

RLU

Algebra II/ Trig – In Class Practice

Name: MS. BRAUER

Sec. 8.5- Solving Rational Equations

Period: 3 7

Date: 5/4/17

- 1.) The U-High baseball team would like to finish the season with a win percentage of at least 75% (or .75). If the team has already won 12 of the 20 games they have played, how many games does the team need to win in a row to have a win percentage of 75%?

$$\frac{12+x}{20+x} = .75$$

12 more games.

$$.75(20+x) = 12+x$$

$$15 + .75x = 12 + x$$

$$\begin{array}{r} -12 \qquad \qquad - .75x \\ \hline \end{array}$$

$$\frac{3}{.25} = \frac{.25x}{.25} \quad x = 12$$

$$\begin{array}{l} w = r \cdot t \\ D = r \cdot t \quad r = \frac{D}{t} \quad t = \frac{D}{r} \end{array}$$

- 2.) Mr. Neisler can grade the 1:00 Algebra 2 Tests in 4 hours. When Ms. Brauer assists him, they can grade the same number of papers in 2.5 hours. About how long would it take Ms. Brauer to grade the papers by herself?

Mr. Neisler:

$$1 = r \cdot t \quad r = \frac{1}{4}$$

$$1 = r \cdot 4$$

Ms. Brauer:

$$1 = r \cdot x \quad r = \frac{1}{x}$$

$$\left(\frac{1}{4}(2.5) + \frac{1}{x}(2.5) = 1 \right) 4x$$

$$2.5x + 4 \left(\frac{10}{2.5} \right) = 4x$$

$$\begin{array}{r} -2.5x \qquad \qquad -2.5x \\ \hline \end{array}$$

$$\frac{10}{1.5} = \frac{1.5x}{1.5} \quad x = 6 \frac{2}{3} \text{ hours}$$

- 3.) Working together, it takes Catherine, Jenna, and Lana two hours to paint one room. When Catherine is working alone, she can paint the room in 6 hours; Jenna can paint the room in 4 hours on her own. How long would it take Lana to paint the room on her own?

$$\frac{1}{6}(2) + \frac{1}{4}(2) + \frac{1}{x}(2) = 1$$

$$\left(\frac{1}{3} + \frac{1}{2} + \frac{2}{x} = 1 \right) 6x$$

$$2x + 3 + 12 = 6x$$

$$\begin{array}{r} -5x \quad -5x \\ \hline \end{array}$$

$$12 = x$$

$$x = 12 \text{ hours}$$

1.) Derek can build a laptop twice as fast as David. Working together, it takes them 5 hours. How long will it take Derek working alone?

David: $\frac{1}{2x} = \frac{2x}{2x}$

Derek: $\frac{1}{x} = \frac{x}{x} \cdot R$

$$\frac{5}{2x} + \frac{5}{x} = 2x \cdot 5 + 10 = 2x$$

$$\frac{15}{2} = \frac{2x}{2}$$

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

$$\left(\frac{5}{2x}\right) + \left(\frac{5}{x}\right) = \frac{1}{1} \frac{2x}{1}$$

$$x = 7.5$$

2.) Mason can mow the lawn in 20 minutes. Paul can mow the lawn in 30 minutes. If they work together, how long will it take them to mow the lawn?

M: $\frac{1}{20} = \frac{20 \text{ min}}{20} (R)$

P: $\frac{1}{30} = \frac{30}{30} (R)$

$$\frac{1}{20}$$

$$\frac{1}{30}$$

$$3x + 2x = 60$$

$$5x = 60$$

$$x = 12 \text{ min.}$$

$$\left(\frac{1}{20}x + \frac{1}{30}x = 1\right) 60$$

3.) Three machines are twisting pretzels. Two are old and one is new. The new machine can twist pretzels twice as fast as an old machine can. An old machine can twist the daily quota of pretzels in 20 hours. How long will it take to make the quota if the machines are operated at the same time?

old: $\frac{1}{2x} = \frac{2x}{2x}$

$$r = 1/2x$$

$$r = 1/40$$

5 hours

$$\frac{2x}{10} = 1$$

$$x/5 = 1$$

$$5 = x$$

new: $\frac{1}{x} = \frac{x}{x}$

$$r = 1/x$$

$$r = 1/20$$

$$2\left(\frac{1}{20}\right)x + \frac{1}{10}x = 1$$

4.) Alyssa swam downstream at 6 mph and then swam back upstream at 4 mph. If she swam for a total of 1.25 hours, how far did she swim in all?

$$\frac{D}{T} = \frac{r \cdot t}{T} \quad \frac{D}{6} = \frac{(6)t}{6}$$

$$\frac{D}{4} = \frac{(4)t}{4}$$

6 miles

3 miles BOTH ways

~~6 miles~~

$$\left(\frac{x}{6} + \frac{x}{4} = 1.25\right) 24$$

$$4x + 6x = 30$$

$$\frac{10x}{10} = \frac{30}{10} \quad x = 3$$

5.) Katy can jog 5 miles downhill in the same time that it takes her to jog 3 miles uphill. Find her jogging rate for each way if she jogs downhill 4 mph faster than she jogs uphill.



$$\frac{5}{x+4} = \frac{3}{x}$$

temp - uphill
10 mph - downhill

$$\frac{5x}{x+4} = \frac{3x}{x} \quad \frac{5x}{2} = \frac{12}{2} \quad x = 6$$

$$x = 6$$

6.) Ms. Brauer can finish tonight's homework 3 times faster than one of her students. Working together, they can finish the homework in 6 minutes. How long would it take each one working alone to finish the homework?

student
+ teacher

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

student: 2 min.

$$\frac{1}{3x}(6) + \frac{1}{x}(6) = 1$$

$$x = 8$$

teacher: 8 min

$$\frac{2}{x} + \frac{6}{x} = 1$$

$$\frac{8}{x} = 1$$

Algebra II/ Trig – Homework

Name: Kelly

Sec. 8.5- Solving Rational Equations

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Date: 5/4/17

1. The pump at the BP gas station can fill Ms. Brauer's new car with gas in 4 minutes. The pump at the Shell can fill the same tank in 3 minutes. If both pumps are used at the same time, how long will it take to fill the tank?

$$\left(\frac{1}{4}x + \frac{1}{3}x = 1\right) 12$$

$$3x + 4x = 12$$

$$\frac{7x}{7} = \frac{12}{7}$$

$$x = 1.7 \text{ minutes.}$$

2. It takes a person the same time to walk 10 miles as it takes a car to travel 15 miles in heavy traffic. If the car is traveling 3 mph faster than the person is walking, how fast is each traveling?

person:

$$10 = vt$$

$$\frac{10(x)t}{x}$$

$$\frac{10}{x} = \frac{15}{x+3}$$

car:

$$15 = vt$$

$$\frac{15 = (x+3)(t)}{x+3}$$

$$10(x+3) = 15(x)$$

$$10x + 30 = 15x$$

$$\begin{array}{r} -10x \quad -10x \\ \hline 30 = 5x \end{array}$$

$$\frac{30}{5} = \frac{5x}{5}$$

$$x = 6$$

person:
6 mph

car:
9 mph

3. Brynn put together one-quarter of her Race Paper in 3 hours. If Vishnu works two hours more than Brynn, he can finish one-sixth of the Race Paper. How long would it take to complete 1 Race Paper if they worked together?

Brynn:

$$\frac{1}{4} = \frac{3}{3}(r)$$

$$\frac{1}{12} = r$$

Vishnu:

$$\frac{1}{6} = r(5)$$

$$r = \frac{1}{30}$$

$$\left(\frac{1}{12}(x) + \frac{1}{30}(x) = 1\right) 60$$

$$\begin{array}{r} 5x + 2x = 60 \\ 7x = 60 \end{array}$$

$$x = \frac{60}{7}$$

$$x = 8.6 \text{ hours}$$

Algebra II/ Trig – Practice

Name: *KLY*

Sec. 8.5- Solving Rational Equations

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We-Try

1. It's Allie's turn to drive during the band's road trip to Florida. When it was raining, she drove for 120 miles. When the rain stopped, she drove 20 mph faster than he did while it was raining. She drove for 300 miles after the rain stopped. If Allie drove for a total of 10 hours, how fast did she drive while it was raining?

WTK:
~~400 mph~~
driving
speed
when
raining
30 mph

	R	T	D
Raining	$X = 30$ mph	$\frac{120}{x}$ <u>10 hrs.</u>	120 miles
NOT Raining	$X + 20 =$ 50 mph	$\frac{300}{x+20}$	300 miles

$$D = RT$$

$$T = \frac{D}{R}$$

$$10 = \frac{120}{x} + \frac{300}{x+20} \quad | \quad x(x+20)$$

$$10x(x+20) = 120(x+20) + 300(x)$$

$$10x^2 + 200x = 120x + 2400 + 300x$$

$$10x^2 + 200x = 420x + 2400$$

$$-420x - 2400$$

$$10x^2 - 220x - 2400 = 0$$

$$10(x^2 - 22x - 240) = 0$$

$$10(x - 30)(x + 8) = 0$$

$$x - 30 = 0 \quad x = 30$$

$$x + 8 = 0 \quad x = -8$$

You-Try

2. On a Trigonometry class trip to Chicago, the students take a boat ride through the Chicago River. The tour boat travels 1.2 miles up a river and 1.2 miles down the river in a total of 1.5 hours. In still water, the boat travels at an average speed of 5.5 miles per hour. What is the speed of the river's current? Round to the nearest tenth.

	R	T	D
UP STREAM	$5.5 - x$	$\frac{1.2}{5.5 - x}$ <u>1.5</u>	1.2
DOWN STREAM	$5.5 + x$	$\frac{1.2}{5.5 + x}$	1.2

$$\left(\frac{1.2}{5.5 - x} + \frac{1.2}{5.5 + x} = 1.5 \right) (5.5 + x)(5.5 - x)$$

$$1.2(5.5 + x) + 1.2(5.5 - x) = 1.5(5.5 + x)(5.5 - x)$$

$$6.6 + 1.2x + 6.6 - 1.2x = (8.25 + 1.5x)(5.5 - x)$$

$$13.2 = (8.25 + 1.5x)(5.5 - x)$$

$$13.2 = 43.375 - 8.25x + 8.25x - 1.5x^2$$

$$13.2 = 43.375 - 1.5x^2$$

$$-43.375 - 43.375$$

$$x = 4.5 \text{ mph.}$$

Group Practice:

3. Trey and Andy are practicing for the 2020 Summer Olympics by creating a canoe team. In still water, they travel 15 mph. Going with the current they can travel 20 miles in the same time that it takes them to travel 10 miles against the current. Find the rate of the current.

	R	T	D
w/ current	$15+x$	$\frac{20}{15+x}$	20
against current	$15-x$	$\frac{10}{15-x}$	10

$x = \text{current}$

$$\frac{20}{15+x} = \frac{10}{15-x}$$

WPK
RATE OF current...
= 5 mph

$$20(15-x) = 10(15+x)$$

$$300 - 20x = 150 + 10x$$

$$-150 + 20x \quad -150 + 20x$$

$$\frac{150}{30} = \frac{30x}{30} \quad x = 5$$

4. This summer, Ms. Brauer is traveling to London to see her brother. Her jet will travel 3950 miles from Chicago, Illinois, to London, England, and 3950 miles on the return trip. The total flying time is 16.5 hours. The return trip will take longer due to winds that generally blow from west to east. If the jet's average speed with no wind is 485 miles/hour, what is the average speed of the wind during the round-trip flight? Round to the nearest mile per hour.

	R	T	D
TO	$485+x$	$\frac{3950}{485+x}$	3950
FROM	$485-x$	$\frac{3950}{485-x}$	3950

wind speed.

55 mph

$$\frac{3950}{485+x} + \frac{3950}{485-x} = 16.5$$

$$3950(485-x) + 3950(485+x) = 16.5(485+x)(485-x)$$

$$16.5(235225 - x^2)$$

$$3831500 = 3881212.5 - 16.5x^2$$

5. Cooper and Christian make paper airplanes and test their flight on the U-High football field. Cooper calculates that his plane can fly 910 centimeters with the wind. In the same amount of time Christian's can go 660 centimeters against the wind. Assuming both of their airplanes are expertly made (have the same flying capabilities) and the speed of the plane in still air is 305 centimeters per minute. What is the speed of the wind?

	R	T	D
Cooper	$305+x$	$\frac{910}{305+x}$	910
Christian	$305-x$	$\frac{660}{305-x}$	660

$x = 48.4 \text{ cm/min}$

$$\frac{910}{305+x} = \frac{660}{305-x}$$

WPK
speed of wind

$$660(305+x) = 910(305-x)$$

$$201300 + 660x = 277550 - 910x$$

$$-277550 - 660x \quad -277550 - 660x$$

$$-76250 = -1570x$$

$$\frac{-76250}{-1570} = \frac{-1570x}{-1570}$$