## S.2 MATHEMATICS NOTES

**TOPIC**: BUSINESS ARITHMETIC/ BUSINESS MATHEMATICS

**SUB TOPIC**: DISCOUNTS AND COMMISSION

**INTRODUCTION:**

**DISCOUNTS:** Sometimes shopkeepers tend to reduce prices of certain good such that:- they sell them quickly, they attract more customers or the reduction is given to customers who buy good in bulk (large quantities). These deductions are called discounts.

**Example 1:**

A shopkeeper sells brand new computers at shs 800,000 each but because he wants to attract more customers, he decided to reduce the price at a discount of 20% . At what price did he sell his computers?

**Solution:**

**Method one**

Selling price of computers = shs 800,000

Deduction or discount = 20% of shs 800,000

$= \frac{20}{100}$ x 800,000

= shs 160,000

Selling price after the discount

= 800,000 – 160,000

= shs 640,000

**Method two**

20% discount = 100% - 20%

= 80%

Selling price after 20% discount

$= \frac{80}{100}$ x 800,000 = shs640,000

Example II

After a discount of 10%, a customer paid shs 120,000 for a DVD player. Find the market price of a DVD player?

Solution:

Let the market price be x

10% discount = 100% - 10%

= 90%

Market price is $\frac{90}{100}$ x $x$ = shs 120,000

$\frac{90x}{100}$ = 120,000

90x = 120,000 x 100

90x = 120,000,000

$x = \frac{12,000,000}{90}$

$x$ = shs 133,333.33…..

$x$ = shs $133,333\frac{1}{3}$

**Example III**

At Orungo smile book shop, the price of advanced learners dictionary is shs 40,000. If a customer pays shs 30,000 for a copy. Find the percentage discount?

**Solution:**

Market price = shs 40,000

Selling price after discount = shs 30,000

Discount = 40,000 – 30,000

= shs 10,000

% discount = $\frac{discount}{market\ price}$ x 100%

= $\frac{10,000}{40,000}$ x 100%

= $\frac{100000}{40,000}$

% discount = 25%.

**ACTIVITY / EXERCISE**

1. A trader gives a discount of 5% for cash payments. How much will a customer pay for an article sold at a market price of shs 55,000
2. A wholesaler allows a retailer a trade discount of 15% for a bag of cement sold at shs 35,000. How much does a retailer pay per bag of cement?
3. In Bata Uganda shop, the market price of a new leather shop is shs 120,000, but because I am paying in cash, I am given a discount so that I only pay shs 105,000. What is the percentage discount I have been given?
4. Jane paid shs 15,300 after being given a discount of 15%. What was the original bill?

## COMMISSION

## INTRODUCTION

When goods or services are sold or delivered by one person (salesman or saleswoman) on the behalf of the true owner, a salesperson receives a salary depending on the amount of goods or services sold or delivered. This is done to encourage the salesperson to try as much as possible to look for customers. This salary is what we call a commission.

**Example 1**

A salesperson receives a commission of shs 30,000 which is 15% of the total sales of goods. What was his total sale?

**Solution**

Let the total sales be y

Commission = shs 30,000

Total sales: 15% of y = 30,000

$$\frac{15}{100} \times y = 30{,}000$$

$$15y = 30{,}000 \times 100$$

$$y = \frac{30{,}000 \times 100}{15}$$

$$y = 2000 \times 100$$

$$y = 200{,}000$$

**Example II**

The price of ETOP newspaper is shs 1000, a news vender for Etop receives a commission of 5% for selling the first 100 copies and 2% for extra number of copies sold. How much commission does he receive for selling?

(a). 50 copies of Etop newspaper

(b). 200 copies of Etop newspaper

**Solution**

(a). 1 copy = shs 1000

50 copies = 50 x 1000

= shs 50,000

Commission = $\frac{5}{100}$ x 50,000

= 5 x 500

= shs 2,500

1 copy = shs 1000

200 copies = 200x 1000

= shs 200,000

(b). 200 copies

Commission for 1st 100 copies

= $\frac{5}{100}$ x 100 x 1000

= shs 5,000

Commission for extra 100 copies

$\frac{2}{100}$ x 100 x 1000

= shs 2000

Total commission for all the 200 copies

= 5,000 + 2,000

= shs. 7,000

**Example III**

Mr Okello sells airtime easy load on the behalf of MTN company. In a certain week he received a commission of shs 32,000 after selling airtime worth shs 640,000. What percentage commission did he earn during that week?

**Solution**

Total sales = shs 640,000

Commission received = shs 32,000

Percentage commission = $\frac{\text{Commission}}{\text{Total sales}} \times 100\%$

$= \frac{32{,}000}{640{,}000} \times 100\%$

$= \frac{100}{20}$

$= 5\%$

**Exercise**

1. A salesman receives 3% commission from his employer for what he sells. In a certain month he sold 8 pairs of trousers at shs 15,000 per pair, 14 dresses at shs 25,000 per dress and 25 shorts at shs 12,000 each. How much commission did he receive?
2. If the commission on shs 600,000 is shs 90,000. What is the percentage rate of the commission ?
3. Find the commission on shs 40,000 at $7\frac{1}{2}$ % hence explain your method.

**References:**

Secondary school mathematics Book 2 pages 75, 76, 77

Fountain mathematics for secondary schools students Book 3 pages 50, 51, 52, 53 and 54.

**Sub topic 2:PERCENTAGE PROFIT AND LOSS**

**INTRODUCTION:**

The price at which a shop keeper pays for an article bought is called cost price(CP) while the price which he sells it is called selling price (SP)

Profit = cost price – selling price

Percentage profit = $\frac{\text{profit}}{\text{Cost price}} \times 100\%$

Sometimes the selling price is less than the cost price , hence the article /item has been sold at a loss.

Percentage loss = $\frac{\text{loss}}{\text{Cost price}} \times 100\%$

**Examples**

1. An article bought at shs 24,800 is sold for shs 32,800. Find the percentage profit.

   Solution:

Buying price / cost price (CP) = shs 24,800

Selling price (SP) = shs 32,800

Profit = 32,800 – 24,800

= shs 8,000

Percentage profit = $\frac{8000}{24800} \times 100\%$

= $\frac{800,000}{24800}$

= 32.258 %

Percentage profit = 32.26% ( 2dp cal)

2. By selling an article at shs 14,500 a profit of 25% was made. What was the cost price of the article?

**Solution:**

Let the cost price be ***x***

25% profit $\frac{125}{100} \times x = 14,500$

$\frac{125x}{100} = 14,500$

$x = \frac{14500 \times 100}{125}$

Cost price $x$ = shs 11,600

3. If the cost price for an article is shs 2,400 what selling price would give a profit of 25%

**Solution:**

Cost price = shs 2,400

Percentage profit = 25%

Let selling price be S.P

Profit = 25% of shs 2,400

= $\frac{25}{100} \times 2,400$

= shs 600

Selling price = soct price + profit

Selling price = 2,440 + shs 600

= shs 3,000

4. Mr. Kamujje bought a text book for shs 40,000 and sold it at a selling price of 35,000. What was his percentage loss?

**Solution:**

Cost price = shs 40,000

Selling price = shs 35,000

Loss = shs 35,000 – 40,000

= shs -5000 ( Negative means loss )

= shs 5000

Percentage loss = $\frac{\text{loss}}{\text{Cost price}} \times 100\%$

= $\frac{5000}{40,000} \times 100\%$

= $\frac{500000}{40000}$

= 12.5 %

= 12 ½ %

**ACTIVITY**

1. A smart phone is sold for shs 300,000 and making a loss of 15%. What was the cost price for the smart phone?
2. A shopkeeper sells an umbrella at a profit of 5% if her profit is shs 1500, find
   (a).the cost price
   (b) the selling price
3. Mr. Musoke bought 10kg of onions at shs 6000 per kg. At what price should he sell all the onions such that he makes a profit of 25%
4. Copy and complete the table given below:

| | **Cost price** | **Percentage profit/loss** | **Selling price** |
|---|---|---|---|
| (a) | Shs 3500 | 20% profit | …… |
| (b) | Shs 4800 | 10% loss | ……. |
| (c) | Shs 80,000 | …… | Shs 96,000 |
| (d) | Shs 18,000 | …… | Shs 15,000 |
| (e) | Shs 12,000 per dozen | …… | Shs 800 each dozen |
| (f) | Shs 50,000 | 100% | …….. |

| | | | |
|---|---|---|---|
| (g) | …… | 20% | Shs 12,000 |
| (h) | Shs 60,000 | ……. | Shs 70,000 |

**REFERENCES**

Secondary school mathematics SSM students book 2 pages 79, 80 and 81

Fountain mathematics for secondary schools students book 2 pages 48, 49,

**SUB-TOPIC 3: SIMPLE INTEREST AND COMPOUND INTEREST.**

**Simple Interest**

**Introduction:**

If you pay money into a bank deposit account or a village SACCO, you receive an interest. If you borrow money from the bank or a village SACCO, you will pay an interest . An interest is payment for the use of money deposited or borrowed.

Simple interest is an amount of money paid for using money for a specified period of time.

The following are the key words commonly used:

Principal (P)-money deposited or borrowed

Rate (R) - percentage interest per annum

Time (T) – number of years

Simple interest (I) = $\frac{\text{Principal(P) x Rate (R) x Time (T)}}{100}$

$$I = \frac{PRT}{100}$$

**Examples**

1. Mr Ben deposited shs 100,000 in a bank which pays him a simple interest rate of 19% per annum. How much interest would Ben receive at the end of:

   (a).one year

   (b) 5 years

**Solution**

(a).P = shs 100,000

R = 19%

T = 1

$$I = \frac{PRT}{100}$$

$$I = \frac{100{,}000 \times 19 \times 1}{100}$$

$I$ = shs 19,000.

Hence the total amount of money Ben has in the ban will be:

Principal + interest

Shs 100,000 + shs 19,000

Shs = 119,000

(b). $P$ = shs 100,000

$R$ = 19%

$T$ = 5 years

$$I = \frac{100{,}000 \times 19 \times 5}{100}$$

= 19,000 x 5

= shs 95,000

Hence the total amount Ben has in the bank after 5 years will be

100,000 + 95,000

= shs 195,000

2. A businessman borrowed shs 1,200,000 from stanbic bank which charges him a simple interest of 15% per annum.
   (a). Find the interest he paid to stanbic bank after a period of 5 years
   (b). How much money does he remain to pay bank after a period of 5 years

**Solution:**

(a). $P$ = shs 1,200,000

$R$ = 15% per annum

$T$ = 5 years

$$I = \frac{1{,}200{,}000 \times 15 \times 5}{100}$$

$$I = \frac{90{,}000{,}000}{100}$$

$I$ = shs 900,000

(b). After 5 years he remains with a balance of

Shs 1,200,000 – shs 900,000

= shs 300,000

3. The simple interest on shs 80,000 after a period of 3 years is shs 48,000. Find the rate of interest per annum.

**Solution:**

P = shs 80,000

T = 3 years.

I = 48,000

R = ?

$$I = \frac{PRT}{100}$$

$$48{,}000 = \frac{80{,}000 \times R \times 3}{100}$$

$$48{,}000 = \frac{240{,}000\,R}{100}$$

$$R = \frac{48{,}000}{2400}$$

R = 20%

4. Find the principal which will give a simple interest of shs 15,600 after 2 years at a rate of 30% simple interest per annum.

**Solution**:

P = ?

I = shs 15,600

T = 2 years

R = 30% per annum

$$I = \frac{PRT}{100}$$

$$15{,}600 = \frac{P \times 30 \times 2}{100}$$

$$15{,}600 = \frac{60P}{100}$$

$$60P = 15{,}600 \times 100$$

$$P = \frac{1{,}560{,}000}{60}$$

$$P = \text{shs } 26{,}000$$

5. Find the time after which shs 40,000 will give a simple interest of shs 12,000 at a rate of 15% per annum.

Solution

P = shs 40,000

I = shs 12,000

R = Shs 15%

T = ……years

$$I = \frac{PRT}{100}$$

$$12{,}000 = \frac{40{,}000 \times 15 \times T}{100}$$

$$12{,}000 = \frac{600{,}000\ T}{100}$$

$$12{,}000 = 6000\ T$$

$$T = \frac{12{,}000}{6000}$$

$$T = 2 \text{ years.}$$

**Exercise:**

1. How much simple interest will shs 45,000 earn at a rate of 10% per annum in a period of:
   (a).1 year
   (b). 5 years
2. Find the simple interest earned on shs 300,000 at a rate of 9% per annum in a period of 2 years 6 months
3. A man deposited shs 300,000 in a bank which offers him a simple interest rate of 10% per annum
   (a). find the interest he earned from the bank at the end of 2 years
   (b). find the total amount he has in the bank at the end of 2 years

4. If P = shs 800,000, T = 6 months and I = shs 40,000, find R.

5. If I = shs 4500, T = 3 years, R = $7\frac{1}{2}$% per annum, find P
6. If P = 10million, R = 11% per annum and I = 2.2 million, find T

**REFERENCES**

Fountain mathematics for secondary schools students book 2 pages: 55,56 and 57

Secondary school mathematics students book 2 pages: 81, 82 ,82 and 84.

UCE Essential mathematics pages 52 and 53,

**COMPOUND INTEREST**

**INTRODUCTION**

Whereas simple interest is calculated on the principal only, compound interest is calculated on the amount. With compound interest, the interest is added to the principal at the end of each year. The new principal is used to calculate the interest in the next year.

Note:

Amount (A) = Principal (P) + Interest (I)

**CALCULATING COMPOUND INTEREST USING STEP BY STEP METHOD**

**Examples**

1. John invested shs 100,000 in centenary development bank, the bank pays him a compound interest rate of 10% per annum.

   (a).Find the total amount John has in the bank at the end of 2 years

   (b). Find also the total compound interest earned by John at the end of 2 years.

**Solution:**

(a). P = shs 100,000

R = 10% per annum

T = 2 years

**Year 1**

P = shs 100,000 , R = 10% , T = 1 year

$I = \frac{100{,}000 \times 100 \times 1}{100}$

I = shs 10,000

Amount at the end of year 1

= 100,000 + 10,000

= shs 110,000

**Year 2**

P = shs 110,000 ( The total amount at the end of year 1 becomes the Principal at the beginning of year 2)

R = 10%

I = 1 year

$$I = \frac{110{,}000 \times 10 \times 1}{100}$$

I = shs 11,000

Amount at the end of year 2

= 110,000 + 11,000

= shs 121,000

(b). Amount = shs 121,000

Interest = Amount – Principal

= 121,000 – 100,000

Compound interest = shs 21,000

2. Shs 125,000 is interested at 6% per annum compound interest

Calculate;

(a). The amount after two years

(b). The interest after two years.

Solution

Step by step method

Year 1

Principal (P) = shs 125,000

Rate (R) = 6% per annum

Time (T) = 1 year

$$I = \frac{125{,}000 \times 6 \times 1}{100}$$

I = shs 7,500

Amount at the end of year 1

= 125,000 + 7500

= shs 132,500

**Year 2**

Principal (P) = 132,500, Rate® = 6% p.a

Time (T = 1year

Interest (I) = $\frac{132,500 \times 6 \times 1}{100}$

= 7,950

Amount after 2 years = 132,500 + 7950

= shs 140,450

(b). Interest after two years

= amount – principal

= 140,450 – 125,000

= shs 15,450

**ACTIVITY 1**

Suppose you invest shs 50,000 in the bank which offers a compound interest rate of 10% per annum.

(a). What will be 10% of shs 50,000

(b). What will be the amount after the first year.

(c). What will be 10% of the amount found in (b) above

(d). What will be the amount after the second year

**ACTIVITY 2**

If shs 35,000 is invested at a compound interest of 4% per annum for 2 years.

(a). Find the amount at the end of year two

(b). Find the interest after two years

**ACTIVITY 3**

A teacher invested shs 60,000 at 5% compound interest. How much money will she have.

(a) After one year

(b) After two years

**ACTIVITY 4**

Find the compound interest on shs 244,000

(a). after 2 years at 2% per annum

(b). after 2 years at 10% per annum

(c) after 2 years at 55% per annum

**ACTIVITY 5**

Calculate the amount and the interest earned by making each of the following investments

(a). shs 200,000 for 2 years at a rate of 10% per annum compound interest

(b). shs 150,000 for 2 years at a rate of 5% per annum compound interest

**ACTIVITY 6**

Find the compound interest on shs 86,000

(a). after 2 years at 12% per annum

(b) after 1 ½ years at 8% per annum

**REFERENCES**

UCE Essential mathematics page 53

Fountain mathematics for secondary schools students book 2 pages 58, 59

Secondary school mathematics (SSM) students book 2 pages 84, 85.

**END**