Rational Expressions: Division

If $\frac{a}{b}$ and $\frac{c}{d}$ are rational numbers with $\frac{c}{d} \neq 0$, then $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c}$

When dividing two rational expressions, the quotient is obtained by multiplying the first rational expression by the reciprocal of the second rational expression.

$$\frac{15x^3}{4} \div \frac{5x^2}{8} = \frac{15x^3}{4} \cdot \frac{8}{5x^2} = \frac{3x}{1} \cdot \frac{2}{1} = 6x$$

$$\frac{1}{3-m} \div \frac{1}{2m-6} = \frac{1}{3-m} \cdot \frac{2m-6}{1} = \frac{1}{3-m} \cdot \frac{2(m-3)}{1} = \frac{2(m-3)}{3-m} = \frac{2(m-3)}{-1(m-3)} = \frac{2}{-1} = -2$$

$$\frac{x^2+6x+9}{18} \div \frac{(x+3)^2}{36} = \frac{x^2+6x+9}{18} \cdot \frac{36}{(x+3)^2} = \frac{(x+3)(x+3)}{18} \cdot \frac{36}{(x+3)(x+3)} = \frac{36}{18} = 2$$

Sometimes the division problem is given in the form of a complex fraction.	$\dfrac{\dfrac{x^2-36}{x^4}}{\dfrac{3x-18}{2x^3}}$	To solve this type of problem, think of the problem as the top fraction divided by the bottom fraction. Then rewrite the problem as the top fraction multiplied by the reciprocal of the bottom fraction and solve.	$\dfrac{x^2-36}{x^4} \div \dfrac{3x-18}{2x^3}$ $\dfrac{x^2-36}{x^4} \cdot \dfrac{2x^3}{3x-18}$
$\dfrac{x^2-36}{x^4} \cdot \dfrac{2x^3}{3x-18} = \dfrac{(x-6)(x-6)}{x^4} \cdot \dfrac{2x^3}{3(x-6)} = \dfrac{2(x-6)}{3x}$ or $\dfrac{2x-12}{3x}$			

TRY:

$$\frac{3x^2+3}{5} \div \frac{3x+3}{5}$$

$$10 \div \frac{a+b}{5}$$

$$\frac{2x^2-5x-12}{6+4x} \div \frac{x^2-16}{2}$$

$$\frac{\frac{4x-3}{x}}{\frac{20x-15}{2x^2}}$$