MAKISSA 2024:

1) Your friend is a market vender. She realizes that her customers prefer buying tomatoes in small quantities, so, she decides to re-package her tomatoes into heaps of four. One day she bought nine heaps of tomatoes which had eight tomatoes each from the market at a cost of Ugx 2000 per heap and was given a discount of 5% she decides to sell her heaps of four tomatoes at Ugx 1,200 each and hence wants to find out how much gross profit she will earn from all her heaps. She further intends to visit Queen Elizabeth National Park in December 2024. Her uncle visited the same tourism centre last December 2023 with his 3 children and spent Ugx 17,000 on entrance tickets. Mr and Mrs Mulcasa visited the same park in June 2024 with their child and spent 14,000. She plans to buy entrace tickets for herself, husband and five children and hence needs to know how much she will need. If park charges are adjusted every after five years.

Task

How much,

a) Gross profits will she earn from her heaps after re-packaging?

b) Money will she spend in total to buy the tickets she needs?

Soln:

a) Interpretation:

Cost of heap of 8 tomatoes = shs 2000.

Number of heaps of 8 tomatoes bought = 9 heaps.

Discount = 5%.

Selling price @ heap of 4 tomatoes = shs 1200.

Gross profit after repackaging = ???

Total cost price before the discount = n x Amount @ heap

= 9 x 2000

= shs 18000.

Total cost price after the discount = $\left(\frac{100-5}{100}\right) \times 18000$

= $\frac{95}{100} \times 18000$

= 0.95×18000

C.P = shs 17100.

My friend used shs 17100 to buy the tomatoes.

Total Number of tomatoes bought = No. of heaps x Qty @ heap bought

= 9 x 8

= 72 tomatoes.

Number of heaps of 4 obtained = $\frac{\text{Qty of tomatoes bought}}{4}$

= $\frac{72}{4}$

= 18 heaps.

Total Selling price = n x Amount @ heap

for heaps of 4 tomatoes

= 18 x 1200

S.P = shs 21600.

My Friend obtained shs 21600 after selling her tomatoes.

Gross profit = S.P - C.P

= 21600 - 17100

Gross profit = shs 4500.

Therefore, she will Earn a gross profit of shs 4500 after re-packaging.

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b) Amount needed for 2 Adults & 5 children = ???

Let the amount @ Adult be x and Amount @ child be y

Case I: Considering her Uncle:

$x + 3y = 17000$ ..... (1)

Case II: Considering Mr & Mrs Mukasa:

$2x + y = 14000$

$y = 14000 - 2x$ ... (2)

Replacing y in (1):

$x + 3y = 17000$

$x + 3(14000 - 2x) = 17000$

$x + 42000 - 6x = 17000$

$-5x = 17000 - 42000$

$\frac{-5x}{-5} = \frac{+25000}{+5}$

$x = \text{shs } 5000.$

From (2): $y = 14000 - 2x$

$= 14000 - 2(5000)$

$= 14000 - 10000$

$y = \text{shs } 4000.$

Each adult ticket costs shs 5000 and Each ticket for children costs shs 4000.

Amount need for 2 adults & 5 children:

$= 2x + 5y$

$= 2(5000) + 5(4000)$

$= 10000 + 20000$

$= \text{shs } 30000.$

Therefore, She will spend shs 30000 to buy the tickets she needs...

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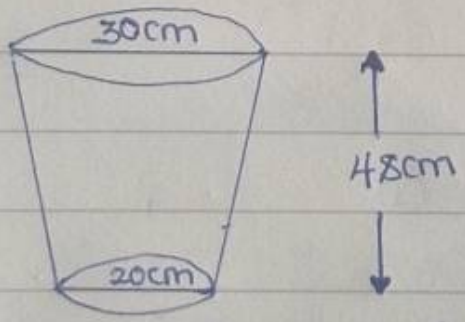
Item 6:

A manager owns a paint Company which makes paint of various colours. He receives an order from his clients to make paint by mixing three colours; White (W), Blue (B), and Red (R). in the ratios W:B = 3:2 and B:R = 3:2. The Customer orders for 380 litres of similar paint. Paint (W) costs Ugx 2200 per litre. Paint (B) costs Ugx 2700 per litre and Paint (R) costs Ugx 2850 per litre.

The manager packs the paint made in buckets in a shape of a frustrum with top diameter 30cm and bottom diameter 20cm. The buckets are 48cm deep as shown:



If the manager buys a cylinderical tank of diameter 1.8m, height 1.2m which he wants to fill with paint so as to cater for any urgent demand that may arise.

Task:

a) (i) Determine the quantity of Each paint in the mixture.

(ii) Find the amount needed to make 1 litre of the mixture.

(iii) Obtain the percentage profit made by selling the mixture at shs 3800 per litre.

b) Help Manager in determining the number of buckets that must be drawn to fill the tank.

Soln:

6a) Interpretation:

Ratios: W:B = 3:2 and B:R = 3:2

Qty of paint (mixture) ordered = 380 litres

Cost of White paint @ 1 litre = ₦9x 2200

Cost of Blue paint @ 1 litre = ₦9x 2700

Cost of Red paint @ 1 litre = ₦9x 2850

i) Qty of Each paint in the mixture = ???

Expressing the Ratios as Fractions:

W:B = 3:2

$\frac{W}{3} = \frac{B}{2}$ ..... ①

B:R = 3:2

$\frac{B}{3} = \frac{R}{2}$ ..... ②

LCM of denominators of common ratios = 6.

Denominators of Eqn ① x 3:

$\frac{W}{(3\times3)} = \frac{B}{(2\times3)}$

$\frac{W}{9} = \frac{B}{6}$ ..... ③

Denominators of Eqn ② x 2:

$\frac{B}{(3\times2)} = \frac{R}{(2\times2)}$

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$\frac{B}{6} = \frac{R}{4}$ ----- (4)

Combining (3) and (4) using the common Ratios:

$\frac{B}{6} = \frac{W}{9} = \frac{R}{4}$

Thus; B : W : R = 6 : 9 : 4

Total Ratio = 6+9+4

= 19

Qty of B = $\frac{6}{19} \times 380$

= 120 litres

Qty of W = $\frac{9}{19} \times 380$

= 180 litres

Qty of R = $\frac{4}{19} \times 380$

= 80 litres

Therefore, there were 120 litres of White paint, 180 litres of Blue paint, and 80 litres of Red paint in the mixture.

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(ii) Cost needed to make 1 litre of the mixture = ???

Qty of K @ 1 litre $= \frac{6}{19} \times 1$

$= \frac{6}{19}$ litres.

Cost of K @ 1 litre of the mixture $= \frac{6}{19} \times 2200$

$=$ Shs 69.4737

$\approx$ Shs 69.5.

Qty of B @ 1 litre $= \frac{9}{19} \times 1$

$= \frac{9}{19}$ litres

Cost of B @ 1 litre of the mixture $= \frac{9}{19} \times 2700$

$=$ Shs 1278.9474

$\approx$ Shs 1278.9

Qty of R @ 1 litre $= \frac{4}{19} \times 1$

$= \frac{4}{19}$ litres.

Cost of R @ 1 litre of the mixture $= \frac{4}{19} \times 2850$

$=$ Shs 600.

Total Cost @ 1 litre of the mixture $= 69.5 + 1278.9 + 600$

= Ugx 1948.4

≈ Ugx 1950.

Therefore, roughly Ugx 1950 is needed to make 1 litre of the mixture...

iii) %age profit made = ???

C.P = Ugx 1950 @ litre.

S.P = Ugx 3800 @ litre.

Total cost price of the mixture = n x Amount @ litre

= 380 x 1950

= Ugx 741000

Total Selling Price of the mixture = n x Amount @ litre

= 380 x 3800

= Ugx 1444000.

%age Profit = $\frac{\text{Profit}}{\text{C.P}} \times 100\%$

= $\frac{(\text{S.P} - \text{C.P})}{\text{C.P}} \times 100\%$

= $\left(\frac{1444000 - 741000}{741000}\right) \times 100$

= $\frac{703000000}{741000}$

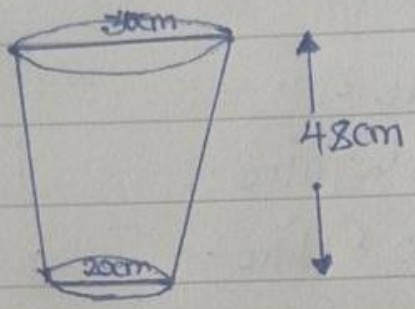
= 94.9%

Therefore, the percentage made by selling the mixture is 94.9%.

b) interpretation:

Base of the Cylinderical tank = 1·8m (180cm)

Height of the Cylindrical tank = 1·2m (120cm)



Number of buckets that must Fill the tank = ???

Volume of the tank = base Area x height

$= \pi r^2 \times h$

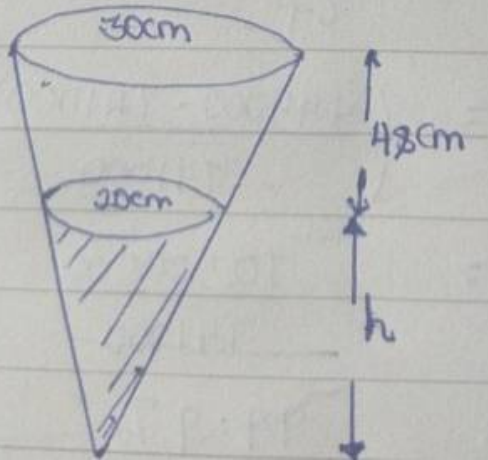
$= \pi \left(\frac{d}{2}\right)^2 \times h$

$= \frac{22}{7} \times \left(\frac{180}{2}\right)^2 \times 120$

$= \frac{85536000}{28}$

$= 3054857.14286\ cm^3$

Volume of the bucket:



$H = (h + 48)cm$

By Similarity:

$$\frac{30}{20} = \frac{(h+48)}{h}$$

$$30h = 20(h+48)$$

$$30h = 20h + 960$$

$$30h - 20h = 960$$

$$\frac{10h}{10} = \frac{960}{10}$$

$$h = 96cm$$

From $H = h + 48$

$= 96 + 48$

$= 144cm$

Volume of the bucket $= \frac{1}{3}\pi\left(R^2H - r^2h\right)$

$$= \frac{1}{3} \times \frac{22}{7}\left[\left(\frac{30}{2}\right)^2 \times 144 - \left(\frac{20}{2}\right)^2 \times 96\right]$$

$$= \frac{22}{21}\left(32400 - 96\right)$$

$$= \frac{22}{21} \times 22800$$

$$= 23885.7142857 cm^3$$

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No of buckets = $\frac{\text{Volume of the tank}}{\text{Volume of a bucket}}$

$= \frac{3054857.14286}{23885.714 2857}$

$= 127.8946$ buckets

$\approx$ 128 buckets.

Therefore, roughly 128 buckets must be drawn to fill the tank...