

Review of Algebra

FUNdamentals

- adding, multiplying fractions
- Solving Skills
- Rules for exponents

EX Add: $\frac{3}{2} + \frac{5}{8}$

$$\frac{3}{2} + \frac{5}{8} \rightarrow \frac{12}{8} + \frac{5}{8}$$

$$\frac{3}{2} \cdot \frac{4}{4} + \frac{5}{8}$$

$$= \boxed{\frac{17}{8}}$$

$$\Rightarrow 2 + \frac{1}{8} = \boxed{2\frac{1}{8}}$$

$$\frac{16 + 1}{8} = \frac{16}{8} + \frac{1}{8}$$

EX Subtract

$$\frac{1}{5} - \frac{3}{7}$$

$$7.5 = 35$$

Common Denom

$$\frac{\textcircled{1} \textcircled{7}}{\textcircled{5} \textcircled{7}} - \frac{\textcircled{3} \textcircled{5}}{\textcircled{7} \textcircled{5}}$$

$$\frac{7}{35} - \frac{15}{35}$$

$$\frac{8}{35}$$

Ex add

$$2 + \frac{1}{8}$$

$$\frac{\textcircled{8} \textcircled{2}}{\textcircled{8} \textcircled{1}} + \frac{1}{8} = \frac{16}{8} + \frac{1}{8} = \boxed{\frac{17}{8}}$$

multiply:

$$\frac{2}{3} \cdot \frac{5}{2} = \frac{5 \cdot 2}{3 \cdot 2} = \frac{10}{6} = \frac{5}{3}$$

$$5\left(\frac{1}{4}\right) = \frac{5}{1} \cdot \frac{1}{4} = \boxed{\frac{5}{4}}$$

multiply

$$\frac{\cancel{2}}{\cancel{3}} \cdot \frac{\cancel{3}}{\cancel{2}} = \frac{2 \cdot 3}{3 \cdot 2} = \frac{6}{6} = 1, \quad \frac{4}{1} \cdot \frac{1}{4} = \frac{4}{4} = 1$$

Ex solve

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

$$3x + 1 = \underline{4x + 2} + \underline{2x} + \underline{2}$$

$$\begin{array}{rcl} 3x + 1 & = & 6x + 4 \\ -3x & -3x & \end{array} \rightarrow \frac{-3}{3} = \frac{3x}{3}$$

$$\begin{array}{rcl} 1 & = & 3x + 4 \\ -4 & -4 & \end{array}$$

$$-3 = 3x$$

$$-1 = x$$

Solve

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

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

$$\frac{2}{3}x = \frac{4}{3} - 1 \cdot \frac{3}{3}$$

$$\frac{2}{3}x = \frac{4}{3} - \frac{3}{3}$$

$$\frac{2}{3}x = \frac{1}{3}$$

$$\cancel{\frac{2}{3}}x = \frac{1}{\cancel{2} \cdot \frac{1}{3}}$$

$$x = \frac{1}{3} \cdot \frac{3}{2} = \frac{1}{2}$$

$$\left(\frac{3}{2} \cdot \frac{2}{3} \right) x = \frac{1}{\cancel{2}} \cdot \frac{\cancel{3}}{1}$$

$$1x = \frac{1}{2} \Rightarrow \boxed{x = \frac{1}{2}}$$

Ex Solve $\frac{3}{x+1} - \frac{2}{3} = 2$

$$\frac{3}{\underline{x+1}} - \frac{2}{\underline{3}} = \underline{2}$$

$$\left((x+1) \cdot 3 \right)$$

$$3(x+1)$$

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

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

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

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

$$9-2(x+1) = 6(x+1)$$

$$9-2x-2 = 6x+6$$

$$\underline{9 - 2x - 2} = 6x + 6$$

$$7 - 2x = 6x + 6$$
$$+ 2x \quad + 2x$$

$$\begin{array}{r} 7 \\ - 6 \end{array} = \begin{array}{r} 8x + 6 \\ - 6 \end{array}$$

$$\frac{1}{8} = \frac{\cancel{8}x}{\cancel{8}}$$


$$x = \frac{1}{8}$$

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

$$+ \frac{2}{3}$$

$$\frac{3}{3} \cdot 2 + \frac{2}{3} = \frac{6}{3} + \frac{2}{3}$$

$$\frac{8}{3}$$

$$\frac{3}{x+1} = \frac{8}{3} \rightarrow \frac{3(x+1)}{(x+1)} = \frac{8(x+1)}{3}$$

$$3 \cdot 3 = \cancel{3} \frac{8}{\cancel{3}} (x+1) \rightarrow 9 = 8x + 8$$

$$- 8 \quad - 8$$

$$9 - 8 = 8x + 11$$

$$\frac{1}{8} = \frac{8}{8} x \rightarrow \boxed{x = 1}$$

Rules for exponents

$$\textcircled{1} x^a x^b = x^{a+b}$$

$$\textcircled{4} (xy)^a = x^a y^a$$

$$\textcircled{2} \frac{x^a}{x^b} = x^{a-b}$$

$$\textcircled{5} x^{-a} = \frac{1}{x^a}$$

$$\textcircled{3} (x^a)^b = x^{a \cdot b}$$

$$\textcircled{6} \frac{1}{x^{-a}} = \frac{x^a}{1}$$

$$X^a X^b = X^{a+b}$$

$$X^2 X^3 = X^{2+3} = X^5$$

↓ ↓

$$\begin{array}{ccccccccc} X & \cdot & X & \cdot & X & & X & \cdot & X & = & X \\ 1 & 2 & 3 & & 4 & 5 & & & & & \end{array}$$

$$\frac{x^a}{x^b} = x^{a-b}$$

$$\frac{x^3}{x^2} = x^{3-2} = x^1 = x$$

$$\frac{x^3}{x^2} = \frac{\cancel{x} \cdot \cancel{x} \cdot x}{\cancel{x} \cdot \cancel{x}} = x$$

$$(X^a)^b = X^{a \cdot b}$$

$$(X^2)^3 = X^{2 \cdot 3} = X^6$$

$$(X^2)^3 = X^2 \cdot X^2 \cdot X^2 = \underset{1}{\cancel{X}} \cdot \underset{2}{\cancel{X}} (\underset{3}{\cancel{X}} \cdot \underset{4}{\cancel{X}}) (\underset{5}{\cancel{X}} \cdot \underset{6}{\cancel{X}}) = X^6$$

$$(xy)^a = x^a y^a$$

$$(xy)^4 = x^4 y^4$$

$$(xy^4) = (x^1 y^1)(x^1 y^1)(x^1 y^1)(x^1 y^1)$$

$$= \underbrace{x \cdot x \cdot x \cdot x}_{x^4} \cdot \underbrace{y \cdot y \cdot y \cdot y}_{y^4}$$

$$(x+y)^4 \neq x^4 + y^4$$

$$(xy)^4 = x^4 y^4$$

$$\frac{1}{x^a} = x^{-a}$$

$$\frac{1}{x^{-a}} = x^a$$

Simplify

$$\frac{x^2 y^3 x^{-2} z^4}{y^4 x^{-3} z^5}$$