

Solve for x.

$$\frac{2}{x^2-x} = \frac{1}{x-1}$$
 cross-multiply  

$$2(x-1) = (x^2-x) \cdot 1$$
 (no fractions)  

$$2x-2 = x^2-x$$
 Various powers of x → ① get it equal to zero  

$$-x^2+2x-2 = -2x+2$$
 ② factor  

$$0 = x^2 - 3x + 2$$
 TRI  

$$0 = (x-1)(x-2)$$
  

$$x-1=0 \quad x-2=0$$
  

$$x=1 \quad x=2$$
 extraneous →  $x=1$  ✓  $x=2$  ✓  

$$\frac{2}{x^2-x} = \frac{1}{x-1} \rightarrow \frac{2}{(1)^2-1} = \frac{1}{1-1}$$
  $\frac{2}{0} = \frac{1}{0}$   

$$\frac{2}{(2)^2-2} = \frac{1}{2-1}$$
  $\frac{2}{2} = \frac{1}{1}$  ✓

Must check solutions:

- cannot have zero in denominator (extraneous solution)
- left side = right side

Solve for x.

$$\frac{15x}{3x-6} = \frac{10}{x-2}$$
  

$$10(3x-6) = 15x(x-2)$$
  

$$30x - 60 = 15x^2 - 30x$$
  

$$-30x + 60 \quad \downarrow \quad -30x + 60$$
  

$$0 = 15x^2 - 60x + 60$$
  

$$0 = 15(x^2 - 4x + 4)$$
  

$$0 = 15(x-2)(x-2)$$
  

$$x-2=0 \quad x-2=0$$
  

$$x=2$$
 extraneous No Solutions  

$$\frac{15x}{3x-6} = \frac{10}{x-2} \rightarrow \frac{15(2)}{3(2)-6} = \frac{10}{2-2}$$
  

$$\frac{30}{0} = \frac{10}{0}$$

$$\frac{?}{?} = \frac{?}{?}$$
  
 allowed to cross-multiply

Solve for x.

$$\frac{4x+1}{x+1} = \frac{12}{x^2-1} + 3 \cdot \frac{x^2-1}{x^2-1}$$
 not allowed to cross multiply  
 Combine terms (common denominator)  

$$\frac{4x+1}{x+1} = \frac{12}{x^2-1} + \frac{3x^2-3}{x^2-1}$$
  

$$\frac{4x+1}{x+1} = \frac{3x^2+9}{x^2-1}$$
 cross multiply  

$$(4x+1)(x^2-1) = (3x^2+9)(x+1)$$
  

$$4x^3 - 4x + x^2 - 1 = 3x^3 + 3x^2 + 9x + 9$$
  

$$-3x^3 - 9x - 3x^2 - 9 - 3x^3 - 3x^2 - 9x + 9$$
  

$$x^3 - 2x^2 - 13x - 10 = 0$$
 RRT  

$$x = -5, -2$$

$$\frac{4x+1}{x+1} = \frac{3x^2+9}{x^2-1}$$
 notice this denominator factors  

$$\frac{4x+1}{x+1} = \frac{3x^2+9}{(x+1)(x-1)}$$
 multiply both sides by any factors in common in denominator  

$$\frac{4x+1}{1} = \frac{3x^2+9}{x-1}$$
 cross multiply  

$$1(3x^2+9) = (4x+1)(x-1)$$
  

$$3x^2+9 = 4x^2 - 4x + x - 1$$
  

$$-3x^2 - 9 - 3x^2 - 9 - 3x^2 - 9$$
  

$$0 = x^2 - 3x - 10$$
  

$$0 = (x-5)(x+2)$$

$$0 = x^2 - 3x - 10$$
$$0 = (x-5)(x+2)$$
$$\downarrow \quad \downarrow$$
$$\boxed{x=5} \quad \boxed{x=-2}$$