GENERAL MATHEMATICS

Name of the Learner:_____Grade level:_____

Section:_____Date:_____

LEARNING ACTIVITY SHEET

CALCULATE THE PRESENT VALUE OF AND PERIOD OF DEFERRAL OF A DEFERRED ANNUITY

Background Information for learners

A deferred payment annuity is an insurance product that provides future payments to the buyer rather than an immediate stream of income. An annuity is a financial contract that allows the buyer to make a lump-sum payment, or a series of payments, in exchange for receiving future periodic disbursements.

A deferred payment annuity allows the investment, known as the premium, to grow both by contributions and interest before payments are initiated. A deferred payment annuity is also known as a "deferred annuity" or a "delayed annuity."

The period of deferment is the time interval to the beginning of the first payment interval.

*if the first payment is due at the end of a specified interval, the formula is $d = m * k - 1$

*if the first payment is due on the next interval the formula is $d = m * k$

Below is the formula in solving the Present Value of a Deferred Annuity:

$$PV = R\frac{1-(1+j)^{-(d+n)}}{j} - R\frac{1-(1+j)^{-d}}{j}$$

PV= Present Value

R=Regular payment

$j =$ rate per conversion period

$j = \frac{i^{(m)}}{m}$, where $i^{(m)}$ is the annual rate and m is the number of conversion period

n = no. of paying periods

$n = t * m$, where t is the number of years

d = Deferred periods.

Lets have an example,

Hazel availed of a cash loan that gave her an option to pay P10,000 monthly for 1 year. The first payment due after 6 months. How much is the present value of the loan if the interest rate is 12% converted monthly?

Identify the given:

$$R = P10{,}000$$
$$t = 1 year$$
$$i^{(m)} = 12\% or 0.12$$
$$m = 12$$

Calculate the value of $j, n,$ and d

$$j = \frac{i^{(m)}}{m} = \frac{0.12}{12} = 0.01$$

$$n = t * m$$
$$n = 1 * 12 = 12$$

$$d = 6 - 1 = 5 periods$$

Substitute all the given value using the Present Value of a Deferred Annuity:

$$PV = R\frac{1-(1+j)^{-(d+n)}}{j} - R\frac{1-(1+j)^{-d}}{j}$$
$$PV = 10{,}000\frac{1-(1+.01)^{-(5+12)}}{0.01} - 10{,}000\frac{1-(1+.01)^{-5}}{0.01}$$
$$PV = 10{,}000\frac{.1556225127}{0.01} - 10{,}000\frac{0.0485343124}{0.01}$$
$$PV = 10{,}000(15.5622512667) - 10{,}000(4.85343124)$$
$$PV = 155{,}622.51266701 - 48{,}534.312393251$$
$$PV = P107{,}088.20$$

Learning Competencies with code

The learners are able to calculate the present value of and period of deferral of a deferred annuity. M11GM-11d-3,Quarter II Week 4

Activity 1. Identify the given values of the ff. in the given situation.

1. Mr. Julian wanted to buy a new branded car. He decided to pay P20,000 monthly for 5 years starting at the end of the 2 years with an interest rate of 12% compounded monthly.

$R =$
$t =$
$i^{(m)} =$
$m =$

$j =$
$d =$
$n =$

2. A company offers Hazel Joy Vergara a deferred payment option for the car loan with a monthly payment of P5,000 for 4 years. The payment will start at the end of 5 months at the interest of 3% compounded monthly.

$R =$
$t =$
$i^{(m)} =$
$m =$

$j =$
$d =$
$n =$

Activity 2. Find the period of deferral in each of the following deferred annuity problem.

1. A regular payment of P500 monthly for 3 years that will start 4 months from now.
2. A payment of P100,000 every quarter for 8 years starting at the end of 2 years.
3. A semi- annual payments of P1000 for 12 years that will start 3 years from now.
4. An annual installment of 25 years, first payment after 5 years.
5. A half- year instalment of 8 years, first payment of P2,000 after 18 months.

Activity 3. Calculate present value of each problem completely.

1. Mr. Julian decided to buy a house and lot for his son before the latter's big day. A payment for every month is P24,000 for 25 years starting at the end of 4 months with an interest of 6% compounded monthly.

2. Joy gave allowance to her mother for her medicine, She withdrew P25,000 semi-annually for 10 years starting at the end of 2 years. How much is the mother‘s allowance if the interest rate is 8%converted semi-annually?

RUBRIC

CRITERIA	1	2	3	4	TOTAL
IDENTIFYING GIVEN	No given are correct	At most 4 is correct given	At least 4 is correct given	All the given are correct	
STEPS	None of the steps were completed /no work was shown	Few steps were completed thoroughly with work shown	Most steps were completed thoroughly with work shown	Every step was completed thoroughly with work solution	
ACCURACY	Entire activity assignment was incorrect	Several step of the problem was incorrect	One step of the problem was incorrect	Each step of the problem was completed and correct	

*The rubric is for Activity 3 only.

Reflection *(The learner writes how he/she feels about the activity.)*

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References for learners

Oronce, O. (2016). General Mathematics. Manila: Rex bookstore, Inc.

http://teachtogether.chedk12.com/teaching_guides/view/31

https://www.youtube.com/watch?v=hTUQ-wqV73A

https://www.investopedia.com/terms/d/deferred-payment-annuity.asp

Answer Key:

Activity 1

1. $R = P20{,}000$, $t = 5 years$, $i^{(m)} = 0.12$, $m = 12$, $j = 0.01$, $n = 60$

2. $R = P5{,}000$, $t = 4 years$, $i^{(m)} = .03$, $m = 12$, $j = 0.0025$, $n = 48$

Activity 2

1. 3 months or 3 periods
2. 7quarters or 7 periods
3. 5 semi-annuals or 5 periods
4. 4 years or 4 periods
5. 2 half-year or 2 periods

Activity 3

1. Given:

$R = P24{,}000$, $t = 25 years$, $i^{(m)} = 0.06$, $m = 12$, $j = 0.05$, $n = 300$, $k = 3$

Solution:

$$PV = R\frac{1-(1+j)^{-(d+n)}}{j} - R\frac{1-(1+j)^{-d}}{j}$$
$$PV = 24{,}000\frac{1-(1+.005)^{-(3+300)}}{0.005} - 24{,}000\frac{1-(1+.005)^{-3}}{0.005}$$
$$PV = 24{,}000\frac{0.7793604883}{0.005} - 24{,}000\frac{0.0148512407}{0.005}$$
$$PV = 24{,}00(155.87209766) - 24{,}000(2.97024814)$$
$$PV = 3{,}740{,}930.34384 - 71{,}285.95536$$
$$PV = P3{,}669{,}644.39$$

2. Given:

$$R = P25{,}000 \qquad j = 0.04$$
$$t = 10\,years \qquad n = 20$$
$$i^{(m)} = 0.08 \qquad k = 3$$
$$m = 2$$

Solution:

$$PV = R\frac{1-(1+j)^{-(d+n)}}{j} - R\frac{1-(1+j)^{-d}}{j}$$
$$PV = 25{,}000\frac{1-(1+.04)^{-(3+20)}}{0.04} - 25{,}000\frac{1-(1+.04)^{-3}}{0.04}$$
$$PV = 25{,}000\frac{0.594273667}{0.04} - 25{,}000\frac{0.1110036413}{0.04}$$
$$PV = 25{,}00(14.856841675) - 25{,}000(2.7750910325)$$
$$PV = 3{,}740{,}930.34384 - 71{,}285.95536$$
$$PV = P302{,}043.77$$