Work Problems

Work Problems are those problems where you have two people (or machines) doing a job at different rates. There are three physical quantities to note. They are rate, time, and quantity, where $Q = r \times t$.

For example, if George can assemble 3 chairs per hour and he works for 8 hours, we have:

$$\text{Quantity} = 3\ \frac{\text{chairs}}{\text{hour}} \cdot 8\ \text{hours} = 24\ \text{chairs}$$

An essential KEY that you must be aware of is that the time it takes a person to do 1 task (or 1 job) is the reciprocal of their rate!

For example, if it takes George 4 hours to assemble a table, then his rate is $\frac{1}{4}$ tables per hour.

Or, if it takes a team x hours to do a job, their team rate is $\frac{1}{x}$ jobs per hour.

There is usually two ways to work these problems.

Method 1. Add individual rates to get a team rate.*
Method 2. Add each "person's" quantity (/part of job completed), to get 1 (job).

*Method 1 is usually easiest but it can't be used if one person quits early or arrives late.

Example 1 Barry can do a job in 3 hours, whereas it takes Sanchez 5 hours to do the same thing. How long would it take them working together?

Let x = time it would take them working together.

Method 1

	time	rate
Barry	3	1/3
Sanchez	5	1/5
Team	x	1/x

Equation: $\frac{1}{3} + \frac{1}{5} = \frac{1}{x}$

Method 2

	individual time	rate ×	actual time = working	(quantity) part of job completed
Barry	3	1/3	x	x/3
Sanchez	5	1/5	x	x/5

Equation: $\frac{x}{3} + \frac{x}{5} = 1$