

PROFIT AND LOSS

Summary:

1. (i) *Cost price is the price at which an item is purchased*
(ii) *Selling price is the price at which an item is sold*
2. *Selling above the cost price is a gain. Thus **profit** = selling price – cost price*
3. *Selling below the cost price is a loss. Thus **loss** = cost price – selling price*
4. (i) **Percentage profit** = $\frac{\text{Profit}}{\text{Cost price}} \times 100$
(ii) **Percentage loss** = $\frac{\text{Loss}}{\text{Cost price}} \times 100$
4. (i) *A profit of **20%** means the selling price is **120%** of the cost price*
(ii) *A loss of **20%** means the selling price is **80%** of the cost price*

EXAMPLES:

1. *A trader bought a radio at **Shs 16,000** and sold it at **Shs 20,000**. Find his:*

(i) *profits*

(ii) *percentage profit*

Soln:

(i) *profits = SP – CP*

(ii) *percentage profit = $\frac{\text{Profit}}{\text{Cost price}} \times 100$*

2. *A book is bought at **Shs 1,500** and sold at a profit of **40%**. Find the selling price*

Soln:

$$SP = \frac{140}{100} \times CP$$

3. A trader sold an item at **Shs 54,000** and made a profit of **20%**. Find the cost price

Soln:

$$SP = \frac{120}{100} \times CP$$

4. A trader sold an item at a profit of **5%**. If his profit is **Shs 1500**, find his:

(i) cost price

(ii) selling price

Soln:

$$(i) \text{ percentage profit} = \frac{\text{Profit}}{\text{Cost price}} \times 100$$

$$5 = \frac{1500}{CP} \times 100$$

$$CP = 30,000$$

$$(ii) SP = 30,000 + 1,500 = 31,500$$

$$OR \quad SP = \frac{105}{100} \times CP$$

5. The selling price of **12** eggs is equal to the cost price of **15** eggs. Find the percentage profit.

Soln:

$$\text{If } 12SP = 15CP$$

$$\Rightarrow SP = 1.25CP$$

$$\text{Percentage profit} = \frac{(1.25CP - CP)}{CP} \times 100 = 25$$

5. By selling a book at **Shs 4,800**, a trader would gain **20%**. Find how much he must sell it in order to gain **30%**.

Soln:

Soln:

$$SP = \frac{120}{100} \times CP$$

$$4,800 = \frac{120}{100} \times CP$$

$$CP = 4,000$$

$$SP = \frac{130}{100} \times CP$$

$$SP = \frac{130}{100} \times 4,000$$

$$SP = 5,200$$

6. A trader bought a car at **Shs 6 million** and sold it at **Shs 4.8 million**. Find his:

(i) loss

(ii) percentage loss

Soln:

$$(i) \text{ loss} = CP - SP$$

$$(ii) \text{ percentage loss} = \frac{\text{Loss}}{\text{Cost price}} \times 100$$

7. A plot of land is bought at **Shs 20 million** and sold at a loss of **20%**. Find the selling price

Soln:

$$SP = \frac{80}{100} \times CP$$

8. A trader sold an item at **Shs 7,000** and made a loss of **$12\frac{1}{2}\%$** . Find the cost price

Soln:

$$SP = \frac{87.5}{100} \times CP$$

9. A trader sold an item at **Shs 3.6 million** and made a loss of **25%**. Find the profit he would make if he had sold it at **Shs 6 million**

Soln:

$$SP = \frac{75}{100} \times CP$$

$$3.6 = \frac{75}{100} \times CP$$

$$CP = 4.8$$

$$\text{Profit} = 6 - 4.8 = 1.2m$$

10. By selling items **P** and **Q** each at **Shs 3,300**, a profit of **10%** and a loss **34%** were respectively made on the items. Find the percentage loss on both items

Soln:

Item P:

$$SP = \frac{110}{100} \times CP$$

$$3,300 = \frac{110}{100} \times CP$$

$$CP = 3,000$$

Item Q:

$$SP = \frac{66}{100} \times CP$$

$$3,300 = \frac{66}{100} \times CP$$

$$CP = 5,000$$

$$\text{Total CP} = 3000 + 5000 = 8,000$$

$$\text{Total SP} = 3,300 + 3,300 = 6,600$$

$$\text{Total percentage loss} = \frac{\text{Total loss}}{\text{Total cost price}} \times 100$$

$$\text{Total percentage loss} = \frac{(8,000 - 6,600)}{8,000} \times 100 = 17.5$$

EER:

1. A radio is bought at **Shs 15,000** and sold at **Shs 16,200**. Find the percentage profit
2. A trader sold an item at **Shs 4.8 million** and made a profit of **15%**. Find the cost price of the item
3. A trader buys an old radio at **Shs 65,000** and spends **Shs 15,000** on its repair. If he sells it at **Shs 100,000**, find his percentage profit.
4. A carpenter incurs a loss of **20%** by selling a chair at **Shs 240,000**. Find the percentage he would gain by selling it at **Shs 360,000**.
5. By selling an item at **Shs 2400**, a trader would gain **4%**. Find how much he must sell it in order to gain **12%**.

6. The selling price of 5 eggs is equal to the cost price of 7 eggs. Find the percentage profit.
7. The cost price of 17 books is equal to the selling price of 20 books. Find the percentage loss.
8. The selling price of n eggs is equal to the cost price of 27 eggs. If there is a profit of 35%, find the value of n .
9. The selling price of n pens is equal to the cost price of 12 pens. If there is a loss of 20%, find the value of n .
10. A trader incurs a loss of 15% by selling an item at Shs 18,700. Find how much he must sell it in order to make a profit of 15%.
11. A trader sold two items at Shs 18,000 each. On one he gained 20% and the other he lost 20%. Find the percentage loss on both items
12. A trader bought two plates at Shs 2,500 each. If he sells one at a profit of 5%, then find how much he should sell the other so that he make a profit of 20% on both plates.
13. A trader bought 120 books at a rate of Shs 2,000 per book. He sold 72 of them at a rate of Shs 2,500 per book and the remaining at a rate of Shs 2,000 per book. Find his percentage profit
14. An item is usually sold at a profit of 80%. If its cost price later went up by 20% and its selling price remained the same, find by how much is the percentage profit reduced
15. A car dealer buys a car at Shs 1,250,000 and hire it for 25 weeks at a charge of Shs 3,500 per day. Insurance costs Shs 33,700 during the entire period, at the end of which he sells it at Shs 750,000. Calculate the profit that he makes on the transaction
16. A trader bought an item at Shs 5,500 and sold it at 30% more than the buying price. Find the trader's:
- (i) selling price
 - (ii) profit

DISCOUNTS

Summary:

1. (i) *Discount is a reduction in the selling price of an item*

(ii) *Sale price = original price – discount*

4. (i) *Percentage discount = $\frac{\text{Discount}}{\text{Original price}} \times 100$*

(ii) *A discount of 20% means the sale price is 80% of the original price*

EXAMPLES:

1. *An item costing Shs 16,000 was sold at Shs 12,000. Find the:*

(i) *cash value of the discount*

(ii) *percentage discount*

Soln:

(i) *Discount cash value = 16,000 – 12,000 = 4,000*

(ii) *percentage discount = $\frac{\text{discount}}{\text{Original price}} \times 100 = \frac{4,000}{16,000} \times 100 = 25$*

2. *An item costing Shs 60,000 was sold at a discount of 20% . Find:*

(i) *how much was paid for it*

(ii) *cash value of the discount*

Soln:

(i) *Actual cost price = $\frac{80}{100} \times 60,000 = 48,000$*

(ii) *Discount cash value = $\frac{20}{100} \times 60,000 = 12,000$*

3. The cost of an item is **Shs 4,500** after a discount of **10%**. Find its original cost price

Soln:

$$\frac{90}{100} \times CP = 4,500$$

$$\therefore CP = 5,000$$

4. An item costing **Shs 50,000** was sold at two successive discounts of **20%** and **5%**. Find:

(i) how much was paid for it

(ii) the total percentage actual discount

Soln:

$$(i) \text{ 1}^{\text{st}} \text{ cost price} = \frac{80}{100} \times 50,000 = \mathbf{40,000}$$

$$\therefore \text{Final cost price} = \frac{95}{100} \times 40,000 = \mathbf{38,000}$$

$$(ii) \text{ Actual percentage discount} = \frac{(50,000 - 38,000)}{50,000} \times 100 = \mathbf{24}$$

5. Find a single percentage discount equivalent to successive discounts of **20%**, **10%** and **5%**.

Soln:

$$\text{1}^{\text{st}} \text{ selling price} = \frac{80}{100} \times MP = \mathbf{0.8MP}$$

$$\text{2}^{\text{nd}} \text{ selling price} = \frac{90}{100} \times 0.8MP = \mathbf{0.72MP}$$

$$\therefore \text{Final selling price} = \frac{95}{100} \times 0.72MP = \mathbf{0.684MP}$$

$$\text{Actual percentage discount} = \frac{(MP - 0.684MP)}{MP} \times 100 = \mathbf{31.6}$$

6. The marked price of an item is **Shs 240,000**. A trader sold it to his customer at a discount of **10%** and still made a profit of **20%**. Find the:

(i) price at which the trader had bought the item

(ii) percentage profit the trader would have made if no discount was allowed

Soln:

(i) If discount is **10%**

$$\Rightarrow SP = \frac{90}{100} \times 240,000 = \mathbf{216,000}$$

If profit is **20%**

$$\Rightarrow \frac{120}{100} \times CP = 216,000$$

$$\therefore CP = \mathbf{180,000}$$

$$(ii) \text{ Percentage profit} = \frac{(240,000 - 180,000)}{180,000} \times 100 = \mathbf{33.33}$$

7. A trader buys a bag at **Shs 60,000** and marks it for sale at a price that gives a profit of **20%** when he allows a discount of **10%** on its purchase. Find the marked price of the bag

Soln:

If profit is **20%**

$$\Rightarrow SP = \frac{120}{100} \times 60,000 = \mathbf{72,000}$$

If discount is **10%**

$$\Rightarrow \frac{90}{100} \times MP = 72,000$$

$$\therefore MP = \mathbf{80,000}$$

EER:

- 1. The cost of an item is **Shs 4,800** after a discount of **20%**. Find its original cost price*
- 2. A bicycle priced **Shs 200,000** was sold at a discount of **15%**. Find:*
 - (i) how much was paid for it*
 - (ii) cash value of the discount*
- 3. Find the percentage discount allowed when an item costing **Shs 60,000** is sold at **Shs 48,000***
- 4. Find a single percentage discount equivalent to successive discounts of **20%** and **15%**.*
- 5. An item costing **Shs 80,000** was sold at successive discounts of **10%** and **5%**. Find its final cost price after the discounts*
- 6. The marked price of a radio is **Sh. 950,000**. A trader allows a discount of **10%** but still makes a profit of **12%**. Find the:*
 - (i) price at which the trader had bought the radio*
 - (ii) percentage profit the trader would have made if no discount was allowed*
- 7. A trader buys a bag at **Shs 40,000** and marks it for sale at a price that gives a profit of **20%** when he allows a discount of **4%** on its purchase. Find the marked price of the bag*
- 8. A man bought a shirt at **20%** discount. If he paid **Shs 20,000**, find the original price of the shirt*
- 9. The price of an article is **Shs 240,000**. If a discount of **12%** is given, find the selling price of the article*

HIRE PURCHASE

Summary:

- 1. Hire purchase is the instalment payment for an item over time*
- 2. The hire purchase price includes interest charges. Thus it is higher than the cash price of an item*

EXAMPLES:

*1. A radio whose cash price is **Shs 180,000** can also be bought on hire purchase by paying a deposit of **35%** of the cash value followed by **6** equal monthly instalments of **Shs 24,500**. Find the:*

(i) hire purchase price of the radio

(ii) extra amount paid over the cash price using hire purchase

Soln:

$$(i) \text{ Hire purchase price} = \left(\frac{35}{100} \times 180,000 \right) + (6 \times 24,500) = \mathbf{210,000}$$

$$(ii) \text{ Extra payment} = 210,000 - 180,000 = \mathbf{30,000}$$

*2. The marked price of an item is **Shs 640,000**. A **5%** discount is offered on cash purchase. It can also be bought on hire purchase by paying a deposit of **40%** followed by **18** equal monthly instalments of **Shs 23,000**. Find how much is saved by paying cash than using hire purchase*

Soln:

$$\text{Cash price} = \frac{95}{100} \times 640,000 = \mathbf{608,000}$$

$$\text{Hire purchase price} = \left(\frac{40}{100} \times 640,000 \right) + (18 \times 23,000) = \mathbf{670,000}$$

$$\therefore \text{ Savings} = 670,000 - 608,000 = \mathbf{62,000}$$

3. A motor company had the following advertisement:

GET YOURSELF A CAR CHEAPLY	
CASH VALUE:	Shs 24.5 MILLION
CASH DISCOUNT:	8% OF THE CASH VALUE
HIRE PURCHASE:	DEPOSIT 60% OF THE CASH VALUE AND PAY 4 MILLION MONTHLY FOR 3 MONTHS

Calculate:

- (i) how much is saved by paying cash than using hire purchase
- (ii) the percentage profit the trader made on hire purchase price if he had bought it at **20%** below the cash price

Soln:

(i) **Cash price** = $\frac{92}{100} \times 24.5 = 22.54$ million

Hire purchase price = $\left(\frac{60}{100} \times 24.5\right) + (4 \times 3) = 26.7$ million

\therefore **Savings** = $26.7 - 22.54 = 4.16$ million

(ii) **Cost price** = $\frac{80}{100} \times 24.5 = 19.6$ million

\therefore **Percentage profit** = $\frac{(26.7 - 19.6)}{19.6} \times 100 = 36.2$

4. The cash price of a radio is **Shs 200,000**. It can also be bought on hire purchase by paying a deposit of **45%** followed by **5** equal monthly instalments. If the total hire purchase price is **Shs 240,000**, find the amount of each monthly instalment

Soln:

Hire purchase price = deposit + total instalments

$$\left(\frac{45}{100} \times 200,000\right) + (5 \times P) = 240,000$$

$\therefore P = 30,000$

EER:

- 1. An item whose cash price is **Shs 60,000** can also be bought on hire purchase by paying a deposit of **Shs 20,000** followed by **4** equal weekly instalments of **Shs 13,000**. Find how much is saved by paying cash than using hire purchase*
- 2. The marked price of a car is **Shs 6.4 million**. A **7.5%** discount is offered on cash purchase. It can also be bought on hire purchase by paying **4** equal monthly instalments of **Shs 1.65 million**. Find how much is saved by paying cash than using hire purchase*
- 3. A radio whose cash price is **Shs 300,000** can also be bought on hire purchase by paying an extra charge of **Shs 60,000**. If **9** equal monthly instalments are to be made, find the amount of each monthly instalment*
- 4. A printer whose cash price **Sh. 800,000** can also be bought on hire purchase by paying a deposit of **Sh.260,000** and **18** equal monthly installments . If the hire purchase price is **45%** more than the cash price, find the amount of each monthly instalment*
- 5. The marked price of a car is **Shs 4.5 million**. A company bought it at a discount of **20%** for its employee, who was then to pay a deposit of **Shs 1.8 million** and **12** equal monthly instalments of **Shs 0.27 million**. Find the percentage profit the company got from the employee on the car*
- 6. A motor company had the following advertisement:*

GET YOURSELF A CAR CHEAPLY	
CASH VALUE:	Shs 48.5 MILLION
CASH DISCOUNT:	8% OF THE CASH VALUE
HIRE PURCHASE:	DEPOSIT 60% OF THE CASH VALUE AND PAY 7 MILLION MONTHLY FOR 3 MONTHS

- (a) Calculate how much Tom would save by paying cash than using hire purchase*
- (b) Tom bought the car by hire purchase and then sold it at **35 million**. Find the percentage loss he made*

7. A Smartphone company had the following advertisement:

BUY A PHONE NOW WHILE STOCK LASTS	
CASH VALUE:	Shs 320, 000 LESS 15% DICOUNT
HIRE PURCHASE:	DEPOSIT 15% OF THE CASH VALUE AND PAY EITHER Shs 82, 000 MONTHLY FOR 4MONTHS OR Shs 25, 000 WEEKLY FOR 12WEEKS

(a) Calculate the:

(i) saving made by paying cash than using monthly hire purchase.

(ii) saving made by using weekly hire purchase than monthly hire purchase

(b) If the trader had bought the phone at **20%** below cash value and sold it on monthly hire purchase, find the percentage profit he made

COMMISSION

Summary:

1. Commission is a reward to the sales agent based on the level of sales

2. Commission is usually a percentage of the value of goods sold

EXAMPLES:

1. A sales agent gets a commission of **15%** for selling goods. Find his commission for sales worth **Shs 600,000**

Soln:

$$\text{Commission} = \frac{15}{100} \times 600,000 = \mathbf{90,000}$$

2. A salesman gets a commission of **15%** on the first **Shs 120,000** of his total sales and **20%** on the rest. Find his commission for sales worth **Shs 370,000**

Soln:

$$\text{Commission} = \left(\frac{15}{100} \times 120,000 \right) + \frac{20}{100} \times (370,000 - 120,000) = \mathbf{68,000}$$

3. A salesman earns a basic salary of **Shs 100,000** per month and a commission of **8%** for sales above **Shs 150,000**. In a certain month, he allowed a discount of **5%** on the sold goods worth **Shs 400,000**. Calculate his income for that month

Soln:

$$\text{Total sales} = \frac{85}{100} \times 400,000 = \mathbf{340,000}$$

$$\text{Earned Income} = 100,000 + \frac{8}{100} \times (340,000 - 150,000) = \mathbf{115,200}$$

4. A salesman earned **Shs 180,000** as commission for selling **10** shirts at **Shs 25,000** each, **15** skirts at **Shs 10,000** each and **7** trousers at **Shs 50,000** each. Find his percentage rate of commission

Soln:

$$\text{Total sales} = (10 \times 25,000) + (15 \times 10,000) + (7 \times 50,000) = 750,000$$

$$\text{Percentage commission} = \frac{180,000}{750,000} \times 100 = \mathbf{24}$$

5. A salesman gets a commission of **8%** for selling goods. Find his sales when he receives **Shs 40,000** as commission

Soln:

If required sales = **y**

$$\Rightarrow \frac{8}{100} \times y = \mathbf{40,000}$$

$$\therefore y = \mathbf{500,000}$$

6. A salesman gets a commission of **12%** on the first **Shs 150,000** of his total sales and **20%** on the rest. Find his sales when he receives **Shs 108,000** as commission

Soln:

If required sales = y

$$\Rightarrow \left(\frac{12}{100} \times 150,000 \right) + \frac{20}{100} \times (y - 150,000) = 108,000$$

$$\therefore y = 600,000$$

7. A sales agent earns a salary of Shs 200,000 per month and a commission of 15% for the sales in excess of Shs 100,000. In the first month, his total earning amounted to Shs 320,000.

(a) Find his sales for that month

(b) If the total sales in the second month increased by 20%, find the commission he received in that month.

(c) If the total sales in the third month decreased by 25%, find his income for that month

Soln:

(i) If required sales = y

$$\Rightarrow 200,000 + \frac{15}{100} \times (y - 100,000) = 320,000$$

$$\therefore y = 900,000$$

$$\text{(ii) Total sales} = \frac{120}{100} \times 900,000 = 1,080,000$$

$$\text{Commission} = \frac{15}{100} \times (1,080,000 - 100,000) = 147,000$$

$$\text{(iii) Total sales} = \frac{75}{100} \times 1,080,000 = 810,000$$

$$\text{Earned Income} = 200,000 + \frac{15}{100} \times (810,000 - 100,000) = 306,500$$

EER:

1. A salesman earns a basic salary of **Shs 120,000** per month and a commission of **8%** of the month's total sales. In a certain month, he sold goods worth **Shs 1,350,000**. Calculate his income for that month

2. A salesman gets a commission of **4%** on the first **Shs 800,000** of his total sales and **5%** on the rest. Find his:

(i) commission for sales worth **Shs 1,500,000**

(ii) sales when he receives **Shs 172,000** as commission

3. A bookshop employs two salesmen Bob and Tom. Bob earns a basic salary of **Shs 18,500** per week and a commission of **2.5%** on each book sold. Tom earns a basic salary of **Shs 24,000** per week and a commission of **5%** for sales in excess of **1,800** books. In a certain year, each sold a total of **15,000** books at **Shs 4,000** each.

(i) Find who earned more money and by how much (Assume **52** weeks in a year)

(ii) In another year, Bob earned a total of **Shs 2,962,000**. Find the number of books he sold that year

4. A salesman gets commission as follows:

10% on the first **Shs 100,000**

12% on the next **Shs 400,000**

15% on the remainder

Find his:

(i) commission for sales worth **Shs 800,000**

(ii) sales when he receives **Shs 52,000** as commission

5. A hawker sells cups at **Shs 500** each. He sold **50** cups in the first week. In the second week he sold **20%** more than in the first week. In the third week he sold **10%** more than in the second week. Each week he receives a commission of **8%** of the price of the first **20** cups sold, and **12%** for any cups sold in excess of **20**.

(a) Express the number of cups sold in the third week as a percentage of the number sold in the first week

(b) Calculate the commission he received in the third week

(c) If in the fourth week the hawker received **Shs 2,000** as commission, calculate the number of cups he sold in that week

CURRENCY EXCHANGE

Summary:

- 1. The price of one currency relative to another is called currency exchange rate*
- 2. The rate at which the bank buys your foreign currency is called buying rate*
- 3. The rate at which the bank sells you foreign currency is called selling rate*
- 4. Currency conversion problems can be solved using a summary table and ratio theorem*

EXAMPLES:

- 1. A radio costs £30. Find its cost in dollars if £1 = \$1.6.*

Soln:

Pounds	1	30
Dollars	1.6	x

$$\frac{1}{1.6} = \frac{30}{x}$$

$$\therefore x = \$48$$

- 2. Find how many dollars are worth Ug Shs 21,000, if \$1 = Ug Shs 3,500.*

Soln:

Dollars	1	x
Ug Shs	3,500	21,000

$$\frac{1}{3500} = \frac{x}{21,000}$$

$$\therefore x = \$6$$

3. Find how many pounds are worth \$600, if \$1 = Ug Shs 1,900 and £1 = Ug Shs 5,700.

Soln:

Dollars	1	600
Ug Shs	1,900	x

$$\frac{1}{1,900} = \frac{600}{x}$$

$$\therefore x = \text{Ug Shs } 1,140,000$$

$$\text{Also } \frac{1}{5,700} = \frac{y}{1,140,000}$$

$$\therefore y = \text{£}200$$

Pounds	1	y
Ug Shs	5,700	x

4. Find how many dollars are worth K Shs 9,750, if 1K Shs = 24 Ug Shs and \$1 = Ug Shs 1,950.

Soln:

K Shs	1	9,750
Ug Shs	24	x

$$\frac{1}{24} = \frac{9,750}{x}$$

$$\therefore x = \text{Ug Shs } 234,000$$

$$\text{Also } \frac{1}{1,950} = \frac{y}{234,000}$$

$$\therefore y = \$120$$

Dollars	1	y
Ug Shs	1,950	x

5. Bank of Uganda buys and sells foreign currencies as follows:

Foreign currency	Exchange rate	
	Buying	Selling
1 Euro (€)	<i>Shs 3,400</i>	<i>Shs 3,500</i>
1 Pound sterling (£)	<i>Shs 4,000</i>	<i>Shs 4,200</i>

A tourist arrived in Uganda with **1,300 Euros** which he exchanged for Uganda shillings. During his stay he spent **Ug Shs 2,320,000** and converted the remainder in to pound sterling before he left. Calculate the amount he received on his departure

Soln:

The bank buys **1 Euro (€)** at **Shs 3,400**

Euros	1	1,300
Ug Shs	3,400	x

$$\frac{1}{3,400} = \frac{1,300}{x}$$

$$\therefore x = \text{Ug Shs } 4,420,000$$

$$\text{Remainder} = 4,420,000 - 2,320,000 = 2,100,000$$

The bank sells **1 pound (£)** at **Shs 4,200**

Pound	1	y
Ug Shs	4,200	2,100,000

$$\frac{1}{4,200} = \frac{y}{2,100,000}$$

$$\therefore y = \text{£}500$$

EER:

1. Convert **£10** to Euros, if **£1 = € 1.12**
2. A Smartphone costs **24,000** Indian rupees. Find its cost in pound sterling if **£1 = 96 rupees**
3. A tourist exchanged **\$1200** for Uganda shillings at a rate of **\$1 = Ug Shs 3500**. Find the amount he received in Uganda currency
4. A radio costs **Ug Shs 787,500**. Find its cost in pounds sterling, if **US \$1 = Ug Shs 2500** and **£25 = US \$ 35**.
5. A tourist exchanged **\$900** for pound sterling at a rate of **£1 = \$1.5**. Find the amount he received in pound sterling, if the bank charged him **5%** commission
6. A tourist exchanged **\$750** for Uganda shillings. He spent **Ug Shs 1,260,000** and converted the remainder in to pound sterling before he left. Find the amount he received on his departure, if **\$1 = Ug Shs 3600** and **£1 = Ug Shs 4,800**.
7. Bank of Uganda buys and sells foreign currencies as follows:

Foreign currency	Exchange rate	
	Buying	Selling
1 US Dollar (\$)	Shs 2,900	Shs 3,000
1 Pound sterling (£)	Shs 4,650	Shs 4,700

A tourist arrived in Uganda with **\$4,500** which he exchanged for Uganda shillings. During his stay he spent **Ug Shs 10,230,000** and converted the remainder in to pound sterling before he left. Calculate the amount he received on his departure

8. A tourist changed **\$900** into Euros when the exchange rate was **€1 = \$1.5**. He spent **€450** and received **\$210** in exchange of the remainder. Find the exchange rate of this second transaction
9. A tourist had **£ 8,000** when he visited Uganda. He changed all of it to Uganda shillings (Ug Shs) at a rate of **Shs 3200 per £ 1** while in Uganda, he spent **Ug Shs 7,200,000** and later exchanged the balance to pounds at a rate of **Ug Shs 4000 per £1**. How much did he get.

SIMPLE INTEREST

Summary:

- 1. The amount borrowed or lent is called the principal*
- 2. The reward to the lender is called interest*
- 3. In solving simple interest problems, the following relations apply:*

(i) Simple interest = $\frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$

(ii) Amount = principal + interest

EXAMPLES:

- 1. Find the simple interest on Shs 25,000 for 3 years at a rate of 8% per annum*

Soln:

$$I = \frac{PRT}{100} = 2,5000 \times \frac{8}{100} \times 3 = 6,000$$

- 2. Find the amount to which Shs 80,000 accumulates in 9 months at a simple interest rate of 15% per annum*

Soln:

$$\text{If } A = P + I,$$

$$\Rightarrow A = 80,000 + \left(80,000 \times \frac{15}{100} \times \frac{9}{12} \right) = 89,000$$

- 3. Find the simple interest on Shs 100,000 at a rate of 6% per annum from 9th oct 2016 to 21st Dec 2016*

Soln:

Hint: In calculating interest on days, do not count the day when the money is lent out, but count the day when it is returned

$$\text{No of days} = 22 \text{ (in Oct)} + 30 \text{ (in Nov)} + 21 \text{ (in Dec)} = 73$$

$$I = \frac{PRT}{100} = 100,000 \times \frac{6}{100} \times \frac{73}{365} = 1,200$$

4. Find how long will it take for a sum of **Shs 80,000** to yield an interest of **Shs 12,000** at a rate of **5% per annum** simple interest

Soln:

$$\text{If } I = \frac{PRT}{100},$$

$$\Rightarrow 80,000 \times \frac{5}{100} \times T = 12,000$$

$$\therefore T = 3 \text{ years}$$

5. Find the principal that yields a simple interest of **Shs 27,000** in **9** years at a rate of **6% per annum**

Soln:

$$\text{If } I = \frac{PRT}{100},$$

$$\Rightarrow P \times \frac{6}{100} \times 9 = 27,000$$

$$\therefore P = \text{Shs } 50,000$$

6. Find the principal that will amount to **Shs 147,200** in **6** years at a simple interest rate of **14% per annum**

Soln:

$$\text{If } A = P + I,$$

$$\Rightarrow P + \left(P \times \frac{14}{100} \times 6 \right) = 147,200$$

$$\therefore P = \text{Shs } 80,000$$

7. A sum of **Shs 12,500** amounts to **Shs 15,500** in **4** years at the rate of simple interest. Find the rate of interest per annum

Soln:

$$\text{If } A = P + I,$$

$$\Rightarrow 12,500 + \left(12,500 \times \frac{R}{100} \times 4\right) = 15,500$$

$$\therefore R = 6\%$$

8. A man borrowed **Shs 15.6** million from a bank at a simple interest rate of **15%** per annum. He has to repay the loan within **2** years in equal weekly instalments. Calculate the:

(i) interest he paid to the bank

(ii) total amount to be paid

(iii) amount he paid per week

Soln:

$$(i) I = \frac{PRT}{100} = 15.6 \times \frac{15}{100} \times 2 = 4.68 \text{ million}$$

$$(ii) A = P + I = 15.6 + 4.68 = 20.28 \text{ million}$$

$$(iii) \text{ Weekly payment} = \frac{\text{Amount}}{\text{No of weeks in 2 years}} = \frac{20.28}{2 \times 52} = 0.195 \text{ million}$$

EER:

1. Find the simple interest on **Shs 96,000** for **10** months at a rate of **$8\frac{1}{3}\%$** per annum

2. A sum of **Shs 25,000** is invested for **3** years at a simple interest rate of **6%** per annum. Find the interest and amount received in that period

3. Find the amount to which **Shs 60,000** accumulates in **4** years at a simple interest rate of **15% per annum**
4. Tom deposited **Shs 8,000** which amounted to **Shs 9,200** after **3** years at simple interest. Find the rate of interest per annum
5. Tom deposited **Shs 40,000** in a bank which offers a simple interest rate of **5% per annum**. Find how much interest he earned after **8** years
6. A sum of money lent out at simple interest amounts to **Shs 84,000** in **10** years at a rate of **3% per annum**. Find the sum lent out
7. A bank lent out **Shs 500,000** to Tom for **2** years and **Shs 300,000** to Bob for **4** years at the same rate of simple interest. If the total interest from both men amounted to **Shs 220,000**, find the rate of interest per annum
8. Tom and Bob borrowed **Shs 30,000** and **Shs 35,000** respectively at the same rate of simple interest for **3** years. If Bob paid **Shs 1,500** more interest than Tom, find the rate of interest per annum
9. Tom wants to buy a car which is priced at **Shs 6 million**. He deposits **Shs 2.4 million** and **15** months later he is required to pay the rest on which he is charged a simple interest rate of **20% per annum**. Find the total amount of money Tom will have to pay for the car
10. A sum of money lent out at simple interest amounts to **Shs 62,000** after **4** years and to **Shs 77,000** after **9** years. Find the sum lent out and the rate of interest per annum

COMPOUND INTEREST

Summary:

- 1. Compound interest is the interest earned on both the principal and on the interest previously earned*
- 2. In solving compound interest problems, the following relations apply:*

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

$$(ii) \text{Compound Interest} = \text{Amount} - \text{principal}$$

$$(iii) \text{The principal for the next period} = \text{Interest earned} + \text{principal}$$

EXAMPLES:

- 1. Find the amount and interest received on Shs 600,000 invested for 2 years at a compound interest rate of 15% per annum.*

Soln:

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

$$\Rightarrow A = 600,000 \times \left(1 + \frac{15}{100}\right)^2 = 793,500$$

$$\text{If } C \cdot I = A - P$$

$$\Rightarrow C \cdot I = 793,500 - 600,000 = 193,500$$

METHOD 2: (STEP BY STEP METHOD)

$$\text{First year amount } A = \frac{115}{100} \times 600,000 = 690,000$$

$$\text{Second year Amount } A = \frac{115}{100} \times 690,000 = 793,500$$

$$\text{If } C \cdot I = A - P$$

$$\Rightarrow C \cdot I = 793,500 - 600,000 = 193,500$$

METHOD 3: (STEP BY STEP METHOD)

$$\text{First year interest } I = \frac{PRT}{100} = 600,000 \times \frac{15}{100} \times 1 = 90,000$$

$$\text{First year amount } A = 600,000 + 90,000 = 690,000$$

$$\text{Second year interest } I = 690,000 \times \frac{15}{100} \times 1 = 103,500$$

$$\text{Second year Amount } A = 690,000 + 103,500 = 793,500$$

$$\text{If } C \cdot I = A - P$$

$$\Rightarrow C \cdot I = 793,500 - 600,000 = 193,500$$

2. Tom deposited Shs 750,000 in a bank which offers a compound interest rate of 20% per annum. Find how much interest he earned after 3 years

Soln:

$$\text{If } C \cdot I = A - P$$

$$\Rightarrow C \cdot I = 750,000 \times \left(1 + \frac{20}{100}\right)^3 - 750,000 = 546,000$$

3. Find the difference between the simple interest and compound interest on Shs 50,000 for 2 years at a rate of 5% per annum

Soln:

$$I = \frac{PRT}{100} = 50,000 \times \frac{5}{100} \times 2 = 5,000$$

$$\text{If } C \cdot I = A - P$$

$$\Rightarrow C \cdot I = 50,000 \times \left(1 + \frac{5}{100}\right)^2 - 50,000 = 5,125$$

Required difference $= 5,125 - 50,000 = 125$

4. A sum of money amounts to **Shs 1,296,000** in 3 years at a compound interest rate of **20% per annum**. Find the sum invested

Soln:

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

$$\Rightarrow P\left(1 + \frac{20}{100}\right)^3 = 1,296,000$$

$$\therefore P = 750,000$$

5. A sum of money lent out at compound interest yielded an interest of **Shs 36,400** in 3 years at a rate of **20% per annum**. Find the sum lent out

Soln:

$$\text{If } C \cdot I = A - P$$

$$\Rightarrow P\left(1 + \frac{20}{100}\right)^3 - P = 36,400$$

$$\therefore P = 50,000$$

6. Tom deposited **Shs 750,000** which amounted to **Shs 1,296,000** after 3 years at compound interest. Find the rate of interest per annum

Soln:

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

$$\Rightarrow 750,000 \times \left(1 + \frac{r}{100}\right)^3 = 1,296,000$$

$$\Rightarrow 1 + \frac{r}{100} = \sqrt[3]{\frac{1,296,000}{750,000}}$$

$$\therefore r = 20\%$$

7. A man invests **Shs 200,000** at the beginning of each year in a bank which offers a compound interest rate of **5% per annum**. Calculate the amount of money the man had in the bank immediately after payment of the third investment.

STEP BY STEP METHOD

$$\text{First year amount } A = \frac{105}{100} \times 200,000 = \mathbf{210,0000}$$

$$\text{Second year principal} = 210,000 + 200,000 = 410,000$$

$$\text{Second year Amount } A = \frac{105}{100} \times 410,000 = \mathbf{430,500}$$

$$\text{Third year principal} = 430,500 + 200,000 = \mathbf{630,500}$$

$$\therefore \text{Required amount} = \mathbf{630,500}$$

8. A man borrows **Shs 250,000** at **10% per annum** compound interest. He pays back **Shs 100,000** at the end of each year. Calculate his debt at the beginning of the third year.

STEP BY STEP METHOD

$$\text{First year amount } A = \frac{110}{100} \times 250,000 = \mathbf{275,0000}$$

$$\text{Second year principal} = 275,000 - 250,000 = 175,000$$

$$\text{Second year Amount } A = \frac{110}{100} \times 175,000 = \mathbf{192,500}$$

$$\text{Third year principal} = 192,500 - 100,000 = \mathbf{92,500}$$

$$\therefore \text{Remaining debt} = \mathbf{92,500}$$

8. A sum of money lent out at compound interest amounts to **Shs 60,000** after one year and to **Shs 72,000** after 2 years. Find the sum lent out and the rate of interest per annum

9. Tom deposited **Shs 800,000** in a bank which offers a compound interest rate of **8.5%** per annum. Find how long will it take for his money to accumulate to **Shs 941,780**

PERIODIC COMPOUNDING

Summary:

1. An investment may be compounded more than once a year. It can be compounded daily, weekly, monthly, quarterly and semiannually.

2. If interest is compounded more than once a year, then: $A = P\left(1 + \frac{r}{100k}\right)^{nk}$,

where n = time frame in years, k = number of compoundings within a year,

nk = number of compoundings over n year, $\frac{r}{k}$ = interest rate for one period

3. (i) Interest compounded quarterly means that its compounded four times a year. Thus $k = 4$

(ii) Interest compounded semiannually means that its compounded two times a year. Thus $k = 2$

(iii) Interest compounded monthly means that its compounded **12** times a year. Thus $k = 12$

(iv) Interest compounded weekly means that its compounded **52** times a year. Thus

$$k = 52$$

(v) Interest compounded daily means that its compounded 365 times a year. Thus $k = 365$

4. The term $\frac{r}{k}$ means that the interest rate per year is converted into interest rate for one period

EXAMPLES:

1. Tom invested **Shs 60,000** for $1\frac{1}{2}$ years at a rate of **12%** per annum compounded quarterly. Find the amount received in that period

Soln:

$$\text{If } A = P \left(1 + \frac{r}{100k} \right)^{nk}$$

$$\Rightarrow A = 60,000 \times \left(1 + \frac{12}{100(4)} \right)^{1.5(4)} = 71,643$$

2. Find the interest received on **Shs 800,000** invested at a rate of **20%** per annum, compounded semiannually for $2\frac{1}{2}$ years

Soln:

$$\text{If } C \cdot I = A - P, \text{ where } A = P \left(1 + \frac{r}{100k} \right)^{nk}$$

$$\Rightarrow C \cdot I = 800,000 \times \left(1 + \frac{20}{100(2)} \right)^{2.5(2)} - 800,000 = 488,408$$

3. Find the amount received on **Shs 400,000** invested at a rate of **15%** per annum, compounded monthly for 2 years

Soln:

$$\text{If } A = P \left(1 + \frac{r}{100k} \right)^{nk}$$

$$\Rightarrow A = 400,000 \times \left(1 + \frac{15}{100(12)} \right)^{2(12)} = 538,940.42$$

EER:

1. Find the amount and interest received on **Shs 750,000** invested for **3 years** at a compound interest rate of **20% per annum**.
2. Tom invested **Shs 60,000** for $1\frac{1}{2}$ years at a rate of **12% per annum** compounded quarterly. Find the interest received in that period
3. Find the amount received on **Shs 800,000** invested at a rate of **20% per annum**, compounded semiannually for $2\frac{1}{2}$ years
4. Tom and Bob were each given Uganda shilling **980,000** at the beginning of **2015**. Tom exchanged his money to US dollars and then banked it on his foreign currency account at a compound interest rate of **2% per annum**, while Bob banked his money without exchanging it, at a compound interest rate of **12% per annum**. The exchange rate in **2015** and **2016** were **Ug Shs 1,250** and **Ug Shs 1,500** to a dollar respectively. If Bob withdrew **Shs 120,000** at the end of **2016**,
 - (i) Calculate the amount of money (in **UG Shs**) each man had in the bank at the end of **2016**
 - (ii) who had more money and by how much?
5. Jane and Joan invested **Shs 600,000** each in a savings society for **2 years**. Jane opted for simple interest while Joan opted for compound interest. Both interest rates were at **12% per annum**.
 - (i) Find the interest earned by each of them
 - (ii) who had more money and by how much?
6. Tom wants to buy a house which is priced at **Shs 56,000,000**. A deposit of **25%** of the value of the house is required. A bank will lend him the rest of the money at a compound interest of **15% per annum** and payable after two years.

Calculate the:

(i) deposit Tom must make

(ii) amount of money Tom will have to pay the bank after two years

(iii) total money which Tom will spend to buy the house

7. *At the beginning of the year 2015, Bob deposited Shs 1,900,000 in a bank which offers a compound interest rate of 2.75% per four months. Find how much interest he earned at the end of the year*

8. *Tom borrows Shs 750,000 at a simple interest rate of 20% per annum and then immediately lends it to Bob at the same rate but at a compound interest. Find how much will Tom gain by this transaction after 3 years*

9. *A man borrowed Shs 14.85 million from a bank at a compound interest rate of 12% per annum. He has to repay the loan within 2 years in 6 equal instalments. Calculate the:*

(i) total amount he paid to the bank

(ii) interest he paid to the bank

(iii) amount he paid per instalment

10. *A man borrowed Shs 39.6 million from a bank at a compound interest rate of 10.5% per annum. He has to repay the loan within 2 years in 8 equal instalments. Calculate the:*

(i) total amount he paid to the bank

(ii) interest he paid to the bank

(iii) amount he paid per instalment

11. *At the beginning of each year starting in 2011, a man invests Shs 800,000 in a bank which offers a compound interest rate of 5% per annum. Calculate the amount of money the man had in the bank at the end of 2013*

APPRECIATION AND DEPRECIATION

Summary:

1. (i) The gradual gain in the value of an asset is called appreciation

(ii) If an asset appreciates in value, then $A = P\left(1 + \frac{r}{100}\right)^n$

2. (i) The gradual loss in the value of an asset is called depreciation

(i) If an asset depreciates in value, then $A = P\left(1 - \frac{r}{100}\right)^n$

EXAMPLES:

1. A plot of land valued **Shs 400,000** appreciates in value at **15% per annum**. Find its value after **2 years**

Soln:

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

$$\Rightarrow A = 400,000 \times \left(1 + \frac{15}{100}\right)^2 = 529,000$$

2. A house valued **Shs 600,000** appreciates in value at **10% per annum**. Find its value after **3 years**

Soln:

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

$$\Rightarrow A = 600,000 \times \left(1 + \frac{10}{100}\right)^3 = 798,600$$

3. A bicycle valued **Shs 250,000** depreciates in value at **20% per annum**. Find its value after **3 years**

Soln:

$$\text{If } A = P\left(1 - \frac{r}{100}\right)^n$$

$$\Rightarrow A = 250,000 \times \left(1 - \frac{20}{100}\right)^3 = 128,000$$

4. A laptop valued **Shs 500,000** depreciates in value at **10% per annum**. Find its value after **3 years**

$$\text{If } A = P\left(1 - \frac{r}{100}\right)^n$$

$$\Rightarrow A = 500,000 \times \left(1 - \frac{10}{100}\right)^3 = 256,000$$

5. A car was bought at **Shs 5 million**. In the first year, its value depreciated by **20%**, in the second year by **15%** and in the third year by **10%**. Find its value after **3 years**

STEP BY STEP METHOD

$$\text{First year amount } A = \frac{80}{100} \times 5 = 4 \text{ million}$$

$$\text{Second year Amount } A = \frac{85}{100} \times 4 = 3.4 \text{ million}$$

$$\text{Third year Amount } A = \frac{90}{100} \times 3.4 = 3.06 \text{ million}$$

\therefore Required amount = 3.06 million

EER:

1. A house was bought at **Shs 150,000**. In the first year, its value appreciated by **25%**, in the second year by **10%** but dropped by **20%** in the third year. Find its value after **3 years**

2. A new factory machine depreciates in value at **25% per annum**. If its value after **3 years** is **Shs 135,000**, find its value when new

TRADE PARTNERSHIP

Summary:

- 1. Partnership business is a business owned by two or more people*
- 2. Partners must negotiate and agree upon a fair profit-sharing ratio*

EXAMPLES:

*1. Tom, Bob and Ben form a trade partnership. Tom contributes **Shs 750,000**, Bob **Shs 500,000** and Ben **Shs 900,000**. **20%** of the annual gross profits are reinvested and a monthly taxation of **Shs 10,000** is to be paid by each shareholder. The net profit is to be shared in the ratio of their capital contributions. If at the end of the year their business made a gross profit of **Shs 3,160,000**, find how much did each member get as his net profit*

Soln:

Amount re-invested =

$$\text{Annual tax} = 3 \times 10,000 \times 12 = \mathbf{360,000}$$

$$\text{Net profit} = 3,160,000 - (632,000 + 360,000) = \mathbf{2,168.000}$$

$$\text{Profit-sharing ratio} = 750,000 : 500,000 : 900,000 = \mathbf{15 : 10 : 18}$$

Tom's share =

Bob's share =

Ben's share =

- 2. Tom, Bob and Ben decided to buy a bus. The bus owner offered the bus at **Shs 280** million but agreed to be paid **60%** of the value as initial deposit in the ratio **3:2:5** respectively and the remaining amount to be paid after **1** year. The total balance was to be paid from the profits of the bus in the same ratio as the deposits. They agreed to share the net profits in the ratio of their deposits. If at the end of the year the bus realized **Shs 208** million, find:*

(i) how much deposit did each contribute

(ii) how much of the balance did Ben contribute.

(iii) how much money was left with Tom after paying the balance

Soln:

(i) Amount deposited = $0.6 \times 280 = 168$ million

Total ratio = $3 + 2 + 5 = 10$

Tom's contribution = $0.3 \times 168 = 50.4$ million

Bob's contribution = $0.2 \times 168 = 33.6$ million

Ben's contribution = $0.5 \times 168 = 84$ million

(ii) Total balance = $280 - 168 = 112$ million

Ben's balance contribution = $0.5 \times 112 = 56$ million

(iii) Net profit = $208 - 112 = 96$ million

Tom's balance contribution = $0.3 \times 96 = 28.8$ million

EER:

- 1. Tom and Bob decided to buy a plot. The plot owner offered the plot at Shs 20 million but agreed to be paid 75% of the value as initial deposit in the ratio 5:3 respectively and the remaining amount to be paid after 2 years including an additional 5% of the initial value for processing the plot documents. The total balance was to be paid in the same ratio as the deposit. Find how much of the balance did Bob contribute.***

2. Tom and Bob have shares in a company. Tom contributed **Shs 400** million and Bob **Shs 600** million as share capital. The company expenses that year were electricity **Shs 12** million, salaries **Shs 55** million and transport **Shs 13** million. The net profit is to be shared in the ratio of their share capital. If at the end of the year their company made a gross profit of **Shs 200** million

(a) find the:

(i) total expenditure for the company

(ii) percentage of the company's expenses to the net profit

(b) Find how much money each share holder got that year if **10%** of this was paid as income tax

3. Tom and Bob contributed **Shs 112,000** and **Shs 128,000** respectively to start a partnership business. They agreed to share their profits as follows.

35% to be shared equally

25% to be shared in the ratio of their respective contributions and **40%** to

be retained for the running of the business. If their profit was **Shs 864,000**, calculate the:

(i) amount Bob received

(ii) amount retained for the business

4. Five members of a self supporting enterprise Tom, Bob, Ben, Sam and Tim were given a certain amount of money to share amongst themselves. Tom got $\frac{3}{8}$ of the total amount while Bob got $\frac{2}{5}$ of the remainder. The remaining amount was shared equally among Ben, Sam and Tim each of which received **Shs 600,000**

(i) How much was shared among the five business men?

(ii) How much did Bob get?

(iii) Tom, Bob and Tim invested their money and earned a profit of **Shs 1,200,000**. A third of the profit was reinvested and the rest was shared in the ratio of their investments. Find how much each got.

TAXATION

(b) A man earns a gross monthly salary of sh 630,000. His allowance in a given month amounted to sh 128,000 and tax was levied on taxable income as follows:

5% for the first sh 200,000

35% for the rest

Find the:

(i) taxable income

(ii) income tax paid by the man