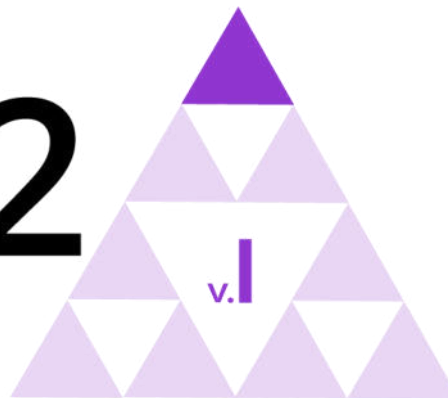


IM 9–12 MATH



Unit

Polynomials and Rational Functions

ALGEBRA 2

Lesson 21

Rational Equations (Part 2)

Learning Goal

Let's write and solve some more rational equations.

Algebra 2

Adding Rationals



Warm-up: Math Talk

Solve each equation mentally:

$$\frac{x}{2} = \frac{3}{4}$$

$$\frac{3}{x} = \frac{1}{6}$$

$$\frac{1}{4} = \frac{1}{x^2}$$

$$\frac{2}{x} = \frac{x}{8}$$

A Rational River



Noah likes to go for boat rides along a river with his family. In still water, the boat travels about 8 kilometers per hour. In the river, it takes them the same amount of time to go upstream 5 kilometers as it does to travel downstream 10 kilometers.



1. If the speed of the river is r , write an expression for the time it takes to travel 5 kilometers upstream and an expression for the time it takes to travel 10 kilometers downstream.
2. Use your expressions to calculate the speed of the river. Explain or show your reasoning.

Rational Resistance



Circuits in parallel follow this law: The inverse of the total resistance is the sum of the inverses of each individual resistance. We can write this as: $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_n}$ where there are n parallel circuits and R_T is the total resistance. Resistance is measured in ohms.

1. Two circuits are placed in parallel. The first circuit has a resistance of 40 ohms and the second circuit has a resistance of 60 ohms. What is the total resistance of the two circuits?
2. Two circuits are placed in parallel. The second circuit has a resistance of 150 ohms more than the first. Write an equation for this situation showing the relationships between R_T and the resistance R of the first circuit.
3. For this circuit, Clare wants to use graphs to estimate the resistance of the first circuit R if R_T is 85 ohms. Describe how she could use a graph to determine the value of R and then follow your instructions to find R .



$$\begin{aligned}\frac{1}{85} &= \frac{1}{R} + \frac{1}{R+150} \\ \frac{1}{85} &= \frac{2R+150}{R(R+150)}\end{aligned}$$

$$\begin{aligned}\frac{1}{85} &= \frac{2R+150}{R(R+150)} \\ \frac{1}{85} \cdot R(R+150) &= 2R+150\end{aligned}$$

I can write and solve equations with simple rational expressions on each side.

Learning Targets

Algebra 2



Show that $\frac{2}{4-x} = \frac{10}{4+x}$ is equivalent to $12x = 32$ for all values of x not equal to 4 or -4.



This slide deck is copyright 2020 by Kendall Hunt Publishing, <https://im.kendallhunt.com/>, and is licensed under the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0), <https://creativecommons.org/licenses/by-nc/4.0/>. This slide deck is copyright 2020 by Kendall Hunt Publishing, <https://im.kendallhunt.com/>, and is licensed under the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0), <https://creativecommons.org/licenses/by-nc/4.0/>.

All curriculum excerpts are under the following licenses:

IM 9–12 Math is copyright 2019 by Illustrative Mathematics. It is licensed under the Creative Commons Attribution 4.0 International License (CC BY 4.0).

This material includes public domain images or openly licensed images that are copyrighted by their respective owners. Openly licensed images remain under the terms of their respective licenses. See the image attribution section for more information.

The Illustrative Mathematics name and logo are not subject to the Creative Commons license and may not be used without the prior and express written consent of Illustrative Mathematics.