

Rationals Review

$$7) \frac{56x^2y}{70x^3y^2} = \frac{\overset{8}{\cancel{56}^0} \cancel{x}^0 \cancel{x}^0 \cancel{y}^0}{10 \cancel{7}^0 \cancel{x}^0 \cancel{x}^0 \cancel{x}^0 \cancel{y}^0 \cancel{y}^0} = \frac{8}{10xy} = \frac{4}{5xy}$$

D: $x \neq 0, y \neq 0$

$$8) \frac{x^2-49}{x+7} = \frac{\begin{array}{r|l} x-7 & \\ \hline x^2 & -7x \\ +7x & -49 \\ \hline & -49 \end{array}}{x+7} = \frac{\cancel{(x+7)}(x-7)}{\cancel{x+7}} = x-7$$

D: $x \neq -7$

$$9) \frac{x+4}{x^2+8x+16} = \frac{x+4}{\begin{array}{r|l} x+4 & \\ \hline x^2 & 4x \\ +4x & 16 \\ \hline & 16 \end{array}} = \frac{\cancel{x+4}}{\cancel{(x+4)}(x+4)} = \frac{1}{x+4}$$

D: $x \neq -4$

$$7) \frac{x-3}{x^2-4} \cdot \frac{x+2}{x^2-6x+9} = \frac{x-3}{\begin{array}{r|l} x+2 & \\ \hline x^2 & 2x \\ -2x & -4 \\ \hline & -4 \end{array}} \cdot \frac{x+2}{\begin{array}{r|l} x-3 & \\ \hline x^2 & -3x \\ -3x & 9 \\ \hline & 9 \end{array}}$$

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

D: $x \neq -2, 2, -3, 3$

$$8) \frac{x+y}{x-1} \cdot \frac{x^2-2x+1}{x^2-y^2} = \frac{x+y}{x-1} \cdot \frac{\begin{array}{r|l} x-1 & \\ \hline x^2 & -1x \\ -1x & 1 \\ \hline & 1 \end{array}}{\begin{array}{r|l} x+y & \\ \hline x^2 & yx \\ -yx & -y^2 \\ \hline & -y^2 \end{array}}$$

$$= \frac{\cancel{x+y}}{\cancel{x-1}} \cdot \frac{\cancel{(x-1)}(x-1)}{\cancel{(x+y)}(x-y)} = \frac{(x-1)}{(x-y)}$$

D: $x \neq 1, x \neq y, x \neq -y$

9)

$$\frac{x \begin{array}{|c|c|} \hline 3x^2 & 4x \\ \hline \end{array} - 2 \begin{array}{|c|c|} \hline 6x & -8 \\ \hline \end{array}}{2x-1} \cdot \frac{x \begin{array}{|c|c|} \hline x^2 & 2x \\ \hline \end{array} - 2 \begin{array}{|c|c|} \hline -2x & -4 \\ \hline \end{array}}{3x+4} = \frac{(3x+4)(x-2)}{(2x-1)(x+2)} \cdot \frac{(x+2)(x-2)}{(3x+4)}$$

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

D: $x \neq -\frac{1}{3}, \frac{1}{2}, -2, 2$

10)

$$\frac{x^2+7x+12}{x-5} \cdot \frac{x^2+9x+18}{x^2-7x+10} = \frac{x^2+7x+12}{x-5} \cdot \frac{x^2-7x+10}{x^2+9x+18}$$

$$= \frac{x \begin{array}{|c|c|} \hline x^2 & 3x \\ \hline \end{array} + 4 \begin{array}{|c|c|} \hline 4x & 12 \\ \hline \end{array}}{x-5} \cdot \frac{x \begin{array}{|c|c|} \hline x^2 & -2x \\ \hline \end{array} - 5 \begin{array}{|c|c|} \hline 3x & 10 \\ \hline \end{array}}{x+3} = \frac{(x+3)(x+4)}{x-5} \cdot \frac{(x-5)(x-2)}{(x+3)(x+6)}$$

$$= \frac{(x-2)(x+4)}{x+6}$$

D: $x \neq 5, -3, -6$

11)

$$\frac{x+3}{2x-1} + \frac{x-1}{2x-1} = \frac{2x+2}{2x-1} \quad D: x \neq \frac{1}{2}$$

12)

$$\frac{2 \cdot 1 \cdot x}{2 \cdot 3x^2 \cdot x} + \frac{5 \cdot 3}{2x^3 \cdot 3} = \frac{2x+15}{6x^3} \quad D: x \neq 0$$

$$13) \frac{1}{x-3} + \frac{3}{x^2-27} = \frac{1}{x-3} \left(\frac{x^2+3x+9}{x^2+3x+9} \right) + \frac{3}{(x-3)(x^2+3x+9)}$$

$$= \frac{x^2+3x+9}{(x-3)(x^2+3x+9)} + \frac{3}{(x-3)(x^2+3x+9)} = \frac{x^2+3x+12}{(x-3)(x^2+3x+9)}$$

D: $x \neq 3$

$$14) \frac{x}{x^2-6x+9} + \frac{3}{2x^2-5x-3} = \frac{x}{x-3} + \frac{3}{2x+1}$$

x	x-3
x	x ² -3x
-3	-3x+9

x	2x+1
x	2x ² +1x
-3	-6x-3

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

D: $x \neq -\frac{1}{2}, 3$

$$15) \frac{2}{x^2-x-12} - \frac{4}{x^2+6x+9} = \frac{2}{x-4} - \frac{4}{x+3}$$

x	x-4
x	x ² -4x
+3	+3x-12

x	x+3
x	x ² +3x
+3	+3x+9

$$\frac{(x+3)2}{(x-4)(x+3)} - \frac{4}{(x+3)(x+3)} \left(\frac{x-4}{x-4} \right) = \frac{2x+6}{(x+3)^2(x-4)} - \frac{4x-16}{(x+3)^2(x-4)} = \frac{-2x+22}{(x+3)^2(x-4)}$$

D: $x \neq 4, -3$

$$16) \frac{x}{2x^2-3x-20} - \frac{1}{2x^2+7x+5} = \frac{x}{2x+5} - \frac{1}{2x+5}$$

x	2x+5
x	2x ² +5x
-4	-8x-20

x	2x+5
x	2x ² +5x
1	2x+5

$$= \frac{x}{(x-4)(2x+5)} - \frac{1}{(x+1)(2x+5)} \left(\frac{x-4}{x-4} \right) = \frac{x^2+x}{(x-4)(2x+5)(x+1)} - \frac{x-4}{(x+1)(2x+5)(x-4)} = \frac{x^2+4}{(x+1)(2x+5)(x-4)}$$

D: $x \neq -\frac{5}{2}, -1$

38) a) $\frac{x+3}{y+3}$ Doesn't simplify

b) $\frac{3-x}{3-y}$ Doesn't simplify

* c) $\frac{3x}{3y} = \frac{x}{y}$, $\frac{3}{3}$ cancels out (=1)

d) $\frac{x^3}{y^3} = \left(\frac{x}{y}\right)^3$ Can't simplify otherwise

* e) $\frac{n^3x}{n^3y} = \frac{x}{y}$, $\frac{n^3}{n^3}$ cancels out (=1)

3) Hoshi is wrong. You must factor in order to simplify. You cannot cancel addition or subtraction with division. Amiri is correct

22) $\frac{2n}{n-4} - \frac{2}{(n-4)^2} = \frac{4}{n+5}$

$$\frac{2n}{n-4} - \frac{2n-8}{n-4} = \frac{4}{n+5}$$

$$\frac{8}{(n-4)^2} = \frac{4}{(n+5)(n-4)}$$

$$\begin{array}{r} 8n + 40 = 4n - 16 \\ -4n \end{array}$$

$$\begin{array}{r} 4n + 40 = -16 \\ -4n \end{array}$$

$$\frac{4n}{4} = \frac{-56}{4} \rightarrow n = -14$$

$$23) \frac{3}{x^2+5x+6} - \frac{7}{x+3} = -\frac{x-1}{x+2}$$

$$\frac{3}{(x+2)(x+3)} - \frac{\cancel{(x+2)} 7}{\cancel{(x+2)}(x+3)} = -\frac{x-1}{x+2} \cdot \frac{(x+3)}{(x+3)}$$

$$\cancel{(x+2)(x+3)} \left(\frac{3}{(x+2)(x+3)} - \frac{7x+14}{(x+2)(x+3)} = -\frac{x^2+2x-3}{(x+2)(x+3)} \right) \cancel{(x+2)(x+3)}$$

$$3 - (7x+14) = -(x^2+2x-3)$$

$$\begin{array}{r} 3 - 7x - 14 = -x^2 - 2x + 3 \\ +x^2 + 2x \quad \quad \quad +x^2 + 2x - 3 \end{array}$$

$$x^2 - 5x - 14 = 0$$

$$(x-7)(x+2) = 0$$

$$x=7 \text{ or } \cancel{x=-2}$$

False solution because Domain doesn't include $x=-2$.

$$11) \cancel{a(a-2)} \left(\frac{4}{a} = \frac{3}{a-2} \right) \cdot \cancel{a(a-2)}$$

$$\begin{array}{r} 4a - 8 = 3a \\ -4a \quad \quad -4a \end{array}$$

$$\begin{array}{r} -8 = -a \\ -1 \quad \quad -1 \end{array}$$

$$\boxed{8=a}$$

$$12) \cancel{x(x)} \left(\frac{3}{x} = \frac{1}{x-2} \right) \cdot x(x-2)$$

$$\begin{array}{r} 3x - 6 = x \\ -3x \quad -3x \end{array}$$

$$\begin{array}{r} -6 = -2x \\ \underline{-2} \quad \underline{-2} \\ 3 = x \end{array}$$

$$13) \cancel{x(x)} \left(\frac{x-3}{x} = \frac{x-3}{x-6} \right) \cdot x(x-6)$$

$$\begin{array}{r} x^2 - 6x - 3x + 18 = x^2 - 3x \\ -x^2 \quad \quad \quad -x^2 \end{array}$$

$$\begin{array}{r} -9x + 18 = -3x \\ +9x \quad \quad +9x \end{array}$$

$$\begin{array}{r} 18 = 6x \\ \underline{6} \quad \underline{6} \\ 3 = x \end{array}$$