Senior High School

General Mathematics

Module 14:

Business Loans and Consumer Loans

AIRs - LM

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GENERAL MATHEMATICS
Module 14: Business Loans and Consumer Loans
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Region I

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Senior High School

General Mathematics
Module 14:
Business Loans and Consumer Loans

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

Target

In the previous lessons, you studied the concepts of interest and annuity. From there, you have learned how to compute interest, future and present values of annuities.

In this section, you will be introduced to the concepts of loan and its types. Also, you will be equipped with the necessary skills in solving problems that involve these types of loans.

After going through this learning material, you are expected to:

1. illustrate business and consumer loan **(M11GM – IIf – 1),**
2. distinguish between business and consumer loans **(M11GM – IIf – 2); and**
3. solve problems involving business and consumer loans (amortization and mortgage) **(M11GM – IIf – 3).**

Learning Objectives:

1. define loan
2. differentiate business and consumer loans
3. illustrate business and consumer loans
4. distinguish between business and consumer loans
5. solve problems involving business and consumer loans (amortization and mortgage)
6. construct amortization schedule

Before going on, check how much you know about this topic by answering the pretest on the next page on a separate sheet of paper.

Pretest

Directions: Read and answer each question carefully. Write the letter of your answer on a separate sheet of paper.

1. Which of the following refers to a money lent specifically for business purposes?
   A. Business loan B. Collateral
   C. Consumer loan D. Emergency loan
2. Which of the following refers to a money lent specifically for personal or family purposes?
   A. Business loan B. Collateral
   C. Consumer loan D. Emergency loan
3. What do you call a loan that is not secured by a collateral?
   A. Amortization B. Annuity
   C. Secured loan D. Unsecured loan
4. Juan applied for a loan amounting to P3,000,000 to purchase a condominium. What type of loan is illustrated in the given situation?
   A. Business loan B. Collateral
   C. Consumer loan D. Emergency loan
5. Pedro wants to put up a grocery store. Since he does not have enough money on hand, he plans to borrow money from the bank to pay the rentals and to buy the grocery items for his store. What type of loan is illustrated in the given situation?
   A. Business loan B. Collateral
   C. Consumer loan D. Emergency loan
6. Teresa plans to put up another branch of her spa salon. She borrowed money from the bank to establish her new salon. What type of loan is illustrated in the given situation?
   A. Business loan B. Collateral
   C. Consumer loan D. Emergency loan

For items 7 – 9, use the problem below.

Phoebe obtained a loan amounting to P350,000 payable for 4 years. The monthly amortization is P8,709.76.

7. What is the total number of payments made to pay the entire loan?
   A. 4 B. 12
   C. 36 D. 48
8. How much is the total amount paid after 3 years?
   A. P408,068.48 B. P418,068.48
   C. P428,068.48 D. P438,068.48
9. How much is the total interest?
   A. P68,008.48 B. P68,068.48
   C. P68,168.48 D. P68,268.48

For items 10 – 15, use the problem below.

An amortized loan amounting to P110,000 is charged with an interest rate of 8% per annum. Payments will be made annually for 8 years.

10. What is the total number of payments made to pay the entire loan?
    A. 2 B. 4
    C. 6 D. 8

11. How much is the annual payment?
    A. P19,141.62 B. P19,241.62
    C. P19,341.62 D. P19,441.62
12. How much is the total amount paid after 8 years?
    A. P153,632.96 B. P153,732.96
    C. P153,132.96 D. P153,932.96
13. How much is the total interest?
    A. P40,932.96 B. P41,932.96
    C. P42,932.96 D. P43,132.96
14. How much is the interest paid on the first payment?
    A. P8,800 B. P8,900
    C. P9,000 D. P9,200
15. How much is the outstanding balance after the first payment is made?
    A. P99,558.38 B. P99,658.38
    C. P99,758.38 D. P99,858.38

Jumpstart

For you to understand the lesson well, do the following activities.
Have fun and good luck!

ACTIVITY: Loan is the key!

Directions: Read the given situation below and answer the questions that follow.

Last September 27, 2009, Philippines was hit by typhoon Pepeng. Unluckily, the house of Mr. Duran was one of the many houses that was greatly devastated during the landfall. With no enough money on hand for his house renovation, he went to a bank and applied for a loan amounting to P400,000. The bank offered him an interest rate of 6.5% per annum which will be paid monthly for 3 years. On October 12, 2009, his loan was approved and right after, he started buying materials for his house renovation.

Questions:

1. How much money did Mr. Duran borrow from the bank?
2. What was the interest rate charged by the bank?
3. What is the total number of payments made to pay the entire loan?
4. How long will his loan last?
5. What type of loan is illustrated in the given situation, is it a consumer loan or a business loan?

Discover

FINANCIAL LOAN

It is a form of debt contract entered into by two parties, an organization or an individual. The lender which is usually a financial institution advances a sum of money to the borrower. In return, the borrower agrees to certain set of terms which includes the principal amount, interest rate, finance charges, and other conditions.

Loans can be classified as secured or unsecured loan.

What is the difference between secured and unsecured loans?

In a ***secured loan***, the borrower pledges some assets as collateral for the loan. Collateral could be real-state or other investments. In case the borrower fails to pay his/her obligations, the lender has the right to take possession of the assets pledge by the borrower. On the other hand, an ***unsecured loan*** is a loan that is approved without the need for collateral.

Loans also differ in form. The two most common types of loans are business and consumer loans.

What is the difference between a consumer loan and business loan?

A ***business loan*** is a money lent specifically for a business purpose. It may be used to start a business or to have a business expansion. On the other hand, a ***consumer loan*** is a money lent to an individual for personal or family purposes. The most popular examples of consumer loans are mortgages, home equity, and credit card.

To further distinguish a consumer loan from a business loan, let's have some examples.

A. Mr. Pepito, a government employee, plans to make some renovations in their house. Since he does not have enough cash, he decided to borrow money from the bank to cover the expenses for his house renovation.
B. Mr. Dulay was able to put up another branch of his restaurant. This was made possible because of an approved loan from a lending institution.
C. In order to finance the education of her child, Mrs. Daliba borrowed some money from the bank.
D. Mr. Biscocho and his family decided to go for a trip outside the country. In order to cover the expenses for the trip, he decided to apply for a loan.

Which of the following situations above illustrate a consumer loan? How about business loan?

Great! Situations A, B, and D illustrate a consumer loan since the loans made by the borrowers are intended for personal or family use. On the other hand, situation C illustrates a business loan since the loan made by the borrower is intended for business purposes.

Now that you already know the difference between consumer and business loans, we then proceed to solving problems involving these types of loans. To start, let us have some definition of terms.

Amortization. It is the process of paying a loan over time in a regular equal payment.

Mortgage. It is a type of secured loan secured by a collateral that the borrower is obliged to pay at specified terms.

Amortization Schedule. It is a complete table of periodic loan payments that shows the principal, interests and the outstanding balance after each payment is made.

COMPUTING REGULAR PAYMENTS ON AN AMORTIZED LOAN

The formula for calculating the payment amount is given by:

$$R = \frac{P}{\left[\frac{1-(1+j)^{-n}}{j}\right]}$$

where;

R = regular or periodic payment
P = Loan amount
j = the interest rate per period and is given by the formula, $j = \frac{r}{m}$ where ***r*** is the annual interest rate and ***m*** is the number of compounds

Note: annually ***(m = 1)*** quarterly ***(m = 4)***
semi – annually (***m = 2***) monthly ***(m = 12)***

n = the total number of payments and is given by the formula, ***n = mt*** where ***m*** is the number of compounds and ***t*** is time express in years.

Example 1: A consumer loan amounting to P100,000 is to be repaid monthly for 15 months with an interest rate of 9%. How much is the monthly payment?

Solution:

Step 1. Identify the given in the problem.

a. P = P100,000

b. $j = \frac{r}{m} = \frac{0.09}{12} = 0.0075$ *Since interest rate is 9%, then **r = 0.09**. Also, since payment is done monthly then **m = 12.***

c. $n = mt$

$= 12\left(\frac{15}{12}\right)$

$= 15$

*Since the given time **t** is in months, we convert 15 months to years. Thus, t = 15/12.*

d. R = ?

Step 2. Substitute the values in the formula.

$$\boldsymbol{R = \frac{P}{\left[\frac{1-(1+j)^{-n}}{j}\right]}}$$

$$\boldsymbol{R = \frac{100{,}000}{\left[\frac{1-(1+0.0075)^{-15}}{0.0075}\right]}}$$

$$\boldsymbol{R = \frac{100{,}000}{\left[\frac{1-(1.0075)^{-15}}{0.0075}\right]}}$$

$$\boldsymbol{R = \frac{100{,}000}{\left[\frac{1-0.89397253784}{0.0075}\right]}}$$

$$\boldsymbol{R = \frac{100{,}000}{\left[\frac{0.10602746216}{0.0075}\right]}}$$

$$\boldsymbol{R = \frac{100{,}000}{14.1369949547}}$$

$$\boldsymbol{R = 7073.64}$$

Therefore, the monthly payment is P7073.64

Example 2: Ms. Dulay borrowed P1,250,000 at a fixed interest rate of 10% per annum to purchase a car. The loan is to be repaid quarterly for 20 years.

A. How much is her quarterly mortgage payment?
B. How much is the total amount of money accumulated for 20 years?
C. Find the total interest that she will pay for the loan.

Solution:

Step 1. Identify the given in the problem.

a. P = P1,250,000

b. $j = \frac{r}{m} = \frac{0.10}{4} = 0.025$ *Since interest rate is 10%, then **r = 0.10**. Also, since payment is done quarterly then **m = 4.***

c. $n = mt$

$= 4(20)$

$= 80$

d. R = ?

Step 2. Substitute the values in the formula.

$$R = \frac{P}{\left[\frac{1-(1+j)^{-n}}{j}\right]}$$

$$R = \frac{1{,}250{,}000}{\left[\frac{1-(1+0.025)^{-80}}{0.025}\right]}$$

$$R = \frac{1{,}250{,}000}{\left[\frac{1-(1.025)^{-80}}{0.025}\right]}$$

$$R = \frac{1{,}250{,}000}{\left[\frac{1-0.13870456974}{0.025}\right]}$$

$$R = \frac{1{,}250{,}000}{\left[\frac{0.86129543053}{0.025}\right]}$$

$$R = \frac{1{,}250{,}000}{34.45181722128}$$

$$R = 36{,}282.56$$

Therefore, the quarterly mortgage amount is P36,282.56

B. To find the total amount of money accumulated for 20 years, we multiply the quarterly mortgage and the total number of payments made. Thus, we have

Total amount accumulated = R x n

= P36,282.56(80)

= **P2,902,604.8**

C. To find the total interest, we subtract the loan amount from the total amount accumulated. Thus, we have

Total interest = Total amount accumulated – P

= P2,902,604.8 - P1,250,000

= **P1,652,604.8**

Example 3: An amortized loan amounting to P150,000 is charged with an interest rate of 7% per annum. If payments will be made semi – annually for 2 years, how much is the periodic payment? Construct the amortization schedule.

Solution:

Step 1. Identify the given in the problem.

a. P = P150,000

b. $j = \frac{r}{m} = \frac{0.07}{2} = 0.035$ *Since interest rate is 7%, then* ***r = 0.07****. Also, since payment is done semi - annually then* ***m = 2.***

c. $n = mt$

$= 2(2)$

$= 4$

d. R = ?

Step 2. Substitute the values in the formula.

$$\boldsymbol{R = \frac{P}{\left[\frac{1-(1+j)^{-n}}{j}\right]}}$$

$$\boldsymbol{R = \frac{150{,}000}{\left[\frac{1-(1+0.035)^{-4}}{0.035}\right]}}$$

$$\boldsymbol{R = \frac{150{,}000}{\left[\frac{1-(1.035)^{-4}}{0.035}\right]}}$$

$$\boldsymbol{R = \frac{150{,}000}{\left[\frac{1-0.8714422277}{0.035}\right]}}$$

$$\boldsymbol{R = \frac{150{,}000}{\left[\frac{0.1285577723}{0.035}\right]}}$$

$$\boldsymbol{R = \frac{150{,}000}{3.67307920861}}$$

$$\boldsymbol{R = 40837.67}$$

Therefore, the monthly payment is P40,837.67

Amortization Schedule

To construct the amortization schedule for the given problem, we follow the format shown below.

Payment Number ***n***	*Beginning Principal*	*Regular Payment* ***R***	*Interest Payment*	*Principal Reduction*	*Outstanding Balance*
1					
2					
3					
4					

FIRST PAYMENT (ROW 1)

a. For the first payment, the beginning principal is the loan amount which is **P150,000.**

b. The computed regular payment is worth **P40,837.67**

c. To compute the interest for the first payment, we multiply the beginning principal (*1st payment*) by the interest rate per period. Thus, we have

Interest (1st payment) = P150,000(0.035) = **P5250**

d. To compute the principal reduction, we subtract the regular payment to the interest. Thus, we have

Principal reduction (1st payment) – Interest = P40837.67 – P5250 = **P35587.67**

e. To compute the outstanding balance, we subtract the beginning principal (1st payment) to the principal reduction payment. Thus, we have

Beginning Principal (1st payment) – Principal reduction = P150,000 - P35587.67

= **P114,412.33**

The summary for the first payment is shown below.

Payment Number ***n***	*Beginning Principal*	*Regular Payment* ***R***	*Interest Payment*	*Principal Reduction*	*Outstanding Balance*
1	P150,000	P40837.67	P5250	P35587.67	P114,412.33

SECOND PAYMENT (ROW 2)

a. For the second payment, the beginning principal is **P114,412.33**

b. The computed regular payment is worth **P40,837.67**

c. To compute for the interest for the second payment, we multiply the beginning principal (second payment) by the interest rate per period. Thus, we have

Interest (2nd payment) = P114,412.33 (0.035) = **P4,004.43**

d. To compute the principal reduction, we subtract the regular payment to the interest. Thus, we have

Principal reduction (2nd payment) – Interest = P40,837.67 – P4004.43 = **P36,833.24**

e. To compute the outstanding balance, we subtract the beginning principal (2nd payment) to the principal reduction payment. Thus, we have

Beginning Principal (2nd payment) – Principal reduction = P114,412.33- P36,833.24

= P77,579.09

Payment Number ***n***	*Beginning Principal*	*Regular Payment* ***R***	*Interest Payment*	*Principal Reduction*	*Outstanding Balance*
1	P150,000	P40,837.67	P5250	P35587.67	P114,412.33
2	**P114,412.33**	**P40,837.67**	**P4,004.43**	**P36,833.24**	**P77,579.09**

The summary for the second payment is shown below.

For the third and fourth payments, we follow the same procedures which yield to:

Payment Number ***n***	*Beginning Principal*	*Regular Payment* ***R***	*Interest Payment*	*Principal Reduction*	*Outstanding Balance*
1	P150,000	P40,837.67	P5250	P35587.67	P114,412.33
2	P114,412.33	P40,837.67	P4,004.43	P36,833.24	P77,579.09
3	**P77,579.09**	**P40,837.67**	**P2,715.27**	**P38,122.4**	**P39,456.69**
4	**P39,456.69**	**P40,837.67**	**P1,380.98**	**P39,456.69**	**0**

Explore

Activity 1: Identify Me!

Directions: Identify if the given situations below illustrate a consumer loan or a business loan. Write **BL** for business loan, and **CL** for consumer loan. Use a separate sheet of paper for your answer.

1. Mr. Pedro wants to buy 3 new computers for his PISO NET business. To do this, he obtained a loan amounting to P100,000 from the bank.
2. Juan wants to buy a tricycle which will serve as his children's service in going to their school. To make this happen, he applied for a loan in a bank.
3. Teresita was able to put up her tutorial center near the school. This was made possible by an approved loan in a bank.
4. Jericho wants to put up a grocery store. Since he does not have enough money on hand, he plans to borrow money from the bank to pay the rentals and to buy the grocery items for his store.
5. Juan applied for a loan amounting to P1,200,000 to purchase a car.

Activity 2: Solve Me!

Directions: Analyze the given problems below and answer the questions that follow. Show your solutions and write it on a separate sheet of paper.

Problem 1: Mr. Baltazar borrowed P1,500,000 for the expansion of his business. The loan is charged with an interest rate of 7.5% per annum for 3 years. If the payment is made annually, how much is the yearly payment?

Problem 2: A loan worth P150,000 is charged with an interest rate of 6% per annum for 3 years. If payment is made annually, how much is the yearly amortization? Construct its amortization schedule by completing the table below.

Payment Number ***n***	*Beginning Principal*	*Regular Payment* ***R***	*Interest Payment*	*Principal Reduction*	*Outstanding Balance*
1	P150,000		P9,000	P47,116.47	
2		P56,116.47		P49,943.46	P52,940.07
3	P52,940.07	P56,116.47	P3,176.40		0

Problem 3: An amortized loan amounting to P360,000 is charged with an interest rate of 7% per annum. If payments will be made annually for 2 years, how much is the periodic payment?

Problem 4: Mr. Cruz applied for a loan worth P250,000 which is to be paid annually with an interest rate of 9% per annum for 3 years.

a. How much is the annual amortization?
b. How much is the total interest paid?
c. Construct its amortization schedule.

Deepen

Directions: Analyze and solve the problem. Use a separate sheet of paper for your solution and be guided by the rubric shown below.

A client is applying for a loan amounting to P400,000 in the bank where you are working. You explained to the client that the bank is charging 9% interest rate per annum and that payment is to be made monthly. The client asked you how much will the monthly payment be if the loan will last for a.) 2 years b.) 3 years c.) 4 years so that he will have an idea how much will be deducted from his salary.

Your task is to compute and explain to the client the monthly amortization, the total amount accumulated and total interest to be paid after a.) 2 years b.) 3 years c.) 4 years.

Which do you think would be a better choice for the client considering the repayment term (2, 3 or 4 years) and the monthly salary deduction? Explain why?

Rubrics:

Criteria	1 point	3 points	5 points
Accuracy	Little to none of the answers are correct.	Some of the answers are correct.	All of the answers are correct.
Organization	Solution is sloppy and unorganized.	Some of the solutions are clearly presented and organized.	All of the solutions are clearly presented and organized.
Written Explanation	Explanation is very confusing.	Explanation is clear but confusing in some parts.	Explanation is very clear

Gauge

Directions: Read and answer each question carefully. Write the letter of your answer on a separate sheet of paper.

1. Which of the following refers to a money lent specifically for business purposes?
   A. Business loan B. Collateral
   C. Consumer loan D. Emergency loan
2. Which of the following refers to a money lent specifically for personal or family purposes?
   A. Business loan B. Collateral
   C. Consumer loan D. Emergency loan
3. What do you call a loan that is secured by a collateral?
   A. Amortization C. Annuity
   B. Secured loan D. Unsecured loan

4. Peter applied for a loan amounting to P3,000,000 to purchase a house and lot for his family. What type of loan is illustrated in the given situation?
   A. Business loan B. Collateral
   C. Consumer loan D. Emergency loan
5. Regina wants to put up a beauty parlor. Since she does not have enough money on hand, she plans to borrow money from the bank to pay the rentals and to buy the equipment needed for her shop. What type of loan is illustrated in the given situation?
   A. Business loan B. Collateral
   C. Consumer loan D. Emergency loan
6. Teresa plans to put up another branch of her spa salon. She borrowed money from the bank to establish her new salon. What type of loan is illustrated in the given situation?
   A. Business loan B. Collateral
   C. Consumer loan D. Emergency loan

For numbers 7 – 9, refer to the given problem below.

Problem: Phoebe obtained a loan amounting to P80,000 payable for 3 years. The monthly amortization is P2,451.92.

7. What is the total number of payments made to pay the entire loan?
   A. 3 B. 4 C. 12 D. 36
8. How much is the total amount paid after 3 years?
   A. P88,269.12 B. P88,769.12
   C. P88,569.12 D. P88,969.12
9. How much is the total interest?
   A. P8,269.12 B. P8,769.12
   C. P8,569.12 D. P8,969.12

For numbers 10 – 15, refer to the given problem below.

Problem: Mr. Chavez obtained P6,000,000 mortgage to purchase a house. The mortgage will be repaid for 20 years at 8% per annum compounded semi - annually.

10. What is the total number of payments made to pay the entire loan?
    A. 20 B. 40 C. 60 D. 80
11. How much is the semi - annual payment?
    A. P303,140.94 B. P303,240.94
    C. P303,340.94 D. P303,440.94
12. How much is the total amount paid after 20 years?
    A. P12,125,637.6 B. P13,125,637.6
    C. P14,125,637.6 D. P15,125,637.6
13. How much is the total interest?
    A. P6,125,637.6 B. P6,225,637.6
    C. P6,325,637.6 D. P6,425,637.6
14. How much is the interest paid on the first payment?
    A. P140,000 B. P240,000
    C. P340,000 D. P540,000
15. How much is the outstanding balance after the first payment is made?
    A. P5,025,637.60 B. P5,205,637.60
    C. P5,636,859.06 D. P5,936,859.06

References

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