Unit 4 Day 11

Solving Harder Rational Equations

Warm-up!

Warm-up:

1. $\dfrac{x+2}{x+1} - x = \dfrac{-6}{x+1}$ EV: _____

2. $\dfrac{4}{x-5} = \dfrac{2}{x+8}$ EV: _____

3. $\dfrac{2}{x-4} + 2 = \dfrac{6}{x-4}$ EV: _____

4. $\dfrac{x}{x+24} = \dfrac{2}{x}$ EV: _____

Warm-up Continued!

5. The volume, V, of a certain gas varies inversely with the amount of pressure, P, placed on it. The volume of this gas is 175 cm^3 when 3.2 kg/cm^2 of pressure is placed on it. What amount of pressure must be placed on 400 cm^3 of this gas?

6. The time, t, in hours, that it takes x people to plant n trees varies directly with the number of trees and inversely with the number of people. Suppose 6 people can plant 12 trees in 3 hours. How many people are needed to plant 28 trees in 5 hours and 15 minutes?

Warm-up!

Warm-up:

1. $\dfrac{x+2}{x+1} - x = \dfrac{-6}{x+1}$ EV: $x \ne -1$

$x = \pm 2\sqrt{2}$

1. Multiply **all** pieces by (x+1), which is the LCD
2. Combine like terms / simplify
3. Solve for x

2. $\dfrac{4}{x-5} = \dfrac{2}{x+8}$ EV: $x \ne 5, -8$

x = -21

1. Cross multiply
2. Distribute
3. Solve for x

3. $\dfrac{2}{x-4} + 2 = \dfrac{6}{x-4}$ EV: $x \ne 4$

x = 6

1. Multiply **all** pieces by (x-4), which is the LCD
2. Combine like terms / simplify
3. Solve for x

4. $\dfrac{x}{x+24} = \dfrac{2}{x}$ EV: $x \ne -24, 0$

x = 8, -6

1. Cross multiply
2. Distribute
3. Solve for x by factoring

Warm-Up

5. The volume, V, of a certain gas varies inversely with the amount of pressure, P, placed on it. The volume of this gas is 175 cm³ when 3.2 kg/cm² of pressure is placed on it. What amount of pressure must be placed on 400 cm³ of this gas?

$$V = volume, \quad P = pressure$$

$$V = \frac{k}{P} \qquad k = 560 \qquad 400 = \frac{560}{P}$$

$$175 = \frac{k}{3.2} \qquad \boxed{V = \frac{560}{P}} \qquad 400p = 560$$

$$p = 1.4$$

1.4 kg/cm²

6. The time, t, in hours, that it takes x people to plant n trees varies directly with the number of trees and inversely with the number of people. Suppose 6 people can plant 12 trees in 3 hours. How many people are needed to plant 28 trees in 5 hours and 15 minutes?

$$t = \frac{nk}{x} \qquad k = 1.5 \qquad 5.25 = \frac{1.5(28)}{x}$$

$$t = time, \ n = \# \ of \ trees,$$

$$3 = \frac{12k}{6} \qquad \boxed{t = \frac{1.5n}{x}} \qquad 5.25x = 42$$

$$x = \# \ of \ people$$

$$x = 8$$

8 people

HW Answers

Day 9 Homework: Solving Rational Equations

1-9) Solve each rational equation.

1. $\dfrac{x}{5} = \dfrac{7}{3}$

$3x = 35$

$x = 11\frac{2}{3}$

2. $\dfrac{10}{y} = \dfrac{5}{14}$

$5y = 140$

$y = 28$

3. $\dfrac{4}{12} = \dfrac{7}{2w}$

$8w = 84$

$w = 10.5$

4. $\dfrac{x}{6} = \dfrac{6}{x}$

$x^2 = 36$

$X = \pm \sqrt{36}$

$\rightarrow x = \pm 6$

5. $\dfrac{2x}{16} = \dfrac{2}{x}$

$2x^2 = 32$

$x^2 = 16$

$x = \pm \sqrt{16}$

$\rightarrow x = \pm 4$

6. $\dfrac{3}{x+4} = \dfrac{x-4}{16}$

$(x+4)(x-4) = 48$

$x^2 - 16 = 48$

$x^2 = 64$

$x = \pm \sqrt{64}$

$x = \pm 8$

7. $\dfrac{x-3}{7} = \dfrac{5}{2}$

$2x - 6 = 35$

$2x = 41$

$x = 20.5$

8. $\dfrac{4}{x-5} = \dfrac{2}{x+8}$

$4x + 32 = 2x - 10$

$2x = -42$

$x = -21$

9. $\dfrac{x}{x+24} = \dfrac{2}{x}$

$x^2 = 2x + 48$

$x^2 - 2x + 48 = 0$

$(x-8)(x+6) = 0$

$x = 8, \ x = -6$

HW Answers

10-22) Find the Least Common Denominator for each equation. Solve each rational equation by multiplying through by the LCD. Watch out for extraneous solutions.

10. $3\left(\dfrac{2}{3}+\dfrac{x}{3}\right)=\left(\dfrac{-13}{3}\right)3$

$2 + x = -13$

$x = -15$

11. $4y\left(\dfrac{1y}{4y}+\dfrac{4}{4y}\right)=\left(\dfrac{3y}{4y}\right)4y$

$1y + 4 = 3y$

$4 = 2y$

$y = 2$

10 LCD ___3___

Answer $x = -15$

11 LCD ___$4y$___

Answer $y = 2$

12. $5a\left(\dfrac{a^2}{5a}-\dfrac{2}{5a}\right)=\left(\dfrac{14}{5a}\right)5a$

$a^2 - 2 = 14$

$a^2 = 16$

$a = \pm\sqrt{16}$

$a = \pm 4$

13. $(x-3)\left(\dfrac{2}{x-3}+\dfrac{x}{x-3}\right)=\left(\dfrac{5}{x-3}\right)(x-3)$

$2 + x = 5$

$x \cancel{=} 3$

bc it is
a EV which
means No solution

12 LCD ___$5a$___

Answer $a = \pm 4$

13 LCD ___$(x-3)$___

Answer No solution

14. $(n-8)\left(\dfrac{1}{n-8}-1\right)=\left(\dfrac{7}{n-8}\right)(n-8)$

$1 - 1(n-8) = 7$

$1 - n + 8 = 7$

$-n = -2$

15. LCD!! $(r-2)(r-5)$ $\left(\dfrac{1}{r-2}+\dfrac{1}{r^2-7r+10}\right)=\left(\dfrac{6}{r-2}\right)(r-2)(r-5)$

$r - 5 + 1 = 6r - 30$

$5r = 26$

$r = 5.2$

Tonight's Homework

Packet page 17-18

Remember To Study For Friday's Test!!

Suggestion Of The Day: Start on tomorrow Night's Test Review Homework
Packet p. 19-21 (Remember these are usually longer HW assignments)

There are some updates to Packet p. 19 (see next slide)

Packet update…

For tomorrow Night's Test Review Homework Packet p. 19-21…

There are some updates to Packet p. 19

2. ~~$y = 2[\![x-1]\!]$~~ $y = -2\,|x - 1|$

AND Omit #5, 9, 13

Evaluate each expression

5. ~~$[\![4.7]\!] =$~~	6. $\,|4.7| =$
9. ~~$[\![-4.7]\!] =$~~	10. $\,|-4.7| =$

13. Solve the following equation for x and write in set notation: ~~$\left[\!\left[\dfrac{3}{2}x - 1\right]\!\right] = 8$~~

Today's Lesson….

Solving Harder Rational Equations

Example 1:

$$\frac{x-4}{4} + \frac{x}{3} = 6.$$

$$\frac{12(x-4)}{4} + \frac{12x}{3} = 72$$

$$3(x-4) + 4x = 72$$

$$3x - 12 + 4x = 72$$

$$7x - 12 = 72$$

$$7x = 84$$

$$x = 12$$

Steps:
1. Find the LCD.   In Ex 1: LCD = 12

2. Multiply each side by the LCD.

3. Simplify.

4. Solve for x!

Example 2:

$$\frac{3}{2x} - \frac{2x}{x+1} = -2$$

Note that $x \neq -1$ and $x \neq 0$. The LCD of the fractions is $2x(x+1)$

Multiply each side of the equation by $2x(x+1)$.

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

$$(3)(x+1) - (2x)(2x) = -2(2x)(x+1)$$

$$3x + 3 - 4x^2 = -4x(x+1)$$

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

$$7x + 3 = 0$$

$$7x = -3$$

$$x = \frac{-3}{7}$$

You Give It Try!!

Reminder: How to use the Least Common Denominator OR LCD

$$\frac{x}{3} + \frac{2}{5} = 7 \Rightarrow LCD = 15 \Rightarrow$$

$$\left(15\right)\frac{x}{3} \div + \left(15\right)\frac{2}{5} \div = 7(15) \Rightarrow$$

$$5(x) + 3(2) = 105 \Rightarrow$$

$$x = 19.8$$

Example 3: $\dfrac{4}{x+3} - \dfrac{3}{x^2+6x+9} = 1$

k = 0, -2

Example 4: $\dfrac{6}{x} - \dfrac{9}{x-1} = \dfrac{1}{4}$

x = -3, -8

Example 5: $\dfrac{2m}{m-1} + \dfrac{m-5}{m^2-1} = 1$

m = -4 or ✗

Cannot be m = 1 because it is an excluded value!! (Makes the bottom of the fraction 0)

Solving Rational Equations Practice Complete Page 42-43 #1-10

If your work is completed early, start working on the Homework pages 17-18.

We will check our answers once everyone has completed the page... Answers on the next slide

Practice Answers

1. $a = -3$

2. $b = -9/4$

3. $x = 4.1$

4. $k = 1/2$

5. $m = -3/2$

6. $x = -2$

7. $p = -5$ or 3

8. $a = 5$

9. $b = 1$

10. $k = -1$

(k cannot be 6 because it's an excluded value)

Practice!

Quiz Corrections

On separate sheet of GRAPH paper, rework the ones you missed. Show your work! Ask teacher or neighbors for help! Be better prepared for our test coming up. ☺

Kahoot!

https://play.kahoot.it/#/?quizId=fe331d08-ae69-4dc1-a78b-c4d28e539abd

Kahoot!

https://create.kahoot.it/?_ga=1.234693214.1782845466.1413554510#quiz/13018359-9177-4366-ab71-14997c675d79

Tonight's Homework

Packet page 17-18

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