Simplifying Rational Expressions

A rational expression is a quotient of two polynomials. The polynomial in the denominator must not turn into zero.
Excluding Values / Placing Restriction: Values that make the expressions undefined

$\frac{a}{b}$	Excluding the following Value: $b = 0$, Restriction: $b \neq 0$

$\frac{a}{b} \div \frac{c}{d}$ $\quad b, c, d \neq 0$ $\quad$ Why can c not be zero?

Note:

- Reduce where possible
- Always factor first
- Check restrictions as soon as you factor (Restrictions always apply to original question.)

Example 1: Simplifying Rational Expressions

Simplify

a) $\frac{24x^3 + 6x^2 + 12x}{6x}$ $\quad$ b) $\frac{x}{2x^2 - 4x}$ $\quad$ c) $\frac{3 - 2x}{4x - 6}$

d) $\frac{x^2 + 3x - 10}{x^2 + 8x + 15}$ $\quad$ e) $\frac{2y^2 - y - 15}{4y^2 - 13y + 3}$