

1) Simplify:

a) You may use either method to simplify this. I will use Method 2 here:

$$\begin{aligned} \frac{\frac{1}{2} + \frac{1}{4}}{\frac{3}{4} - \frac{9}{8}} &= \frac{\binom{1}{2} \binom{8}{8} + \binom{1}{4} \binom{8}{8}}{\binom{3}{4} \binom{8}{8} - \binom{9}{8} \binom{8}{8}} \\ &= \frac{(1)(4) + (1)(2)}{(3)(2) - 9} \\ &= \frac{4 + 2}{6 - 9} = \frac{6}{-3} = -2 \end{aligned}$$

b) $(a^2b^{-3})^{-1} = (a^2)^{-1} \cdot (b^{-3})^{-1} = a^{-2}b^3 = \frac{b^3}{a^2}$

c) You may use either method for this. I will use Method 1:

$$\frac{\frac{x+5}{3x^2}}{\frac{2x+10}{9}} = \frac{x+5}{3x^2} \cdot \frac{9}{2x+10} = \frac{x+5}{3x^2} \cdot \frac{9}{2(x+5)} = \frac{1}{x^2} \cdot \frac{3}{2} = \frac{3}{2x^2}$$

2) Perform the indicated operation and reduce if possible.

a) $\frac{2x}{x+2} + \frac{4}{x+2} = \frac{2x+4}{x+2} = \frac{2(x+2)}{x+2} = 2$

b) $3 + \frac{2}{x+3} = \frac{3(x+3)}{x+3} + \frac{2}{x+3} = \frac{3x+9+2}{x+3} = \frac{3x+11}{x+3}$

c)

$$\begin{aligned} \frac{15}{n^2+n-6} - \frac{3}{n-2} &= \frac{15}{(n-2)(n+3)} - \frac{3}{n-2} \\ &= \frac{15}{(n-2)(n+3)} - \frac{3(n+3)}{(n-2)(n+3)} \\ &= \frac{15-3n-9}{(n-2)(n+3)} \\ &= \frac{6-3n}{(n-2)(n+3)} \\ &= \frac{3(2-n)}{(n-2)(n+3)} \\ &= \frac{3(-1)(n-2)}{(n-2)(n+3)} \\ &= \frac{-3}{n+3} = -\frac{3}{n+3} \end{aligned}$$

Solve each equation. Indicate your final answer **clearly**.

$$3) \frac{3}{4x} + \frac{5}{6} = \frac{4}{3x}$$

$$\left(\frac{3}{4x}\right)(12x) + \left(\frac{5}{6}\right)(12x) = \left(\frac{4}{3x}\right)(12x)$$

$$(3)(3) + (5)(2x) = (4)(4)$$

$$9 + 10x = 16$$

$$10x = 7$$

$$x = \frac{7}{10}$$

$$4) \frac{4}{x-2} + 2 = \frac{8}{x^2-2x}$$

$$\left(\frac{4}{x-2}\right)(x(x-2)) + 2x(x-2) = \left(\frac{8}{x(x-2)}\right)(x(x-2))$$

$$4x + 2x^2 - 4x = 8$$

$$2x^2 = 8$$

$$x^2 = 4$$

$$x = \pm\sqrt{4} = \pm 2 \text{ [the Square Root property]}$$

Substituting back into the original equation, $x = 2$ gives a 0 denominator, so there is one solution:

$$x = -2$$

Simplify completely. Write your answers with only natural number exponents.

$$5) (9r^{-3}c^{10})(4rc^{-8}) = 36r^{-2}c^2 = \frac{36c^2}{r^2}$$

$$6) \left(\frac{x^{-3}}{y^{-7}}\right)^{21} = \frac{(x^{-3})^{21}}{(y^{-7})^{21}} = \frac{x^{-63}}{y^{-147}} = \frac{y^{147}}{x^{63}}$$