

18 COMMERCIAL ARITHMETIC

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Currency

The medium for business transactions is called **currency**. Thus, 'currency of a country' means the particular type of money in use in that country.

Different countries have different types of currencies. Table 18-1 shows some countries and the currencies they use.

Country	Currency
Kenya	Shilling (Ksh)
Uganda	Shilling (Ush)
Tanzania	Shilling (Tsh)
Ethiopia	Ethiopian Birr
South Africa	South African Rand
Nigeria	Naira
Britain	Sterling Pound (UK £)
Europe	Euro
USA	US Dollar (US \$)
Japan	Japanese Yen (¥)
India	Indian Rupee (Rs)
Canada	Canadian Dollar (C\$)
Sweden	Swedish Kronor (Kr)

Table 18-1

Most countries in the world use a decimal currency i.e. currency that is divided into 100 smaller units, often called cents (from the Latin word centum, meaning 'hundred').

Denomination of a currency means the value of a coin or note.

Kenya currency

The basic unit of Kenya currency is the **shilling**. 100 cents are equivalent to one shilling. 20 shillings are equivalent to one **pound**. The following abbreviations are used with Kenya currency:

- ct for cent
- Sh for shilling
- £ for pound

To differentiate Kenya currency from that of other countries, the letter K is put before each of these abbreviations, so that Ksh means Kenya shillings, and K£ means Kenya pound.

A sum of money in both larger and smaller units should always be written with two digits after the decimal point, even when the second one is zero e.g. 3 shillings 50 cents is written as Sh 3.50 and not Sh 3.5, 2 shillings 5 cents is written as Sh 2.05, etc.

Amounts less than a shilling can be written in two ways e.g. 75 cents can be written as 75 ct or Sh 0.75.

Amounts of Kenya money are usually rounded off to the nearest 50 cents since the one, five and ten cent coins are no longer in use. However, in instructions on paper, the cent is still in use.

Exercise 18.1

- Write the following in shillings.
 - (a) 355 ct
 - (b) 55 ct
 - (c) 990 ct
 - (d) 305 ct
- Convert the following to cents.
 - (a) Sh 0.05
 - (b) Sh 9.95
 - (c) Sh 7
 - (d) Sh 100.50
- Convert the following to Kenya pounds (K£).
 - (a) Sh 5 000
 - (b) Sh 50 000
 - (c) Sh 12
 - (d) Sh 1
- Convert the following amounts to shillings.
 - (a) K£ 50
 - (b) K£ 135
 - (c) K£ 0.25
 - (d) K£ 7.60
- Evaluate the following, giving your answers in shillings.
 - (a) 3×50 ct
 - (b) 10×75 ct

5/2/10000

155
 108
 10000
 113
 2130

- (c) 6×85 ct (d) 7×105 ct
6. Evaluate the following, giving your answers in shillings.
- (a) $6 \times \text{Sh } 3.55$ (b) $12 \times \text{Sh } 2.05$
(c) $9 \times \text{Sh } 14.45$ (d) $11 \times \text{Sh } 12.15$
7. Evaluate the following, giving your answers in both shillings and cents.
- (a) $\text{Sh } 250 \div 5$ (b) $\text{Sh } 61.10 \div 5$
(c) $\text{Sh } 17.25 \div 3$ (d) $\text{Sh } 125 \div 10$
8. Calculate, in shillings;
- (a) 25% of Ksh 144 (b) $62\frac{2}{3}\%$ of K£ 288
9. Express $1 \frac{25}{100} \times \frac{36}{100}$
- (a) 5 ct as a percentage of Sh 1.25,
(b) Sh 3.50 as a percentage of K£ 3.50,
(c) Sh 1 as a percentage of 75 ct,
(d) K£ 0.2 as a percentage of Sh 250.
10. (a) A man earns K£ 5 646 per annum. Calculate his earning per month, in shillings.
(b) How many pens each costing Sh 25.50 can be bought with K£ 10? How much change is there?

Currency conversion and exchange rates

It is often necessary to exchange the currency of one country for that of another. Such exchange is known as **currency conversion**. Currency conversion is usually done by the Central Bank of a country, Commercial Banks, Foreign Exchange (Forex) Bureaus, and some big hotels.

The reason for currency conversion is to facilitate trade between various countries, as the currency of one country is usually not usable in another.

Conversion between various currencies is done using **currency conversion tables**, such as the ones published daily in the newspapers. The figures given in the tables are called **exchange rates** and they give the equivalents of one

150

$$\begin{array}{r}
 150 \text{ US } \$ \text{ to Ksh} \\
 78.75 \times 3 \\
 \hline
 236.25 / 1085
 \end{array}$$

currency to units of others. The rates vary slightly from day to day due to world economic and trade factors. However, these factors are outside the scope of mathematics.

Table 18-2 shows the exchange rates that were produced by the Central Bank of Kenya and published in a local daily in July 2002. The figures in the table were the Kenya shilling equivalents of the currencies of various countries.

CBK EXCHANGE RATES	
	CBK Mean Rates
1 US Dollar	78.7528
1 Sterling Pound	120.6704
1 Euro	78.2888
1 South African Rand	7.6320
1 Ksh/Ush	22.8218
1 Ksh/Tsh	11.8411
1 UAE Dirham	21.4413
1 Canadian Dollar	52.2299
1 Swiss Franc	53.2449
100 Japanese Yen	65.8844
1 Swedish Kronor	8.6188
1 Norweigan Kronor	10.5156
1 Danish Kronor	10.5423
1 Indian Rupee	1.6118
1 Hongkong Dollar	10.0968
1 Singapore Dollar	44.6394
1 Saudi Riyal	20.9991
1 Australian Dollar	44.2079

Table 18-2

Key

- 1 Ksh/Ush means Uganda shillings equivalent of 1 Ksh
1 Ksh/Tsh means Tanzania shillings equivalent of 1 Ksh

Example 18.1

Use the exchange rates in Table 18-2 to convert each of the following currencies to the stated equivalent.

- (a) 150 US Dollars (US \$) to Ksh
(b) 85 Euros to Ksh
(c) 3 050 Uganda shillings (Ush) to Ksh
(d) Ksh 2 000 to US Dollars (US \$)

(e) Ksh 6 500 to Sterling pound (UK£)

Solution

(a) From the conversion table,
 $US \$ 1 = Ksh 78.7528 \approx Ksh 78.75$
 $\therefore US \$ 150 = Ksh 78.75 \times 150$
 $= Ksh 11 812.5$
 $= Ksh 11 813$ (to the nearest shilling)

(b) $1 Euro = Ksh 78.2888 \approx Ksh 78.29$
 $\therefore 85 Euros = Ksh 78.29 \times 85$
 $= Ksh 6 654.65$
 $= Ksh 6 654.50$ (to the nearest 50 ct)

(c) $Ush 1 = Ush 22.8218 \approx Ush 22.82$
 $\therefore Ush 3 050 = Ksh \frac{3 050}{22.82}$
 $= Ksh 133.50$ (to the nearest 50 ct)

(d) $US \$ 1 = Ksh 78.7528 \approx Ksh 78.75$
 $\therefore Ksh 2 000 = US \$ \frac{2 000}{78.75}$
 $= US \$ 25.40$ (2 d.p.)

(e) $UK £ 1 = Ksh 120.6704 \approx Ksh 120.67$
 $\therefore Ksh 6 500 = UK £ \frac{6 500}{120.67}$
 $= UK £ 53.87$ (2 d.p.)

Example 18.2

How many Euros are worth 1 Sterling pound (UK £) ?

Solution

From Table 18-2, $1 Euro = Ksh 78.2888$ and
 $UK £ 1 = Ksh 120.6704$

So, $Ksh 1 = \frac{1}{78.29} Euros$

$UK £ 1 = \frac{120.67}{78.29}$
 $= 1.54 Euros$ (2 d.p.)

85 £ into
 $2000 \rightarrow US \$$
 $145 \$ = 78.75$
 2000

$\frac{2000}{78.75}$

$\frac{2000.00}{78.75}$

Exercise 18.2

- Convert each of the following currencies to the stated equivalent (Use Table 18-2).
 - 265 US Dollars to Kenya shillings
 - 248 Swiss Francs to Kenya shillings
 - 1000 Indian Rupees to Kenya shillings
 - Ksh 5 604 to US Dollars
 - 100 000 Indian Rupees to US Dollars
 - 100 000 Euro to Sterling Pounds
 - 500 US Dollars to Japanese Yen
 - 13 000 Japanese Yen to Euro
- At the close of business on a certain day in 1990, the exchange rates were Ksh 20.7190 to the US Dollar, Ksh 33.782 3 to the Sterling pound, and Ksh 14.836 4 to 100 Japanese Yen.

Use these rates to convert

- Ksh 41 438 to US Dollars
- UK£ 395 to US Dollars
- 300 Japanese Yen to US Dollars

- When the exchange rate was Ksh 10.6406 to the US Dollar, a tourist who was leaving Kenya changed Ksh 1000 at the Airport bank. If a commission of Ksh 50 was charged, how many dollars did he get?
- A trader imported an item worth 10 000 Yen in Japan. If this item was subjected to 25% import tax in Kenya, how much was it worth in Ksh if the exchange rate was Ksh 10.0268 to 100 Japanese Yen at that time?
- A trader left Kenya for Britain. He had Ksh 150 000 which he exchanged for Sterling pounds at a rate of Ksh 110.539 per Sterling pound. He spent a third of his money in Britain and then left for America

where he exchanged the remaining pounds for dollars at a rate of US \$ 1.622 0 to the Sterling pound. Calculate how much he finally got, in US \$.

6. In 1987, at a time when the exchange rate was 1 Sterling Pound = Ksh 19.2382, the World Bank gave a certain town in Kenya a grant of 15 million Sterling pounds for a road network development project. How much was this worth in US Dollars if 1 US Dollar was equivalent to Ksh 10.640 6?

Buying and selling of currency

In the previous section, we used the mean rates provided by the Central Bank of Kenya, on a certain day, to convert various currencies into Kenya Shillings and vice versa. In this section we deal with buying and selling of currency using tables published by various Commercial Banks in the country.

Table 18-3 shows buying and selling rates of some currencies in such banks on a certain day. The table shows that on that day, ABC Bank was buying the Euro at Ksh 78.04 and selling it at Ksh 78.18. The 'buying' and 'selling' is from the point of view of the bank. The selling rate is higher than the buying rate because the bank must make some profit out of these transactions.

Key for Table 18-3:

- \$-US dollar
- £-Pound sterling
- C\$-Canadian dollar
- JY-Japanese yen
- ZR-South African Rand

$$\begin{array}{r} \text{Ans} \rightarrow \text{US } \$ 2000 \\ 78.50 \times 2000 \\ \hline 1\,570\,000 \\ \hline 15\,700\,000 \\ \hline 75\,000 \\ \hline 15\,625\,000 \\ \hline 12\,000 \\ \hline 3\,460 \\ \hline 75 \\ \hline 40 \\ \hline 175 \end{array}$$

BANK RATES							
Bank	Currencies						
		Euro	\$	£	C\$	100 JY	ZR
ABC	Buy	78.04	78.65	120.37	51.88	65.74	7.67
	Sell	78.18	78.75	120.56	51.96	65.84	7.70
Barclays	Buy	78.00	78.45	120.27	51.74	65.63	7.62
	Sell	78.50	78.95	121.04	52.07	66.05	7.67
Coop	Buy	78.06	78.65	120.52	51.86	65.84	7.64
	Sell	78.53	78.85	120.87	52.03	66.03	7.68
KCB	Buy	76.44	78.70	118.15	51.72	64.60	7.67
	Sell	76.51	78.80	118.30	51.79	64.68	7.68
NBK	Buy	78.23	78.72	120.67	51.89	65.84	7.63
	Sell	78.33	78.82	120.74	51.99	65.95	7.65
Stanbic	Buy	78.16	78.60	120.49	51.84	65.81	7.63
	Sell	78.36	78.80	120.80	51.97	65.98	7.65
CBA	Buy	78.08	78.63	120.45	51.80	65.75	7.57
	Sell	78.32	78.73	120.74	52.00	66.99	7.72

Table 18-3

Example 18.3

A tourist arrived in the country with US \$ 2 000 which he changed into Kenya shillings. He spent Ksh 75 000 on hotel accommodation and Ksh 40 000 on travel and other expenses. He changed the remaining money into Sterling pounds. If he did all his money transactions at the Barclays Bank and the rates remained as shown in Table 18.3, how much money, in £, did he remain with?

Solution

1 US \$ = Ksh 78.45 (buying rate of the bank)

$$\therefore \text{US } \$ 2\,000 = \text{Ksh } 78.45 \times 2\,000 = \text{Ksh } 156\,900$$

$$\begin{array}{r} 2000 \\ 78450 \\ \hline 156900 \\ - 115000 \\ \hline 41900 \end{array}$$

2075
41900
20

He spent Ksh (75 000 + 40 000)
= Ksh. 115 000

His balance was Ksh(156 900 – 115 000)
= Ksh 41 900

He bought Sterling pounds @ Ksh. 121.04
(selling rate of the bank)

$$\begin{aligned} \therefore \text{Amount he bought} &= \frac{41900}{121.04} \\ &= \text{£ } 346.17 \\ &= \text{£ } 346 \text{ (to the nearest £)} \end{aligned}$$

Exercise 18.3

- Mr Onyango received US \$ 250 from his son who lives in the United States of America. How much, in Ksh, did Mr Onyango have if he exchanged the money at the National Bank of Kenya (NBK) using the rates in Table 18-3?
- Vero was to pay a fee of 450 Euros for a correspondence course that she was taking from a country in Europe. How much, in Ksh, did she need if she was to pay through Stanbic Bank using the rates in Table 18-3?
- Ann bought a second-hand vehicle from Japan. The cost of the car in Japan was 450 000 yens and shipping it cost US \$ 1 000. If she did all her transactions through Commercial Bank of Africa (CBA), with exchange rates as in Table 18-3, how much, in Ksh, did she spend?
- A businessman had kept Ksh 2 million which he changed into Japanese yen at the Coop. Bank using the rates in Table 18-3. He travelled with it to Japan where he spent 1.5 million yens. He then travelled to USA and changed his money into US dollars at the rate of 1 US \$ = 119.78 Japanese yen. If he spent US \$ 10 000, find to the nearest US \$, how much he was left with?

1200

$$\frac{125}{100} \times 1200$$

$$\begin{array}{r} 125 \\ 12 \\ \hline 1250 \\ 250 \\ \hline 1500 \end{array}$$

Profit and loss

Profit or gain means money gained in business. For instance, a trader who sells an article at a price higher than what he bought it for (cost price) is said to have sold at a profit.

Loss is the opposite of profit. Thus, a trader who sells an article at a price lower than what he bought it for is said to have sold at a loss.

If an article is sold at the same price as it was bought for, it is said to have been sold **at par**, i.e. no loss or profit.

Profit or loss may be calculated as:

$$\text{Profit} = \text{Selling price} - \text{Buying price.}$$

$$\text{or percent profit} \times \text{buying price}$$

$$\text{Loss} = \text{Buying price} - \text{Selling price}$$

$$\text{or percent loss} \times \text{buying price.}$$

Example 18.4

A hardware dealer bought a wheelbarrow for Sh 1 200 and sold it at a profit of 25%. Find his actual profit and the selling price.

Solution

$$\begin{aligned} \text{Profit} &= 25\% \text{ of Sh } 1\ 200 \\ &= \frac{25}{100} \times \text{Sh } 1\ 200 \\ &= \text{Sh } 300 \end{aligned}$$

$$\begin{aligned} \text{Selling price} &= \text{Buying price} + \text{Profit} \\ &= \text{Sh } 1\ 200 + \text{Sh } 300 \\ &= \text{Sh } 1\ 500 \end{aligned}$$

Example 18.5

I bought a radio at Sh 6 500 and later sold it at Sh 5 200. What was the loss percent?

Solution

$$\begin{aligned} \text{Actual loss} &= \text{Sh } 6\ 500 - \text{Sh } 5\ 200 \\ &= \text{Sh } 1\ 300 \end{aligned}$$

$$\text{Loss percent} = \frac{\text{Sh } 1\ 300}{\text{Sh } 6\ 500} \times 100\% = 20\%$$

Example 18.6

Find the cost price of an item that was sold at Sh 126.50 thus making a profit of 15%.

Solution

If Sh x is the cost price, then

$$115\% \text{ of } x = \text{Sh } 126.50$$

$$\text{i.e. } \frac{115}{100}x = \text{Sh } 126.50$$

$$\begin{aligned} \therefore x &= \text{Sh } \frac{126.50 \times 100}{115} \\ &= \text{Sh } 110 \end{aligned}$$

Exercise 18.4

- Find (i) the actual loss or profit, and (ii) the selling price for the following buying prices.
 - Sh 350, profit 10%
 - Sh 1250, profit 25%
 - Sh 1 350, loss 45%
 - Sh 4 500, loss 15%
 - Sh 125.60, loss 25%
- Find the profit or loss percent for the following cost and selling prices.
 - CP = Sh 125, SP = Sh 150
 - CP = Sh 1400, SP = Sh 1 330
 - CP = Sh 800, SP = Sh 840
 - CP = Sh 995, SP = Sh 825
 - CP = Sh 825, SP = Sh 995
- Find the cost price for the following selling prices and profit or loss.
 - SP = Sh 385, Profit = 10%
 - SP = Sh 13.30, Loss = 5%
 - SP = Sh 800, Profit = 25%
 - SP = Sh 4 500, Loss = 25%
 - SP = Sh 699.50, Profit = 25%
- A carpenter spent a total of Sh 10 500 in making a wall unit. At how much must he sell it to make a profit of 85%?

- A man sold his car at Sh 120 000 and made a loss of 25%. At how much had he bought it?
- A woman bought 125 tomatoes at Sh 1.50 each.
 - If she sold them at a profit of $33\frac{1}{3}\%$ s. what was her actual profit?
 - (i) At how much should she have sold each tomato to get a profit of $66\frac{2}{3}\%$?
(ii) What would be her actual profit in this case?

Commission and discount

Many sales people are paid a certain percentage of the value of the goods they sell. This is called **commission**. The more the goods they sell, the more commission they get.

Example 18.7

In one month, a motor vehicle salesman sold 3 motor vehicles, one at Sh 1.5 million, another at Sh 750 000 and the other at Sh 200 000. If he is paid a commission of 7%, how much did he get?

Solution

$$\begin{aligned} \text{Total value of vehicle sold} &= \text{Sh } 1\,500\,000 + \text{Sh } 750\,000 + \text{Sh } 200\,000 \\ &= \text{Sh } 2\,450\,000 \end{aligned}$$

$$\begin{aligned} \text{Commission} &= \text{Sh } \frac{7}{100} \times 2\,450\,000 \\ &= \text{Sh } 171\,500 \end{aligned}$$

Discount is a price reduction. Manufacturers and wholesalers offer retailers discounts so that they can resell the goods at a profit. Such discounts are off the manufacturers' and wholesalers' list price (i.e. suggested retail price). Such discount is called a **trade discount**.

Handwritten calculations:

$$\begin{array}{r} 3 \times 1\,500\,000 \\ + \quad 750\,000 \\ + \quad 200\,000 \\ \hline 2\,450\,000 \end{array}$$

$$\begin{array}{r} 7 \times 2\,450\,000 \\ \hline 171\,500 \end{array}$$

When a customer buys goods on credit sellers issue an invoice or bill to the customer. The invoice states the period within which the invoice amount should be cleared. A seller can offer a price reduction from the invoice price if the buyer decides to pay in cash (i.e. immediately). Such a discount is called a **cash discount**. Cash discount may also be offered as a way of attracting more customers.

Like commission, discount is usually expressed as a percentage of the marked price.

Example 18.8

A trader offers a Christmas sale with a discount of 10% on all her merchandise. If Judy buys goods worth Sh 9 500, how much does she actually pay to the trader?

Solution

$$\begin{aligned} \text{Discount} &= 10\% \text{ of Sh } 9\,500 \\ &= \frac{10}{100} \times \text{Sh } 9\,500 \\ &= \text{Sh } 950 \end{aligned}$$

$$\begin{aligned} \therefore \text{Discounted price} &= \text{Sh } 9\,500 - \text{Sh } 950 \\ &= \text{Sh } 8\,550 \text{ (This is what Judy pays)} \end{aligned}$$

$$\begin{array}{r} 950 \\ 100 \times 9500 \\ \hline 950 \\ 8550 \end{array}$$

Exercise 18.5

1. Calculate the amount of commission, in shillings,

- (a) at 8% on Sh 3 000 worth of sales
- (b) at 7% on K£ 275 worth of sales

2. Find the commission percent in the following.

Commission	Sales
(a) Sh 500	Sh 25 000
(b) Sh 951.30	Sh 13 950
(c) Sh 3 866.40	K£6 444
(d) K£ 27	Sh 6 000

$$\frac{25}{100} \times 1250$$

$$\frac{27}{100} \times 3000$$

3. Mr Koech earns his commission as follows:

- 5% on sales up to Sh 5 000
- 10% on sales from Sh 5 000 to Sh 20 000
- 15% on sales in excess of Sh 20 000

Find his commission on sales worth Sh 30 000.

4. Calculate the actual cost if a 10% discount is given on an invoice of

- (a) Sh 505
- (b) Sh 1 299.50
- (c) Sh 4 360
- (d) Sh 109.60

5. An item whose marked price was Sh 900 was sold at Sh 810. What was the discount rate given?

6. A customer paid Sh 2 340 for a commodity on which a discount of $2\frac{1}{2}\%$ was given.

What was the marked price of the commodity?

7. A salesman sold goods worth Sh 674 000 and received a commission of Sh 20 220. What was the rate of commission?

8. Lydia received Sh 1 800 commission on newspaper sales. Her rate of commission was 20%. How much worth of newspapers did she sell?

9. Mr. Ita receives a salary of Sh 20 000 per month plus a commission of 10% on all sales over Sh 600 000. Last month, his sales amounted to Sh 850 000. How much did he earn?

10. Joe bought a shirt at a 20%-off sale. If the marked price was Sh 960, what was the sale price?

11. The list price of a personal computer is Sh 160 000. The manufacturer offers a 30% trade discount. What is the trade discount amount and the net price?

12. A salesman gets 10% commission on the first K£ 1 000 worth of goods sold and 15% on all sales above K£ 1000. Find the

Handwritten calculations and scribbles at the bottom of the page, including numbers like 150, 2000, 3000, 1250, 35, 155, and various fractions and percentages.

total worth in Ksh of goods sold if in a certain month he got Sh 5 000 as commission payment.

13. A show ticket seller gets a commission of Sh 2.50 on every ticket that he sells. If he gets Sh 3 300, how many tickets did he sell? If this commission is 2%, what is the sale price of each ticket?

14. Mrs Tumbo bought the following goods from a shop.

- 2 kg of sugar @ Sh 50.
- 3 loaves of bread @ Sh 20
- 5 half-litre packets of milk @ Sh 25.
- 3 packets of maize meal @ Sh 39

Mrs Koko bought the same items in the same quantities in another shop where she was given a discount of 10%. How much less did Mrs Koko pay ?

15. A clothes shop offers a discount of 10% on a jacket and a discount of 8% on a shirt. If the jacket cost 3 times as much as the shirt, what is the overall discount percent given to a customer who buys the two items?

16. A radio cassette player whose cost price is Sh 4 850 is marked to sell at a price that gives a profit of 40%. What will its selling price be during a SALE when 25% is taken off the marked price?

$$\begin{array}{r} 4850 \\ - 25 \\ \hline 15 \end{array}$$

15

$$\begin{array}{r} 115 \quad 2 \\ 10 \overline{) 4850} \\ \underline{110} \\ 2425 \\ \underline{2425} \\ 0 \\ 485 \\ \underline{485} \\ 0 \\ 55775 \end{array}$$

Sh 5,577.50

$$V = \frac{1}{r} r^2 \times h$$

Balla