Dividing Fractions

Example:

To divide a given fraction with another fraction (*called divisor fraction*), the given fraction is multiplied with the reciprocal of the divisor fraction (*the other fraction*). For example, let's start with whole numbers and divide 4 by 2.

$$4 \div 2 = \frac{4}{1} \div \frac{2}{1} = \frac{\cancel{4}^{2}}{1} \times \frac{1}{\cancel{2}_{1}} = \frac{2 \times 1}{1 \times 1} = \frac{2}{1} = 2$$

I know, I have over stretched the above problem, as 4 ÷ 2 = 2 is simple like a piece of pie. But, my goal here, is not to teach you grade 3 work, rather to take your skills to next level. I don't want you to wonder when your teacher, while explaining arithmetic, writes $4 \times \frac{1}{2} = 2$.
Now you know that $4 \div 2 = 4 \times \frac{1}{2}$ and they both are equal to 2.

Now let's move further to divide a whole number with a proper fraction and divide 9 by $\frac{3}{5}$ Also divide $\frac{3}{5}$ by 9.

$$9 \div \frac{3}{5} = \frac{\cancel{9}^{3}}{1} \times \frac{5}{\cancel{3}_{1}} = \frac{3 \times 5}{1} = \frac{15}{1} = 15$$

$$\frac{3}{5} \div 9 = \frac{\cancel{3}^{1}}{5} \times \frac{1}{\cancel{9}_{3}} = \frac{1 \times 1}{5 \times 3} = \frac{1}{15}$$

Next step is dividing a proper fraction by another proper fraction

Divide $\frac{6}{7}$ by $\frac{15}{21}$. Also divide $\frac{15}{21}$ by $\frac{6}{7}$.

$$\frac{6}{7} \div \frac{15}{21} = \frac{\cancel{6}^{2}}{\cancel{7}_{1}} \times \frac{\cancel{21}^{3}}{\cancel{15}_{5}} = \frac{2 \times 3}{1 \times 5} = \frac{6}{5} = 1\frac{1}{5}$$

$$\frac{15}{21} \div \frac{6}{7} = \frac{\cancel{15}^{5}}{\cancel{21}_{3}} \times \frac{\cancel{7}^{1}}{\cancel{6}_{2}} = \frac{5 \times 1}{3 \times 2} = \frac{5}{6}$$

Divide $\frac{5}{16}$ by $3\frac{1}{8}$

$$\frac{5}{16} \div 3\frac{1}{8} = \frac{5}{16} \div \frac{25}{8} = \frac{\cancel{5}^{1}}{\cancel{16}_{2}} \times \frac{\cancel{8}^{1}}{\cancel{25}_{5}} = \frac{1 \times 1}{2 \times 5} = \frac{1}{10}$$

Always, always convert "divide sign" into "multiply sign" by flipping the divisor fraction (fraction after the divide sign). Keep it this way in your mind that we never divide fractions and if you see a divide sign between two fractions, just convert it into multiply sign by flipping the divisor fraction.