

## LESSON 133 .....

1.  $\frac{x-2}{x+2}$
2.  $x+1$
3. 0
4.  $\frac{x}{x-2}$
5.  $x = -2$
6. No solutions
7. Vertical:  $x = -3$   
Horizontal:  $y = 2$
8.  $h = 2, k = 1$
9. 12 hours
10. 2 amperes

*Worked-out solutions:*

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

$$2. \frac{x^2 - 9}{x+3} \div \frac{x-3}{x+1} = \frac{x^2 - 9}{x+3} \cdot \frac{x+1}{x-3}$$

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

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

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

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

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

$$= \frac{2x}{x+x-4} = \frac{2x}{2x-4} = \frac{x}{x-2}$$

$$5. \frac{1}{2x} - \frac{1}{4} = \frac{1}{x} \quad \text{Restrictions: } x \neq 0$$

LCD =  $4x$

$$4x \left( \frac{1}{2x} - \frac{1}{4} \right) = 4x \left( \frac{1}{x} \right) \quad \text{Multiply both sides by the LCD.}$$

$$2 - x = 4$$

$$x = -2$$

Simplify.

Solve for  $x$ .

$$6. \frac{3-x}{x-1} = \frac{2}{x} + \frac{2}{x(x-1)} \quad \text{Restrictions: } x \neq 0, 1$$

LCD =  $x(x-1)$

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

$$x(3-x) = 2(x-1) + 2 \quad \text{Simplify.}$$

$$x^2 - x = 0$$

Write in standard form.

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

Solve for  $x$ .

$$x = 0, x = 1$$

Both are extraneous, so there are no solutions.

7. The vertical asymptote is  $x = -3$  because it is the value of  $x$  that makes the denominator zero.

The horizontal asymptote is  $y = 2/1 = 2$  because it is the ratio of the leading coefficients of the numerator and denominator when their degrees are equal.

8. The vertical asymptote is  $x = h = 2$ .  
The horizontal asymptote is  $y = k = 1$ .

9. Let  $x$  = Paul's time alone  
Joe's rate + Paul's rate = combined rate, so

$$\frac{1}{6} + \frac{1}{x} = \frac{1}{4}$$

Solve for  $x$ , and you get  $x = 12$ .

It will take 12 hours.

10.  $x$  = resistance,  $y$  = current  
Plug  $x = 3$  and  $y = 4$  into  $y = k/x$ .

$$4 = k/3; k = 12$$

The equation is  $y = 12/x$ .

When  $x = 6$ ,  $y = 2$ .

It will be 2 amperes.