

Simplifying Rational Expressions and Solving Rational Equations Test *Review*

Simplify the rational expression. State any restrictions on the variable.

$$1. \frac{k^2 - k - 2}{k^2 - 4k - 5} = \frac{(k-2)(k+1)}{(k-5)(k+1)} = \frac{k-2}{k-5}$$

$\begin{array}{r|l} -2 & -1 \\ \hline & \end{array}$ 
 $\begin{array}{r|l} -5 & -4 \\ \hline & \end{array}$

$k \neq 5, -1$

$$2. \frac{n^4 - 10n^2 + 24}{n^4 - 9n^2 + 18} = \frac{(n^2-6)(n^2-4)}{(n^2-6)(n^2-3)} = \frac{n^2-4}{n^2-3}$$

$\begin{array}{r|l} 24 & -10 \\ \hline & \end{array}$ 
 $\begin{array}{r|l} 18 & -9 \\ \hline & \end{array}$

$n^2 - 6 = 0$   
 $n^2 = 6$   
 $n \neq \pm\sqrt{6}, \pm\sqrt{3}$

What is the product in simplest form? State any restrictions on the variable.

$$3. \frac{\cancel{3g^3} \cdot \cancel{h^3}}{\cancel{10h^2} \cdot \cancel{10g^2}} = \frac{3g^3 h^3}{100}$$

$$\begin{matrix} g \neq 0 \\ h \neq 0 \end{matrix}$$

$$4. \frac{y^2}{y-3} \cdot \frac{y^2 - y - 6}{y^2 + 1y} = \frac{\cancel{y^2} \cdot y}{\cancel{y-3}} \cdot \frac{(\cancel{y-3})(y+2)}{\cancel{y}(y+1)}$$

$$\begin{matrix} y \neq 0, 3, -1 \\ \frac{y(y+2)}{y+1} \end{matrix}$$

What is the quotient in simplified form? State any restrictions on the variable.

5.  $\frac{a+2}{a-5} \div \frac{a+1}{a^2-8a+15}$

$a \neq 5, 3, -1$

$$\frac{a+2}{a-5} \div \frac{a+1}{(a-5)(a-3)}$$

$$\frac{a+2}{a-5} \cdot \frac{(a-5)(a-3)}{a+1}$$

$$\frac{(a+2)(a-3)}{a+1}$$

6. Find the least common multiple of  $x^2 - 7x + 6$  and  $x^2 + 3x - 4$ .

$$(x-6)(x-1) \quad (x+4)(x-1)$$

$$LCM = (x-1)(x+4)(x-6)$$

Simplify the sum. ~~cancel~~ only factor denominator

$$7. \frac{a^2 + 7a + 10}{a^2 + 2a - 15} + \frac{10}{a - 3} \quad (a+5)$$

$$\frac{a^2 + 7a + 10}{(a+5)(a-3)} + \frac{10a + 50}{(a+5)(a-3)}$$

$$\frac{a^2 + 17a + 60}{(a+5)(a-3)}$$

$$\begin{array}{r|l} 60 & 17 \\ \hline 5(12) & 5+12 \end{array}$$

$$\frac{\cancel{(a+5)}(a+12)}{\cancel{(a+5)}(a-3)} = \frac{a+12}{a-3}$$

$$a \neq -5, 3$$

Simplify the difference.

$$8. \frac{n^2 - 10n + 24}{n^2 - 13n + 42} - \frac{9}{n-7} \quad (n \neq 6)$$

$$\frac{n^2 - 10n + 24}{(n-7)(n-6)} - \frac{9n - 54}{(n-7)(n-6)}$$

$$\frac{n^2 - 19n + 78}{(n-7)(n-6)} = \frac{\cancel{(n-6)}(n-13)}{(n-7)\cancel{(n-6)}}$$

$$\begin{array}{r|l} 78 & -19 \\ \hline & -6-13 \end{array}$$

$$\boxed{n \neq 7, 6}$$

$$\frac{n-13}{n-7}$$

Solve the equation. Check the solution.

9.  $\frac{c+3}{c-8} = \frac{c-4}{c+5}$

$$(c+3)(c+5) = (c-8)(c-4)$$

$$\cancel{c^2} + 8c + 15 = \cancel{c^2} - 12c + 32$$

$$2c - 17 = -12c + 32$$

10.  $\frac{4}{a} + \frac{5}{3a} = 3$  ( $3a$ )

$$\frac{20c - 17}{20}$$

$$c = \frac{17}{20}$$

$$LCD = 3a$$

$$12 + 5 = 9a$$

$$\frac{17}{9} = \frac{9a}{9}$$

$$\frac{17}{9} = a$$