PCFU (E12) Solving Rational Functions in Context Name:_____

Solutions with explanations

1. Jimmy's car is traveling 60 km/hr faster than Abdul's car. During the time it takes Abdul to go 180 km, Jimmy goes 480 km. Find their speeds.

	Distance (km)	Rate/Speed (kmph)	Time (hours)
Jimmy	480	$x + 60$	$\frac{480}{x+60}$
Abdul	180	x	$\frac{180}{x}$

I decided by reading the question that I needed to use distance = rate x time is some form.	$d = r \cdot t$ or $r = \frac{d}{t}$ or $t = \frac{d}{r}$
The first thing I did was write down that the distance Jimmy's car travelled was 480 km and the distance that Abdul's car travelled was 180 km.	Jimmy's distance = 480 Abdul's distance = 180
Then I realized that Jimmy's rate was given to me in terms of Abdul's rate so I decided to let my variable represent Abdul's rate. Then I added 60 to Abdul's rate to represent Jimmy's rate.	Let x= Abdul's speed So x+60 = Jimmy's speed
I set up two expressions to represent Jimmy's and Abdul's time, in terms of their speed and the distance they covered, using the distance formula.	$t = \frac{d}{r} = \frac{480}{x+60}$ for Jimmy and $t = \frac{d}{r} = \frac{180}{x}$ for Abdul.
With the sentence "During the time it takes Abdul to go 180 km, Jimmy goes 480 km." I knew that the times were the same. I set up an equation with the two expressions equal to each other.	$\frac{480}{x+60} = \frac{180}{x}$
Then to solve I multiplied both numerators by the LCM/LCD: x(x+60).	$\frac{x(x+60)\cdot 480}{(x+60)} = \frac{x(x+60)\cdot 180}{x}$
From here I needed to reduce or divide to get rid of the denominators. On the left I divided (x+60) into (x+60). On the right I divided x into x.	$x \cdot 480 = (x+60)\cdot 180$
I distributed the 180 to both terms on the right.	$480x = 180x + 10{,}800$
Then I continued to solve for x by subtracting 180x from both sides	$300x = 10{,}800$
Finally I divided both sides by 300 to solve for x.	$x = 36$
I then had to interpret my answer. Since x represented Abdul's rate that meant that he was travelling at **36 km per hour**. So Jimmy was travelling at x + 60 or 36 + 60 = **96 km per hour**.	

Follow Up

1. Hannah walked to the grocery store which was 2 miles away. Her walking rate on the way back was 0.75 of her walking rate on the way to the store because she was carrying the groceries. If it took Hannah 1 hour to make the round trip, what was her walking rate on the way to the store?

a) Let r = Hannah's walking rate on the way to the store. How can you represent Hannah's walking rate on the way back from the store?

b) Use $t = \frac{d}{r}$ to set up an expression to represent the time it took Hannah to walk to the grocery store.
Hannah's time walking to the grocery store =

c) Use the same format to set up an expression to represent the time it took Hannah to walk home from the grocery store.
Hannah's time walking back from the store =

d) The round trip took Hannah 1 hour. Set up your equation.
Hannah's time walking to the grocery store + Hannah's time walking Back from the grocery store = Total time for the trip

e) Solve your equation. Show your work.

2. A group of students are volunteering for Help the Homeless during their spring break. They are putting the finishing touches on a house they built. Working alone, Dylan can paint a certain room in 4 hours. Tia can paint the same room in 6 hours. How many hours will it take them to paint the room if they work together?

	Time to finish	Rate (amount of job done per hour)
Dylan alone	4	$\frac{1}{4}$
Tia alone	6	$\frac{1}{6}$
Together	x	$\frac{1}{x}$

I decided to let x represent the length of time it would take Dylan and Tia to paint if they worked together. Then I used the given information to set up hourly rates.	For example: In 1 hour Dylan can finish one-fourth of the whole job if he works alone.
Then I decided to use Dylan's contribution in 1 hour plus Tia's contribution in 1 hour and set that equal to what they could accomplish together in 1 hour.	$\frac{1}{4}+\frac{1}{6}=\frac{1}{x}$
To solve this equation I multiplied each numerator by 12x, the LCD.	$\frac{1\cdot 12x}{4}+\frac{1\cdot 12x}{6}=\frac{1\cdot 12x}{x}$
Then I was able to divide each expression to get rid of fractions. In the first one I did 12 ÷4 =3 then in the second one 12÷6 = 2 and finally on the right x÷x=1.	$3x+2x=12$
I combined like terms.	$5x=12$
I divided both sides by 5.	$x=2.4$
Since I set it up so that x represented the amount of time it would take them to paint the room if they worked together, I had my answer. Together Dylan and Tia will take **2.4 hours** to paint the room, or since, 0.4 is 2/5 of an hour, we could also say **2 hours and 24 minutes**.	

Follow Up:

Write an equation to model each scenario. Then, solve each equation.

2. Clara can paint a room in 8 hours; while Mikayla can paint the same room in 6 hours. If they paint the room together, how long will it take them to paint the room?

a) How much of the whole room can Clara paint working alone for 1 hour?(Hint: Your answer will be a fraction.)

b) How much of the whole room can Mikayla paint working alone for 1 hour?

c) Let x = the number of hours it will take to paint the room while working together. How much of the whole room can they paint working together for 1 hour?

d) Set up your equation:

Clara's contribution for 1 hour	+	Mikayla's contribution for 1 hour	=	Amount painted in 1 hour if they work together

e) Solve your equation. Show your work.