



Concept: Problem Solving

Name:

- **You should have completed Equations Outline A and B for Topic 5: Problem Solving before beginning this handout.**

COMPUTER COMPONENT

Instructions: Select the computer program *Understanding Equations* (Neufeld)
Follow the instructions to the Main Menu.
Select *Problem Solving* from the Main Menu.

Notice: You will need to use the **Jump To** feature of the program (found on the top left of your screen) in order to get to the section where you left off.



Work through all sections of this topic **in order**:

- *Meat Mixture*
- *Coffee Mixture*
- *Rate of Work*
- *Summary – Problem Solving Using Equations*
- *Practice Questions*



As you work through the computer exercises, make your notes in the **NOTES** section of this page.

When you reach the end of the section *Practice Questions* on the computer, move on to the **OFF COMPUTER EXERCISES** below.

NOTES:**Meat Mixture**

Solve the following:

Mixers Supermarket combines meat that sells for \$6.80/kg with meat that sells for \$4.40/kg. They want a 30kg mixture that sells for \$5.20/kg. *How many kilograms of each type of meat are used?*

Let x be the amount of \$6.80 /kg meat.

Then $30 - x$ will be the amount of 5.20 /kg meat.

Fill in the table:

Meat	Amount	Value
6.80/kg	x	$6.80x$
4.40/kg	$30 - x$	$4.40(30 - x)$
5.20/kg	30	$5.20(30)$

We know the following: (*Write the equation and solve it.*)

The value of the meat at \$6.80/kg	plus	the value of the meat at \$4.40/kg	is equal to	the total value of the 30kg at \$5.10/kg
<u>$6.80x$</u>	+	<u>$4.40(30 - x)$</u>	=	<u>$5.20(30)$</u>

$$\begin{array}{rclcl}
 6.80x + 4.40(30 - x) & = & 5.20(30) & & (1) \\
 6.80x + 132 - 4.40x & = & 156 & & \\
 2.4x + 132 & = & 156 & & \\
 -132) & & 2.4x + 132 - 132 & = & 156 - 132 \\
 & & 2.4x & = & 24 \\
 \div 2.4) & & \underline{2.4x} & = & \underline{24} \\
 & & 2.4 & = & 2.4 \\
 & & x & = & 10
 \end{array}$$

Check: Substitute $x = 10$ into (1)

$$\begin{aligned}
 \text{L.S.} &= 6.80x + 4.40(30 - x) & \text{R.S.} &= 5.20(30) \\
 &= 6.8(10) + 4.40(30 - 10) & &= 156 \\
 &= 68 + 4.40(20) \\
 &= 68 + 88 \\
 &= 156 \\
 \text{L.S.} &= \text{R.S.} & \text{Therefore the Solution is correct.}
 \end{aligned}$$

The amount of \$6.80/kg meat is **10** kg.

The amount of \$4.40/kg meat is $30 - x = 30 - 10$
 $= 20\text{kg}$.

Coffee Mixture

Interesting Fact:

Coffee is the second most traded commodity in the world. Oil is the first.

<http://www.gomestic.com/Consumer-Information/25-Facts-About-Coffee.42195>

Record the step to answer the coffee mixture question.

Let y be the amount of \$5.00/kg coffee

25 kg of coffee worth \$7.00/kg is used.

Then $25 + y$ will be the amount of \$6.50/kg coffee.

Coffee	Amount	Value
7.00/kg	25	7.00(25)
5.00/kg	y	5.00 y
6.50/kg	$25 + y$	6.50(25 + y)

$$\begin{array}{rcl}
 & 5.00y + 7.00(25) & = 6.50(25 + y) & (1) \\
 & 5.00y + 175 & = 162.50 + 6.50y \\
 -6.50y) & 5.00y + 175 - 6.50y & = 162.50 + 6.50y - 6.50y \\
 & -1.50y + 175 & = 162.50 \\
 - 175) & -1.50y + 175 - 175 & = 162.50 - 175 \\
 & -1.50y & = -12.50 \\
 \div -1.50) & \underline{-1.50y} & = \underline{-12.50} \\
 & -1.50 & = -1.50 \\
 & y & = 8.3 \text{ (rounded to one decimal place)}
 \end{array}$$

Check: Substitute $y = 8.3$ into (1)

$$\begin{array}{rcl}
 \text{L.S.} & = 5.00y + 7.00(25) & \text{R.S.} = 6.50(25 + y) \\
 & = 5.00(8.3) + 7.00(25) & = 6.50(25 + 8.3) \\
 & = 41.5 + 175 & = 216.5 \\
 & = 216.5 &
 \end{array}$$

L.S. = R.S. Therefore the Solution is correct.

8.3 kg of the \$5.00/kg coffee needs to be added.

Rate of Work

To solve rate of work problems:

(a) Determine what **amount** of the job gets done in **one** hour by each person.

Mary does $\frac{1}{2}$ of a car in an hour.

Juan does $\frac{2}{3}$ of a car in an hour

- (b) Determine how much they can do in **one** hour if they work together.
 (Hint: Add together what they can do individually.)

of cars Mary does in one hour + # of cars Juan does in one hour = # of cars together in one hour

$$\frac{1}{2} + \frac{2}{3} = \text{\# of cars together in one hour}$$

Hint:

Common
Denominator

$$\frac{1 \times 3}{2 \times 3} + \frac{2 \times 2}{3 \times 2} = \text{\# of cars together in one hour}$$

$$\frac{3}{6} + \frac{4}{6} = \frac{7}{6}$$

- (c) To determine how long it will take to wash one car - divide one hour by how many cars they can wash in one hour.

Here is where our numbers start to make the problem look difficult. To understand what needs to be done – first use easier numbers.

If they wash 2 cars in an hour, to wash 1 car it takes $1 \div 2 = \frac{1}{2}$ hours.

If they wash 3 cars in an hour, to wash 1 car it takes $1 \div 3 = \frac{1}{3}$ hours.

The pattern.

If they wash $\frac{7}{6}$ of a car in an hour, to wash 1 car it takes $1 \div \frac{7}{6} = \frac{6}{7}$

Another way to look at the same problem.

Let the time taken for both of them to wash one car be t .

$$\bullet \bullet \quad t \times \# \text{ of cars Mary does in 1 hour} + t \times \# \text{ of cars Juan does in 1 hour} = 1 \text{ car}$$

$$t \times \frac{1}{2} + t \times \frac{2}{3} = 1 \text{ car}$$

<p><i>Hint:</i> <i>Common</i> <i>Denominator</i></p>
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$$t \times \frac{1 \times 3}{2 \times 3} + t \times \frac{2 \times 2}{3 \times 2} = 1 \text{ car}$$

$$t \times \frac{3}{6} + t \times \frac{4}{6} = 1 \text{ car}$$

$$\frac{7t}{6} = 1 \text{ car}$$

$$\frac{6}{7} \times \frac{7t}{6} = 1 \text{ car} \times \frac{6}{7}$$

Solve for t ,

<p><i>Hint:</i> <i>Multiply by the inverse.</i></p>

$$t = \frac{6}{7} \text{ cars}$$

Working together they can wash 1 car in $\frac{6}{7}$ of an hour.

Summary: Problem Solving Using Equations

Record the six steps in problem solving.

Step 1: Read the problem. Understand the problem.

Look for the unknown quantity

Step 2: Let a variable represent an unknown quantity.

Step 3: Express any other unknown in terms of this variable.

Make a diagram in area and perimeter questions.

Use a chart in money problems.

Use a chart in age problems.

Step 4: Write an Equation. Translate from words to math.

Step 5: Solve the equation and clearly state the answer.

Step 6: CHECK – Prove your answer is correct.

OFF COMPUTER EXERCISES

Round all decimal answers to 1 decimal place.

1. A candy store combines gum drops that sell for \$5.50/kg with gummy worms that sell for \$4.00/kg. They want to end up with 81kg of mixture that will sell for \$5.00/kg. *How many kilograms of each type of candy should they use?*

Let x be the amount of \$5.50/kg candy used.

Then **81 - x** will be the amount of \$4.00/kg candy used.

Fill in the chart.

	Amount	Value
gum drops (\$5.50/kg)	x	$5.50(x)$
gummy worms (\$4.00/kg)	$(81-x)$	$4.00(81 - x)$
mixture (\$5.00/kg)	81	5×81

Solve for x .

Value of gum drops + Value of gummy worms = value of mixture

$$\begin{array}{rcl}
 \therefore & 5.5x + 4(81-x) & = 5 \times 81 \\
 & 5.5x - 4x + 324 & = 405 \\
 & 1.5x + 324 & = 405 \\
 -324) & 1.5x + 324 - 324 & = 405 - 324 \\
 & 1.5x & = 81 \\
 & \underline{\frac{3x}{2}} & = 81 \\
 & 2 & = \\
 \times 2) & (2)\underline{\frac{3x}{2}} & = (2)81 \\
 & 2 & = \\
 & 3x & = 162 \\
 \div 3) & \underline{\frac{3x}{3}} & = \underline{\frac{162}{3}} \\
 & 3 & = 3 \\
 & x & = 54
 \end{array}$$

Check: Substitute $x = 54$ into $5.5x + 4(81-x) = 5 \times 81$

$$\begin{array}{rcl}
 \text{L.S.} & = & 5.5x + 4(81-x) \\
 & = & 5.5(54) + 4(81-54) \\
 & = & 5.5(54) + 4(81-54) \\
 & = & 297 + 108 \\
 & = & 297 + 108 \\
 & = & 405
 \end{array}
 \qquad
 \begin{array}{rcl}
 \text{R.S.} & = & 81 \times 5 \\
 & = & 405
 \end{array}$$

$$\begin{array}{rcl}
 \text{Number of kilograms of gum drops:} & = & x \\
 & = & 54 \text{ kg}
 \end{array}$$

$$\begin{array}{rcl}
 \text{Number of kilograms of gummy worms:} & = & (81-x) \\
 & = & (81 - 54) \\
 & = & 27 \text{ kg}
 \end{array}$$

They should use **54 kg** of gum drops and **27 kg** of gummy worms.

2. A gardening store combines grass seed that sells for \$2.65/kg with grass seed that sells for \$3.25/kg. The store wants a 20kg mixture that will sell for \$3.00/kg. *How many kilograms of each type of grass seed should they use*

Let x be the amount of \$2.65/kg grass seed used.

Then $20 - x$ will be the amount of \$3.25/kg grass seed used.

	Amount	Value
Seed A	x	$2.65x$
Seed B	$20 - x$	$3.25(20 - x)$
Mixture (\$3.00/kg)	20	3.00×20

Solve for x .

Value of Seed A + Value of Seed B = Value of Mixture

$$\begin{array}{rclcl}
 \therefore & 2.65x + 3.25(20 - x) & = & 3.00 \times 20 & \\
 & 2.65x + 3.25(20 - x) & = & 60 & \\
 \times 100) & 265x + 325(20 - x) & = & 6000 & \\
 & 265x + 6500 - 325x & = & 6000 & \\
 -6500) & 265x + 6500 - 325x - 6500 & = & 6000 - 6500 & \\
 & 265x - 325x & = & -500 & \\
 & -60x & = & -500 & \\
 & x & = & 8.3 \text{ (rounded to one decimal place)} &
 \end{array}$$

Check: Substitute $x = 8.3$ into $2.65x + 3.25(20-x) = 3.00 \times 20$

$$\begin{array}{rcl}
 \text{L.S.} & = & 2.65x + 3.25(20 - x) \\
 & = & 2.65(8.3) + 3.25(20 - 8.3) \\
 & = & 21.995 + 3.25(11.7) \\
 & = & 21.995 + 38.025 \\
 & = & 60.02 \\
 & = & 60 \text{ (rounded to 1 decimal place)} \\
 \text{L.S.} & = & \text{R.S.} \quad \text{Therefore the Solution is correct.}
 \end{array}$$

$$\begin{array}{rcl}
 \text{Number of kilograms of \$2.65 grass seed:} & = & x \\
 & = & 8.3\text{kg}
 \end{array}$$

$$\begin{array}{rcl}
 \text{Number of kilograms of \$3.25 grass seed:} & = & 20 - x \\
 & = & 20 - 8.3 \\
 & = & 11.7\text{kg}
 \end{array}$$

The store should use **8.3 kg** of Seed A and **11.7 kg** of Seed B.

3. Sally has 22kg of white flour worth \$1.25/kg. She wants to add whole wheat flour worth \$1.75/kg to create a blend worth \$1.40/kg. *How much whole wheat flour should she add?*

Let x be the amount of whole wheat flour.

Sally has 22 kg of white flour.

Then $x + 22$ will be the amount of the blend.

Flour Type	Amount	Value
Whole Wheat Flour	x	$1.75x$
White Flour	22	1.25×22
Blended Flour	$x + 22$	$1.40(x + 22)$

Solve for x .

$$\text{Value of WholeWheat} + \text{Value of White} = \text{Value of Blend}$$

$$\begin{array}{rcl}
 & 1.75x + 1.25 \times 22 & = 1.40(x + 22) \\
 \times 100) & 100(1.75x) + 100(1.25 \times 22) & = 100(1.40)(x + 22) \\
 & 175x + 125 \times 22 & = 140(x + 22) \\
 & 175x + 2750 & = 140x + 3080 \\
 -140x) & 35x + 2750 & = 3080 \\
 -2750) & 35x & = 330 \\
 \div 35) & x & = 9.4 \quad (\text{rounded to 1 decimal place})
 \end{array}$$

Check: Substitute $x = 9.4$ into $1.75x + 1.25 \times 22 = 1.40(x + 22)$

$$\begin{array}{rcl}
 \text{L.S.} & = & 1.75x + 1.25 \times 22 \\
 & = & 1.75(9.4) + 1.25 \times 22 \\
 & = & 16.45 + 27.5 \\
 & = & 43.95 \\
 & = & 44 \quad (\text{rounded}) \\
 \text{R.S.} & = & 1.40(x + 22) \\
 & = & 1.40(9.4 + 22) \\
 & = & 1.40(31.4) \\
 & = & 43.96 \\
 & = & 44 \quad (\text{rounded})
 \end{array}$$

L.S. = R.S. Therefore the Solution is correct.

Sally should add 9.4 kg of whole wheat flour.

4. Jeremy is able to pick an orchard of apples in 2 days when he works alone. Joshua is younger and is able to pick the same orchard of apples in 4 days when he works alone. They enjoy each other's company. How long would it take them if they worked together?

Let x days be the time it takes to pick the orchard if they work together.

Since Jeremy takes 2 days to pick the orchard, in 1 day he picks 0.5 of the orchard.

Since Joshua takes 4 days to pick the orchard, in 1 day he picks 0.25 of the orchard.

In x days, Jeremy can pick 0.5x of the orchard

 Joshua can pick 0.25x of the orchard.

So when they work together to pick the orchard,

Jeremy's work + Joshua's work = 1 (*The whole job*)

Continue on to finish the solution.

$$\begin{array}{rcl}
 \therefore & 0.5x + 0.25x & = 1 \\
 & 0.75x & = 1 \\
 \text{or} & \frac{3x}{4} & = 1 \\
 & \frac{3x}{4} & = 1 \\
 \times \frac{4}{3} & \frac{4}{3} \times \frac{3x}{4} & = 1 \times \frac{4}{3} \\
 & x & = \frac{4}{3}
 \end{array}$$

Check: Substitute $x = \frac{4}{3}$ into $0.5x + 0.25x = 1$

$$\begin{array}{rcl}
 \text{L.S.} & = & 0.5x + 0.25x & \qquad \qquad \text{R.S.} & = & 1 \\
 & = & \left(\frac{1}{2}\right)\left(\frac{4}{3}\right) + \left(\frac{1}{4}\right)\left(\frac{4}{3}\right) & & & \\
 & = & \frac{4}{6} + \frac{1}{3} & & & \\
 & & \frac{4}{6} + \frac{2}{6} & & & \\
 & & 1 & & &
 \end{array}$$

L.S. = R.S. Therefore the Solution is correct.

Working together they can pick all the apples in the orchard in $1 \frac{1}{3}$ days.

5. Bob has 1500g nails worth \$4.45/kg. He wants to add nails worth \$4.05/kg to create a blend worth \$4.10/kg. *How many grams of the second type of nails should he add?*

(Hint: Use a chart in money problems)

Let x represent the amount of added nails (kg).

Nails	Amount	Value
Type 1 nails	1.5	4.45(1.5)
Type 2 nails	x	4.05 x
Blended Nails	$1.5 + x$	4.10($1.5 + x$)

Value of Type 1 + Value of Type 2 nails = Value of Blended Nails

$$\begin{array}{rcl}
 \therefore & 4.45(1.5) + 4.05x & = 4.10(1.5 + x) \\
 \times 100) & 445(1.5) + 405x & = 410(1.5 + x) \\
 & 667.5 + 405x & = 615 + 410x \\
 -405x) & 667.5 + 405x - 405x & = 615 + 410x - 405x \\
 & 667.5 & = 615 + 5x \\
 -615) & 667.5 - 615 & = 615 + 5x - 615 \\
 & 52.5 & = 5x \\
 \div 5) & \underline{52.5} & = \underline{5x} \\
 & 5 & 5 \\
 & 10.5 & x
 \end{array}$$

Check: Substitute $x = 10.5$ into $4.45(1.5) + 4.05x = 4.10(1.5 + x)$

$$\begin{array}{rcl}
 \text{L.S.} & = & 4.45(1.5) + 4.05x \\
 & = & 4.45(1.5) + 4.05(10.5) \\
 & = & 6.675 + 42.525 \\
 & = & 49.2 \\
 \text{R.S.} & = & 4.10(1.5 + x) \\
 & = & 4.10(1.5 + 10.5) \\
 & = & 6.15 + 43.05 \\
 & = & 49.2
 \end{array}$$

L.S. = R.S. Therefore the Solution is correct.

Bob should use 10.5 kg or 1050 grams of the second type of nails.

6. If Joe works alone he can clean the house in 8 hours. Mary can clean the house alone in 6 hours. Joe and Mary decide to clean the house together. *How long will it take them?*

Name	Hours/house	Houses/hour
Joe	8	$\frac{1}{8}$
Mary	6	$\frac{1}{6}$

Working together,

Let the time it takes for them to clean 1 house be x hours.

$$\begin{aligned} \therefore \quad & \frac{1x}{8} + \frac{1x}{6} = 1 \\ \times 24) \quad & 3x + 4x = 24 \\ & 7x = 24 \\ \div 7) \quad & x = 3.4 \quad (\text{rounded to one decimal places}) \end{aligned}$$

Check: Substitute $x = 3.4$ into $\frac{1x}{8} + \frac{1x}{6} = 1$

$$\begin{aligned} \text{L.S.} &= \frac{1x}{8} + \frac{1x}{6} & \text{R.S.} &= 1 \\ &= \frac{1(3.4)}{8} + \frac{1(3.4)}{6} \\ &= \frac{3.4}{8} + \frac{3.4}{6} \\ &= \frac{3.4}{8} \times \frac{3}{3} + \frac{3.4}{6} \times \frac{4}{4} \\ &= \frac{10.2}{24} + \frac{13.6}{24} \\ &= \frac{23.8}{24} \\ &= 1 \quad (\text{rounded}) \end{aligned}$$

L.S. = R.S. Therefore the Solution is correct.

It will take them 3.4 hours to clean the house when working together.

Another way:

In 8 hours Joe can clean 1 house.

In 6 hours Mary can clean 1 house

•• In 24 hours Joe can clean 3 houses.

In 24 hours Mary can clean 4 houses.

Working together they can clean 7 houses in 24 hours

Working together they can clean 1 house in $\frac{24}{7}$ hours or 3.4 hours.

7. Juan can paint the house in two days when he works alone. Juanita can paint the house in three days when she works alone. *How long will it take Juan and Juanita to paint the house if they work together?*

Name	Days/House	Houses/Day
Juan	2	$\frac{1}{2}$
Juanita	3	$\frac{1}{3}$

When working together, let the time it takes for them to paint 1 house be x days.

$$\begin{aligned} \therefore \quad & \frac{1x}{2} + \frac{1x}{3} = 1 \\ \times 6) \quad & 3x + 2x = 6 \\ & 5x = 6 \\ \div 5) \quad & x = 1.2 \end{aligned}$$

Check: Substitute $x = 1.2$ into $\frac{1x}{2} + \frac{1x}{3} = 1$

$$\begin{aligned} \text{L.S.} &= \frac{1x}{2} + \frac{1x}{3} & \text{R.S.} &= 1 \\ &= \frac{1(1.2)}{2} + \frac{1(1.2)}{3} \\ &= \frac{1.2}{2} + \frac{1.2}{3} \\ &= \frac{1.2}{2} \times \frac{3}{3} + \frac{1.2}{3} \times \frac{2}{2} \\ &= \frac{3.6}{6} + \frac{2.4}{6} \\ &= \frac{6}{6} \\ &= 1 \end{aligned}$$

L.S. = R.S. Therefore the Solution is correct.

Working together, it will take Jaun and Juanita 1.2 days to paint the house.

8. It takes Max and Jennie two hours to mow the lawn when they work together. If Max works alone it takes him three hours to mow the lawn. *How long does it take Jennie to mow the lawn when she works alone?*

Let the time Jennie takes to mow the lawn to be represented by x .

Name	Hours/Lawn	Lawns/Hour	Lawns Mowed in 2 hours
Max	3	$\frac{1}{3}$	$\frac{1}{3} \times 2$
Jennie	x	$\frac{1}{x}$	$\frac{1}{x} \times 2$

Using the lawn mowed in 2 hours column and given that working together they mowed 1 lawn in 2 hours.

$$\begin{array}{rcl} \therefore & \frac{1}{3} \times 2 + \frac{1}{x} \times 2 & = 1 \\ \times 3) & 2 + \frac{2}{x} & = 3 \\ & \underline{x} & \\ -2) & \frac{2}{x} & = 1 \\ \times x) & 2 & = x \end{array}$$

Check: Substitute $x = 6$ into $\frac{1}{3} \times 2 + \frac{1}{x} \times 2 = 1$

$$\begin{array}{rcl} \text{L.S.} & = & \frac{1}{3} \times 2 + \frac{1}{x} \times 2 & \text{R.S.} & = & 1 \\ & = & \frac{1}{3} \times 2 + \frac{1}{6} \times 2 & & & \\ & = & \frac{2}{3} + \frac{2}{6} & & & \\ & = & \frac{2}{3} \times \frac{2}{2} + \frac{2}{6} & & & \\ & = & \frac{4}{6} + \frac{2}{6} & & & \\ & = & \frac{6}{6} & & & \\ & = & 1 & & & \end{array}$$

L.S. = R.S. Therefore the Solution is correct.

When working alone, Jennie will take 6 hours to mow the lawn.

Interesting Fact:

The Swiss lead the world in chocolate consumption per capita. They consume roughly 22 pounds of chocolate per person per year.

www.geocities.com/NapaValley/4908/trivia.htm

9. A chocolate factory wants to combine chocolates that sell for \$5.60/kg with chocolates that sell for \$6.20/kg. They want to end up with 24kg of mixture that will sell for \$6.00/kg. *How many grams of each type should they use?*

Let the amount of 5.60/kg chocolate be x kg.

Let the amount of 6.20/kg chocolate be y kg.

Type	Amount	Value
1 st at 5.60/kg	x	$5.60x$
2 nd at 6.20/kg	y	$6.20y$
Mixture 6.00/kg	24	$6.00(24)$

$$\therefore \quad 5.6x + 6.20y = 6.00 \times 24 \quad (1)$$

$$x + y = 24 \quad (2)$$

Simplify and arrange terms

$$\therefore \quad 5.6x + 6.20y = 144 \quad (1)$$

$$x + y = 24 \quad (2)$$

Multiply equation (2) by -5.6 so that x terms add to 0

$$5.6x + 6.20y = 144 \quad (1)$$

$$\begin{array}{r} \times -5.6 \\ (1) + (2) \end{array} \quad \begin{array}{r} 5.6x + 6.20y = 144 \\ -5.6x - 5.6y = -134.4 \\ \hline 0x + 0.6y = 9.6 \end{array} \quad (2)$$

$$0.6y = 9.6$$

$$\div 0.6 \quad y = 16$$

Substitute $y = 16$ into the equations (2) $x + y = 24$ and solve for the other variable

$$x + y = 24 \quad (2)$$

$$x + 16 = 24$$

$$\begin{array}{r} -16) \\ x = 8 \end{array}$$

The amount of 5.60/kg chocolate is 8kg.

The amount of 6.20/kg chocolate is 16 kg.

Check: Substitute $x = 8$ and $y = 16$ into $5.6x + 6.20y = 6.00 \times 24$ (1)

$$\begin{array}{lcl}
 \text{L.S.} & = & 5.6x + 6.20y \\
 & = & 5.6(8) + 6.20(16) \\
 & = & 44.8 + 99.2 \\
 & = & 144 \\
 \text{R.S.} & = & 6.00 \times 24 \\
 & = & 144
 \end{array}$$

L.S. = R.S. Therefore the Solution is correct.

10. Uncle Al requires a large water tank to be filled in order to plant his tomato seeds.

He has three options for filling the water tank.

Option 1: He can use a large hose ... it requires 3 minutes to fill the tank.

Option 2: He can use a small hose ... it requires 5 minutes to fill the tank.

Option 3: He can use both hoses at the same time.

How long will it take to fill the tank using Option 3?

Let the time to fill 1 tank with option 3 be represented by x

<i>Option Number</i>	<i>Minutes/tank</i>	<i>Tank/minutes</i>	<i>Amount Filled in x minutes</i>
Option 1	3	$\frac{1}{3}$	$\frac{1}{3}x$
Option 2	5	$\frac{1}{5}$	$\frac{1}{5}x$
Option 3	x		1

$$\begin{array}{lcl}
 \therefore & \frac{1}{3}x + \frac{1}{5}x & = 1 \\
 \times 15) & 5x + 3x & = 15 \\
 & 8x & 15 \\
 \div 8) & x & = \frac{15}{8} \\
 & x & = 1.875
 \end{array}$$

Check: Substitute $x = \frac{15}{8}$ into $\frac{1}{3}x + \frac{1}{5}x = 1$

$$\begin{aligned}
 \text{L.S.} &= \frac{1}{3}x + \frac{1}{5}x & \text{R.S.} &= 1 \\
 &= \frac{1}{3} \times \frac{15}{8} + \frac{1}{5} \times \frac{15}{8} \\
 &= \frac{5}{8} + \frac{3}{8} \\
 &= \frac{8}{8} \\
 &= 1
 \end{aligned}$$

L.S. = R.S. Therefore the Solution is correct.

Using both hoses (Option 3), he can fill the tank in 1.875 minutes.