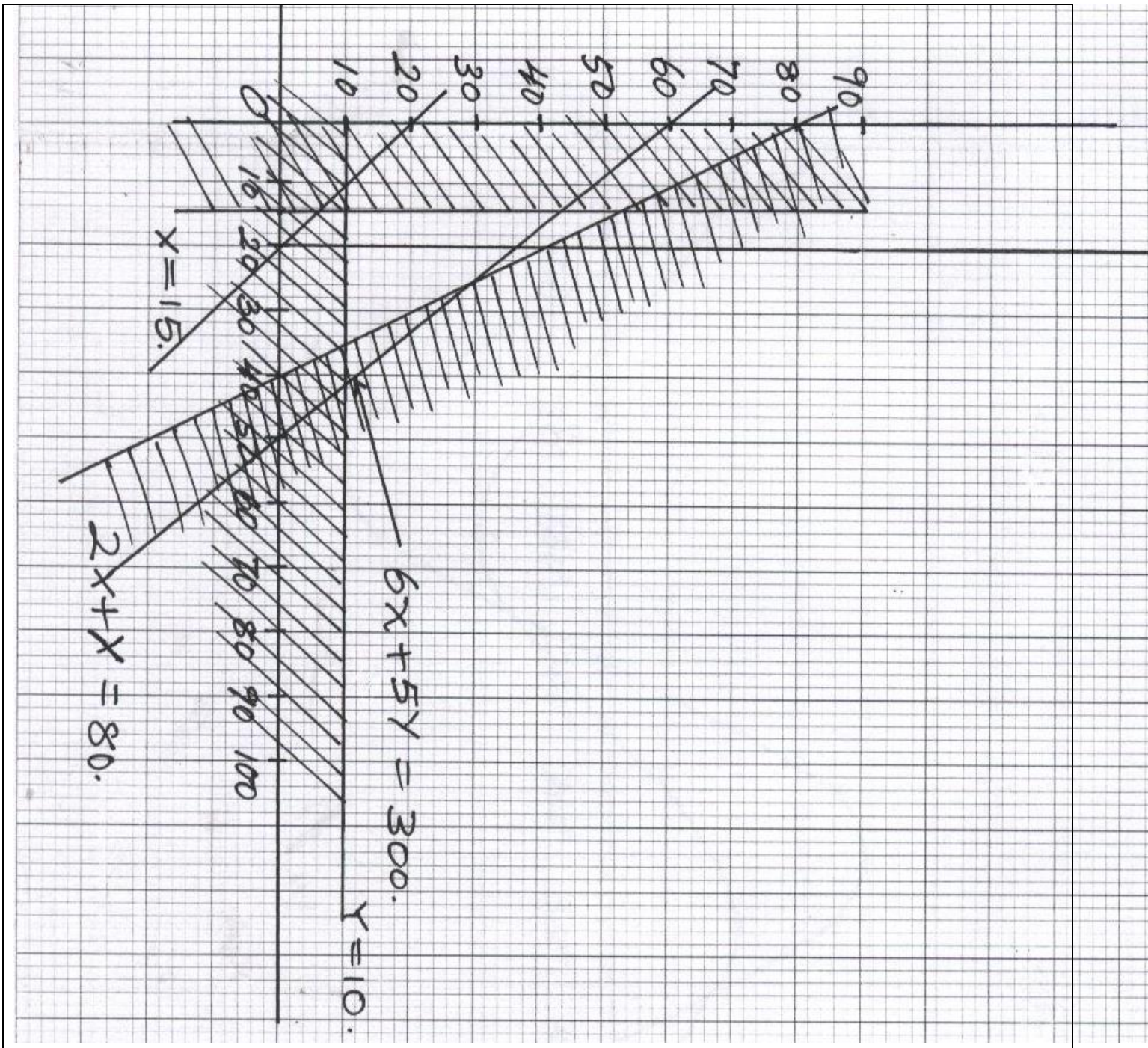
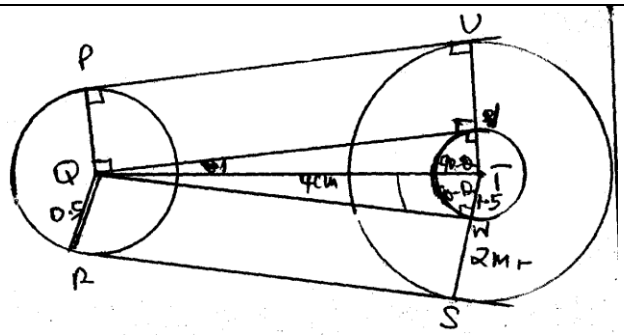
2. Compound proportions, mixtures and rates of work

1	Cost of mixture per kg $= \frac{(5\times 30)+(3\times 60)}{8}$ = sh 41.25 Selling price $\Rightarrow \frac{130}{100}\times 41.25$ = Ksh.53.625	M_1 M_1 A_1	Allow 53.60
		3	
2	a) x-Hexagonal and y-Rectangular tables $x \geq 15$ $y \geq 10$ $6x+3y \leq 240 (2x+y \leq 80)$ $120x+100y \leq 6000 \quad (6x+5y \leq 300)$ b) $x \geq 15$ region ✓shaded $y \geq 10$ region ✓shaded $2x+y \leq 80$ region ✓shaded $6x+5y \leq 300$ region ✓shaded c) (i) Search line ✓drawn (26, 28) (ii) $(26\times 80+28\times 60)$ Ksh. 3,760	B1 B1 B1 B1 B1 B1 B1 B1 B1 B1	
		10	



3.	 PU = QV = QW = RS $= \sqrt{4^2 - 1.5^2}$ = 3.708cm	**M1** **M1**	

	$Sin\theta = \frac{1.5}{4} \Rightarrow Sin^{-1}0.375 = 22.02^0$ $\angle PQR(obtuse) = 360^0 - 2(90 + 22.02)$ $= 135.96^0$ $Arc\ PR = \frac{135.96}{360} \times 2 \times 3.14 \times 0.5 = 1.1866$ Arc US subtends angle 360 – 2(90 – 22.02) = 224.04 Arc US = $\frac{224.04}{360} \times 2 \times 3.142 \times 2 = 7.8215$ Total length = 3.708 x 2 + 1.1866 + 7.8215 = 16.4241 (b) ($^4/_3$ x 16.4241) 21.8988 22.90	**M1** **M1** **M1** **M1** **A1** **M1** **A1** **B1**	
		10	

1. *a)* *Deposit: Total ratio 2 + 3 + 5 = 10*
Georgina: $^2/_{10}$ x 30000 = 6000
Gilbert: $^3/_{10}$ x 30000 = 9000
Akumu: $^5/_{10}$ x 30000 = 15000

b) Balance to be paid
= 510000 – 30000 = 480000
Each pays = $\frac{480000}{3}$ = 160000

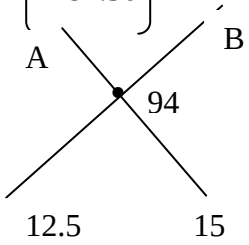
c) Profit = $^{20}/_{100}$ x 510000 = 102000
Georgina received: $^1/_6$x 102000= 17000
Gilbert received: $^2/_6$x 102000 = 34000
Akumu received: $^3/_6$ x 102000 = 51000

2.

Men	*Days*
12	*20*
16	*?*

= $\frac{12 \times 20}{16}$ days
= 15 days

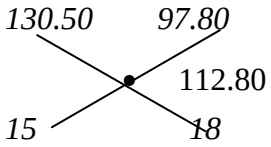
3 *t cost*
+09.00 *81.50*



Cost of mixture
Sh 112.8 x $\frac{100}{120}$ = 94 per kg
Ratio A : B
(81.50 – 94) : (109 – 94)
12.5 : 15

2.5 : 3
5 : 6

Alt. At selling Price



A sales at $\frac{109}{100} \times 120$

$= \underline{130.50/=}$

B sales at $\frac{81.50}{100} \times 120$

$\underline{= 97.80/=}$

A & B mixed sells at

$\frac{94 \times 120}{100} =$

sh 112.80 per kg

Ratio A : B

(112.80 – 97.8) :

(130 – 112.8)

15: 18

5 : 6

4 *Let Onacha take x days.*

Mogutu takes x + 5 days.

$\frac{1}{x} + \frac{1}{x+5} = \frac{1}{6}$

$x^2 (x + 5) + 6x = x(x – 5)$

$x^2 – x – 30 = 0$

$(x – 10) (x + 3)$

$x = 10, 3$ *Onacha takes 10 days.*

5 $\frac{dy}{dx} = 6x2 + x – 4$

When x = 1,

$\frac{dy}{dx} = 6+1 -4 = 3$

Grad of normal $= \frac{-1}{3}$

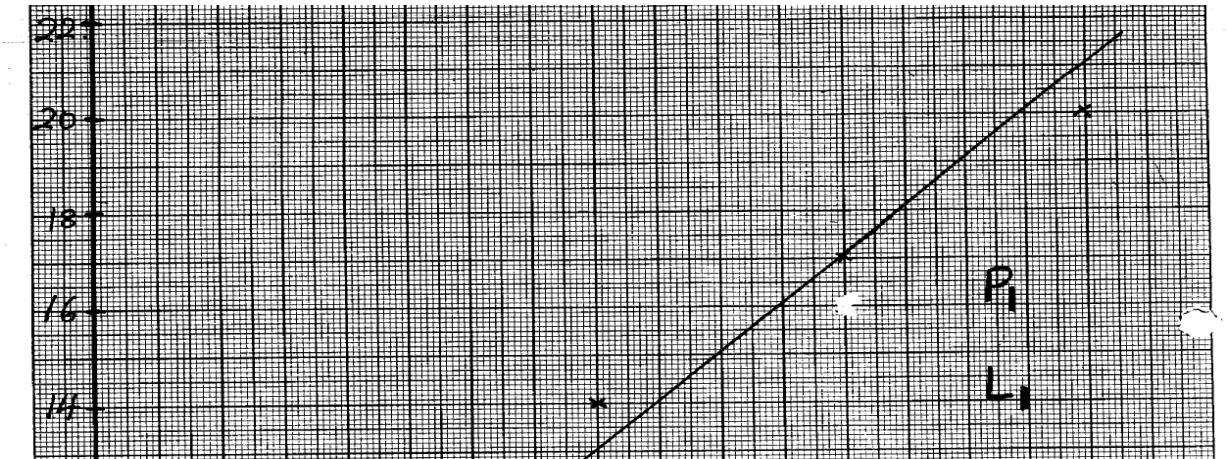
$y + ½ = -1/3 (X -1)$

$y = \frac{-1}{3} x – \frac{1}{6}$

6 *Gradient* $= \frac{11 – 8}{3 – 1.5}$

$= 2$

$K = 2, M = 5$ $B = 2A + 5$



7 (70 – 25 x 60 = 2700

2700 Cos 47

= 2700 x 0.68 = 1841.4nm

8 $\frac{6x\ 72 + 66 \times 4}{10} = 69.6$

100% = 69.6

∴ 105 = 73.10

9 (a) (i)

A	B	Mixture
150	160	156
1	n	1+n

150 160n (n+1)156

150 + 160n = 156(n+1)

N = $^{6}/_{4} = {}^{3}/_{2}$

= $\frac{112}{100} \times 156$ = shs. 174.72

(b) At 11.45 a.m

Depth filled by P in 2hrs = 2.1m

3hrs = $\frac{3hr}{2hr} \times 2.1m$

= 3.15m

Depth filled by q in 7hrs = 2.1m

3hrs = $\frac{3hrs}{7hrs} \times 2.1m$

= 0.9m

Depth emptied by R in 6hrs = 2.1m

$\frac{2hrs}{6hrs} = 2hr \times 2.1$

$\therefore$ Depth at 11.45a.m = (3.15 + 0.9) – 0.7 = 3.35m

10 Let the amount to be mixed be x kg of the lower, priced grade and y kg for higher price grade

X kg of the lower priced grade cost Sh. 420x

Y kg of the higher priced grade cost Sh.470y

Total cost of (x+y0 kg of mixture

$= \text{Shs.}\frac{420x + 470y}{x + y}$

equating $\frac{420x + 470y}{x + y} = 455$

$420x + 470y = 455x + 455y$

$470y – 455y = 455x – 420y$

$15y = 35x$

$X: y = 3:7$

11. Cross sectional area = r^2

$= (\frac{22}{7} \times 35 \times 35)cm^2$

Flow per second = $(\frac{22}{7} \times 35 \times 35 \times 45)cm^2$

After 2¼ hrs = $(\frac{22}{7} \times 35 \times 35 \times 45 \times 3 \times 60 \times 69)$liters

= 233887.5litres

12 a) In 2000,

Costs		Shs
Material = $^{8}/_{25} \times 1250$	=	400
Labour = $^{14}/_{25} \times 1250$	=	700
Transport = $^{3}/_{25} \times 1250$	=	150

In 2003

Material = 400 x 2	=	800
Labour = $^{130}/_{100} \times 700$	=	910
Transport = $^{120}/_{100} \times 150$	=	180

b) In 2004

Costs		
Material	=	800
Transport	=	180

$\therefore$ labour = 1981 – (800 + 180)= Shs.1001

$\therefore$ Increase in labour = 1001 – 910 = 91

% increase = $^{91}/_{910} \times 100$

= 10%

13. Cost price = $100 \times \frac{114}{120}$ = shs. 95

Let A: B = n :1

$\frac{95}{1} = \frac{80n + 100}{n + 1}$

$95n + 95 = 80n + 100$

$15n = 5$

$n = {}^{1}/_{3}$

$n:1 = 1:3$

$A:B = 1:3$

14. *Let the ratio be x: y*

$76x + 84y = 81(x + y)$

$84y - 81y = 81x - 76x$

$3y = 5x$

$\frac{3}{5} = \frac{x}{y}$

$x : y = 3 : 5$

15. a) *Cost of 8kg = 5 x 25 + 2 x 30 + 1 x 45 = 230*

Cost of 1 kg $= {}^{230}/_{8} = 28.75$

Profit/ kg $= 28.75 \times {}^{20}/_{100}$

$= 5.75$

b) i) *Selling price*

$= 28.75 \times {}^{112}/_{100} = 32.20$

$32.20 \times {}^{120}/_{100} = 38.64$

38.64

ii) *New cost/ kg*

$= 1.12 \times 28.75 = 32.20$

$\% \text{ Profit} = \frac{40.25 - 32.20}{32.20} \times 100$

$= 25\%$

16. $= \frac{3(5.60) + 11y}{14} = 6.70$

$= 16.8 + 11y = 93.8$

$11y = 77$

$y = 7$

1Kg costs Shs. 7.00