7.1 Simplifying Rational Expressions

STEPs:

1. Factor the numerator and denominator completely.
2. Simplify: cancel terms that appear in the numerator & denominator (matches)
   → Reduce fractions!

* Look for restrictions.
→ when terms with x cancel out
→ when x is in the denominator.

Ex) $\frac{36}{\frac{12x}{12}+\frac{24}{12}} = \frac{36^{\div 12}}{12^{\div 12}(x+2)} = \boxed{\frac{3}{(x+2)}}$

Restrictions: $x+2=0$
$\quad -2 \quad -2$
$x \neq -2$

* Set denominator $=0$ & solve.

x cannot equal -2 b/c can't divide by 0.

Ex) $\frac{x^2-5x-14}{x^2+4x+4} = \frac{(x-7)\cancel{(x+2)}}{(x+2)\cancel{(x+2)}} = \boxed{\frac{x-7}{x+2}}$ $\quad x \neq -2$

both restrictions but same value!

Ex) $\frac{x-2}{\frac{5x}{5}-\frac{10}{5}} = \frac{\cancel{(x-2)}}{5\cancel{(x-2)}} = \boxed{\frac{1}{5} \quad x \neq 2}$

$x-2=0$
$+2 \quad +2$
$x \neq 2$

ex) $\frac{4x-20}{4x} = \frac{4(x-5)}{4x} = \frac{(x-5)}{x}$ $x \neq 0$

Ex) $\frac{6x^2+x-2}{3x^2-10x-8}$

Numerator: $6x^2+x-2$

1	-12
4+-3 ✓	-3·4 ✓

$(6x^2+4x)(-3x-2)$

$2x(3x+2)-1(3x+2)$

Numerator: $(3x+2)(2x-1)$

Denominator: $3x^2-10x-8$

-10	-24
-12+2 ✓	-12·2 ✓

$(3x^2-12x)+(2x-8)$

$3x(x-4)2(x-4)$

Denominator: $(x-4)(3x+2)$

$\frac{(3x+2)(2x-1)}{(x-4)(3x+2)} = \frac{2x-1}{x-4}$

Restrictions: $3x+2=0$ $x-4=0$

$-2 \quad -2$ $\boxed{x \neq 4}$

$\frac{3x}{3} = \frac{-2}{3}$

$\boxed{x \neq -2/3}$