



# INSTALMENT PURCHASES

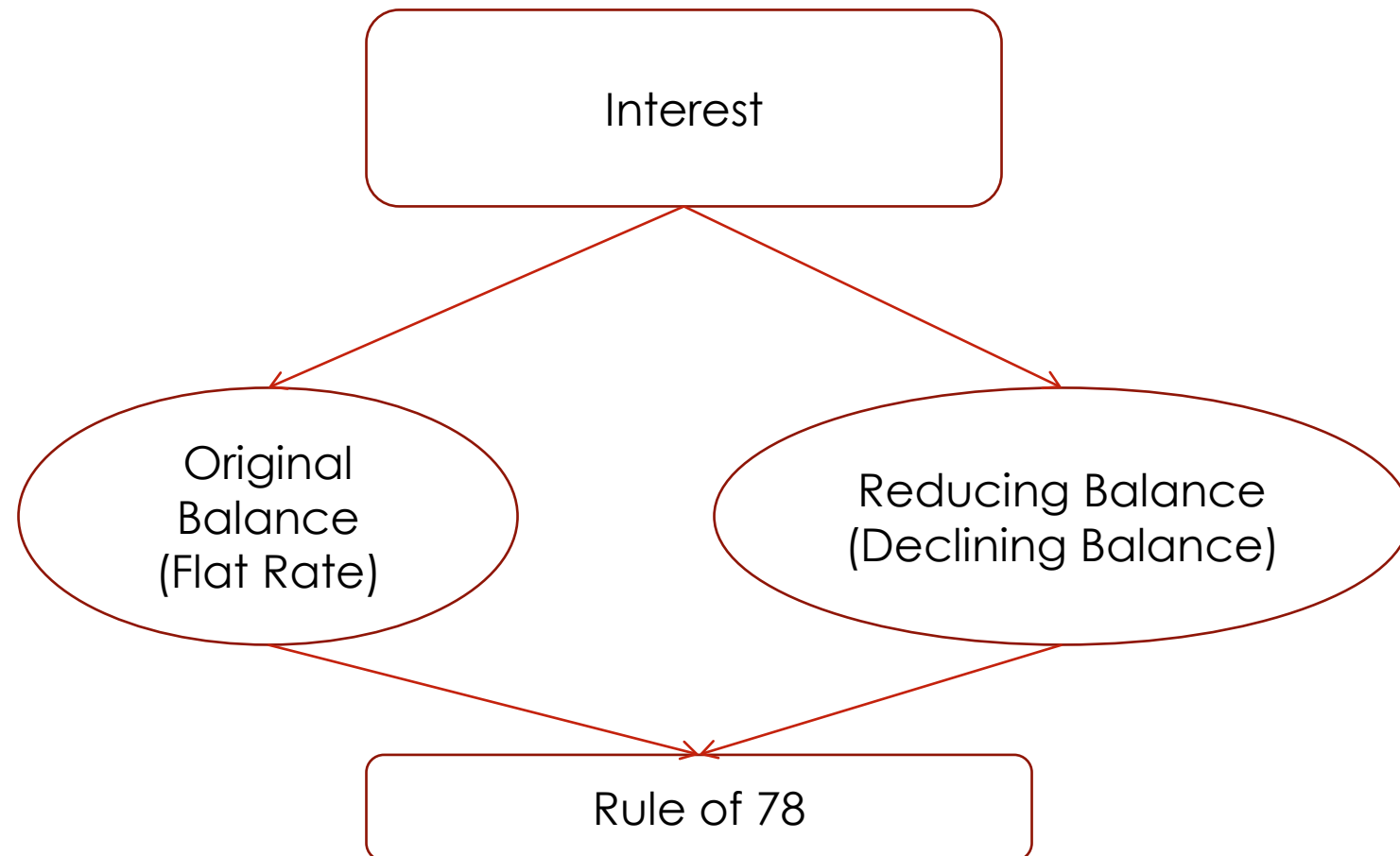
Prepared by:

Mathematical Science Department

# LEARNING OUTCOMES

By the end of this chapter, student should be able to :

- explain the meaning of instalment purchases,
- understand how the interest rate is charged on the original balance and the reducing balance of the credit,
- compute the interest rate charged on the original balance of credit,
- compute the interest rate charged on the reducing balance of credit, and
- compute the outstanding balance and unearned interest of the lender under Rule of 78



# INTRODUCTION

- In an installment purchase plan, a *consumer* is given the *opportunity to pay back over a period*.
- The retailer will usually asked for a considerable sum of *down payment* and will *charged the balance with certain amount of interest* or sometimes called service charged.
- The period of payment may be in *week* or *month*.
- *Some examples of business outlet* that uses the installment plan in their business transaction are Court Mammoth, The Catalog Shop, Singer and Sen Heng Electrical Appliances.



# TERMS USED IN INSTALLMENT PURCHASE.

- **Cash price (CP)**: The cost of item listed at the time of purchase.
- **Interest (I)**: Amount charged on balance
- **Original balance (B)**: The balance after down payment was made or the deposit.(Cash balance)
- **Periodic payment (R)**: Amount of installment paid every week or month.
- **Number of payment (n)**: Total number of payment to settle the balance plus interest.
- **Installment price (IP)**: The total amount paid for the item bought including the down payment.

# GENERAL FORMULA

$$CP = B + DP$$

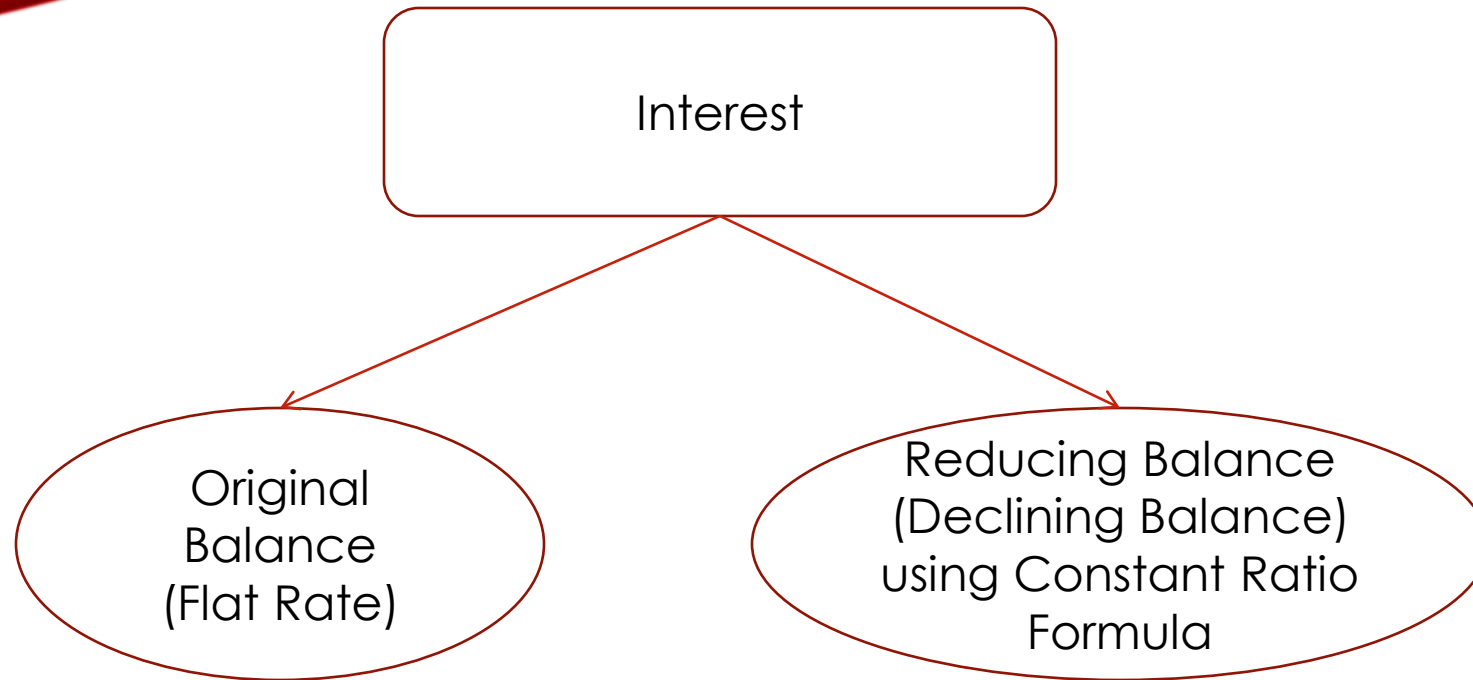
$$R = \frac{B + I}{n}$$

$$\begin{aligned} IP &= CP + I \\ &= B + DP + I \\ &= Rn + DP \end{aligned}$$

Tip : n

If monthly payment (years x  
12)

If weekly payment (years x  
52)



$$I = Prt$$

$$I = \frac{Br(n + 1)}{2m}$$





$$I = Prt$$

I = amount of interest

P = balance

r = interest rate

t = duration in year

$$I = \frac{Br(n+1)}{2m}$$

I = amount of interest

B = balance

r = annual interest rate

n = total number of payments

m = 12 (monthly payment)

= 52 (weekly payment)



# RULE OF 78

- Hire Purchase Act
- Outstanding Principal Balance  
= unpaid payment – interest rebate

$$OPB = Rk - I \left[ \frac{k(k+1)}{n(n+1)} \right]$$

# EXAMPLE

David paid a down payment of RM15,000 to buy a new car. The balance of RM60,000 was paid by making a loan which charged an interest of 3.7% on reducing balance. He settled the loan by making equal monthly payments for seven years. By using constant ratio formula, find

- i) the interest charged,
- ii) the instalment price



# SOLUTION

$$DP = 15000$$

$$B = 60000$$

$$r = 0.037$$

$$n = 12(7) = 84$$

$$m = 12(\text{monthly})$$

$$\begin{aligned} I &= \frac{Br(n+1)}{2m} \\ &= \frac{60000(0.037)(84+1)}{2(12)} \\ &= \text{RM}7862.50 \end{aligned}$$

$$\begin{aligned} IP &= B + DP + I \\ &= 60000 + 15000 + 7862.50 \\ &= \text{RM}82862.50 \end{aligned}$$

# EXAMPLE

A series of magazines was purchased by making a down payment of RM100 and 10 monthly payments of RM121.50. If the interest charged was 1.5% based on the original balance, find:

- i) the instalment price of the magazines.
- ii) the cash price of the magazines.
- iii) the amount of outstanding balance just after the 8th payment using the Rule of 78.



# SOLUTION

i)

$$\begin{aligned} IP &= Rn + DP \\ &= 121.50(10) + 100 \\ &= \text{RM}1315 \end{aligned}$$

ii)

$$\begin{aligned} I &= Prt \\ &= B(0.015)\left(\frac{10}{12}\right) \\ &= 0.0125B \end{aligned}$$

$$\begin{aligned} R &= \frac{B+I}{n} \\ 121.50 &= \frac{B+0.0125B}{10} \\ 1215 &= 1.0125B \\ B &= \text{RM}1200 \end{aligned}$$

$$\begin{aligned} CP &= B + DP \\ &= 1200 + 100 \\ &= \text{RM}1300 \end{aligned}$$

iii)

$$\begin{aligned} k &= 10 - 8 = 2 \\ I &= 0.0125B \\ &= 0.0125(1200) = 15 \end{aligned}$$

$$\begin{aligned} OPB &= Rk - I \left[ \frac{k(k+1)}{n(n+1)} \right] \\ &= 121.50(2) - 15 \left[ \frac{2(2+1)}{10(10+1)} \right] \\ &= \text{RM}242.18 \end{aligned}$$

# EXAMPLE

A loan of RM20,000 is charged RM8,000 interest and was repaid by making 48 equal monthly payments. Find

- i) the monthly payment,
- ii) the outstanding balance just after the 10th payment using the rule of 78.



# SOLUTION

*i)*

$$\begin{aligned} R &= \frac{B + I}{n} \\ &= \frac{20000 + 8000}{48} \\ &= \text{RM}583.33 \end{aligned}$$

*ii)*

$$k = 48 - 10 = 38$$

$$\begin{aligned} OPB &= Rk - I \left[ \frac{k(k+1)}{n(n+1)} \right] \\ &= 583.33(38) - 8000 \left[ \frac{38(38+1)}{48(48+1)} \right] \\ &= \text{RM}17125.72 \end{aligned}$$



# EXAMPLE

Nazmir wishes to purchase a set of furniture that costs him RM25,000 and he has two options to consider.

	Option A	Option B
Down payment	RM2000	RM2000
Interest rate	4% on flat rate	6% on reducing balance
Mode of payment	monthly	monthly
Period of payment	24 months	24 months

For each option, calculate

- the interest charged
- the periodic payment

Based on the total interest charged, which option should Nazmir select? Why?



# SOLUTION

*Option A*

$$\begin{aligned} B &= CP - DP \\ &= 25000 - 2000 \\ &= 23000 \end{aligned}$$

$$I = Prt$$

$$\begin{aligned} &= 23000(0.04)\left(\frac{24}{12}\right) \\ &= \text{RM}1840 \end{aligned}$$

$$\begin{aligned} R &= \frac{B + I}{n} \\ &= \frac{23000 + 1840}{24} \\ &= \text{RM}1035 \end{aligned}$$

*Option B*

$$\begin{aligned} B &= CP - DP \\ &= 25000 - 2000 \\ &= 23000 \end{aligned}$$

$$\begin{aligned} I &= \frac{Br(n+1)}{2m} \\ &= \frac{23000(0.06)(24+1)}{2(12)} \\ &= \text{RM}1437.50 \end{aligned}$$

$$\begin{aligned} R &= \frac{B + I}{n} \\ &= \frac{23000 + 1437.50}{24} \\ &= \text{RM}1018.23 \end{aligned}$$

Decision:

Based on total interest charged,  
Nazmir should select Option B  
because interest charged is lower.



# EXERCISE

Naza wishes to purchase a set of home-theater equipment that costs RM30,000 and he has two shops to consider.

	Shop WY	Shop KL
Down payment	RM1500	RM1500
Interest rate	6% on original balance	10% on reducing balance
Installment payment	monthly	monthly
Duration of installment	2 years	2 years

For each shop, calculate

- the interest charged
- the monthly installment payment
- the installment price
- the difference in the installment price between two shops

**Please submit your  
answer to your  
instructor.**

# SOLUTION

i)

$$\begin{aligned} B &= CP - DP \\ &= 30000 - 1500 \\ &= 28500 \end{aligned}$$

$$\begin{aligned} I &= Prt \\ &= 28500(0.06)\left(\frac{24}{12}\right) \\ &= \text{RM}3420 \end{aligned}$$