Math 9 – Unit 4: Word Problems

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Lesson #5: Rate of Work Problems

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Learning Goal: We are learning to solve word problems involving rate of work.

A rate of work is how long does it take someone (or something) to complete a job. The first key is that no matter the job, think of it as ONE job. Write each scenario as a rate of work:

a) Jimmy assembles one table in 3 hours:

$\frac{1 \text{ table job}}{3 \text{ hours}}$

$\frac{1}{3}$

b) Helen delivers 30 packages in 8 hours:

1 job

$\frac{1 \text{ job of 30 packages}}{8}$

To solve a word problem involving rate of work, we will go back to using "LET" statements!

a) It takes Mary nine hours to paint a fence. Kayla can paint the same fence in eight hours. If they worked together how long would it take them?

Let: Mary : $\frac{1}{9}$

Kayla : $\frac{1}{8}$

Together : $\frac{1}{x}$

add

Equation: $\frac{1}{9} + \frac{1}{8} = \frac{1}{x}$

$(9)(8)(x)$

$\frac{(9)(8)(x)}{9} + \frac{(9)(8)(x)}{8} = \frac{(9)(8)(x)}{x}$

$8x + 9x = 72$

$\frac{17x}{17} = \frac{72}{17}$

$x = 4.2$ hours

b) Huong can pick forty bushels of apples in 10 hours. Shawna can pick the same amount in 14 hours. Find how long it would take them if they worked together.

Let: Huong : $\frac{1}{10}$

Shawna : $\frac{1}{14}$

Together : $\frac{1}{x}$

Equation: $\frac{1}{10} + \frac{1}{14} = \frac{1}{x}$

$(10)(14)(x)$

$14x + 10x = 140$

$\frac{24x}{24} = \frac{140}{24}$

$x = 5.8$ hours.

c) Working together, Danielle and Andrew can harvest a field in 6 hours. Had he done it alone it would have taken Andrew 15 hours. How long would it take Danielle to do it alone?

Let: Andrew: $\frac{1}{15}$

Danielle: $\frac{1}{x}$

Together: $\frac{1}{6}$

Equation: $\frac{1}{15} + \frac{1}{x} = \frac{1}{6}$ $(15)(x)(6)$

$6x + 90 = 15x$

$-6x \quad -6x$

$\frac{90}{9} = \frac{9x}{9}$

$10 = x$

∴ Danielle can harvest the field in 10 hours

d) Working together, Krystal and Jack can dig a 10 ft by 10 ft hole in 4.24 hours. Had he done it alone it would have taken Jack nine hours. Find how long it would take Krystal to do it alone.

Let: Jack $\frac{1}{9}$

Krystal $\frac{1}{x}$

Together $\frac{1}{4.24}$

Equation: $\frac{1}{9} + \frac{1}{x} = \frac{1}{4.24}$ $(9)(x)(4.24)$

$4.24x + 38.16 = 9x$

$-4.24x \quad -4.24x$

$\frac{38.16}{4.76} = \frac{4.76x}{4.76}$

$8 = x$

∴ Krystal can dig the hole in 8 hours.

Success Criteria:

- I can express rate of work as fractions: $\frac{job}{time}$
- I can eliminate the fractions by multiplying by the common denominator