Lesson 4.1: Simplifying Rationals

Simplify.

$$\frac{42}{77} = \frac{\cancel{7}\cdot 6}{\cancel{7}\cdot 11} = \frac{6}{11}$$

$$* \quad \frac{36x^4}{16x^2} = \boxed{\frac{9x^2}{4}}$$

$\div 4x^2$

$\div 4x^2$

$$\frac{36\cdot x\cdot x\cdot \cancel{x\cdot x}}{16\cdot \cancel{x\cdot x}}$$

Simplify. State excluded values.

* $\frac{11x^4}{55x^5} \begin{matrix} \div 11 \\ \div 11 \end{matrix} = \frac{1x^4}{5x^5} \begin{matrix} \div x^4 \\ \div x^4 \end{matrix} = \boxed{\frac{1}{5x}}$

Excluded:

$55x^5 \neq 0$

$\sqrt[5]{x^5} \neq \sqrt[5]{0}$

$\boxed{x \neq 0}$

* $\frac{4x^2y^3}{42x^5y} \begin{matrix} \div 2 \\ = \\ \div 2 \end{matrix} \quad \frac{2x^2y^3}{21x^5y} \begin{matrix} \div x^2 \\ \div x^2 \end{matrix}$

$\frac{2y^3}{21x^3y} \begin{matrix} \div y \\ \div y \end{matrix} = \boxed{\frac{2y^2}{21x^3}}$

Excluded:

$42x^5y \neq 0$

$\boxed{\begin{matrix} x \neq 0 \\ y \neq 0 \end{matrix}}$

(2) $\frac{60x^3 \div 12}{12x \div 12} = \frac{5x^3}{1x} = \boxed{5x^2}$

$x \neq 0$

Simplify. State excluded values.

$$\frac{3x+6}{9x^2-36}$$

① Factor
② Excluded
③ Simplify

① $\frac{3(x+2)}{9(x^2-4)} = \frac{3(x+2)}{9(x+2)(x-2)}$

② $9(x+2)(x-2)=0$

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

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

③ $\frac{3\cancel{(x+2)}}{9\cancel{(x+2)}(x-2)} = \boxed{\frac{1}{3(x-2)}}$

Simplify. State excluded values.

① Factor

① $$\frac{3x^2+5x-2}{x^2-7x-18} = \frac{(3x-1)(x+2)}{(x-9)(x+2)}$$

② $(x-9)(x+2)=0$

$x-9 \neq 0$ $\quad$ $x+2 \neq 0$

$\boxed{x \neq 9}$ $\quad$ $\boxed{x \neq -2}$

③ $$\frac{(3x-1)\cancel{(x+2)}}{(x-9)\cancel{(x+2)}} = \boxed{\frac{3x-1}{x-9}}$$

Simplify. State excluded values.

1 $$\frac{2x^3 + 7x^2 + 6x}{4x^3 - 9x} = \frac{x(2x^2 + 7x + 6)}{x(4x^2 - 9)}$$

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

3 $$\boxed{\frac{x+2}{2x-3}}$$

2 $2x - 3 \neq 0$

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

$2x + 3 \neq 0$

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

$\boxed{x \neq 0}$

$$\frac{x+4}{x^2+6x+8} \longrightarrow \frac{\cancel{x+4}}{(x+2)\cancel{(x+4)}}$$

$$\boxed{\frac{1}{x+2}}$$

$x+2 \neq 0$

$\boxed{x \neq -2}$

$x+4 \neq 0$

$\boxed{x \neq -4}$

① $\dfrac{32(3)^2}{12(3)^3} = \dfrac{288}{324} = \dfrac{8}{9}$ ✓

$32x^{\cdot}$

Box 2: $\dfrac{32x^2}{12x^3}$ $\div 4x^2$ $\div 4x^2$ $= \boxed{\dfrac{8}{3x}}$

Box 3: $\dfrac{8}{3(3)} = \dfrac{8}{9}$ ✓

Box 4: $x \neq 0$