frac{7}{2})(1) = -\frac{7}{2}$.
4. The claim $\frac{7}{2}$ differs from the computed value $-\frac{7}{2}$, so its sign is not correct.

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. Multiply the quotient by the divisor.
2. The sign is negative because the factors have different signs.
3. $x = (\frac{3}{2}) \times (-1) = -\frac{3}{2}$.
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. $-3 + (3) = 0$.

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. Its magnitude is $\frac{4}{7} < 1$, so $-1 < -\frac{4}{7} < 1$.

Problem 6

1. Reciprocal of the divisor: $1/(-3) = -\frac{1}{3}$.
2. $(1) \div (-3) = (1) \times (-\frac{1}{3}) = -\frac{1}{3}$.
3. Check: $(-\frac{1}{3})(-3) = 1$.
4. The omitted step is $-\frac{1}{3} - (1) = -\frac{4}{3}$.

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. $-x = -\frac{12}{5}$ gives $x = \frac{12}{5}$; check $-(\frac{12}{5}) = -\frac{12}{5}$.

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. Double is $2(-4) = -8$; difference $-8 - (-4) = -4$.

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. The omitted step is $-\frac{102}{55} - (-\frac{17}{5}) = \frac{17}{11}$.

Problem 10

1. Reciprocal of the divisor: $1/(-\frac{7}{12}) = -\frac{12}{7}$.
2. $(\frac{19}{8}) \div (-\frac{7}{12}) = (\frac{19}{8}) \times (-\frac{12}{7}) = -\frac{57}{14}$.
3. Check: $(-\frac{57}{14})(-\frac{7}{12}) = \frac{19}{8}$.
4. $-x = -\frac{57}{14}$ gives $x = \frac{57}{14}$; check $-(\frac{57}{14}) = -\frac{57}{14}$.

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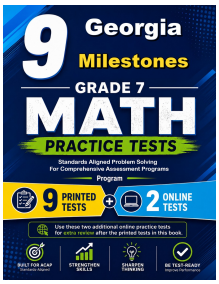

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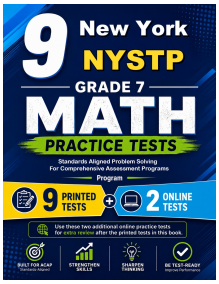

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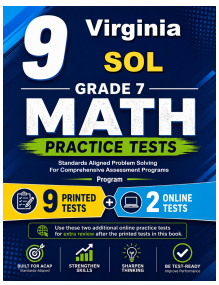

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