GENERAL MATHEMATICS

Name of Learner:_____ Grade Level:_____

Section: _____ Score: _____

LEARNING ACTIVITY SHEET

ILLUSTRATES, DISTINGUISHES AND SOLVE PROBLEMS INVOLVING BUSINESS AND CONSUMER LOANS (AMORTIZATION AND MORTGAGE)

Background Information for Learners

Loans are provided to help people who are experiencing financial crisis. Loans refer to lending of things/money to individuals or organizations that is expected to be paid back on a certain time with interest.

There are different types of loans that we can take depending on our needs. The various types of loans are home loans, personal loans, student loan, business loan etc.

In this learning activity sheet, you will be able learn the basic concepts of loans. The **business loan** which is referred as the borrowed money from a bank or other lending institutions/persons that can be **used to start a business or to have a business expansion** and the **consumer loan** which is referred as the borrowed money from a bank or other lending institutions/persons that can be used for **personal or family purposes**.

Example 1. Identify whether the following is a consumer or business loan.

1. Mr. and Mrs. Bautista borrowed money from their aunt abroad to finance the college education of their children.

Solution: Consumer Loan

2. Gina plans to sell cactus online. She borrows ₱10,000 from her parents to start her online selling.

Solution: Business Loan

3. Mr. Marquez wants to have his own house. He went to the Pag-IBIG (Home and Development Mutual Fund) office to apply and avail for a housing loan.

Solution: Consumer Loan

4. Sharon owns two (2) Green Cab Pizza carts in their barangay. She wants to put another pizza cart business in their nearby barangays so she decided to have a loan to materialize her plans.

Solution: Business Loan

5. Althea has a computer shop and owns 9sets of computers. She wants to add 6 more computers so she applied and availed ₱60,000 loan from a lending company.

Solution: Business Loan

Example 2. Mr. Rivera borrowed ₱ 250,000 from a bank to purchase a residential lot. The rate of interest of his loan is 7.5% annually The loan is to be paid for 2 years. How much is to be paid after 2 years?

Solution:

Given: P=₱ 250,000, $i^m = 7.5\%\ or\ 0.075$

j= $\frac{i^m}{m} = \frac{0.075}{1} = 0.075$

n= (m)(t) = (1)(2)= 2

Find: Future Amount (F)

$F=P\ (1+j)^n$

$F=250{,}000(1+0.075)^2$

F= ₱288,906.25

Thus, the amount to be paid by Mr.Rivera after 2 years is ₱288,906.25

Example 3. A housing loan amounting to ₱870,000 requires a 20% down payment. How much is the mortgage?

Solution:

Given: down payment rate= 20% or 0.20

Cash price = ₱870,000

Find: amount of loan or mortgage

Down payment = down payment rate x cash price
= 0.20 x ₱870,000
= ₱174,000

Amount of the Loan = Cash Price-Down Payment
= ₱870,000- ₱174,000
= ₱696,000

Thus, the amount of loan or mortgage is ₱696,000

Example 4. Mrs. Lopez acquired a housing loan amounting to ₱1,200,000. Her monthly amortization is ₱19,942.63 for 15 years. The interest rate is 7% convertible monthly. Find the outstanding balance after the 110th payments.

Solution:

Given: P = ₱1,200,000
R = ₱19,942.63
i^m = i^{12} = 7% or 0.07
j = $\frac{i^{12}}{m} = \frac{0.07}{12}$
n = (m)(t)= (12)(15)= 180 (total number of payments)
k = 110 (number of payments made)

Find: Outstanding balance after 110th payments

Answer: Let B_{110} represents the outstanding balance after the 110th payments or present value of the remaining 70 payments (n=70)

$$B_{110} = R\left[\frac{1-(1+j)^{-n}}{j}\right]$$
$$= ₱19{,}942.63\left[\frac{1-(1+\frac{0.07}{12})^{-70}}{\frac{0.07}{12}}\right]$$
$$= ₱1{,}143{,}408.87$$

Thus, the outstanding balance after 110 payments is ₱1,143,408.87

Learning Competencies

Illustrates, distinguishes and solve problems involving business and consumer loans (amortization and mortgage). **M11GM-IIf-1 to 3**

Exercise 1:

Directions: Read and analyze each situation then identify whether the given is a business loan or consumer loan. Write **BL** if it is a business loan or **CL** if it is a consumer loan. Write your answer on the space provided before the number. [**1 point each**]

_____1. Mr. Aquino owns 2 tractors for farming. He wants to buy 2 more tractors and use these for business. He applied for a loan in a bank.
_____2. Mario wants to tour his family in other places so he applied for a loan and bought a pick-up truck.
_____3. Due to COVID-19 pandemic, lot of people needs to work from home through online. So, Ram decided to put up internet business because this is in demand nowadays. He then applied for a loan to purchase materials and equipment to start his business.
_____4. Mr. & Mrs. Santos borrowed ₱300,000 from a bank in order to build rooms for rent.
_____5. Due to the hot weather, Athena's water refilling business has become popular in their barangay. So, she made a loan from a bank that can be used to expand her business in other barangay.
_____6. Elsa bought a washing machine that could help her in washing their clothes through home credit.
_____7. Aiyana wants to renovate their old house but she does not have savings. She went to a bank and applied for a salary loan to finance her plan.
_____8. Freggie had a housing loan payable monthly for 15 years.
_____9. Food is a basic necessity of a human being. So, Cory plans to have a restaurant. She borrowed money from a lending institution for the construction and operation of her business.
_____10. Ariel got loan worth ₱450,000 and used this amount to purchase an apartment near his workplace.

Exercise 2:
Directions: Analyze the given amortization procedures in the table below then fill in each blank using the guide questions below the table. Show your solution using an extra sheet of paper. [**3 points each]**

Problem: A salary loan amounting to ₱15,000 is to be paid annually for 4 years with an interest rate of 6% compounded annually. The annual amortization is ₱ ₱4,328.87.

Period	Regular Payment (R)	Interest Component of Payment	PRINCIPAL Component of Payment	Outstanding Balance
0				A
1	B	₱900	₱3,428.87	₱11,571.13
2	₱4,328.87	₱694.27	C	7,936.53
3	₱4,328.87	D	3,852.68	E
4	₱4,328.87	245.031	4,083.84	F
Totals	G	H	I	

Guide Questions:

A. How much is the amount of the loan? (Outstanding balance at time 0)

B. How much is the first regular annual payment?

C. For the second payment, how much goes to pay the principal?

D. For the third payment, how much goes to pay the interest?

E. How much is the outstanding balance after the 3rd payment?

F. How much should be the outstanding balance after the 4th or last payment?

G. How much is the total amount of regular payment for 4 years?

H. How much is the total interest paid for 4 years?

I. How much is the total payment for the principal for 4 years?

Exercise 3: Problem Solving

Directions: Read and analyze each question. Then answer the following problems completely. Show your step-by-step solution in each item.

1. Mr. Bagain borrowed ₱2,000,000 for the expansion of his farm supply business. The effective rate of interest is 8%. The loan is to be repaid in full after three years. How much is to be paid after three years? **[5 points]**
   Solution:

2. Ramon borrowed ₱1,700,000 for the purchase of a reaper harvester machine. If his monthly payment is ₱ 35,000 on a 5-year mortgage, find the total amount of interest. **[5 points]**

   Solution:

3. If a 2- hectares land is to be sold for ₱2,000,000 and the lender requires 30% down payment, what is the amount of the mortgage? **[5 points]**

   Solution:

4. Beatriz got a loan amounting to ₱40,000 and to be repaid in 12 months at 6% convertible monthly. How much is her monthly payment? **[5 points]**

   Solution:

5. Mr.. Reyes is considering to pay his outstanding balance for 4 years of payment. The original amount of loan is ₱450,000 payable annually in 6 years. If the interest rate is 8.5% per annum. a.) Find the regular payment annually, b) How much is the outstanding balance after 4 years of payment, c) Find the total amount of interest for 6 years. **[15 points]**

   Solution:

Reflection:

What are the factors that you need to consider in applying for a loan? Why is it important to consider those factors? Explain your answer. Write your answers on the blanks provided below.

_____

_____

_____

References of Learners

Verzosa, D.B. , et.al., (2016). General Mathematics for Senior High School (First Edition). Quezon City Manila; Lexicon Press Inc.

Answer Key:

Exercise 1

1. BL
2. CL
3. BL
4. BL
5. BL
6. CL
7. CL
8. CL
9. BL
10. CL

Exercise 2

Period	Regular Payment (R)	Interest Component of Payment	PRINCIPAL Component of Payment	Outstanding Balance
0				A. ₱15,000
1	B. ₱4,328.87	₱900	₱3,428.87	₱11,571.13
2	₱4,328.87	₱694.27	C. ₱3,634.6	₱7,936.53
3	₱4,328.87	D. ₱476.19	₱3,852.68	E. ₱4,083.85
4	₱4,328.87	₱245.031	₱4,083.84	F. 0
Totals	G. ₱17,315.48	H. ₱2,315.49	I. ₱15,000	

Exercise 3

1. Given: P=₱2,000,000
   j=8% or 0.08
   n=3 years
   Find: Future Value (F)
   $F=P(1+j)^n$
   $F=₱2,000,000(1+0.08)^3$
   F=₱2,519,424
   Thus, the amount to be paid after 3 years is **₱2,519,424**

2. The total amount paid is given by
   Total Amount =(35,000)(12months)(5years)
   =₱2,100,000

   Thus, the total interest is the difference between the total amount paid and the amount of the mortgage.
   Total Interest = Total Amount Paid- Amount of the Mortgage
   = ₱2,100,000- ₱1,700,000

= ₱400,000

The total interest of the mortgage for 5 years is **₱400,000**

3. Given:
   Cash Price=₱2,000,000
   Down payment rate=30% or 0.30

   Down payment= Cash Price x Down payment Rate
   = ₱2,000,000 x 0.30
   = ₱600,000
   Amount of the Loan = Cash price –Down payment
   = ₱2,000,000-₱600,000
   = ₱1,400,000
   The amount of the loan or mortgage is **₱1,400,000**

4. Given: P= ₱40,000
   i^{12}=6% or 0.06, j=$\frac{i^{12}}{m} = \frac{0.06}{12}$= 0.005
   n=12
   Find: Monthly/Regular Payment R
   R = $\frac{P}{[\frac{1-(1+j)^{-n}}{j}]}$
   = $\frac{40{,}000}{[\frac{1-(1+0.005)^{-12}}{0.005}]}$
   = **₱3,442.66**
   The monthly payment of Beatriz is **₱3,442.66**
5. Given: P= ₱450,000
   n=6
   j=8.5% or 0.085
   Find: Outstanding balance after 4 years (present value of the remaining 2 payments)

   a. R = $\frac{P}{[\frac{1-(1+j)^{-n}}{j}]}$
   = $\frac{450{,}000}{[\frac{1-(1+0.085)^{-6}}{0.085}]}$
   = ₱98,823.19

   The regular payment annually of Mr. Reyes is ₱98,823.19

   b. B_4 = R $[\frac{1-(1+j)^{-n}}{j}]$
   = 98,823.19 $[\frac{1-(1+0.085)^{-2}}{0.085}]$
   = ₱175,027.16

   The remaining balance of Mr. Reyes after 4th payment is ₱ 175,027.16

   c. The total amount paid is given by

Total Amount = ₱98,823.19 x 6years
= ₱592, 939.14

Thus, the total interest is the difference between the total amount paid and the amount of mortgage.

Total Interest = Amount Paid – Amount of Mortgage
= ₱592, 939.14 - ₱450,000
= **₱142, 939.14**