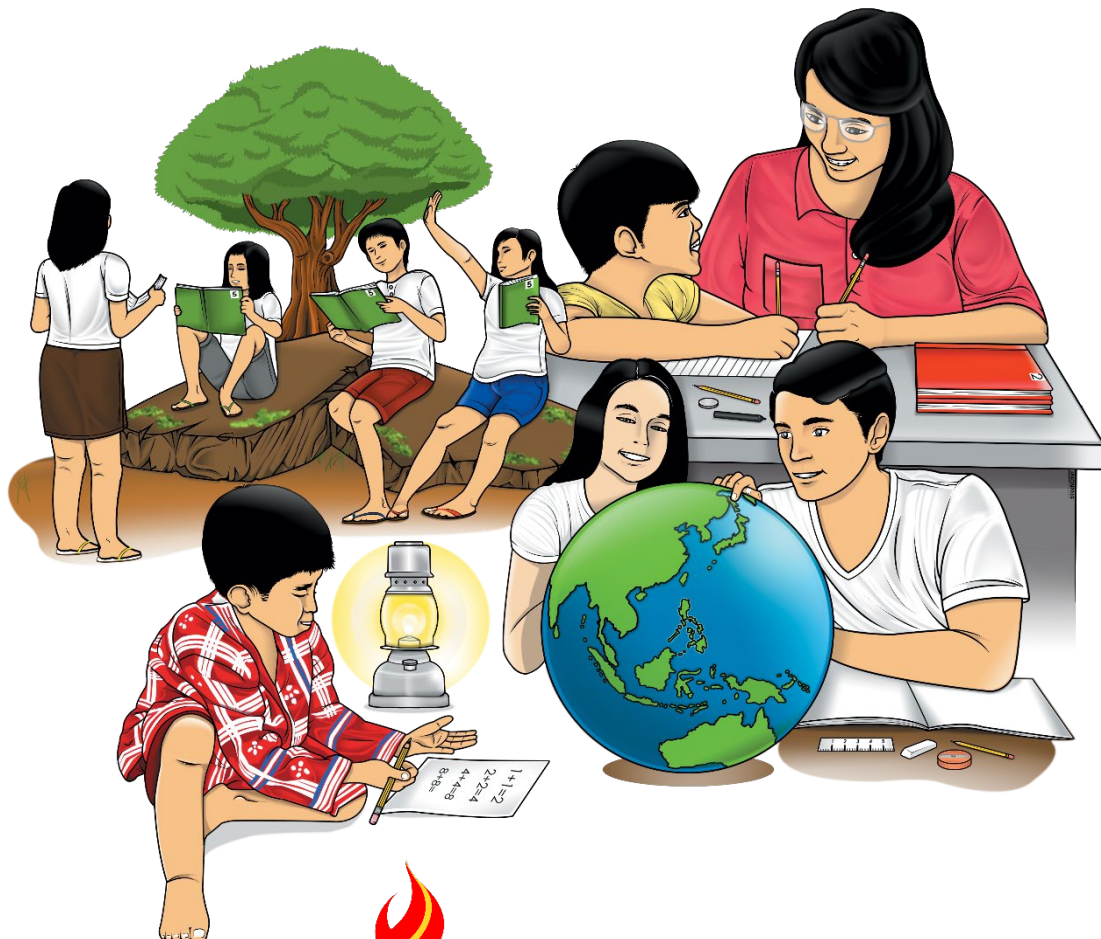# General Mathematics
Quarter 2 – Module 2:
Interest, Maturity, Future, and Present Values in Simple and Compound Interests

General Mathematics – Senior High School
Alternative Delivery Mode
Quarter 2 – Module 2: Interest, Maturity, Future, and Present Values in Simple
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General Mathematics
Quarter 2 – Module 2:
Interest, Maturity, Future, and Present Values in Simple and Compound Interests

DepED
DEPARTMENT OF EDUCATION

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.

What I Need to Know

On your previous module, you have already illustrated and distinguished the difference between simple and compound interests. A deeper analysis of this topic will be the focus of this module wherein the relationships among the variables in solving the simple and compound interest will be explored.

You will realize the importance of deriving a certain formula to compute the required variable involved in interest. The connection among interest, principal or present value, rate, time and maturity value will be reiterated. This topic will also revolve around money and since it is talking about money you will learn more on how to make decisions that concerns about it.

Are you now ready for the new lesson, if so you may proceed to this module and have fun while learning.

The module is composed of two lessons, namely:

- Lesson 1 – Interest, Maturity, Future, and Present Values in Simple Interest
- Lesson 2 – Interest, Maturity, Future, and Present Values in Compound Interest

After going through this module, you are expected to:

1. compute interest, maturity value, future value, and present value in simple interest environment;
2. compute interest, maturity value, future value, and present value in compound interest environment; and
3. derive the formula of simple and compound interest to compute the maturity, future, and present value.

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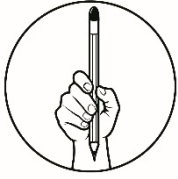
What I Know

Let's find out how far you might already know about this topic by answering the assessment below.

Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. Which of the following is the formula to find the simple interest?
   a. $I_s = Prt$
   b. $I_s = P(1 + r)^t$
   c. $I_s = F - P$
   d. $I_s = \frac{F}{(1+r)^t}$

2. What formula will be used to find the present value of simple interest?
   a. $P = I_s rt$
   b. $P = \frac{I_s}{rt}$
   c. $P = \frac{rt}{I_s}$
   d. $P = \frac{I_s r}{t}$

3. If the investment amounting to ₱35,000 earned an interest of ₱2,500 how much will be the maturity value?
   a. ₱32,500
   b. ₱37,500
   c. ₱30,000
   d. ₱40,000

4. Given that P = ₱5,250, r = 1.25% and t = 5 years, find the simple interest.
   a. ₱32,812.50
   b. ₱3,281.25
   c. ₱328.13
   d. ₱32.82

5. Given that P = ₱10,500, r = $4\frac{1}{2}$% and t = 8 months, find the simple interest.
   a. ₱315
   b. ₱3,150
   c. ₱3,780
   d. ₱31,500

6. Which of the following is the formula to find the compound interest?
   a. $I_c = P(1 + r)^t$
   b. $I_c = F - P$
   c. $I_c = \frac{F}{(1+r)^t}$
   d. $I_c = P(1 + \frac{i^m}{m})^{mt}$

7. What is the frequency of conversion if the annual rate is compounded quarterly?

      a. 2   c. 4

      b. 3   d. 12

8. If the interest rate is 5% compounded monthly, what is the interest rate per conversion period?

      a. 2.5%   c. 1.25%

      b. 1.67%   d. 0.42%

9. Given that I_s = 750, r = 5% and t = 3 years, what is the principal or present value?

      a. ₱50

      b. ₱500

      c. ₱5.000

      d. ₱50,000

10. If F = ₱25,000 and P = ₱20,000, how much is the compound interest?

      a. ₱45,000

      b. ₱25,000

      c. ₱20,000

      d. ₱5,000

For numbers 11 – 12, use the following values: F = 40,000, t = 3 ½ years, i^4 = 0.10 and m= 4

11. What is the present value?

      a. ₱30, 000.25

      b. ₱28, 309.09

      c. ₱25, 307.15

      d. ₱20, 432.75

12. How much is the compound interest?

      a. ₱9,999.75

      b. ₱11,690.91

      c. ₱14,692.85

      d. ₱19,567.25

13. If the maturity value is ₱23,000 and the compound interest is ₱3,500, how much is the present value?

      a. ₱26,500

      b. ₱23,000

      c. ₱19,500

      d. ₱15,000

For numbers 14 – 15, use the following values: P = ₱15,000, i^{12} = 5%, t = 4 years, m = 12.

14. How much is the maturity value?

      a. ₱18, 313.43

      b. ₱17, 413.37

      c. ₱16, 313.37

      d. ₱15, 413.43

15. How much is the compound interest?

      a. ₱413.43

      b. ₱1,313.37

      c. ₱2,413.37

      d. ₱3, 313.43

Lesson 1 — Interest, Maturity, Future, and Present Values in Simple Interest

Business transactions are common events we experienced in our daily lives like banking, financing, marketing and pawning activities which involves withdrawals, deposits, used of credit cards and others. When these transactions occur there are two parties involved the lender and the borrower hence there involves a particular amount which we call interest.

Everything that we have right now is just borrowed, our talents, jobs, and even our lives. God is the sole person who does not charge interest from what He lent. However, the money that we borrowed or loaned from others once paid earned an interest which will be tackled in this module.

What's In

For you to begin consider the previous lesson essential in obtaining success in this module. In the last module, you differentiate simple and compound interest. Simple interest is computed by multiplying the principal (P) by the rate (r) and the length of time (t) (I=Prt) while compound interest is computed on the principal plus the accumulated past interests.

Different terms related to simple and compound interest were also given emphasis such as the lender or creditor which refers to the person who invests or makes funds available and the borrower or debtor, which refers to the person who owes the money.

Moreover, different terms essential in the interest formula were also explained such as time or term, principal or present value, rate, and maturity value. However, additional terms for compound interest were also given importance such as frequency of conversion, nominal rate, and rate of interest for each conversion period. These terms will be useful for you to have a better grasp of this module.

Other skills such as expressing percent to decimals is also necessary for example:

Express the following as decimal:

1. 12%   -   0.12
2. 10.5%   -   0.105
3. 300%   -   3
4. $8\frac{1}{2}\%$ -   0.85

Notes to the Teacher

Use of calculator in this module is allowed because it will help them to easily compute what is asked, however reiterate to the learners that to ensure the accuracy and precision of the solution the use of correct formula is necessary. Also, inform them that in other books different variables were used to represent the components of interest formula, it will not affect the result as long as the relationship with other variables is the same with the relationship to be presented in this module.
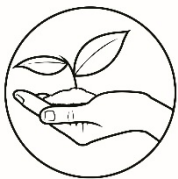
What's New

Read and analyze the situation below.

Let's Save

Janice and Jamaica are both senior high school students. After class the two had a conversation:

Janice: Wow, your cellphone is so cool! Is that new?

Jamaica: Thank you! And yes, I just bought it yesterday.

Janice: Did your mother give you money? What will you do with your old cellphone?

Jamaica: No, I saved up my allowance to accumulate enough money to buy this phone. I am still using my old phone. I will use my new phone for my social media accounts.

Janice: How much is that?

Jamaica: It is only ₱2,300 but it is already android so I can download different applications like Tiktok, Snapchat and games . Therefore, I will not be bored!

Janice: Oh! We are almost the same, I also saved ₱2,300 (already) from my allowance

Jamaica: What (do you plan) will you buy from your savings?

Janice: My old cellphone is still working, so I think there is no need for me to buy a new one. It will be better if I save this money.

Jamaica: But your money might get lost if you will not spend it?

Janice: I saw from an advertisement in Cooperative Bank that the minimum amount to open an account for students is ₱2,000, and they call it Kid Savers.

Jamaica: Is there an advantage if you put the money on the bank?

Janice: According to the advertisement there will be 2.5% interest in a year. I will use it in my college education.

Questions:

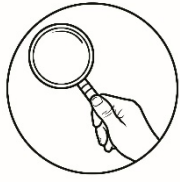1. What is the dialogue all about?
    _____

 2. Do you think saving money is important? Explain your answer.
    _____

2. Do you think it is wrong for Jamaica to buy a new cellphone?
    _____

3. What can you say about Janice's attitude towards money?
    _____

4. How much will Janice save after two years?
    _____

5. How do you value education?

    _____

What is It

From the previous conversation, you can say that allowance is one of the sources of funds of ordinary students. A person may decide on what they want to do with their money. In the scenario, there are two kinds of students. One who saves to buy the things they wanted and the other one saves to invest for her future. In doing so investing money in the bank earns interest. In computing the simple interest and other related components, the formula is

$$I_s = Prt$$

where:

I_s = simple interest

P = principal or the amount invested or borrowed or present value

r = simple interest rate

t = time or term in years

The formula can be manipulated to obtain the following relationships:

The formula for finding the principal amount

$$P = \frac{I_s}{rt}$$

The formula for finding the rate

$$r = \frac{I_s}{Pt}$$

The formula for finding the time

$$t = \frac{I_s}{Pr}$$

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To find the maturity (future) value, you can use either of the following:

$$F = P(1 + rt)$$ or $$F = P + I_s$$

where:

F = maturity (future) value

I_s = simple interest

P = principal or the amount invested or borrowed or present value

r = simple interest rate

t = time or term in years

Let us take the following for example:

Example 1: Given: $P = ₱18,500$, $r = 0.03$, $t = 5$. Find simple interest (I_s)

Solution:

Use the formula of Simple Interest	$I_s = Prt$
Substitute the given to the formula	$I_s = 18,500(0.03)(5)$
Performing the operation	$I_s = ₱2,775$

Therefore, the simple interest is ₱2,775

Example 2: Given: $P = ₱20,000$, $I_s = ₱4,000$, $t = 4$. Find the rate (r)

Solution:

Use the formula in finding the rate	$r = \frac{I_s}{Pt}$
Substitute the given to the formula	$r = \frac{4000}{(20,000)(4)}$
Performing the operations	r = 0.05
Express your answer in percent	r = 5%

Therefore, the rate of interest is 5%.

Example 3: Given: $P = ₱40,000.$, $I_s = ₱700$, $r = 7\%$. Find time (t).

Solution:

Use the formula in finding the time	$t = \frac{I_s}{Pr}$
Substitute the given to the formula	$t = \frac{700}{(40000)(0.07)}$
Performing the operations	t = 0.25
Express your answer as unit of time	t= ¼ year or 3 mos.

Therefore, the term or time in years is ¼ year or 3 months.

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Example 4: Given: $P = ₱15,000$, $t = 4$ months, $r = 2\%$. Find maturity (future) value (F).

Solution:

Use the formula of maturity value $\quad\quad\quad\quad\quad\quad\quad F = P(1 + rt)$

Substitute the given to the formula $\quad\quad\quad\quad F = 15,000(1 + (0.02)\left(\frac{1}{3}\right))$

Hint: time must be expressed in years so 4 months will become $\frac{4 mos.}{12 mos} = \frac{1}{3} year$

Performing the operations $\quad\quad\quad\quad\quad\quad\quad\quad$ F = ₱15,100

Alternative Solution:

Solve first the simple interest $\quad\quad\quad\quad\quad\quad I_s = (15,000)(0.02)\left(\frac{1}{3}\right)$

$\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad I_s = 100$

Use the formula $F = P + I_s \quad\quad\quad\quad\quad$ F = 15,000 +100

Therefore, the maturity value is ₱15,100
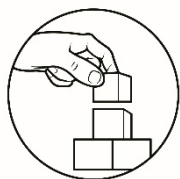
What's More

Activity 1.1

1. If P = ₱4,500, r = 1.25% and t = 5 years, find the simple interest.

    a. What formula will be used? _____

    b. How are you going to express the rate in decimal? _____

    c. How much is the simple interest? _____

2. If P = ₱5,000, = 2% and t = 8 mos., find the maturity value.

    a. Which formula will you use? _____

    b. How are you going to express the time in years? _____

    c. How much is the maturity value? _____

Activity 1.2

Find the value of the required components in each item.

1. Find the simple interest and maturity value if P = ₱13,000, r = 0.8% and   t = 2 ½ years.

2. If I_s = ₱625, r = 2% and t =3 years, find the present value

Activity 1.3

Complete the table below by finding the unknown.

Principal	Rate	Time	Interest	Maturity Value
₱45,000	2%	2.5 years		
	1.2%	4 years	₱4,560	
₱105,000	3%			₱114,450

Guide Questions:

For the first set of values
  a. What unknown variable will you solve first?
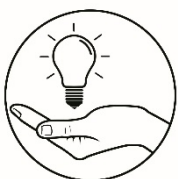 b. What formula will you use to find the missing values?

For the second set of values
  a. Which among the missing components can be solved using the given?
 b. How will you solve the next missing component?

For the third set of values
  a. What formula will you use to find the missing value?
  b. Which component can be solved first using the given?

What I Have Learned

Read the paragraph carefully and supply the missing term/s in the blanks that will make it logical.

In doing a business transaction one of the essential things to consider is the interest because it will be the basis whether you have gained or lost. When the interest is computed based on the principal it is called _____ its formula is _____. There are other components included in the simple interest formula such as principal or present value, rate, time, and maturity value. In finding the principal the formula _____ will be used. Meanwhile the rate must be expressed in _____ and in finding its value given the simple interest, principal and time you will use the formula_____. Moreover, time should be expressed in _____. In a simple interest environment, the formula to be used in finding the time is _____. Lastly maturity value can be obtained by adding the _____ and _____ or if the simple interest is not given you can use the formula _____.
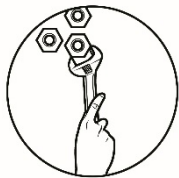
What I Can Do

Money Matters

Read and analyze the situation below, then answer the question that follows.

You are a new accounts clerk in Lucena Metropolitan Bank where you met Mr. and Mrs. Smith who are planning for the education of their children in the future. You introduce to them the advantage of time deposit having the following features:

Option A: 1.10% interest annually in 3 years,
Option B: 1.25% interest annually in 5 years
Option C: 1.75% interest annually in 8 years

The couple has an initial amount of ₱50,000 to be deposited. To help the couple in deciding the terms of their investment make a proposal by completing the table below.

PROPOSAL

PRINCIPAL	TIME	RATE	INTEREST	AMOUNT
₱50,000				
₱50,000				

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₱50,000				

Aside from the amount to be yielded at the end of each term what are the other factors that you can consider?

List down the possible questions that you will ask to the couple to determine those factors.

_____

_____

Is there any disadvantage in choosing each term? What are those?

_____

_____

What advice or tips can be given to the couple in choosing the term of interest?

_____

_____

Rubrics for the Task

Categories	Excellent 3	Fair 2	Poor 1
Relevance of the advice	Excellent understanding in creating advice for choosing a plan	Some understanding in creating advice for choosing a plan	Little to no understanding in creating advice for choosing a plan
Interview Skills	Excellent set of questions that elicit the answer to help in the decision making process is given	A fair set of questions that elicit the answer to help in the decision making process is given	A poor set of questions that elicit the answer to help in the decision making process is given
Accuracy of Solution	The computations made are all correct	The computations made have flaws	There is no attempt in making computation

Lesson 2 — Interest, Maturity, Future, and Present Values in Compound Interest

The previous lesson reiterates the importance of simple interest in a certain transaction. Interest is a natural event in a business transaction, however not all interest is classified as simple interest some of them are considered compound interest.

This lesson will delve into compound interest and the different components involved in it such as present value and maturity value.

What's In

For you to begin considering the lesson on the previous module which is essential in obtaining success in this lesson. Compound interest is not like a simple interest wherein only the principal is considered in the computation this type of interest considers the principal and the accumulated past interest. The frequency of conversion, nominal rate, and rate of interest for each conversion period will also play an important role in this lesson.

In the previous lesson the maturity value is computed using the formula $F = I_s + P$ where F is the future value , I_s is the simple interest and P the present value or the Principal and to find the principal or present value given the interest and maturity value the formula $P = F - I_s$ can be employed.

Let us take the following example.

Example 1: Given: P = ₱35,000 and I_s = ₱ 4,000, find F.

Solution: F

$\qquad$ F = ₱35,000 + ₱4,000 = ₱39,000

Example 2: Given: F = ₱50,000 and P = ₱45,000, find I_s.

Solution:

$\qquad$ I_s = ₱50,000 – ₱45,000= ₱5,000

Example 3: Given I_s = ₱2,000 and F = ₱23,000., fnd P.

Solution:

$\qquad$ P = ₱23,000 - ₱2,000 b= ₱21,000

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Read and analyze the situation below.

Let's Save

Michael is planning to apply for a loan in a Cooperative Bank, and he is already aware of the terms and conditions of payment for his loan. When he is about to pass his application form and compare his computation with the bank's payment terms he notices some discrepancies.

<table>
<tr><td>

Michael's Computation

Amount of Loan: ₱100,000
Interest rate: 3%
Due Date: After 3 years
Computation:
I = (100,000)(0.03(3)
I = ₱9,000
Amount to be paid after 3 years
₱109,000

</td><td>

Computation from the bank

Amount of Loan: ₱100,000
Interest rate: 3%

	Year 1	Year 2	Year 3
Int	3000	6090	9272.70
Amt	103,000	106,090	109,272.70

</td></tr>
</table>

To be enlightened, he asked some explanations why they have different computations and the bank gave him the detailed computation:

Initially at t = 0   ₱100,000
       at t = 1   ₱100,000 (1.03) = ₱103,000
       at t = 2   ₱103,000 (1.03) = ₱106,090
       at t = 3   ₱106,090 (1.03) = ₱109,272.70

Questions

1. Is Michael's computation correct?

    _____

2. Is the bank's computation fair? Why?

    _____

3. How much is the difference in the total amount to be paid between Michael's computation and the bank's computation?

    _____

4. Why do you think the bank's computation yielded more interest?

    _____

5. Do you think the bank committed an error in the computation of the amount to be paid?

    _____

6. If the term of payment will be longer what do you think will happen between the difference of the amount to be paid in Michael's computation and the bank's computation?

    _____

7. If you are Michael and you follow the computation made by the bank do you think there is a way to lessen the amount to be paid at the end of 3 years? How?

    _____
    _____

Notice that there is a difference between the computation of Michael and the bank concerning the amount to be paid for the loan. Michael used simple interest to find the amount to be paid for the loan for three years. While the bank computed first the interest for the first year and added it to the loan amount, then the resulting amount becomes the basis for computing the total amount to be paid for the second year, and it follows the same pattern for the third year. Interest plays a major role in computation because it became one of the factors in determining the amount to be paid for the succeeding years. In such a case, we call that compound interest. To better understand of what compound interest is, the following formulas will be considered.

To find the compound interest, which is compounded annually the formula to find the maturity value is:

$$F = P(1 + r)^t$$

where:

F = maturity (future) value
P = principal or present value
r = interest rate
t = term or time in years

To find the compound interest use the formula:

$$I_c = F - P$$

where:

I_c = compound interest
P = principal or present value
F = maturity (future) value

To find the present value or principal of the maturity value *F* due in *t* years the formulas are:

$$P = \frac{F}{(1 + r)^t}$$

or

$$P = F(1 + r)^{-t}$$

Example 1: Given: P= ₱18,500, r = 3% and compounded annually for 3 years, find the maturity value (F) and the compound interest (I_c).

Solution:

Use the formula of maturity value	$F = P(1 + r)^t$
Substitute the given to the formula	$F = 18,500(1 + 0.03)^3$
Performing the operations	F = ₱20,215.45
Apply the formula of compound interest	$I_c = F - P$
Substitute the value of F that you get and P	$I_c = 20,215.45 - 18500$
Performing the operations	$I_c = ₱1,715.45$

Therefore, the maturity value is ₱20,215.45 and the compound interest ₱1,715.45

Example 2: Given F = ₱15,000, r = 2% compounded annually for 4 years, find the present value (P).

Solution:

Use the formula in finding the present value	$P = \dfrac{F}{(1+r)^t}$
Substitute the given to the formula	$P = \dfrac{15000}{(1+0.02)^4}$
Performing the operations	P= ₱13,857.68

Therefore, the present value is ₱13,857.68

Compounding More Than Once a Year

In the examples above the interest are compounded annually, however, there are cases that interest are compounded more than once a year so in this case additional terms must be clarified such as:

Frequency of conversion (m) - number of conversion period in one year

Conversion or interest period – time between successive conversions of interest

Total number of conversion periods (n)

$n = mt$ = (frequency of conversion) x (time in years)

Nominal rate (i^m) - annual rate of interest or interest rate per year

Rate (j) of interest for each conversion period $j = \dfrac{i^{(m)}}{m} = \dfrac{annual\ rate\ of\ interest}{frequency\ of\ conversion}$

Study the table below.

Situations	m	N	i^m	j
2% compounded annually for 3 years	Annually m = 1	m =1, t = 3 n = (1)(3)=3	$i^1 = 0.02$	$j = \dfrac{i^m}{m}$ $j = \dfrac{0.02}{1} = 0.02$
2% compounded semi – annually for 3 years	Semi – annually m = 2	m = 2, t = 3 n = (2)(3)=6	$i^2 = 0.02$	$j = \dfrac{0.02}{2} = 0.01$
2% compounded quarterly for 3 years	Quarterly m = 4	m = 4, t = 3 n =(4) (3)=12	$i^4 = 0.02$	$j = \dfrac{0.02}{4} = 0.005$
2% compounded monthly for 3 years	Monthly m = 12	m = 12, t = 3 n = (12)(3) = 36	$i^{12} = 0.02$	$j = \dfrac{0.02}{12}$ $= 0.001\overline{6}$
2% compounded daily for 3 years	Daily m = 365	m = 365, t = 3 n = (365(3) =1095	$i^{365} = 0.02$	$j = \dfrac{0.02}{365}$

Since the rate for each conversion period is represented by *j,* then in *t* years, interest is compounded *mt* times. Thus, the formula of Maturity Value for interest compounding m times a year is:

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

where:

F = maturity value
P = present value
$j = \dfrac{i^{(m)}}{m}$
n = mt

Meanwhile, the formula in finding the present value given the maturity value is:

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

Let us take the following for example:

Example 3: Given $P = ₱50,000.00$, $i^4 = 0.03$, $m = 4$, $t = 4$, find F and I_c.

Solution:

|	
Use the formula of maturity value	$F = P(1 + j)^n$
Solve for n and j	$n = mt; n = 4(4); n = 16$
	$j = \frac{i^{(4)}}{m}; j = \frac{0.03}{4}; j = 0.0075$
Substitute the values of the known variables	$F = 50,000(1 + 0.0075)^{16}$
Performing the operations	$F = 56,349.61$
Use the formula of compound interest	$I_c = F - P$
Substitute the values of F and P	$I_c = 56,349.61 - 50,000$
Performing the operation	$I_c = 6,349.61$

Therefore, the maturity value is ₱56,349.61 and the compound interest is ₱6,349.61

Example 4: Given $= ₱45,000.00$, $i^2 = 0.02$, $m = 2$, $t = 4$, find I_c.

Solution:

Use the formula for Present value	$P = \frac{F}{(1+j)^n}$
Solve for n and j	$n = mt; n = 2(4); n = 8$
	$j = \frac{i^{(2)}}{m}; j = \frac{0.02}{2}; j = 0.01$
Substitute the values of the known variables	$P = \frac{45000}{(1+0.01)^8}$
Performing the operations	$P = 41,556.75$
Use the formula for compound interest	$I_c = F - P$
Substitute the values of F and P	$I_c = 45,000 - 41,556.75$
Performing the operation	$I_c = 3,443.25$

Therefore, the present value is ₱41,556.75 and the compound interest is ₱3443.25

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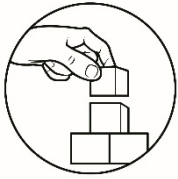
What's More

Activity 2.1

Read each statement and answer the question that follows.

1. If P = ₱85,500, and r = 1.25% compounded monthly for 1 year, find the compound interest.

   What is the first component that should be computed? _____

   What formula will be used? _____

   How much is the maturity value? _____
   How will you find the simple interest? _____

   How much is the simple interest? _____

2. If F = ₱50,000 with the rate 1.5% compounded quarterly for 5 years find the present value and compound interest

   Which should be find first present value or compound interest? _____

   How are you going to express the rate in decimal? _____

   What formula will you use in finding the present value? _____

   How much is the present value? _____

   How will you find the compound interest? _____

   How much is the compound interest? _____

Activity 2.2

Find the value of the required components in each item.

1. Find the compound interest and maturity value if P = ₱43,000, with a rate of 5% is compounded semi-annually for 6 years.

2. Find the compound interest and present value if F = ₱105,000 with a rate of 2.5% is compounded quarterly for 3 years

Activity 2.3
Complete the table below by finding the unknown.

Present Value	Nominal rate ($i^{(m)}$)	Interest compounded	Interest per conversion period (j)	Time in years	Total number of conversions (n)	Compound Interest	Maturity Value
60,000	3%	quarterly		3			
	6%	semi-annually		4			40,000

Guide Questions:
For the first set of values
   a. What unknown variable will you solve first?
   b. How are you going to find j?
   c. What will be n?
   d. How much is the maturity value?
   e. How much is the compound interest?
For the second set of values
   a. What unknown variable will you solve first?
   b. How are you going to find j?
   c. What will be n?
   d. How much is the maturity value?
   e. How much is the compound interest?

Activity 2.4
Complete the table below by finding the unknown.

| Present Value	Nominal rate ($i^{(m)}$)	Interest compounded	Interest per conversion period (j)	Time in years	Total number of conversions (n)	Compound Interest	Maturity Value
78,000	4%	quarterly		6			
	12%	monthly		3			50,000

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What I Have Learned

I. Fill in the blanks to make the statements true.

1. In finding the total number of conversion period you will multiply _____ by _____.

2. To get the rate of interest for each conversion period the annual rate of interest will be _____ by the frequency of conversion.

2. The formula in getting the compound interest given the present value and maturity value is _____

3.

4. The formula in getting the present value in a compound interest environment is _____

5. The formula _____ is used to get the maturity value in a compound interest environment.

II. In not more than three sentences explain how to compute the compound interest.
_____

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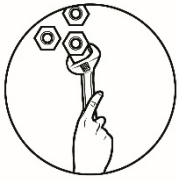
What I Can Do

Money Matters

Read and analyze the situation below then answer the questions that follow.

Suppose you are a regular employee in a finance company that offers a loan payable through salary deduction. One of its privileges is availing a loan that offers a 5% interest compounded annually for 1 to 5 years. You are thinking to apply for a loan but you wanted to analyze if you can shoulder the monthly payment. Make a loan schedule and fill up an application form that will help you decide the amount of loan that you will make

Loan Schedule

Loan Amount	Maturity Value					Monthly Payment
	t=1	t=2	t=3	t=4	t=5	
₱10,000						
₱20,000						
₱30,000						
₱40,000						
₱50,000						
₱100,000						
₱150,000						
₱200,000						
₱250,000						

Loan Application Form

Name: _____

Age:_____   Date of Birth: _____

Occupation: _____

Monthly Income:_____

Sources of Funds:_____

Loan Amount:_____

Other Sources of Funds: _____

Monthly Payment of Loan:_____

Please answer the following questions truthfully:
1. Do you have an existing loans from other banks?
   _____

2. What is the purpose of the loan?
   _____

3. Can your salary cover the monthly payment of the loan? If not do you have other resources to pay the monthly payment?
   _____

Rubrics for Scoring

Categories	Excellent 3	Fair 2	Poor 1
Relevance of the advice	Excellent understanding in creating advice for choosing a plan	Some understanding in creating advice for choosing a plan	Little to no understanding in creating advice for choosing a plan
Planning	The goal set is achievable and realistic	The goal set is hard to achieve	The goal set is not achievable and not realistic
Accuracy of Solution	The computations made are all correct	The computations made have flaws	There is no attempt in making computation

CO_Q2_General Mathematics SHS
Module 2

Multiple Choice. Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. Which of the following described to formula $I_s = Prt$?
   a. simple interest
   b. compound interest
   c. present value
   d. maturity value

2. What will you get if you divide the simple interest by the product of the rate and time?
   a. present value of compound interest
   b. present value of simple interest
   c. maturity value of compound interest
   d. maturity value of simple interest

3. If the investment amounting to ₱45,000 earned an interest of ₱3,500 how much will be the maturity value?
   a. ₱41,500
   b. ₱48,500
   c. ₱40,000
   d. ₱25,000

4. Given that P = ₱15,250, r = 3.25% and t= 3 years, find the simple interest.
   a. ₱24,868.80
   b. ₱14,868.80
   c. ₱1,486.88
   d. ₱148.69

5. Given that P = ₱20,820, r = $2\frac{1}{4}$% and t = 9 months, find the simple interest.
   a. ₱ 351.34
   b. ₱ 3513.38
   c. ₱ 4,216.05
   d. ₱ 42160.50

6. Which of the following is the formula to find the maturity value of the compound interest?
   a. $F = P(1 + r)^t$
   b. $F = F - P$
   c. $F = \dfrac{F}{(1+r)^t}$
   d. $F = P(1 + \dfrac{i^{(m)}}{j})^{mt}$

7. What is the frequency of conversion if the annual rate is compounded monthly?
   - a. 2
   - b. 3
   - c. 4
   - d. 12

8. If the interest rate is 12% compounded quarterly, what is the interest rate per conversion period?
   - a. 3%
   - b. 2.5%
   - c. 1.25%
   - d. 0.42%

9. Given that I_s = 3,750, r = 2 ½ % and t = 3 years, what is the principal or present value?
   - a. ₱500
   - b. ₱5,000
   - c. ₱50,000
   - d. ₱500,000

10. Given that F = ₱50,000 and P = ₱35,000 how much is the compound interest?
    - a. ₱15, 000
    - b. ₱25,000
    - c. ₱35,000
    - d. ₱45,000

For numbers 11 – 12, use the following values: F = 150,000, t = 6 years, i^2 = 5% and m= 2

11. What is the present value?
    - a. ₱100,353.83
    - b. ₱111,533.38
    - c. ₱123,153.83
    - d. ₱132,531.38

12. How much is the compound interest?
    - a. ₱49646.17
    - b. ₱38466.62
    - c. ₱26846.17
    - d. ₱17468.62

13. If the maturity value is ₱50,000 and the compound interest is ₱3,500, how much is the present value?

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a. ₱53,500
b. ₱46,500
c. ₱46,000
d. ₱3,000

For numbers 14 – 15, use the following values: P=₱150,000, $i^2 = 6\%$, t=4 years, m=2

14. How much is the maturity value?

a. ₱190, 015.51
b. ₱179, 413.35
c. ₱167, 313.51
d. ₱159, 413.35

15. How much is the compound interest?
a. ₱9,413.35
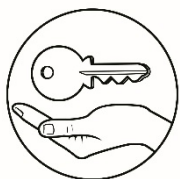b. ₱17,313.51
c. ₱29,413.35
d. ₱40,015.51

Additional Activities

Complete the table.

A.

Principal	Rate	Time	Interest	Maturity Value
₱60,000	4%	3.5 years		
	2.2%	5 years	₱345	
₱125,000	2%			₱135,000

B.

Present Value	Nominal rate $(i^{(m)})$	Interest compounded	Interest per conversion period (j)	Time in years	Total number of conversions (n)	Compound Interest	Maturity Value
₱80,000	2.1%	quarterly		4			
	2%	monthly		6			₱70,000

Answer Key

Orines, Fernando B. *Next Century Mathematics.* Quezon, City: Phoenix Publishing House, 2016.

Oronce, Orlando A. *General Mathematics.* Sampaloc, Manila: Re Bookstore, Inc., 2017.

Santos, Durawin C.,Biason, Ma. Garnet P. *Math Activated:Engage Yourself and Our World General Mathematics.* Makati, City: Salesiana Books by Don Bosco Press, Inc., 2016.