# Unit 4 - Using Equations to Solve Word Problems

| | |
|---|---|
| **Rate of Work Problems** (on this sheet) | How long does it take two people to do a job together?<br>**Classwork:** 1, 3, 5, 9<br>**Homework:** 2, 4, 6, 7, 8 |

**Notes:** Fractions are your friend!

## Classwork

*Write 2 fractions for each question*

1. Ahmed takes 2 h to mow his lawn. His brother, Sami, takes 4 h. What fraction of the lawn does each mow in 1 h?

Ahmed: $\frac{1 \text{ lawn}}{2 \text{ hours}}$ Sami: $\frac{1 \text{ lawn}}{4 \text{ hour}}$

*Solve. Round answers to the nearest tenth, where necessary.*

3. Julio can fill a water tank in 4 min using a large hose. He takes 6 min using a smaller hose. How long will he take if he uses both hoses?

| | Given | Want |
|---|---|---|
| large | $\frac{1}{4}$ | How long for both hoses? |
| smaller | $\frac{1}{6}$ | $\frac{1}{x}$ |

1 min = 60 sec
$\Rightarrow \frac{1}{5}$ min $= \frac{60}{5}$ sec
$\Rightarrow \frac{2}{5}$ min $= 24$ sec

Let $x$ be the time the tank is filled using both hoses

$\frac{1}{4} + \frac{1}{6} = \frac{1}{x}$

$\frac{3}{12} + \frac{2}{12} = \frac{1}{x}$

$5/12 = \frac{1}{x}$ → flip both sides to get "x"

$x = \frac{12}{5}$

$= 2\frac{2}{5}$ minutes

= 2 minutes 24 seconds

(The two hoses working together = the "unknown rate")

∴ It takes 2 min, 24 sec to fill the tank

5. Murray can tile a floor in one hour. His partner can do the same job in half the time. How long will it take them to tile the floor if they work together?

| | Given | Want |
|---|---|---|
| Murray | $\frac{1}{60}$ | rate together |
| Partner | $\frac{1}{30}$ | $\frac{1}{x}$ |

Let $x$ be the time it takes the floor to be tiled working together.

$$\frac{1}{60} + \frac{1}{30} = \frac{1}{x}$$

$$\frac{1}{60} + \frac{2}{60} = \frac{1}{x}$$

$$\frac{3}{60} = \frac{1}{x}$$

$$\Rightarrow x = \frac{60}{3}$$

$$= 20 \text{ min.}$$

$\therefore$ It takes 20 min to tile the floor together

9. Mary takes 3 h to complete a task. Mary and Jim together take 2 h to complete the same task? How long will it take Jim to complete the task working alone?

Mary + Jim = Together

| | Given | Want |
|---|---|---|
| Mary | $\frac{1}{3}$ | Jim |
| Together | $\frac{1}{2}$ | $\frac{1}{x}$ |

Let $x$ be the time it takes Jim to complete the task

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

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

DO NOT FLIP BOTH SIDES UNTIL WE HAVE Fraction = fraction

$$\Rightarrow \frac{1}{x} = \frac{3}{6} - \frac{2}{6}$$

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

flip both sides now

$$\therefore x = 6$$

$\therefore$ It takes Jim 6 hours to complete the task

#4.

| Given | Want |
|---|---|
| Andrea $\frac{1}{2}$ | 500 delivered |
| Althea $\frac{1}{3}$ | together |

Let $x$ be the time it takes to deliver the hand bills

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

$$\frac{3}{6}+\frac{2}{6}=\frac{1}{x}$$

$$\frac{5}{6}=\frac{1}{x}$$

$$\frac{6}{5}=x$$

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

∴ it takes 1 hour and 12 minutes.

By: Gte

Mathworks

#6

| Given | Want |
|---|---|
| M: $\frac{1}{30}$ | time together |
| G: $\frac{1}{20}$ | $\frac{1}{x}$ |

Let 'x' Be the time it takes together

$$\frac{1}{30}+\frac{1}{20}=\frac{1}{x}$$

$$\frac{2}{60}+\frac{3}{60}=\frac{1}{x}$$

$$\frac{5}{60}=\frac{1}{x}$$

$$\frac{60}{5}=x$$

$$12=x$$

∴ It take them 12 min. to finish together

Robyn

#7

| Given | Want |
| --- | --- |
| Ken $\frac{1}{8}$ | $\frac{1}{x}$ |
| Milan $\frac{1}{10}$ | together |

Let $x$ be the time it takes together

$$\frac{1}{8} + \frac{1}{10} = \frac{1}{x}$$

$$\frac{5}{40} + \frac{4}{40} = \frac{1}{x}$$

$$\frac{9}{40} = \frac{1}{x}$$

$$\frac{40}{9} = x$$

$$\therefore 4\frac{4}{9} = x$$

JH

$4\frac{4}{9}$ hours to finish together