

## 2. Commercial Arithmetic 2

1	<p>a)</p> $1.15 \times 54,450 + 6000$ $68,617.5 \times 12$ $sh.823,410$ <p>b)</p> $1^{st} 116160 \times \frac{10}{100} = sh.11,616$ $next 109440 \times \frac{15}{100} = sh.16,416$ $next 109440 \times \frac{20}{100} = sh.21,888$ $next 109440 \times \frac{25}{100} = sh.27,360$ $Remaining 378,930 \times \frac{30}{100} = sh.113,95$ <p>Total annually = 190,959</p> $Monthly = \frac{190,959}{2} = sh.15,913.25$ <p>Less relief 1100.00</p> <p>Net tax payable = sh.14,813.25</p> <p>c)</p> $\frac{20}{100} \times 54,450 = sh.10,890$ <p>Total deductions <math>10,890 + 14,813.25</math> = 25,703.25</p> <p>Monthly income = <math>60,450 - 25,703.25</math> = sh.34,746.75</p>	<p>M<sub>1</sub></p> <p>M<sub>1</sub></p> <p>A<sub>1</sub></p> <p>M<sub>1</sub></p> <p>M<sub>1</sub></p> <p>M<sub>1</sub></p> <p>M<sub>1</sub></p> <p>A<sub>1</sub></p> <p>B<sub>1</sub></p> <p>B<sub>1</sub></p>	<p>✓1<sup>st</sup> and 2<sup>nd</sup> slabs</p> <p>✓3<sup>rd</sup> and 4<sup>th</sup> slabs</p> <p>✓last slab</p> <p>Subtraction of relief</p> <p>Total deductions</p>
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1. After 1<sup>st</sup> year =  $\frac{95}{100} \times 4200000$   
= Shs.357,000
- After 2<sup>nd</sup> year =  $(\frac{87}{100} \times 357000)$   
= sh310590
- After 3<sup>rd</sup> year =  $(\frac{88}{100} \times 310590)$   
= shs.273319.20
- After 4<sup>th</sup> year =  $(\frac{91}{100} \times 273319.20)$   
=shs.248720.50

$$\text{After } 5^{\text{th}} \text{ year} = \frac{(248720.50 \times 93)}{100} = \text{shs.}231310$$

The next 6 years

$$A = 231310 (1 - 0.05)^6 = 170034.10$$

$$\text{Then } 140000 = 170034.10 (1 - 0.04)^n$$

$$(0.96)^n = \frac{140000}{170034.10} = 0.8234$$

$$170034.10$$

$$n = \frac{\log 0.8234}{\log 0.96}$$

$$= \frac{0.0844}{0.01773} = 4.76 \text{ yrs}$$

$$\text{Total no. of years} = 5 + 6 + 4.76 \text{ yrs} = 15.76 \text{ years}$$

2. Gross tax = 4830 + 1120 + 600 = sh 6550 per month

$$\text{Annual gross tax} = 6550 \times 12 = 78,600$$

$$\frac{10}{100} \times 120,000 = \text{sh.}12,000$$

$$100$$

$$\frac{15}{100} \times 120,000 = \text{sh.}18,000$$

$$100$$

$$\frac{25}{100} \times 120,000 = \text{sh.} 30,000$$

$$100$$

$$\text{Re. tax} = 78600 - (12000 + 18000 + 30000)$$

$$= 78600 - 60,000 = 18,6000$$

$$\frac{35}{100} \times x = 18,600$$

$$100$$

$$0.35x = 18,600$$

$$x = \text{sh } 53142.86$$

$$\text{Taxable income p.a} = 36,000 + 53142.86$$

$$= \text{sh.}412142.86$$

$$\text{Monthly salary} = \frac{413142.86}{12} + 12,000$$

$$12$$

$$= 34428.57 + 1200 = \text{Sh } 35628.57$$

3. a)  $\sin 86.3^\circ = \frac{XB}{AB}$   
 $\sin 86.3^\circ = \frac{XB}{30}$   
 $XB = 30 \sin 86.3^\circ$   
 $XB = CD = 29.93746855$

b)  $\angle ABX = 90^\circ - 86.3^\circ$   
 $= 3.7^\circ$   
 $\therefore \angle ABD = 3.7^\circ + 90^\circ$   
 $= 93.7^\circ$

c)  $\angle DBF \text{ obtuse} = 360^\circ - 187.4^\circ$   
 $= 172.6^\circ$

$$\text{Arc DEF} = \frac{\theta}{360} \pi D \text{ or } \frac{\theta}{360} \times 2\pi r$$

$$\text{But } \cos 86.3^\circ = \frac{AX}{AB}$$

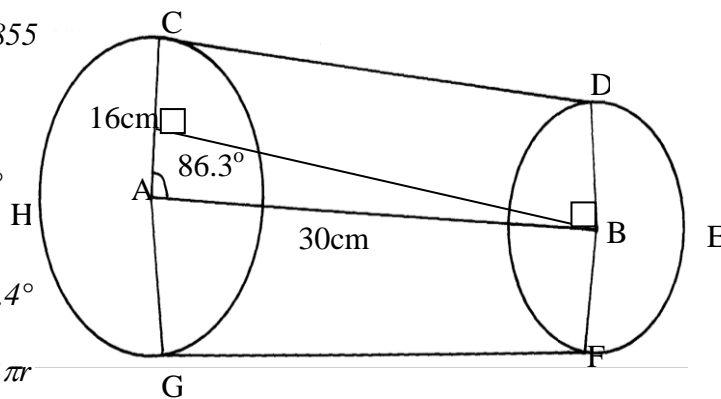
$$\cos 86.3^\circ = \frac{AX}{30}$$

$$AX = 1.935969248 \text{ cm}$$

$$DB = 16 - 1.935969248 = 14.06403075 \text{ cm}$$

$$\therefore \text{Arc DEF} = \frac{172.6^\circ}{360^\circ} \times \frac{22}{7} \times 14.06403075$$

$$= \underline{106807.8751}$$



$$2520$$

$$= 42.38407742 \text{ cm}$$

Arc  $CGH$

$$\angle \text{reflex } CAG = 360^\circ - (2 \times 86.3^\circ)$$

$$= 187.4^\circ$$

$$\therefore \text{Arc } CGH = \frac{187.4^\circ}{360^\circ} \times 2 \times \frac{22}{7} \times 16$$

$$= \frac{131,929.6}{2520}$$

$$= 52.35301587 \text{ cm}$$

Total length of belt to go round the belt

$$= CD + DEF + GF + CHG$$

$$= 29.93746855 + 42.38407742 + 29.93746855 + 52.35301587$$

$$= 154.6120304 \text{ cm}$$

4.  $\angle ABD = 31^\circ$

$$\angle CBD = 37^\circ$$

5.  $A = 15,000(1 + \frac{8}{100})^7$

$$= \text{Ksh.} 25,707$$

6. Principle = 30,000 – 6,000

$$= 24,000/=$$

$$\text{Amount} = 18 \times 2000$$

$$= 36,000/=$$

$$A = P \left[ \frac{1+r}{100} \right]$$

$$6,000 = 24000 \left[ \frac{1+r}{100} \right]^{18}$$

$$\frac{36000}{24000} = \left[ 1 + \frac{r}{100} \right]$$

$$\frac{3}{2} = \left[ \frac{1+r}{100} \right]$$

$$1 + \frac{r}{100} = \sqrt[18]{1.8}$$

$$1 + \frac{r}{100} = 1.023$$

$$\frac{r}{100} = 0.023$$

$$\Rightarrow \underline{2.3\%}$$

7. Commission earned Kshs.  $(8368 - 6700) = \text{Kshs. } 1668/=$

let sales in 3rd bracket be  $y$

$$\left( \frac{10}{100} \times 5000 \right) + \left( \frac{15}{100} \times 3000 \right) + \left( \frac{20}{100} \times y \right) = 1668$$

$$500 + 450 + 0.2y = 1668$$

$$0.2y = 1668 - 950 = 718$$

$$y = \frac{718}{0.2} = 3590$$

$$\text{Total sales} = (8000 + 3590)$$

$$= \text{shs.} 11590$$

8. Find the principal which in 12 years at 5% p.a compound interest amounts to sh.450,00

$$A = P \left( 1 + \frac{R}{100} \right)^n$$

$$I = A - P$$

$$\therefore A = \frac{(100 + R)^n}{100}$$

$$I = P \left( \frac{100 + R}{100} \right)^n - P$$

$$= P (100 + R/100)^n - 1$$

$$\underline{450000} = P = \underline{450000} = 565397$$

9. a) Taxable income = (25000 + 12000 + 3000) = 40000

b) Income tax

$$10164 \times \frac{2}{20} = \text{Shs.}1016.40$$

$$10164 \times \frac{3}{20} = \text{Shs.}1524.60$$

$$10164 \times \frac{4}{20} = \text{Shs.}2032.80$$

Remaining :

$$9508 \times \frac{5}{20} = \text{Shs.}2377$$

$$\text{Total tax payable p.m} = 6950.8 - 1162 = \text{Shs.}5788.80$$

c) Annual tax payable = 5788.80 x 12 = Shs.69465.60

10. (a) taxable income = Kshs. 25000 + Kshs.10480  
= Kshs. 35480

b) tax charged:

$$1^{\text{st}} 4350 = 4350 \times \frac{2}{20} = 683.25$$

$$2^{\text{nd}} 4555 = 4555 \times \frac{3}{20} - 683.25$$

$$3^{\text{rd}} 4555 = 4555 \times \frac{4}{20} - 911$$

$$4^{\text{th}} 4555 = 4555 \times \frac{5}{20} - 1138.75$$

$$\text{Rem. } 17465 = 17645 \times \frac{6}{20} - 5239$$

$$\text{Total tax} = 8407.5$$

$$\underline{800.00}$$

$$7607.50$$

(c)  $40/100 \times 35480 - 14.192 = 49672$

$$\text{New income} = 35480 + 14192 = 49672$$

$$\text{Remainder} = 49672 - 18015 = 31657$$

$$\text{Tax charged} = 31657 \times \frac{6}{20} = 12665.1$$

$$\text{Total tax} = 12665.1$$

$$\% \text{ increase in income} = \frac{4257.6}{7607.5} \times 100 = 55.97\%$$

11.  $A = P(HR/100)^n$

$$500000 = P \left( 1 + \frac{20}{100} \right)^5$$

$$500,000 = \left( \frac{120}{100} \right)^5 P$$

$$\underline{500,000} = P$$

$$(1.2)^5$$

$$P = \text{Shs.}200,938.786 \approx \text{shs. } 200,939$$

12. Principal = 26,000 - 6,000 = 20,000

$$\text{Total H.P instalments} = 1045.3 \times 24 = 25087.20$$

$$25087.20 = 20,000 \left[ 1 + \frac{r}{100} \right]^2$$

$$\frac{\quad}{100}$$

$$1.254 = \left(1 + \frac{r}{100}\right)^2$$

$$1.120 = \frac{1}{100} + r$$

$$\frac{r}{100} = 0.12 \text{ or } 12\%$$

13.  $\left. \begin{array}{l} \text{No. of periods} = 12 \\ r = 4\% \text{ per period} \\ A = 1.0412 \times 15000 \end{array} \right\}$   
 $= 24015.5$

14. a) i) taxable income = 19200 + 12000 + 1300 + 2300 = 34800

b) Net tax

$$8400 \times \frac{2}{20} = 840$$

$$9600 \times \frac{3}{20} = 1440$$

$$12000 \times \frac{4}{20} = 2400$$

$$4800 \times \frac{5}{20} = \underline{1200}$$

$$5800$$

$$\text{Net tax} = 5800 - 1240$$

$$= 4560$$

c) Net salary = 34800 - (4560 + 5530)

$$= 24710$$

15. (a) 9000 + 350 + 800 + 1200 = 11350

(b) 9000 + 3000 = 12000

(c) Total taxes = 12000 x 12

$$= \text{shs.}144000\text{p.a}$$

Taxes

$$450 \times 2 = \text{shs.}9000$$

$$3000 \times 3 = \text{shs.}9000$$

$$3000 \times 4 = \text{shs.}12000$$

$$3000 \times 5 = \text{shs.}15000$$

$$3000 \times 6 = \underline{\text{shs.}18000}$$

$$\text{Shs.}63,000$$

$$144000 - 63000 = \text{shs.}81000$$

$$7y = 81000y = 11571$$

$$\text{Taxable income} = 4500 + 3000 \times 4 + 11571$$

$$= \text{K } 28071\text{p.a}$$

$$\text{Gross salary} = \text{shs. } 561420\text{p.a}$$

(d) Total allowances = 12000 x 12

$$= 144,000$$

$$\text{Basic salary} = 561420$$

$$\underline{144000}$$

$$\text{Shs.}417,420$$

$$\text{Monthly basic pay} = \text{shs. } 34785$$

16. (a) Net tax 5512

$$\text{Add relief } 1162$$

$$\text{Tax payable } 6674$$

$$\text{Tax on } 9680 \text{ earned}$$

$$9680 \times \frac{10}{100} = 968$$

Tax on 9120 earned  
 $9120 \times \frac{15}{100} = \text{Shs. } 1368$

Tax on next 9120  $\times \frac{20}{100} = \text{Shs. } 1824$

Tax on next 9120  $\times \frac{25}{100} = 2280$

Total  $968 + 1368 + 1824 + 2280 = 6440$   
 $6674 - 6440 = 234$

Let  $x$  be charged at 30%

$$\frac{30}{100} \times x = 234$$

$$x = \frac{234 \times 100}{30} = \text{Shs. } 780$$

Total chargeable Income

$$780 + (9120 \times 3) + 9680 = 37820$$

Salary  $37820 - 15220 = \text{Shs. } 2260$  per month.

b) Net salary  $(37820 - 1270 - 6674) = \text{Shs. } 29876$

17. a) 1<sup>st</sup> year after dep. Of 20%

$$800\,000 \times \frac{80}{100}$$

$= \text{Khs. } 640,000$ .....

2<sup>nd</sup> year after dep. of 5%

$$= 640\,000 \times \frac{95}{100}$$

$= 608,000$  .....

The next 3 yrs

$$A = P \left[ 1 - \frac{R}{100} \right]^n = 608,000 \left( 1 - \frac{10}{100} \right)^3$$

$$= 608\,000 (0.9)^3$$

$$= \text{Sh. } 443,232$$
 .....

$$800,000 - 443,232 = \text{Sh. } 356,768$$
 .....

(b) S.I =  $3000 \times \frac{15}{100} \times 2$

$= \text{Sh } 900$  .....

$$A = 3000 \left[ 1 + \frac{15}{100} \right]^2$$

$$= 3000 [1.15]^2$$

$= \text{sh. } 3967.50$  .....

C.I = sh 967.50

$967.50 - 900 = \text{sh } 67.50$  .....

18. (i) Taxable Income

$$\left[ \frac{115}{100} \times 24\,800 \right] + 12000 - 1220$$

$$\begin{aligned}
&= 28520 + 12000 - 1220 \\
&= \text{Ksh.} 39,300 \\
&= \underline{\text{K£ 1965 p.m.}}
\end{aligned}$$

(ii) Tax due	$325 \times 2$	= sh 650	}	
	$650 \times 3$	= sh 1950		
	$325 \times 5$	= sh 1725		
	$325 \times 6$	= sh 1950		
	$340 \times 7.50$	= sh 2250		
	<b>Total tax</b>	<b>= <u>sh. 8825 P.m.</u></b>		
		<i>without relief</i>		

(b) (i) Total deduction

$$\begin{aligned}
&= \text{sh } (7280 + 2400 + 1200 + \frac{2}{100} \text{ of } 24\,800) \dots\dots\dots \\
&= (7280 + 2400 + 1200 + 496) + 1220 \\
&= \text{sh } (11376 + 1220) = \underline{\text{sh. } 12,596 \text{ P.m.}} \dots\dots\dots
\end{aligned}$$

(ii) Net income = sh (24800 + 1200 - 12596) = sh. 24,204 P.m. ....

19. a) Total instalments = (24 x 1250) = Shs. 30000  
H.P = 7200 + 30000 = 37200

b) 124% = 37200  
100% =  
C.P =  $\frac{100}{124} \times 37200$   
= 30000

c)  $A = 30000 (1 + \frac{18}{100})^2$   
= 30000 (1.18)<sup>2</sup> = 41772  
Total interest = 41772 - 30000 = 11772

20. (a) (i)  $(10,500 + 6,500) \times \frac{12}{20} = \text{K£ } 10,20 \text{ p.a}$

(ii) 1<sup>st</sup> 1980 x 2 = Kshs. 3960  
2<sup>nd</sup> 1980 x 3 = Kshs 5940  
3<sup>rd</sup> 2480 x 5 = Kshs. 12 400  
4<sup>th</sup> 1480 x 7 = Kshs. 10360  
5<sup>th</sup> 1980 x 9 = Kshs. 17 820  
Last 300 x 10 = Kshs 3 000  
Kshs. 53 480  
PAYE =  $\frac{53480 - 300 \times 12}{12}$

= Shs. 4156.70

(b) Net monthly pay  
 $17000 - 320 + \frac{2}{100} \times 17000$   
= 17000 - 660  
= Kshs 16 340.00