

Algebra RH

Essential Question: How do we solve work related word problems?

Do Now:

Solve for x .

create a proportion

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

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

$$\frac{2}{10} + \frac{5}{10} = \frac{1}{x}$$

$$\frac{7}{10} = \frac{1}{x} \rightarrow 7x = 10 \\ x = 10/7$$

more efficient approach LCD: $10x$

multiply each term by the LCD

$$2x \cdot 10x \left(\frac{1}{5} \right) + 10x \left(\frac{1}{2} \right) = 10x \left(\frac{1}{x} \right)$$

$$2x + 5x = 10 \\ 7x = 10$$

$$x = 10/7$$

WORK PROBLEMS

General Problem:

Two objects/people perform a job at different rates.
How long does it take them to perform the job working together?



Key to Solving:

$$\frac{1}{\text{time it takes first person working alone}} + \frac{1}{\text{time it takes second person working alone}} = \frac{1}{\text{total time it takes to do the job}}$$

Suppose you can mow a lawn in 3 hours and your friend can mow it in 4 hours. How long will it take both of you to mow the lawn together?



$$x = \# \text{ of hours working together} = 1 \frac{5}{7} \text{ hours}$$

$$\frac{1}{3} + \frac{1}{4} = \frac{1}{x}$$

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

$$4x + 3x = 12$$

$$7x = 12$$

$$x = \frac{12}{7} = 1 \frac{5}{7} \text{ hours}$$

Practice Problems:

(1) Suppose one painter can paint the entire house in twelve hours, and the second painter takes eight hours. How long would it take the two painters together to paint the house?

$x = \#$ of hours working together = 4.8 hours

$$24x \left(\frac{1}{12} \right) + 24x \left(\frac{1}{8} \right) = \left(\frac{1}{x} \right) 24x$$

$$2x + 3x = 24$$

$$5x = 24$$

$$x = 4 \frac{4}{5} \text{ hours}$$

4.8 hours or 4 hours 48 minutes

(2) One garden hose can fill an above-ground pool in 10 hours. A second hose can fill the pool twice as fast as the first one. If both hoses are used together to fill the pool, how many hours will it take?

$x = \#$ of hours for both hoses to fill the pool = $3 \frac{1}{3}$ hours

$$10x \left(\frac{1}{10} \right) + 10x \left(\frac{1}{5} \right) = \left(\frac{1}{x} \right) 10x$$

$$x + 2x = 10$$

$$3x = 10$$

$$x = \frac{10}{3} = 3 \frac{1}{3} \text{ hours}$$

(3) Working together, Ron and Ruby can clean up a room in 8 hours. If Ron works alone it takes him 5 hours to complete the task. How long does it take Ruby to clean the room by herself?

$x = \#$ of hours for Ruby to clean the room = 13 hours 20 minutes

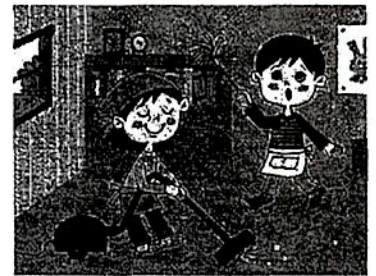
$$\frac{1}{8} + \frac{1}{x} = \frac{1}{5}$$

$$40x \left(\frac{1}{8} \right) + 40x \left(\frac{1}{x} \right) = 40x \left(\frac{1}{5} \right)$$

$$5x + 40 = 8x$$

$$40 = 3x$$

$$x = 13 \frac{1}{3} \text{ hours}$$



The TAKEAWAY

For work word problems, set up rates for each "worker". Add the rates together to write an equation. Solve by creating a proportion. Check that your solution is reasonable.

preferred way

Find the LCD
multiply each term by the LCD