

Grade 9 Academic Math  
Unit 2 – Solving Equations – Part B

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Victim: Mr. Solutions

Brilliant deductions  
Mr. S.!!

| KU  | APP   | TIPS  | COM   |
|-----|-------|-------|-------|
| 9/9 | 23/23 | 10/10 | 10/10 |

1. Complete the following table: [6 COM]

| English Phrase or Sentence                                                                                             | Algebraic Expression or Equation |
|------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| (a) Triple a number decreased by 11                                                                                    | $3n - 11$ ✓                      |
| (b) Three more than a number divided by 5 ✓                                                                            | $\frac{x}{5} + 3$                |
| (c) Fifteen less than triple a number                                                                                  | $3n - 15$ ✓                      |
| (d) The sum of two consecutive odd integers is 96.                                                                     | $a + a + 2 = 96$ ✓               |
| (e) One-fifth of the distance travelled, decreased by 30 is 150.                                                       | $\frac{d}{5} - 30 = 150$ ✓       |
| (f) A number is first decreased by 4, then the result is multiplied by 5. Then 3 is added, giving a final result of 2. | $5(x - 4) + 3 = 2$               |

2. Hosah the Super Cake Boss loves creating Super-Sized Dora the Explorer birthday cakes. Each Dora cake has a length that is 1.85 *times* greater than the width. In addition, the perimeter of each Dora cake is 570 cm. Find the *dimensions* (i.e. length and width) of the cake. [9 KU in total]

- (a) Construct an algebraic model that uses only *one variable*. (2 KU)

| Unknown | Algebraic Representation |
|---------|--------------------------|
| Width   | $w$ ✓                    |
| Length  | $1.85w$ ✓                |

- (b) Translate the problem into an equation. (2 KU)

$$2(w + 1.85w) = 570$$



- (c) Solve the equation. (3 KU)

$$\begin{aligned}
 2(w + 1.85w) &= 570 \\
 \therefore 2(2.85w) &= 570 \quad \checkmark \\
 \therefore 5.7w &= 570 \\
 \therefore \frac{5.7w}{5.7} &= \frac{570}{5.7} \quad \checkmark \\
 \therefore w &= 100 \quad \checkmark \\
 \therefore 1.85w &= 1.85(100) = 185
 \end{aligned}$$

- (d) State a conclusion. (1 KU)

The width of the cake is 100 cm and the length is 185 cm. ✓

- (e) Check the solution. (1 KU)

$$\begin{aligned}
 2(100) + 2(185) \\
 = 200 + 370 \quad \checkmark \\
 = 570
 \end{aligned}$$

3. Jashveer earns \$2.00 per hour **more than** Subhan but \$2.50 per hour **less than** Gurtej. Altogether, the three students earn \$69.50 per hour. [8 APP in total]

- (a) Let  $s$  represent Subhan's hourly wage. Express Jashveer's and Gurtej's hourly wages in terms of  $s$ . **Only the variable "s" should be used!** You will not solve this problem if you use more than one variable! (2 APP)

| Student  | Expression for Hourly Wage |
|----------|----------------------------|
| Subhan   | $s$                        |
| Jashveer | $s+2$                      |
| Gurtej   | $s+4.5$                    |

I'm special!  
I earn the most!

I'm stuck  
in the  
middle!

That  
\$μ@κ\$! I  
earn the  
least!

"Wage" = Money that is paid regularly for work.

- (b) Use the following sentence to write an equation:

"Altogether, the three students earn \$69.50 per hour." (2 APP)

$$s + s + 2 + s + 4.5 = 69.5$$

- (c) Now **solve your equation** and **state a conclusion**. (4 APP)

$$\begin{aligned} s + s + 2 + s + 4.5 &= 69.5 \\ \therefore 3s + 6.5 &= 69.5 \\ \therefore 3s + 6.5 - 6.5 &= 69.5 - 6.5 \\ \therefore 3s &= 63 \\ \therefore \frac{3s}{3} &= \frac{63}{3} \end{aligned}$$

$\therefore s = 21$  ✓  
Therefore, Subhan earns \$21/h, Jashveer earns \$23/h and Gurtej earns \$25.50/h. -1C for not stating

4. Andy Appliances pays salespeople \$10.00 per hour worked **plus** 4% of total sales. [9 APP in total]

- (a) Complete the following table by writing an **algebraic expression** for the **amount earned**. (3 APP)

| Quantity               | Variable | Algebraic Expression for Amount Earned in \$ |
|------------------------|----------|----------------------------------------------|
| Number of Hours Worked | $t$      | $10t$ for working $t$ hours                  |
| Appliance Sales (\$)   | $s$      | $0.04s$ for having sales of $s$ \$           |
| Total Earnings (\$)    | $E$      | $10t + 0.04s$ in total                       |

Forget Bad Boy and all the others! I'm the **baddest** boy in town and I have the **hottest** prices! Nobody beats Andy Appliances!

- (b) How much would salesperson Snoop Lion earn for working for 20 hours and having sales of \$20,000.00? (2 APP)  $E = ?$ ,  $t = 20$ ,  $s = 20000$

$$\begin{aligned} E &= 10(20) + 0.04(20000) \\ &= 200 + 800 \\ &= 1000 \end{aligned}$$

Snoop Lion earns \$1000 for 20 hours of work and \$20,000 in sales.

- (c) How much does salesperson AfroMan need to sell to earn \$1500.00 for 25 hours of work? (4 APP)  $E = 1500$ ,  $t = 25$ ,  $s = ?$

$$\begin{aligned} 1500 &= 10(25) + 0.04s \\ \therefore 1500 &= 250 + 0.04s \\ \therefore 1500 - 250 &= 250 + 0.04s - 250 \\ \therefore 1250 &= 0.04s \end{aligned}$$

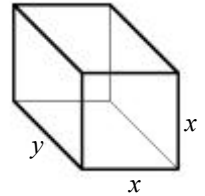
$$\therefore \frac{1250}{0.04} = \frac{0.04s}{0.04}$$

$$\therefore 31250 = s$$

AfroMan must have sales of \$31,250 to earn \$1500 for 25 hours of work.

-1C for not stating

5. Shown at the right is a shape known as a **square prism**. Its surface area can be found using the formula  $A = 2x^2 + 4xy$ .



- (a) Rearrange the formula to isolate  $y$ . (That is, solve for  $y$  in terms of  $x$  and  $A$ ). (4 APP)

$$A - 2x^2 = 2x^2 + 4xy - 2x^2$$

$$\therefore A - 2x^2 = 4xy$$

$$\therefore \frac{A - 2x^2}{4x} = \frac{4xy}{4x}$$

$$\therefore y = \frac{A - 2x^2}{4x}$$

- (b) Given that  $x=5$  and  $A=200$ , use the equation that you obtained in (a) to solve for  $y$ . (2 APP)

$$y = \frac{200 - 2(5)^2}{4(5)}$$

$$= 7.5$$

Using a scientific calculator.  
Recall that scientific calculators follow BEDMAS.  $(200 - 2 \times 5^2) \div (4 \times 5)$

6. The “We R’ Nuts” bulk food store sells cashews at \$20/kg and peanuts at \$10/kg. If the store wants to make a mixture of 500 kg of cashews and peanuts to sell for \$16/kg, how many kilograms of cashews and how many kilograms of peanuts must be in the mixture?

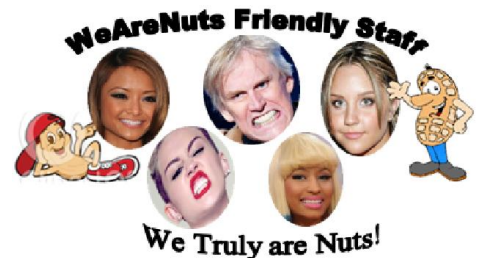
- (a) Complete the following table. Remember that all quantities must be expressed in terms of **one variable**. If you use more than one variable you will not be able to solve this problem! (2 TIPS)

| Quantity                                                                                                          | Representation | Cost (Dollars)     |
|-------------------------------------------------------------------------------------------------------------------|----------------|--------------------|
| Kilograms of Peanuts in the <b>500 kg mixture</b> .                                                               | $p$            | $10p$              |
| Kilograms of Cashews in the <b>500 kg mixture</b> .                                                               | $500 - p$      | $20(500 - p)$ ✓    |
| Total Kilograms of Nuts in the <b>500 kg mixture</b> .<br>(There should <b>not</b> be any variables in this row!) | $500$          | $500(16) = 8000$ ✓ |

- (b) Translate the following sentence into an equation: (3 TIPS)

“In the 500 kg mixture, the cost of the peanuts **plus** the cost of the cashews **is** the total cost of the mixture.”

$$10p + 20(500 - p) = 8000$$



- (c) Now solve the equation and state a conclusion. (5 TIPS)

$$10p + 20(500 - p) = 8000$$

$$\therefore 10p + 10000 - 20p = 8000$$

$$\therefore -10p + 10000 = 8000$$

$$\therefore -10p + 10000 - 10000 = 8000 - 10000$$

$$\therefore -10p = -2000$$

$$\therefore \frac{-10p}{-10} = \frac{-2000}{-10}$$

$$\therefore p = 200$$

$$\therefore 500 - p = 300$$

The mixture should contain 200 kg of peanuts and 300 kg of cashews. ✓