IM 9–12 MATH v.1

Unit 2

Polynomials and Rational Functions

ALGEBRA 2

Lesson 20

Rational Equations (Part 1)

Illustrative Mathematics®

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Learning Goal

Let's write and solve some rational equations.

Algebra 2

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Denominators and Solutions

Warm-up: Notice and Wonder

What do you notice? What do you wonder?

A. $\frac{2x+5}{x} = \frac{7x-5}{x},\ x = 2$

A. $2x + 5 = 7x - 5,\ x = 2$

A. $\frac{2x^2+3}{x+2} = \frac{4x+1}{x+2},\ x = 1$

A. $2x^2 + 3 = 4x + 1,\ x = 1$

Rationalizing the Price of T-shirts

The school art club at a large high school is in charge of designing school T-shirts and getting them printed this year. A local business charges $35 to set up their T-shirt printing machine with the design and $4.25 in materials per T-shirt to print.

1. Create an equation to represent the average cost $C(x)$, in dollars, per T-shirt if x T-shirts are printed by this business.
2. What is the average cost per shirt to print 25 shirts? 100 shirts?
3. What is the cheapest the average cost per T-shirt will get? Explain or show your reasoning.
4. How many shirts should be printed to have an average cost of $5 or less per shirt? Explain how you know.

Batting Averages

Tyler is on a school baseball team and he has had 24 base hits out of 110 at bats this year.

1. What is his current batting average?
2. He wants to raise his batting average to .300. How many of the next consecutive at bats need to be base hits to raise his batting average to .300? Write and solve an equation to describe this situation using for the number of consecutive base hits. Be prepared to explain how you wrote your equation and each of your solving steps.
3. Unfortunately, Tyler gets no base hits in his next three at bats. Revise your equation and then calculate how many of his next consecutive at bats need to be base hits to raise his batting average to .300. Be prepared to explain how you revised your equation and each of your solving steps.

Rational Equations (Part 1)

Lesson Synthesis

There is another printing business in town that charges only $15 to set up and $4.40 in materials per T-shirt to print.

Write an expression for this business that gives the average cost per T-shirt if T-shirts are printed.

What does the solution to the equation $\frac{35 + 4.25x}{x} = \frac{15 + 4.40x}{x}$ tell us?

I can write rational expressions that represent averages to answer questions about the situation.

Learning Targets

Algebra 2

Selling Sweatshirts

Cool-down

A local business charges $20 to set up their sweatshirt printing machine with the design and $9.75 in materials per sweatshirt to print.

1. Write an equation for the average cost $A(x)$ of printing x sweatshirts through this company.
2. Describe what happens to the average cost per sweatshirts as more and more are printed.