KEY

L51 – 9.3 Problem Solving

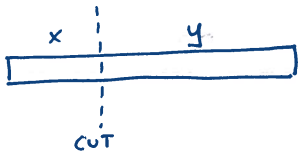
Part 1 – Method

Process:

1. Assign variables using "Let" statements. ⇒ What are you looking for? Those are your variables.
2. Set up first equation.
3. Set up second equation.
4. Solve for variables using Substitution or Elimination.
5. Write a conclusion statement.

Part 2 – Examples

Q1: An 82m cable is cut into two pieces. One piece is 18m longer than the other. What is the length of each piece?



Let x = length of short piece
y = long piece's length

$(x) + (y) = 82$
$y = x + 18$

⇒ Substitution

$x + y = 82$
$x + (x+18) = 82$
$2x + 18 = 82$
$-18 \quad -18$
$2x = 64$
$\div 2 \quad \div 2$
$\boxed{x = 32}$

$y = x + 18$
$y = (32) + 18$
$\boxed{y = 50}$

Short piece is 32m.
Long piece is 50m

Q2: Whitehorse, YT, has three times as much snowfall each year as Vancouver, BC. The total combined snowfall for these two cities is approximately 192 cm. What is the snowfall in each city?

Let x = snowfall in Whitehorse
y = snowfall in Vancouver

$x + y = 192$
$x = 3y$

⇒ Substitution

$x + y = 192$
$(3y) + y = 192$
$4y = 192$
$\div 4 \quad \div 4$
$\boxed{y = 48}$

$x = 3y$
$x = 3(48)$
$\boxed{x = 144}$

Snowfall in Whitehorse is 144cm.
Snowfall in Vancouver is 48cm.

KEY

Q3: Alaina has $72 and earns $6 each day. Joel has $48 and earns $8 each day. In how many days will Joel have as much money as Alaina?

Let y = money
x = day

$y = 72 + 6x$
$y = 48 + 8x$ ⟹ Elimination

$y = 72 + 6x$
$-(y = 48 + 8x)$
$0 = 24 - 2x$
$+2x \quad +2x$
$2x = 24$
$\div 2 \quad \div 2$
$\boxed{x = 12}$

$y = 72 + 6x$
$y = 72 + 6(12)$
$\boxed{y = 144}$

After 12 days, both will have $144.

Q4: In Manitoba, teenagers watch approximately 11 fewer hours of TV each week than adults do. The sum of the hours watched per week for an adult and a teenager is about 37 hours. Approximately how many hours per week do teenagers watch?

Let x = adult hours of TV
y = teenager hours of TV

$x + y = 37$
$y = x - 11$ ⟹ Substitution

$x + y = 37$
$x + (x - 11) = 37$
$2x - 11 = 37$
$+11 \quad +11$
$2x = 48$
$\div 2 \quad \div 2$
$\boxed{x = 24}$

$y = x - 11$
$y = (24) - 11$
$\boxed{y = 13}$

Adults watch 24 hours.
Teenagers watch 13 hours.

Q5: A young Colorado blue spruce tree is growing at a rate of 20 cm per year. Currently, it is 244 cm tall. A 300 cm tall white spruce tree is growing at a rate of 12 cm per year. In how many years will the two trees be the same height?

Let y = height
x = years

$y = 244 + 20x$
$y = 300 + 12x$ ⟹ Elimination

$y = 244 + 20x$
$-(y = 300 + 12x)$
$0 = -56 + 8x$
$+56 \quad +56$
$56 = 8x$
$\div 8 \quad \div 8$
$\boxed{7 = x}$

$y = 244 + 20x$
$y = 244 + 20(7)$
$\boxed{y = 384}$

After 7 years, both trees will be 384 cm tall.

Math 10C

KEY

Q6: A preschool playground has both bicycles and tricycles. There is a total of 30 seats and 70 wheels. How many bicycles are there? How many tricycles are there?

Let x = bicycles
y = tricycles

$x + y = 30$
$2x + 3y = 70$ ⟹ Elimination

$2(x + y = 30)$
$2x + 3y = 70$ ⇒

$2x + 2y = 60$
$-(2x + 3y = 70)$

$-1y = -10$
$\div(-1) \quad \div(-1)$
$y = 10$

$x + y = 30$
$x + 10 = 30$
$x = 20$

There are 20 bicycles and 10 tricycles.

Q7: Students at Evergreen High School want to help the community with the Communities in Bloom project. They decide to sell flower bulbs to raise money. Nancy sells 10 bags of tulip bulbs and 12 bags of iris bulbs for $380. Shawn sells 6 bags of tulip bulbs and 8 bags of iris bulbs for $244. What is the cost of one bag of tulip bulbs? What is the cost of one bag of iris bulbs?

Let x = tulip bulb price
y = price of iris bulbs

$10x + 12y = 380$
$6x + 8y = 244$ ⟹ Elimination

$2(10x + 12y = 380)$
$3(6x + 8y = 244)$ ⇒

$20x + 24y = 760$
$-(18x + 24y = 732)$

$2x = 28$
$\div 2 \quad \div 2$
$x = 14$

$10(14) + 12y = 380$
$140 + 12y = 380$
$12y = 240$
$y = 20$

Tulips cost $14,

Q8: At the snack bar, five toasted bagels and three cans of juice cost $12.50. Three toasted bagels and six cans of juice cost $12.75. What is the price for one bagel? What is the price for one juice?

Let x = price of bagel
y = price of juice.

$5x + 3y = 12.50$
$3x + 6y = 12.75$ ⟹ Elimination

$2(5x + 3y = 12.50)$
$3x + 6y = 12.75$ ⇒

$10x + 6y = 25$
$-(3x + 6y = 12.75)$

$7x = 12.25$
$\div 7 \quad \div 7$
$x = 1.75$

$5x + 3y = 12.50$
$5(1.75) + 3y = 12.50$
$8.75 + 3y = 12.50$
$3y = 3.75$
$y = 1.25$

Bagels cost $1.75
Juice costs $1.25