

Review Key

Simplify. State all excluded values. Show all work to receive credit.

$$1) \frac{2x^2+15x-27}{81-x^2}$$

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

$$\frac{2x-3}{9-x} = -\frac{2x-3}{x-9} \quad x \neq 9, -9$$

$$2) \frac{n+9}{n-1} \cdot \frac{3n-12}{n^2+5n-36}$$

$$\frac{(n+9)}{(n-1)} \cdot \frac{3(n-4)}{(n+9)(n-4)} = \frac{3}{n-1}$$

$$\boxed{\frac{3}{n-1}} \\ n \neq 1, -9, 4$$

$$3) \frac{3n^3-12n^2}{3n^2} \div \frac{n-4}{n+5}$$

$$\frac{3n^2(n-4)}{3n^2} \cdot \frac{(n+5)}{(n-4)} = \frac{n+5}{1}$$

$$\boxed{n+5} \\ n \neq 0, 4, -5$$

$$4) \frac{\frac{5}{x-1}}{\frac{10x}{x^2-1}}$$

$$\frac{5}{x-1} \div \frac{10x}{x^2-1} = \frac{5}{x-1} \cdot \frac{x^2-1}{10x}$$

$$= \frac{5}{(x-1)} \cdot \frac{(x+1)(x-1)}{2 \cdot 5x} = \frac{x+1}{2x}$$

$$\boxed{\frac{x+1}{2x}} \\ x \neq 1, 0, -1$$

$$5) \frac{a}{a^3-a^2} + \frac{3}{a} = \frac{a}{a^2(a-1)} + \frac{3}{a} \cdot \frac{a(a-1)}{a(a-1)} \quad \left(\frac{12t-6}{12t} \cdot \frac{4t}{4t} - \frac{t+4}{48t^2} = \frac{12t^2-72t}{48t^2} - \frac{t+4}{48t^2} \right)$$

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

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

$$\boxed{\frac{3a-2}{a(a-1)}} \\ a \neq 0, 1$$

$$= \frac{12t^2-72t-(t+4)}{48t^2}$$

$$= \frac{12t^2-73t-4}{48t^2} \quad t \neq 0$$

$$\boxed{\frac{12t^2-73t-4}{48t^2}} \quad t \neq 0$$

$$7) \frac{3x}{x^2-x-6} - \frac{x^2+x-6}{x^2-x-6} \div \frac{x^2+5x+6}{x^2+4x+4}$$

order of operations

$$\frac{3x}{x^2-x-6} - \left(\frac{x^2+x-6}{x^2-x-6} \cdot \frac{x^2+4x+4}{x^2+5x+6} \right) = \frac{3x}{(x-3)(x+2)} - \left(\frac{(x+3)(x-2)}{(x-3)(x+2)} \cdot \frac{(x+2)(x+2)}{(x+2)(x+3)} \right)$$

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

$$= \frac{3x-x^2+4}{(x-3)(x+2)} = \frac{-x^2+3x+4}{(x-3)(x+2)} \quad x \neq 3, -2, -3$$

$$\boxed{\frac{-x^2+3x+4}{(x-3)(x+2)}} \quad x \neq 3, -2, -3$$

→ makes denominator = 0

Solve each rational equation. Remember to check for extraneous solutions. Show all work to receive credit.

8) $\frac{3}{3} \frac{2r+4}{4r} = \frac{5}{12r}$

$$\frac{6r+12}{12r} = \frac{5}{12r} \rightarrow \frac{6r+12}{12r} = \frac{5}{12r}$$

$$\frac{6r}{6} = \frac{-7}{6} \rightarrow \boxed{r = -\frac{7}{6}}$$

9) $\frac{3}{x^2+6x+8} + \frac{x+1}{x+2} \cdot \frac{1}{x+2} \cdot \frac{x+4}{x+4}$

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

$$\rightarrow 3 + x^2 + 5x + 4 = x + 4$$

$$x^2 + 5x + 7 = x + 4$$

$$\frac{-x \quad -4 \quad -x \quad -4}{x^2 + 4x + 3 = 0}$$

$$(x+3)(x+1) = 0$$

$$x+3 = 0 \quad x+1 = 0$$

$$\boxed{x = -3} \quad \boxed{x = -1}$$

10) Tell how you know a number is an excluded value and why it is excluded.

A number is excluded if it makes a denominator equal 0. To find an excluded value, set the denominator equal to 0 and solve.

11) The length of a rectangle can be represented by the expression $\frac{x^3}{(x+1)^2}$. If the area of the

rectangle is $\frac{x^4-2x^3}{7x^2+14x+7}$, what is the expression for the width of the rectangle? $A = L \times W$

$$\frac{x^4-2x^3}{7x^2+14x+7} = \frac{x^3}{(x+1)^2} \cdot w \rightarrow w = \frac{x^4-2x^3}{7x^2+14x+7} \div \frac{x^3}{(x+1)^2}$$

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

$x \neq -1, 0$