

Rational Expression Operations

Name: _____

Date: _____

Question 1

Simplify

I. $\frac{8x^3}{5x} \cdot \frac{3}{4x}$

II. $\frac{3y^2z}{2} \cdot \frac{4}{yz^3}$

III. $\frac{x^2 - y^2}{4x + 4y} \cdot \frac{x + y}{x - y}$

Rational Expression Operations

IV. $\frac{x^2 - 6x + 5}{x + 6} \cdot \frac{x - 6}{x^2 + 36}$

V. $\frac{x^2 + 2x - 3}{x^2 + 4x - 5} \cdot \frac{x^2 + 3x - 10}{x^2 + 5x + 6}$

VI. $\frac{y^2 + 4y + 4}{(y - 1)^2} \cdot \frac{y^2 - 2y + 1}{(y + 2)^2}$

Rational Expression Operations

VII. $\frac{y}{4} \div \frac{5}{y}$

VIII. $\frac{4x-8}{x+2} \div \frac{x-2}{x^2-4}$

IX. $\frac{x^2-14x+49}{2x^2-3x-14} \div \frac{3x^2-20x-7}{x^2-6x-16}$

Rational Expression Operations

X. $\frac{3}{x} + \frac{5}{x}$

XI. $\frac{y}{12} + \frac{2y+5}{12}$

XII. $\frac{x^2 - 5x}{x^2 + 6x + 9} + \frac{4x - 12}{x^2 + 6x + 9}$

XIII. $\frac{9}{2y+3} - \frac{5}{2y+3}$

Rational Expression Operations

$$\text{XIV. } \frac{2x^2 + 3x}{x^2 - 7x + 12} - \frac{x^2 + 4x + 6}{x^2 - 7x + 12}$$

$$\text{XV. } \frac{3}{x^2} + \frac{4}{x}$$

$$\text{XVI. } \frac{3}{x+2} + \frac{7}{(x+2)^2}$$

$$\text{XVII. } \frac{x}{x-1} - \frac{x-1}{x}$$

Rational Expression Operations

XVIII. $\frac{x}{x^2+2x+1} + \frac{1}{x^2+5x+4}$

XIX. $\frac{7}{x^2+25x+24} - \frac{0}{x^2+15x+56}$

Rational Expression Operations

XX. $2 + \frac{1}{5-x}$

XXI. $\frac{5y}{4} + \frac{y-2}{-4}$

XXII. $\frac{x-5}{x^2-64} - \frac{5-x}{64-x^2}$

Rational Expression Operations

XXIII. $\frac{3y+2}{3y+6} + \frac{y}{4-y^2}$

XXIV. $\frac{\frac{2}{x^2y} + \frac{3}{xy^2}}{\frac{3}{xy^2} + \frac{2}{x^2y}}$

Rational Expression Operations

XXV.

$$\frac{\frac{z}{z^2 + 3z - 4} - \frac{1}{z^2 + 3z - 4}}{\frac{z}{z^2 + 6z + 8} + \frac{3}{z^2 + 6z + 8}}$$

XXVI.

$$\frac{y - 3 - \frac{2}{y}}{y - 4 - \frac{3}{y}}$$

Rational Expression Operations

XXVII. $\frac{x + x^{-1}}{x - x^{-1}}$

Rational Expression Operations

Question 2

Solve

I. $\frac{5}{8} - \frac{3}{5} = \frac{x}{10}$

II. $\frac{y}{6} - \frac{6}{y} = 0$

III. $\frac{x-4}{x+6} = \frac{1}{3}$

IV. $\frac{y+2}{5} - 1 = \frac{y-2}{4}$

Rational Expression Operations

$$V. \quad \frac{5}{y+1} + \frac{2y}{y^2-1} = \frac{1}{y+1}$$

Rational Expression Operations

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Question 1

Simplify

I. $\frac{8x^3}{5x} \cdot \frac{3}{4x}$

$$\frac{8x^3}{5x} \cdot \frac{3}{4x} \longrightarrow \frac{(8x^3)(3)}{(5x)(4x)} \longrightarrow \frac{24x^3}{20x^2} \longrightarrow \frac{2 \cdot 2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot x}{2 \cdot 2 \cdot 5 \cdot x \cdot x} \longrightarrow \frac{\cancel{2} \cdot \cancel{2} \cdot 2 \cdot 3 \cdot \cancel{x} \cdot \cancel{x} \cdot x}{\cancel{2} \cdot \cancel{2} \cdot 5 \cdot \cancel{x} \cdot \cancel{x}}$$

multiply prime factorization cancel

$$\downarrow$$

$$\frac{6x}{5}$$

II. $\frac{3y^2z}{2} \cdot \frac{4}{yz^3}$

$$\frac{3y^2z}{2} \cdot \frac{4}{yz^3} \longrightarrow \frac{(3y^2z)(4)}{(2)(yz^3)} \longrightarrow \frac{12y^2z}{2yz^3} \longrightarrow \frac{2 \cdot 2 \cdot 3 \cdot y \cdot y \cdot z}{2 \cdot y \cdot z \cdot z \cdot z} \longrightarrow \frac{\cancel{2} \cdot \cancel{2} \cdot 3 \cdot \cancel{y} \cdot y \cdot \cancel{z}}{\cancel{2} \cdot \cancel{y} \cdot \cancel{z} \cdot z \cdot z}$$

multiply prime factorization cancel

$$\downarrow$$

$$\frac{6y}{z^2}$$

III. $\frac{x^2 - y^2}{4x + 4y} \cdot \frac{x + y}{x - y}$

$$\frac{x^2 - y^2}{4x + 4y} \cdot \frac{x + y}{x - y} \longrightarrow \frac{(x^2 - y^2)(x + y)}{(4x + 4y)(x - y)} \longrightarrow \frac{(x - y)(x + y)(x + y)}{4(x + y)(x - y)} \longrightarrow \frac{\cancel{(x - y)} \cdot \cancel{(x + y)} \cdot (x + y)}{4 \cdot \cancel{(x + y)} \cdot \cancel{(x - y)}}$$

factor cancel

$$\downarrow$$

$$\frac{x + y}{4}$$

Rational Expression Operations

IV. $\frac{x^2 - 6x + 5}{x + 6} \cdot \frac{x - 6}{x^2 + 36}$

$$\frac{x^2 - 6x + 5}{x + 6} \cdot \frac{x - 6}{x^2 + 36} \longrightarrow \frac{(x^2 - 6x + 5)(x - 6)}{(x + 6)(x^2 + 36)} \longrightarrow \frac{(x - 5)(x - 1)(x - 6)}{(x + 6)(x^2 + 36)}$$

factor

V. $\frac{x^2 + 2x - 3}{x^2 + 4x - 5} \cdot \frac{x^2 + 3x - 10}{x^2 + 5x + 6}$

$$\frac{x^2 + 2x - 3}{x^2 + 4x - 5} \cdot \frac{x^2 + 3x - 10}{x^2 + 5x + 6} \longrightarrow \frac{(x^2 + 2x - 3)(x^2 + 3x - 10)}{(x^2 + 4x - 5)(x^2 + 5x + 6)} \longrightarrow \frac{(x - 1)(x + 3)(x - 2)(x + 5)}{(x - 1)(x + 5)(x + 2)(x + 3)}$$

factor

↓

$$\frac{x - 2}{x + 2} \longleftarrow \frac{\cancel{(x - 1)}\cancel{(x + 3)}(x - 2)\cancel{(x + 5)}}{\cancel{(x - 1)}\cancel{(x + 5)}(x + 2)\cancel{(x + 3)}}$$

cancel

VI. $\frac{y^2 + 4y + 4}{(y - 1)^2} \cdot \frac{y^2 - 2y + 1}{(y + 2)^2}$

$$\frac{y^2 + 4y + 4}{(y - 1)^2} \cdot \frac{y^2 - 2y + 1}{(y + 2)^2} \longrightarrow \frac{(y^2 + 4y + 4)(y^2 - 2y + 1)}{(y - 1)(y - 1)(y + 2)(y + 2)} \longrightarrow \frac{(y + 2)(y + 2)(y - 1)(y - 1)}{(y - 1)(y - 1)(y + 2)(y + 2)}$$

factor

↓

1

Rational Expression Operations

VII. $\frac{y}{4} \div \frac{5}{y}$

$$\frac{y}{4} \div \frac{5}{y} \longrightarrow \frac{y}{4} \cdot \frac{y}{5} \longrightarrow \frac{(y)(y)}{(4)(5)} \longrightarrow \frac{y^2}{20}$$

flip multiply

VIII. $\frac{4x-8}{x+2} \div \frac{x-2}{x^2-4}$

$$\frac{4x-8}{x+2} \div \frac{x-2}{x^2-4} \longrightarrow \frac{4(x-2)}{x+2} \div \frac{x-2}{(x-2)(x+2)} \longrightarrow \frac{4(x-2)}{x+2} \cdot \frac{(x-2)(x+2)}{x-2}$$

factor flip

$$4x-8 \longleftarrow 4(x-2) \longleftarrow \frac{4(x-2)(x-2)(x+2)}{(x+2)(x-2)} \longleftarrow \frac{4(x-2)(x-2)(x+2)}{(x+2)(x-2)}$$

distribute cancel

IX. $\frac{x^2-14x+49}{2x^2-3x-14} \div \frac{3x^2-20x-7}{x^2-6x-16}$

$$\frac{x^2-14x+49}{2x^2-3x-14} \div \frac{3x^2-20x-7}{x^2-6x-16} \longrightarrow \frac{(x-7)^2}{(x+2)(2x-7)} \div \frac{(x-7)(3x+1)}{(x+2)(x-8)}$$

factor

$$\frac{(x-7)(x-7)(x+2)(x-8)}{(x+2)(2x-7)(x-7)(3x+1)} \longleftarrow \frac{(x-7)^2}{(x+2)(2x-7)} \cdot \frac{(x+2)(x-8)}{(x-7)(3x+1)}$$

flip

$$\frac{(x-7)(x-7)(x+2)(x-8)}{(x+2)(2x-7)(x-7)(3x+1)} \longrightarrow \frac{(x-7)(x-8)}{(2x-7)(3x+1)}$$

cancel

Rational Expression Operations

X. $\frac{3}{x} + \frac{5}{x}$

$$\frac{3}{x} + \frac{5}{x} \longrightarrow \frac{8}{x}$$

add

XI. $\frac{y}{12} + \frac{2y+5}{12}$

$$\frac{y}{12} + \frac{2y+5}{12} \longrightarrow \frac{3y+5}{12}$$

add

XII. $\frac{x^2-5x}{x^2+6x+9} + \frac{4x-12}{x^2+6x+9}$

$$\frac{x^2-5x}{x^2+6x+9} + \frac{4x-12}{x^2+6x+9} \longrightarrow \frac{x^2-5x+4x-12}{x^2+6x+9} \longrightarrow \frac{x^2-x-12}{x^2+6x+9}$$

add

$$\downarrow$$
$$\frac{x-4}{x+3} \longleftarrow \frac{(x-4)\cancel{(x+3)}}{(x+3)\cancel{(x+3)}} \longleftarrow \frac{(x-4)(x+3)}{(x+3)(x+3)}$$

cancel factor

XIII. $\frac{9}{2y+3} - \frac{5}{2y+3}$

$$\frac{9}{2y+3} - \frac{5}{2y+3} \longrightarrow \frac{4}{2y+3}$$

subtract

Rational Expression Operations

XIV. $\frac{2x^2 + 3x}{x^2 - 7x + 12} - \frac{x^2 + 4x + 6}{x^2 - 7x + 12}$

$$\frac{2x^2 + 3x}{x^2 - 7x + 12} - \frac{x^2 + 4x + 6}{x^2 - 7x + 12} \longrightarrow \frac{(2x^2 + 3x) - (x^2 + 4x + 6)}{x^2 - 7x + 12} \longrightarrow \frac{(2x^2 + 3x) + (-x^2 - 4x - 6)}{x^2 - 7x + 12}$$

convert to opposite and add

$$\frac{x + 2}{x - 4} \longleftarrow \frac{\cancel{(x - 3)}(x + 2)}{(x - 4)\cancel{(x - 3)}} \longleftarrow \frac{(x - 3)(x + 2)}{(x - 4)(x - 3)} \longleftarrow \frac{1x^2 - 1x - 6}{x^2 - 7x + 12}$$

cancel

factor

add

XV. $\frac{3}{x^2} + \frac{4}{x}$

$$\frac{3}{x^2} + \frac{4}{x} \longrightarrow \frac{3}{x^2} + \frac{4}{x} \cdot \frac{x}{x} \longrightarrow \frac{3}{x^2} + \frac{4x}{x^2} \longrightarrow \frac{3 + 4x}{x^2}$$

LCD

multiply

XVI. $\frac{3}{x + 2} + \frac{7}{(x + 2)^2}$

$$\frac{3}{x + 2} + \frac{7}{(x + 2)^2} \longrightarrow \frac{x + 2}{x + 2} \cdot \frac{3}{x + 2} + \frac{7}{(x + 2)^2} \longrightarrow \frac{3x + 6}{(x + 2)^2} + \frac{7}{(x + 2)^2} \longrightarrow \frac{3x + 13}{(x + 2)^2}$$

LCD

multiply

add

XVII. $\frac{x}{x - 1} - \frac{x - 1}{x}$

$$\frac{x}{x - 1} - \frac{x - 1}{x} \longrightarrow \frac{x}{x} \cdot \frac{x}{x - 1} - \frac{x - 1}{x} \cdot \frac{x - 1}{x - 1} \longrightarrow \frac{x^2}{x(x - 1)} - \frac{(x - 1)^2}{x(x - 1)} \longrightarrow \frac{x^2}{x(x - 1)} - \frac{x^2 - 2x + 1}{x(x - 1)}$$

LCD

multiply

factor

$$\frac{2x - 1}{x(x - 1)} \longleftarrow \frac{(x^2) + (-x^2 + 2x - 1)}{x(x - 1)} \longleftarrow \frac{(x^2) - (x^2 - 2x + 1)}{x(x - 1)}$$

convert to opposite and add

Rational Expression Operations

XVIII. $\frac{x}{x^2+2x+1} + \frac{1}{x^2+5x+4}$

$$\frac{x}{x^2+2x+1} + \frac{1}{x^2+5x+4} \longrightarrow \frac{x}{(x+1)^2} + \frac{1}{(x+1)(x+4)}$$

factor



$$\frac{x+4}{x+4} \cdot \frac{x}{(x+1)^2} + \frac{1}{(x+1)(x+4)} \cdot \frac{x+1}{x+1}$$

LCD



$$\frac{x^2+4x}{(x+4)(x+1)^2} + \frac{x+1}{(x+4)(x+1)^2}$$

multiply



$$\frac{x^2+5x+1}{(x+4)(x+1)^2}$$

add

XIX. $\frac{7}{x^2+25x+24} - \frac{0}{x^2+15x+56}$

$$\frac{7}{x^2+25x+24} - \frac{0}{x^2+15x+56} \longrightarrow \frac{7}{x^2+25x+24} - 0 \longrightarrow \frac{7}{x^2+25x+24}$$



$$\frac{7}{(x+1)(x+24)}$$

factor

Rational Expression Operations

XX.

$$\begin{aligned}
 & 2 + \frac{1}{5-x} \\
 & 2 + \frac{1}{5-x} \longrightarrow \frac{2}{1} + \frac{1}{5-x} \longrightarrow \frac{5-x}{5-x} \cdot \frac{2}{1} + \frac{1}{5-x} \longrightarrow \frac{10-2x}{5-x} + \frac{1}{5-x} \\
 & \hspace{15em} \text{LCD} \hspace{15em} \text{multiply} \\
 & \hspace{15em} \downarrow \\
 & -\frac{2x-11}{5-x} \longleftarrow \frac{-2x+11}{5-x} \longleftarrow \frac{11-2x}{5-x} \longleftarrow \frac{10-2x+1}{5-x} \\
 & \hspace{10em} \text{factor} \hspace{10em} \text{descending order} \hspace{10em} \text{add}
 \end{aligned}$$

XXI.

$$\begin{aligned}
 & \frac{5y}{4} + \frac{y-2}{-4} \\
 & \frac{5y}{4} + \frac{y-2}{-4} \longrightarrow \frac{5y}{4} + \frac{y-2}{-4} \cdot \frac{-1}{-1} \longrightarrow \frac{5y}{4} + \frac{-y+2}{4} \longrightarrow \frac{5y-y+2}{4} \longrightarrow \frac{4y+2}{4} \\
 & \hspace{10em} \text{change to opposite} \hspace{10em} \text{add} \\
 & \hspace{15em} \downarrow \\
 & \frac{2y+1}{2} \\
 & \hspace{15em} \text{simplify}
 \end{aligned}$$

XXII.

$$\begin{aligned}
 & \frac{x-5}{x^2-64} - \frac{5-x}{64-x^2} \\
 & \frac{x-5}{x^2-64} - \frac{5-x}{64-x^2} \longrightarrow \frac{x-5}{x^2-64} - \frac{5-x}{64-x^2} \cdot \frac{-1}{-1} \longrightarrow \frac{x-5}{x^2-64} - \frac{-5+x}{x^2-64} \\
 & \hspace{10em} \text{change to opposite} \\
 & \hspace{15em} \downarrow \\
 & 0 \longleftarrow \frac{(x-5) + (5-x)}{x^2-64} \longleftarrow \frac{(x-5) - (-5+x)}{x^2-64} \\
 & \hspace{10em} \text{add} \hspace{10em} \text{convert to opposite and add}
 \end{aligned}$$

Rational Expression Operations

XXIII. $\frac{3y+2}{3y+6} + \frac{y}{4-y^2}$

$$\frac{3y+2}{3y+6} + \frac{y}{4-y^2} \longrightarrow \frac{3y+2}{3(y+2)} + \frac{y}{(2+y)(2-y)} \longrightarrow \frac{3y+2}{3(y+2)} + \frac{y}{(y+2)(2-y)}$$

factor associative/commutative

$$\frac{(2-y)(3y+2)}{3(y+2)(2-y)} + \frac{3y}{3(y+2)(2-y)} \longleftarrow \frac{2-y}{2-y} \cdot \frac{3y+2}{3(y+2)} + \frac{y}{(y+2)(2-y)} \cdot \frac{3}{3}$$

multiply LCD

$$\frac{-3y^2+4y+4}{3(y+2)(2-y)} + \frac{3y}{3(y+2)(2-y)} \longrightarrow \frac{-3y^2+4y+4+3y}{3(y+2)(2-y)}$$

FOIL

$$- \frac{3y^2-7y-4}{3(y+2)(2-y)} \longleftarrow \frac{-3y^2+7y+4}{3(y+2)(2-y)}$$

add factor

XXIV. $\frac{\frac{2}{x^2y} + \frac{3}{xy^2}}{\frac{3}{xy^2} + \frac{2}{x^2y}}$

$$\frac{\frac{2}{x^2y} + \frac{3}{xy^2}}{\frac{3}{xy^2} + \frac{2}{x^2y}} \longrightarrow \frac{\frac{2}{x^2y} + \frac{3}{xy^2}}{\frac{2}{x^2y} + \frac{3}{xy^2}} \longrightarrow 1$$

associative/commutative

Rational Expression Operations

XXV.

$$\frac{\frac{z}{z^2+3z-4} - \frac{1}{z^2+3z-4}}{\frac{z}{z^2+6z+8} + \frac{3}{z^2+6z+8}}$$

$$\begin{array}{ccc} \frac{z}{z^2+3z-4} - \frac{1}{z^2+3z-4} & \xrightarrow{\text{factor}} & \frac{z}{(z-1)(z+4)} - \frac{1}{(z-1)(z+4)} \\ \frac{z}{z^2+6z+8} + \frac{3}{z^2+6z+8} & & \frac{z}{(z+2)(z+4)} + \frac{3}{(z+2)(z+4)} \\ & \downarrow & \\ & \frac{z-1}{(z-1)(z+4)} & \text{add and subtract} \\ & \frac{z+3}{(z+2)(z+4)} & \\ \frac{z-1}{(z-1)(z+4)} \cdot \frac{(z+2)(z+4)}{z+3} & \longleftarrow & \end{array}$$

multiply the reciprocal

$$\begin{array}{ccccc} \frac{(z-1)(z+2)(z+4)}{(z-1)(z+4)(z+3)} & \longrightarrow & \frac{\cancel{(z-1)}(z+2)(z+4)}{\cancel{(z-1)}(z+4)(z+3)} & \longrightarrow & \frac{z+2}{z+3} \\ & & \text{cancel} & & \end{array}$$

multiply

XXVI.

$$\begin{array}{ccccccc} \frac{y-3-\frac{2}{y}}{y-4-\frac{3}{y}} & \longrightarrow & \frac{\frac{y^2-3y-2}{y}}{\frac{y^2-4y-3}{y}} & \longrightarrow & \frac{y^2-3y-2}{y} \cdot \frac{y}{y^2-4y-3} & \longrightarrow & \frac{(y^2-3y-2)(y)}{(y)(y^2-4y-3)} \\ & & \text{LCD} & & \text{multiply the reciprocal} & & \text{multiply} \\ & & & & & & \downarrow \\ & & & & \frac{y^2-3y-2}{y^2-4y-3} & \longleftarrow & \frac{(y^2-3y-2)(y)}{(y)(y^2-4y-3)} \\ & & & & & & \text{cancel} \end{array}$$

Rational Expression Operations

XXVII. $\frac{x + x^{-1}}{x - x^{-1}} \longrightarrow \frac{x + \frac{1}{x}}{x - \frac{1}{x}} \longrightarrow \frac{\frac{x^2}{x} + \frac{1}{x}}{\frac{x^2}{x} + \frac{1}{x}} \longrightarrow \frac{\frac{x^2 + 1}{x}}{\frac{x^2 - 1}{x}} \longrightarrow \frac{x^2 + 1}{x} \cdot \frac{x}{x^2 - 1}$

convert LCD add multiply the reciprocal

↓

$\frac{x^2 + 1}{(x + 1)(x - 1)} \longleftarrow \frac{x^2 + 1}{x^2 - 1} \longleftarrow \frac{(x^2 + 1)(\cancel{x})}{(\cancel{x})(x^2 - 1)} \longleftarrow \frac{(x^2 + 1)(x)}{(x)(x^2 - 1)}$

factor cancel multiply

Rational Expression Operations

Question 2

Solve

I. $\frac{5}{8} - \frac{3}{5} = \frac{x}{10}$

$$\frac{5}{8} - \frac{3}{5} = \frac{x}{10} \longrightarrow 10 \left(\frac{5}{8} - \frac{3}{5} \right) = x \longrightarrow \frac{1}{4} = x$$

multiply multiply

II. $\frac{y}{6} - \frac{6}{y} = 0$

$$\frac{y}{6} - \frac{6}{y} = 0 \longrightarrow (6y) \frac{y}{6} - \frac{6}{y} (6y) \longrightarrow y^2 - 36 = 0 \longrightarrow (y + 6)(y - 6) = 0$$

multiply LCD factor

true $y = -6$

true $y = 6$

check

←

$y + 6 = 0$

$y - 6 = 0$

III. $\frac{x-4}{x+6} = \frac{1}{3}$

$$\frac{x-4}{x+6} = \frac{1}{3} \longrightarrow (3)(x-4) = (1)(x+6) \longrightarrow 3x - 12 = x + 6 \longrightarrow 2x - 12 = 6 \longrightarrow 2x = 18$$

cross multiply combine like terms

$x = 9$

IV. $\frac{y+2}{5} - 1 = \frac{y-2}{4}$

$$\frac{y+2}{5} - 1 = \frac{y-2}{4} \longrightarrow \frac{y+2}{5} - \frac{5}{5} = \frac{y-2}{4} \longrightarrow \frac{y-3}{5} = \frac{y-2}{4} \longrightarrow (5)(y-2) = (y-3)(4)$$

LCD subtract cross multiply

$y = -2$

←

$y - 10 = -12$

←

$5y - 10 = 4y - 12$

combine like terms

Rational Expression Operations

$$V. \quad \frac{5}{y+1} + \frac{2y}{y^2-1} = \frac{1}{y+1}$$

$$\frac{5}{y+1} + \frac{2y}{y^2-1} = \frac{1}{y+1} \longrightarrow \frac{5}{y+1} + \frac{2y}{(y+1)(y-1)} = \frac{1}{y+1} \longrightarrow \frac{5y-5}{(y+1)(y-1)} + \frac{2y}{(y+1)(y-1)} = \frac{1}{y+1}$$

factor LCD

$$(y+1)(y-1) \cdot \frac{7y-5}{(y+1)(y-1)} = \frac{1}{y+1} \cdot (y+1)(y-1) \longleftarrow \frac{7y-5}{(y+1)(y-1)} = \frac{1}{y+1}$$

multiply LCD add

$$\cancel{(y+1)}\cancel{(y-1)} \cdot \frac{7y-5}{\cancel{(y+1)}\cancel{(y-1)}} = \frac{1}{\cancel{y+1}} \cdot \cancel{(y+1)}(y-1) \longrightarrow 7y-5 = y-1$$

cancel

$$y = 2/3 \longleftarrow y = 4/6 \longleftarrow 6y = 4 \longleftarrow 6y - 5 = -1$$

simplify combine like terms