Dividing Fractions and Mixed Numbers

Name: _____	Date: _____	Score: _____ / 17

Dividing fractions sounds tricky, but here is the secret: every fraction division is just a multiplication in disguise! The rule *Keep · Change · Flip* turns the problem into one you already know how to solve—keep the first fraction, change $\div$ to $\times$, and flip the second fraction. After that, cross-cancel, multiply straight across, and simplify, exactly like the last topic. If mixed numbers appear, convert them to improper fractions first and use the sign rules to finish the job.

Key Concepts & Quick Review

Keep · Change · Flip (KCF): $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$ (multiply by the reciprocal)

Reciprocal of $\frac{c}{d}$: $\frac{d}{c}$ **Convert first:** $3\frac{1}{2} \div \frac{7}{4} = \frac{7}{2} \times \frac{4}{7} = 2$ **Sign rule:** same signs $\rightarrow +$; different signs $\rightarrow -$.

Examples

① Find $\frac{5}{8} \div \frac{3}{4}$.

Think It Through: Division by a fraction is easier if you use Keep, Change, Flip. Keep $\frac{5}{8}$, change division to multiplication, and flip the second fraction to $\frac{4}{3}$. Now the problem is $\frac{5}{8} \times \frac{4}{3}$. Before multiplying, cross-cancel the 8 and 4 by 4. That leaves $\frac{5}{2} \times \frac{1}{3} = \frac{5}{6}$. The important thing to remember is that only the second fraction gets flipped.

Answer: $\frac{5}{6}$

② A chef has $3\frac{1}{2}$ cups of flour. Each batch of muffins requires $\frac{3}{4}$ cup. How many complete batches can the chef make?

Think It Through: We are finding how many $\frac{3}{4}$-cup groups fit into $3\frac{1}{2}$ cups, so divide: $3\frac{1}{2} \div \frac{3}{4}$. First convert the mixed number: $3\frac{1}{2} = \frac{7}{2}$. Then use Keep, Change, Flip: $\frac{7}{2} \times \frac{4}{3} = \frac{28}{6} = \frac{14}{3} = 4\frac{2}{3}$. That is the math answer, but the question asks for complete batches, so the chef can make only 4 full batches. The extra $\frac{2}{3}$ of a batch is not enough for another full one.

Answer: 4 *complete batches*

Practice Problems

Divide using Keep · Change · Flip. Simplify each answer.

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

2. $\frac{2}{3} \div \frac{4}{9} =$ _____

3. $\frac{5}{6} \div \frac{5}{3} =$ _____

4. $\frac{7}{8} \div \frac{7}{4} =$ _____

5. $\frac{1}{2} \div \frac{3}{4} =$ _____

6. $\left(-\frac{3}{4}\right) \div \frac{1}{2} =$ _____

7. $\frac{5}{8} \div \left(-\frac{5}{4}\right) =$ _____

8. $\left(-\frac{2}{3}\right) \div \left(-\frac{4}{9}\right) =$ _____

9. $6 \div \frac{3}{4} =$ _____

10. $\frac{3}{5} \div 9 =$ _____

11. $2\frac{1}{3} \div \frac{7}{9} =$ _____

12. $1\frac{3}{4} \div \frac{7}{8} =$ _____

13. $3\frac{1}{3} \div 1\frac{2}{3} =$ _____

14. $2\frac{1}{2} \div 1\frac{1}{4} =$ _____

15. $\left(-2\frac{1}{4}\right) \div \frac{3}{4} =$ _____

Study Tips

- **Only** the second fraction (the divisor) gets flipped — never flip the first fraction.
- An integer divided by a fraction is usually *larger*: $6 \div \frac{3}{4} = 8$. This makes sense — there are 8 three-quarter pieces in 6.
- Verify your answer by multiplying: quotient $\times$ divisor $=$ dividend.

Word Problems

16. A ribbon that is $6\frac{3}{4}$ feet long must be cut into pieces that are each $\frac{3}{8}$ foot long. Write a division expression using improper fractions to find the number of pieces, and evaluate it. If the ribbon costs $\$4.80$ total, what is the cost per piece? _____

17. Two hikers are splitting a trail equally. The full trail is $5\frac{5}{6}\ mi$. Hiker A walks $-1\frac{2}{3}\ mi$ relative to the midpoint (meaning she hiked backward part of the way). If Hiker B covers $\frac{3}{4}$ of his assigned half of the trail, how many miles does Hiker B walk? Show all fraction conversions and simplifications. _____

Answer Keys

1) $\frac{3}{2}$
2) $\frac{3}{2}$
3) $\frac{1}{2}$
4) $\frac{1}{2}$
5) $\frac{2}{3}$
6) $-\frac{3}{2}$
7) $-\frac{1}{2}$
8) $\frac{3}{2}$
9) 8
10) $\frac{1}{15}$
11) 3
12) 2
13) 2
14) 2
15) -3
16) 18 pieces; about \$0.27 per piece
17) Each half: $\frac{35}{12}\ mi$; B walks $2\frac{3}{16}\ mi$

Step-by-Step Explanations

Strategy: For Dividing Fractions and Mixed Numbers, rewrite division as multiplication by the reciprocal, then simplify just like a multiplication problem. If the fraction-division result feels odd, compare it with a quick estimate.

Practice 1: $\frac{3}{4} \div \frac{1}{2} =$ **Answer:** $\frac{3}{2}$

In the first example, keep the first fraction, change division to multiplication, and use the reciprocal of the second fraction.

Practice 15: $\left(-2\frac{1}{4}\right) \div \frac{3}{4} =$ **Answer:** -3

Toward the end, keep the first fraction, change division to multiplication, and use the reciprocal of the second fraction.

Word-problem notes:

16. Answer: $\frac{27}{4} \div \frac{3}{8} = 18$ pieces; cost per piece $= \$0.267 \approx \$0.27$.

Start by converting the ribbon length: $6\frac{3}{4} = \frac{27}{4}$. Now divide by the piece length: $\frac{27}{4} \div \frac{3}{8}$. Use Keep, Change, Flip to get $\frac{27}{4} \times \frac{8}{3}$. Cross-cancel to make it easier: $27 \div 3 = 9$ and $8 \div 4 = 2$, so the answer is $9 \times 2 = 18$ pieces. For cost per piece, divide the total cost by the number of pieces: $\$4.80 \div 18 \approx \$0.266\ldots$, which rounds to about \$0.27 per piece. In money problems, rounding to the nearest cent matters.

17. Answer: Each half $= \frac{35}{12}\ mi$; B walks $\frac{3}{4} \times \frac{35}{12} = \frac{35}{16} = 2\frac{3}{16}\ mi$.

First split the whole trail equally: $5\frac{5}{6} = \frac{35}{6}$, and $\frac{35}{6} \div 2 = \frac{35}{12}$. So Hiker B's assigned half is $\frac{35}{12}$ miles. He walks $\frac{3}{4}$ of that half, so multiply: $\frac{3}{4} \times \frac{35}{12} = \frac{105}{48} = \frac{35}{16} = 2\frac{3}{16}\ mi$. Hiker A's backward movement is extra story information here; it does not change the amount Hiker B walks. This is a good reminder to focus on the exact quantity being asked for.

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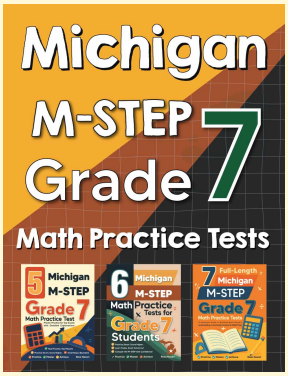

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