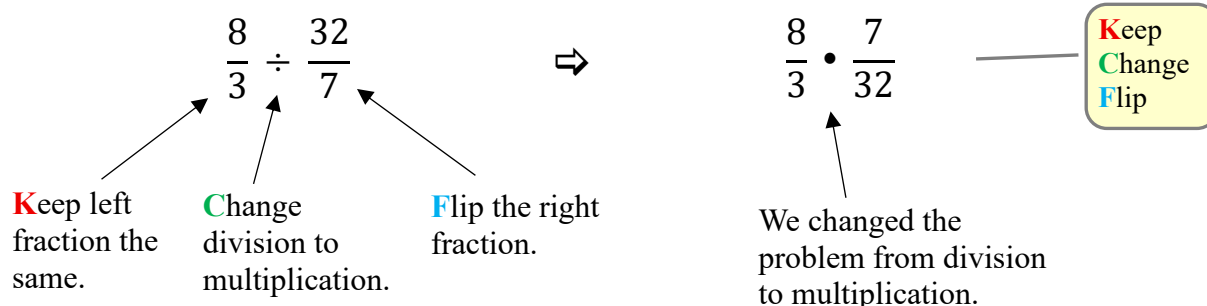


Divide Fractions

Fraction with Fraction

Example: Divide and simplify $\frac{8}{3} \div \frac{32}{7}$

STEP 1: The first step is to convert the division problem into a multiplication problem. We use the **Keep Change Flip** technique to do that.



STEP 2: Now we treat the problem as multiplication. As noted in the multiplication problem earlier, we have a choice in how we proceed. We can use either "Method 1 – Multiply Then Simplify" or "Method 2 – Simplify Then Multiply." Let's simplify first and then multiply. We connect the two fractions together. Then we find prime factorization for all composite numbers in the numerator and the denominator.

$$\frac{8}{3} \cdot \frac{7}{32} \Rightarrow \frac{2 \cdot 2 \cdot 2 \cdot 7}{3 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}$$

"Break down" composite numbers into prime numbers.

STEP 3: Next, we cancel common factors (2) between the numerator and denominator. Recall that the factors do not need to be directly over each other. Multiply the remaining factors straight across in the numerator and denominator for the simplified answer.

$$\frac{\overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{2}} \cdot \overset{1}{\cancel{2}} \cdot 7}{3 \cdot \underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{2}} \cdot \underset{1}{\cancel{2}}} \Rightarrow \text{Answer: } \frac{7}{12}$$

Cancel the common factor 2 to simplify. Multiply remaining factors across numerator and denominator.

Divide Fractions

Whole Number with Fraction

Example: Divide and simplify $21 \div \frac{3}{4}$

STEP 1: We convert the whole number into a fraction by putting a “1” below the 21. Now we are dividing a fraction with fraction, and we know how to solve those problems. Next, we perform **Keep Change Flip** to convert the division problem into a multiplication problem.

$$21 \div \frac{3}{4} \Rightarrow \frac{21}{1} \div \frac{3}{4} \Rightarrow \frac{21}{1} \cdot \frac{4}{3}$$

Put a **1** below the 21 to change it to a fraction. Then do **Keep Change Flip**.

STEP 2: We have a choice to use either “Method 1 – Multiply Then Simplify” or “Method 2 – Simplify Then Multiply.” This time let’s multiply then simplify (for practice). Multiply straight across, numerator with numerator and denominator with denominator.

$$\frac{21}{1} \cdot \frac{4}{3} \Rightarrow \frac{84}{3}$$

Multiply across numerator and denominator.

STEP 3: Simplify, if possible. Use your knowledge of *divisibility rules* to find a common factor that divides evenly into both numerator and denominator. We find that **3** divides into both 84 and 3. We divide numerator and denominator by **3** to get $\frac{28}{1}$. However, never leave a “1” in the denominator as the final answer because we can divide 28 by 1, which results in 28.

$$\frac{84}{3} \div 3 \Rightarrow \frac{28}{1} \Rightarrow \text{Answer: } 28$$

Divide by the common factor **3** to reduce. Or use *long division*.

Note: Another way to reduce is to first try *long division* with $\frac{84}{3}$. Divide the denominator (3) *into* the numerator (84) to see if the remainder is 0. It is 0 and therefore the quotient (28) is the answer. Since the numerator is very large, we can try dividing the denominator *into* the numerator to see if it works (remainder being 0). And it does.