

A common misconception is that you can determine how far away a storm is by measuring the time between thunder and lightning. In reality, though, the time between seeing lightning and hearing thunder is a function of both distance and temperature. The time between seeing lightning and hearing thunder is represented by the function $\text{Time} = \frac{d}{1.09t + 1050}$, where d is the distance (feet) between the observer and the lightning, and t is the temperature (Fahrenheit).

7. If the temperature outside is 70° and you count 3 seconds between the thunder and the lightning, approximately how far away is the storm? Show all of your work and explain your reasoning.
8. If the temperature is 80° and you estimate half a second between thunder and lightning, how far away is the storm? Show all of your work and explain your reasoning.
9. On a 60° day, what is the time between thunder and lightning when the storm is directly overhead? Show all work and explain your reasoning.

In an electrical circuit, when resistors are connected in parallel, the total resistance R_T of the circuit in ohms is given by:

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_n}$$

where n is the number of resistors and R_1 through R_n are the resistances of each resistor in ohms.

- 10. Determine the total resistance of an electrical circuit having two resistors connected in parallel if their resistances are 5 ohms and 8 ohms.**
- 12. The total resistance in a parallel wiring circuit with two resistors is 12 ohms. If the resistance of one branch is 30 ohms, what is the resistance in the other branch?**

A **rational equation** is an equation that contains one or more rational expressions. There are multiple methods you can use to solve rational equations. Depending on the structure of the equation, some methods will be more efficient than others.

M2-208

Sully

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

Restrictions: $x \neq -2, 5$

$$(x+5)(x-5) = (x+2)(x+1)$$

$$x^2 - 25 = x^2 + 3x + 2$$

$$-25 = 3x + 2$$

$$-27 = 3x$$

$$x = -9$$

2. Three students each solved a slightly different equation: $\frac{x+5}{(x-5)(x+2)} = \frac{x+1}{x-5}$. They first recognized the restrictions as $x \neq -2, 5$ their work.

Jermaine

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

$$x+5 = x^2 + 3x + 2$$

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

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

$$-3, 1 = x$$



Dona



$$\frac{x+5}{x+1} = \frac{(x-5)(x+2)}{x-5} \leftarrow \text{Rewrite the proportion.}$$

$$\frac{x+5}{x+1} = x+2$$

$$(x+5) = (x+1)(x+2)$$

$$x^2 + 3x + 2 = x + 5$$

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

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

$$x = -3, 1$$



Quentin

$$\frac{(x+1)(x+2)}{(x-5)(x+2)} = \frac{x+5}{(x-5)(x+2)} \leftarrow \text{Write with common denominator.}$$

$$(x+1)(x+2) = (x+5)$$

$$x+5 = x^2 + 3x + 2$$

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

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

$$-3, 1 = x$$

3. Consider how Jake begins to solve $\frac{2x+4}{x^2-2x-8} = \frac{x+1}{x-4}$.
Finish solving the equation and describe your strategy.
Be sure to list the restrictions.

Jake



$$\frac{2x+4}{x^2-2x-8} = \frac{x+1}{x-4}$$

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

$$x \neq 4, -2$$

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

Seth



$$\frac{6}{x^2 - 4x} + \frac{4}{x} = \frac{2}{x - 4}$$

$$\frac{6}{x(x - 4)} + \frac{4}{x} \cdot \frac{(x - 4)}{(x - 4)} = \frac{2}{x - 4} \cdot \frac{x}{x}$$

$$x \neq 0, 4$$

$$\frac{6}{x(x - 4)} + \frac{4x - 16}{x(x - 4)} = \frac{2x}{x(x - 4)}$$

$$\frac{6 + 4x - 16}{x(x - 4)} = \frac{2x}{x(x - 4)}$$

$$x(x - 4) \left[\frac{6 - 16 = -10}{x(x - 4)} = \frac{2x}{x(x - 4)} \right]$$

$$6 + 4x - 16 = 2x$$

$$4x - 10 = 2x$$

$$2x = 10$$

$$x = 5$$

Sidonie



$$\frac{6}{x^2 - 4x} + \frac{4}{x} = \frac{2}{x - 4}$$

$$\frac{6}{x(x - 4)} + \frac{4}{x} = \frac{2}{x - 4}$$

$$x \neq 0, 4$$

$$(x(x - 4)) \cdot \left[\frac{6}{x(x - 4)} + \frac{4}{x} = \frac{2}{x - 4} \right]$$

$$6 + 4(x - 4) = 2x$$

$$6 + 4x - 16 = 2x$$

$$4x - 10 = 2x$$

$$2x = 10$$

$$x = 5$$

5. Solve the equation $\frac{10}{x^2 - 2x} + \frac{1}{x} = \frac{3}{x - 2}$. Explain why you chose your solution method.