

You can solve systems with rational equations using some of same methods you used with linear systems.

### Activity 1

Follow each direction to solve the system  $\begin{cases} y = \frac{x}{3x-1} \\ y = \frac{1}{x+1} \end{cases}$

1. Set the expressions for  $y$  equal to each other.
2. Solve for  $x$ .
3. Check your answer by substituting in the original system.

### Activity 2

Follow each direction to solve the system  $\begin{cases} x-2 = \frac{6}{y} \\ y+1 = x \end{cases}$

4. Solve each equation for  $y$ .
5. Set the resulting expressions equal to each other.
6. Solve for  $x$ .
7. Check your answer by substituting in the original system.

### Exercises

Solve each system.

8.  $\begin{cases} \frac{y}{x^2-4x+3} = -2 \\ x-2y = 3 \end{cases}$

9.  $\begin{cases} y = \frac{1}{x} \\ y = \frac{3}{4-x^2} \end{cases}$

10.  $\begin{cases} y = x^2 - 2x - 2 \\ y = \frac{x^2+x-6}{x+3} \end{cases}$

11.  $\begin{cases} y = \frac{x+2}{x^2+3x+2} + 2 \\ y-3 = x \end{cases}$

- © 12. Reasoning It is possible for the graph of a system of rational equations to include a point of intersection that is an extraneous solution? Explain.

### Activity 2

④  $x-2 = \frac{6}{y}$  multiply by  $y$  to both sides of eq.

$$y(x-2) = y \cdot \frac{6}{y}$$

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

$$y = \frac{6}{x-2}$$

$$y+1 = x$$

$$y = x-1$$

⑤  $\frac{6}{x-2} = x-1$

⑥ LCD:  $(x-2)$

$$(x-2) \cdot \frac{6}{x-2} = (x-2)(x-1)$$

$$6 = (x-2)(x-1)$$

$$6 = x^2 - 1x - 2x + 2$$

$$0 = x^2 - 3x - 4$$

$$0 = (x-4)(x+1)$$

$$0 = x-4 \text{ or } 0 = x+1$$

$$4 = x$$

$$-1 = x$$

⑦  $\begin{cases} y = \frac{6}{x-2} \\ y = x-1 \end{cases}$

when  $x=4$ :  $y = \frac{6}{4-2} = \frac{6}{2} = 3$

$$(4, 3)$$

when  $x=-1$ :

$$y = -1-1 = -2$$

$$(-1, -2)$$

Also we could substitute into 2nd eq.

### Exercises

Solve graphically or algebraically.

### Activity 1

①  $\frac{x}{3x-1} = \frac{1}{x+1}$

② LCD:  $(3x-1)(x+1)$

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

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

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

$$-3x \quad -3x$$

$$x^2 - 2x = -1$$

$$+1 \quad +1$$

$$x^2 - 2x + 1 = 0$$

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

$$x = 1$$

③ CHECK  $x=1$ :  $\frac{1}{3(1)-1} = \frac{1}{1+1}$

ORIGINAL SYSTEM.

$$\begin{cases} y = \frac{1}{3(1)-1} = \frac{1}{2} \\ y = \frac{1}{1+1} = \frac{1}{2} \end{cases}$$

Solution:  $(1, \frac{1}{2})$