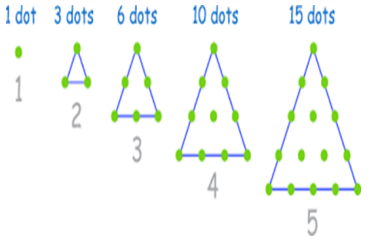
GRADE 10 **DAILY LESSON LOG**	**School**	Rosario National High School	**Grade Level**	**10**
	Teacher		**Learning Area**	**MATHEMATICS**
	Teaching Dates and Time		**Quarter**	**FIRST**

	Session 1	**Session 2**	**Session 3**	**Session 4**
I. OBJECTIVES				
1. Content Standards	The learner demonstrates understanding of key concepts of sequences, polynomials, and polynomial equations.			
2. Performance Standards	The learner is able to formulate and solve problems involving sequences, polynomials, and polynomial equations in different disciplines through appropriate and accurate representations.			
3. Learning Competencies Objectives	The learner generates patterns. **(M10AL-Ia-1)** a. Define sequence. b. Identify the next term of a sequence c. Value accumulated knowledge as means of new understanding.	The learner generates patterns. **(M10AL-Ia-1)** a. Identify the first few terms of a sequence given the nth term/equation. b. Determine the pattern of the given rule. c. Value accumulated knowledge as means of new understanding.	The learner generates patterns. **(M10AL-Ia-1)** a. Find the general or nth term of a sequence b. Identify the pattern of each sequence c. Value accumulated knowledge as means of new understanding.	The learner generates patterns. **(M10AL-Ia-1)** a. Solve problems involving sequence. b. Identify the nth term of the given problem. c. Value accumulated knowledge as means of new understanding.

II. CONTENT	**Sequence**	**Identify the First Few Terms of a Sequence given the n^{th} Term of a Sequence**	**Find the nth term of a Sequence**	**Problems involving Sequence**
III. LEARNING RESOURCES				
A. References				
1. Teacher's Guide	pp. 14-15	14-16	14-16	14-16
2. Learner's Materials	pp. 9-10	9-11	9-11	9-11
3. Textbook	Next Century Mathematics, Mirla S. Esparrago et.al., pp.2 and 15			
4. Additional Materials from Learning Resources (LR) portal	www.world.mathigon.org			https://www.youtube.com/watch?v=UuceRRQGk8E
B. Other Learning Resources	Grade 10 LCTGs by DepEd Cavite Mathematics 2016 PPT, Laptop, Monitor	Grade 10 LCTGs by DepEd Cavite Mathematics 2016 PPT, Laptop, Television	Grade 10 LCTGs by DepEd Cavite Mathematics 2016 PPT, Laptop, Television	Grade 10 LCTGs by DepEd Cavite Mathematics 2016 PPT, Laptop, Television, Activity Notebook
IV. PROCEDURES				
A. Reviewing previous lesson or presenting the new lesson	With Pattern or Without Pattern?	GROUP YOURSELF	Think-Pair-Share	Study and complete the pattern given in each item.

	Identify if each picture below shows a pattern or not. If there is a pattern, put a check mark (✓) and identify it, otherwise put a cross mark (x). 1. Banderitas  2. Coffee beans  3. Tahong shells  4. Stack of Stones In the Beach 	The teacher will give the pattern or sequence and the students will identify the next term by grouping themselves.	Find the next three terms of the given sequence. 	1.  2. 2, 4, 8, 16, ___ 3. Rosario, Novelata, Kawit, Bacoor, Roario, ___ 4. Jan, Apr, Jul, ____ 5. 5, 8, 11, 14, ____

B. Establishing a purpose for the lesson	Complete the pattern generated from the previous activity. a. Color of the Banderitas: Green, Blue, Red, Orange, Yellow, Green, Blue, Red, Orange, Yellow, _____ b. Number of Coffee beans 4, 6, 8, _____ d. Tahong shells Close, Open, Close, Open, Open, Close, Open, Open, Open, _____ e. Number of Stack of Stones 1, 2, 3, 4, 5, _____ f. Dates in the calendar for the month of July 3, 10, 17, 24, _____	Consider the picture at below:  1. Do you see any pattern form the given picture? 2. Write the terms of coffee bean. 3. If the pattern continues what will be next term? 4. Can you give an equation that will satisfy the sequence form by the coffee bean?	From the previous activity: 1. What are the next terms of the given sequence? 2. Can you find the pattern? 3. What is the general/nth term of the sequence?	1. Given the sequence 0, 4, 8. 12, 16 what is the next number? What is the 8th number? 2. Given the sequence 9, 4, -1, -6, -11 what is the next number? What is the 10th number?
C. Presenting examples/Instances of the new lesson	The set objects in the priming activity are called sequences. Illustrative Example:	Ilustrative Example: Consider the rule form of the sequence	A **sequence** is a function whose domain is the finite set {1, 2, 3,…, *n*} or the infinite set {1, 2, 3,…}. Example:	Find the nth term of each pattern. 1. 3, 7, 11, 15 2. 3, 9, 15, 21, 27

	Identify if the set of each object shows a pattern or not then find the next term. 1. □△□△△□△△△□△△△△ 2. 0, 4, 8, 12, 16, ___... 3. 9, 4, -1, -6, -11, ____ 4. 1, 3, 9, 27, 81, _____ 5. 160, 80, 40, 20,10, ___	$a_n = 7n - 4$. If we are asked to get the first five terms of the sequence, we have $a_1 = 7(1) - 4 = 3$ $a_2 = 7(2) - 4 = 10$ $a_3 = 7(3) - 4 = 17$ $a_4 = 7(4) - 4 = 24$ $a_5 = 7(5) - 4 = 31$ Therefore, the sequence can also be denoted as 3, 10, 17, 24, 31.	<table><tr><td>a</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>a_n</td><td>3</td><td>-1</td><td>1.5</td><td>10</td><td>π</td></tr></table>This finite sequence has 5 terms. We may use the notation a_1, a_2, a_3, …, a_n to denote a(1), a(2), a(3)…a(n) respectively. In Grade 10, we often encounter sequences that form a pattern such as that found in the sequence below. Example: a 1 2 3 4… a_n 4 7 10 13… The above sequence is an infinite sequence where $a_n = 3n + 1$	
D. Discussing new concepts and practicing new skills # 1	Think Pair Share Study the following patterns then supply the missing term to complete the sequence. 1. Jan, Mar, May, Jul, Aug, ___, ____ 2. 5, 8, 11, 14, ___, 20, ___...	How do you generate a sequence from a given rule/nth term?	Find the nth term of each sequence 1. 6, 11, 16, 21, 26 2. 2, 10, 18, 26, 34 3. 8, 6, 4, 2, 10	The SSG Club proposed a project on collecting pet bottles to lessen the trash on our school. If the officers can collect 25 pet bottles on the first day, 45 on the second day , 65 on the third day, and the pattern continues, how many pet bottles can they collect in the

	3. 1/2, 1, 3/2, 2, 5/2, ___, 7/2, 4, ___,… 4. 3, -6, ___, -24, 48, ___ … 5. 1, 4, 9, 16, ___, 36, 49, 64, ___			fifth day?How many pet bottles they will collect in one week?
E. Discussing new concepts and practicing new skills # 2	Guide Questions: 1. What pattern is shown in every item? 2. If the pattern continues in each of the item, what will be the next item?	Given the following nth term, supply each blank by a correct answer following the task at the right to generate the pattern. a. Given $a_n = 2(n+1)$, list the first 5 terms of the sequence. Solution: if n = 1 a__ = 2(__+1) Substitute n a_1 = 2(__) Add the terms inside the parenthesis a_1 = ___ Multiply the factors Do the same procedure if n = 2, n = 3, n = 4 and n = 5. Then, list the sequence below. ___, ___, ___, ___, ___ b. Given $a_n = (12)-1$, generate a sequence with 4 terms. Solution: if n = 1	How did you find the activity? Can you find the pattern? How did you find the nth term of each number?	1. Can you see a pattern in a given situation? 2. What is the nth term of the given pattern?

<table>
<tr>
<td></td>
<td></td>
<td>a__ = (12)___−1 Substitute the value of n 4

a_1 = (12)___ Subtract the exponent
a_1 = ____ Simplify the exponent and the fraction
Do the same procedure if n = 2, n = 3 and n = 4 then, list the sequence below.
___, ___, ___, ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Developing mastery (leads to Formative Assessment 3)</td>
<td>Find the Number

Study the given sequence, identify the pattern then find the missing number.

1. 1 3 5 7 9 ____ 13 15 17

2. 0 5 10 ____ 20 25 30 35 40

3. 17 15 13 ____ 9 7 5 3

4. 25 35 45 ___</td>
<td>Complete the table below by s values of n to a_n and list down sequence

<table><tr><td>a_n</td><td colspan="4">n</td><td>sequence</td></tr><tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td></td></tr><tr><td>1. 3n - 5</td><td>-2</td><td>1</td><td>4</td><td>–</td><td></td></tr><tr><td>2. 3*2n - 1</td><td>3</td><td>6</td><td>__</td><td>24</td><td></td></tr><tr><td>3. $-\frac{5}{n}$</td><td>-5</td><td>__</td><td>-53</td><td></td><td></td></tr><tr><td>4. $5-n^2$</td><td>__</td><td>1</td><td>-4</td><td>–</td><td></td></tr><tr><td>5. $(2n-10)^2$</td><td>__</td><td>__</td><td>__</td><td>–</td><td></td></tr></table></td>
<td>What is the general term of each sequence below:

1. -2, 1, 4, 7
2. 3, 6, 12, 24
3. -5, $-\frac{5}{2}$, $-\frac{5}{3}$, $-\frac{5}{4}$
4. 4, 1, -4, -11
5. 64, 36, 16, 4</td>
<td>Find the nth term of the given sequence.
1. 3, 5, 7, 9, 11, 13
2. 12, 19, 26, 33, 40
3. 9, 6, 3, 0, -3</td>
</tr>
</table>

<table>
<tr>
<td></td>
<td>65 75

5. 34 44 54 64
___ 84 94</td>
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<td></td>
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<td>G. Finding practical application of concepts and skills in daily living</td>
<td>Answer the following problems.

1. The table below shows the cost of renting the Cavite Hall at Island Cove Resort and Leisure Park in Kawit, Cavite depending on the number of attendees.

<table>
<tr><th>Number of Persons</th><th>Rental Cost in Peso</th></tr>
<tr><td>20</td><td>6200</td></tr>
<tr><td>25</td><td>6500</td></tr>
<tr><td>30</td><td>6800</td></tr>
<tr><td>35</td><td>7100</td></tr>
</table>
Jose booked the hall</td>
<td>1. Emilia helps her mother in selling “Kalamay Buna” (a delicacy from Indang). From the money that her mother is giving her, she plans to save Php25 every week for seven weeks. Form a sequence that will show the amount of money she is saving from the first to seventh week.
2. The increase in the population of Cavite Province follows a pattern. That is, 1.5% of its previous year’s population is added to the present to obtain the next. If the current population of Cavite is 3,000,000, list the province’s population for the next 2 years.</td>
<td>Christian helps his mother in selling
“ Tinapang Bangus”
(a product from Rosario, Cavite). From the money that his mother is giving him, he plans to save Php30 every week for five weeks. Form a sequence that will show the amount of money he is saving from the first to fifth week, and identify the nth term of the given situation.</td>
<td>A rabbit population of Mr. Ricafrente grew in the following pattern: 2, 4, 8, 16…If all the rabbits live and the pattern continues, how many rabbits will be in the 8^{th} generation? Write the nth term of the sequence.</td>
</tr>
</table>

	for a birthday party for 40 persons. How much will he pay? 2. A rabbit population grew in the following pattern: 2, 4, 8, 16…if all the rabbits live and the pattern continues, how many rabbits will be in the 8^{th} generation? 3. Lewis is offered P20 000.00 as starting salary for a job, with a raise of P2 000.00 at the end of each year of outstanding performance. If he maintains continuous outstanding performance, what will his salary be at the end of 6 years?			
H. Making generalizations and abstractions about the lesson	A sequence is a function whose domain is a finite set of positive integers	A **sequence** is a function whose domain is a finite set of positive integers {1, 2, 3,	A **sequence** is a function whose domain is a finite set of positive integers {1,	A **sequence** is a function whose domain is a finite set

	{1, 2, 3, …, n} or an infinite set {1, 2, 3, …}. It is a string of objects, like numbers, that follow a particular pattern. *(world.mathigon.org)* Each element or object in the sequence is called term. When the sequence goes on forever it is called an infinite sequence, otherwise it is a finite sequence.	…, n} or an infinite set {1, 2, 3, …} Each element or object in the sequence is called **term**. A sequence having last term is called **finite sequence** while a sequence with no last term is called **infinite sequence**. Sequences may come in rule form. These are sequences stated in general or nth terms.	2, 3, …, n} or an infinite set {1, 2, 3, …} Each element or object in the sequence is called **term**. A sequence having last term is called **finite sequence** while a sequence with no last term is called **infinite sequence**. Sequences may come in rule form. These are sequences stated in general or nth terms.	of positive integers {1, 2, 3, …, n} or an infinite set {1, 2, 3, …} Each element or object in the sequence is called **term**. A sequence having last term is called **finite sequence** while a sequence with no last term is called **infinite sequence**. Sequences may come in rule form. These are sequences stated in general or nth terms.
I. Evaluating learning	A. Study the following patterns then supply the missing term to complete the sequence. 1. 2, 4, 7, 11, ____ 2. 7, 9, 11, ____, ____, 17, 19 3. 1, 8, 27, 64, 125, ____ 4. 5, 10, 7, 14, 11, 22, 19, _____	Find the first 5 terms of the sequence given the nth term. 1. $a_n = n + 4$ 2. $a_n = 2n – 1$ 3. $a_n = 12 – 3n$ 4. $a_n = 3^n$ 5. $a_n = (-2)^n$	What is the nth term for each sequence below: 1. 3, 4, 5, 6, 7,… 2. 3, 5, 7, 9, 11,… 3. 2, 4, 8, 16, 32,… 4. -1, 1, -1, 1, -1,… 5. 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$,…	Ms May Ann Fuerte the adviser of Rosario National High School newspaper “Ang Kronikel” assigned her writers to write news about Brigada Eskwela. A writer wrote 890 words on the first day, 760 words on the second day and 630 words on the third day, how many words did the writer wrote on the fifth day?
J. Additional activities for application or remediation	A. Follow Up	A. Follow up:	A. Follow up:	Study:

	1. Observe the things around you. Take a picture of objects forming a sequence. B. Study 1. Write the sequence that satisfy the given equation: $a_n = 3n + 1$	Cut out pictures that show a pattern and identify the rule of the given pattern. B. Study Determine the nth term of the given sequence 2, 4, 7, 11, ____	1. Find the nth term of each sequence a. 4, 7, 10, 13, 16 b. 4, 13, 28, 49, 76	Define Arithmetic Sequence
V. REMARKS				
VI. REFLECTION				
A. No. of learners who earned 80% in the evaluation				
B. No. of learners who require additional activities for remediation who scored below 80%				
C. Did the remedial lessons work? No. of learners who have caught up with the lesson				
E. Which of my teaching strategies worked well? Why did these work?				
F. What difficulties did I encounter which my				

principal or supervisor can help me solve?				
G. What innovation or localized materials did I use/discover which I wish to share with other teachers?				

GRADE 10 **DAILY LESSON LOG**	**School**		**Grade Level**	**10**
	Teacher		**Learning Area**	**MATHEMATICS**
	Teaching Dates and Time		**Quarter**	**FIRST**

	Session 1	Session 2	Session 3	Session 4
I. OBJECTIVES				
4. Content Standards	The learner demonstrates understanding of key concepts of sequences.			
5. Performance Standards	The learner is able to formulate and solve problems involving sequences in different disciplines through appropriate and accurate representations.			
6. Learning Competencies Objectives	The learner illustrates an arithmetic sequence **(M10AL-Ib-1)** a. Describe and illustrate an arithmetic sequence. b. Find the common difference of the terms of an arithmetic sequence. c. Identify if a sequence is an arithmetic sequence.	The learner determines arithmetic means and nth term of an arithmetic sequence **(M10AL-Ib-c-1)** a. Find the missing terms of an arithmetic sequence. b. Find the nth term of an arithmetic sequence. c. Appreciate arithmetic sequence in solving real life problems	The learner determines arithmetic means and nth term of an arithmetic sequence.**(M10AL-Ib-c-1)** a. Find the unknown variables in $a_n = a_1 + (n-1)$ of an arithmetic sequence. b. Appreciate arithmetic sequence in solving real life problems	The learner determines arithmetic means and nth term of an arithmetic sequence.**(M10AL-Ib-c-1)** a. Find the arithmetic means of an arithmetic sequence. b. Insert a certain number of terms between two given terms of an arithmetic sequence. c. Appreciate arithmetic means in solving real life problems.
II. CONTENT	**Illustrating Arithmetic Sequence**	**Finding the nth term of an Arithmetic Sequence**	**Finding the unknown variables in $a_n = a_1 + (n-1)d$ of an Arithmetic Sequence**	**Arithmetic Means**
III. LEARNING RESOURCES				
C. References				
5. Teacher's Guide	pp. 14-16	pp. 16-18	p. 16-17	pp. 17

6. Learner's Materials	pp. 9-11	pp. 12-14	pp. 12-14	pp. 14–15
7. Textbook	Mathematics III: Concepts, Structures and Methods for High School by Oronce, Orlando, et.al., pp. 509 – 511	Mathematics III: Concepts, Structures and Methods for High School by Oronce, Orlando, et.al., pp. 509 – 511	Mathematics III: Concepts, Structures and Methods for High School by Oronce, Orlando, et.al., pp. 509 – 511	Mathematics III: Concepts, Structures and Methods for High School by Oronce, mOrlando, et.al., pp. 512–516 Mathematics III An Integrated Approach by Coronel C. Antonio, et.al., pp. 63–65 Exploring Mathematics II by Oronce and Mrndoza, p.490
8. Additional Materials from Learning Resources (LR) portal		http://newsinfo.inquirer.net/567965/name-play-with-maragondon- peaks	https://encrypted-tbn2.gstatic.com/images?q=tbn:And9GcTDtmvLno6Yae_NrVU1W=K8fyDZUXzWWsd4FhAE-Bqg9PZUzr9Q	http://study.com/academy/lesson/arithmetic-mean-definition-formula-example.html http://www.mathgoodies.com/lessons/vol8/mean.html http://www.123rf.com/photo_37149016_group-of-red-anthurium-flower-in-pot-blooming-in-botanic-farm-anthurium-andraeanum-araceae-or-arum.html https://www.pinterest.com/annakarinsund/examens-fest/ http://www.bluedreamer27.com/saint-mary-magdalene-exhibit-in-kawit-cavite/

<table>
<tr><td>D. Other Learning Resources</td><td>Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and Picture</td><td>Grade 10 LCTGs by DepEd Cavite Mathematics 2016, and Worksheets</td><td>Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation</td><td>Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation</td></tr>
<tr><td>IV. PROCEDURES</td><td></td><td></td><td></td><td></td></tr>
<tr><td>A. Reviewing previous lesson or presenting the new lesson</td><td>Saulog Transit Inc. is one of the many bus transportation companies in the Philippines servicing routes between Cavite and Metro Manila, Olongapo or Baguio City.
One day, on its way back to its terminal at Mendez, via Aguinaldo Highway, one (1) passenger went down at SM City Bacoor, then, another four (4) passengers went down to Robinson’s Place Imus, seven (7) passengers went down to Robinson’s Place Pala-pala and ten (10) passengers went down to Lourdes Church at Tagaytay.</td><td>Emer is a runner from Naic. He plans to join an ultramarathon of 50 km from Naic town plaza to the Kaybiang tunnel next month. During the first day of his training he ran 5 km from Naic town plaza to barangay Muzon. To improve his stamina and endurance, he increased the distance he runs by 1.5 km every day.
What is the distance that he will run on the 7th day of his training?

Complete the table based on the number of km that Emer will run for each day.<table><tr><td>number of days</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>number of km</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table></td><td>Group the class into groups with four members each. Match the following arithmetic sequence to the 10th term and the rule by drawing a line from one column to the next one.<table><tr><th>Sequence</th><th>10th term</th><th>Rule</th></tr><tr><td>1, 4, 7, 10</td><td>23</td><td>5n</td></tr><tr><td>2, 8, 14, 20</td><td>-26</td><td>-7+3n</td></tr><tr><td>18, 14, 10, 6</td><td>28</td><td>9+2(n-1)</td></tr><tr><td>-4, -1, 2, 5</td><td>50</td><td>6n-4</td></tr><tr><td>0.1, 0.4, 0.7, 1,...</td><td>-18</td><td>0.3n=0.2</td></tr><tr><td>9, 11, 13, 15, ...</td><td>27</td><td>3n-2</td></tr><tr><td>-0.8, -1, -1.2, 1,4, ...</td><td>56</td><td>-0.2n-0.6</td></tr><tr><td>5, 15, 20, 25, ..</td><td>28</td><td>22-4n</td></tr></table></td><td>Group the class into two (2) groups then let them find the missing terms in each of the following arithmetic sequence. The group with highest points after the game will be the winner.
1. 2, 6, 10, ___, ___, ___
2. 9, 17, ___, ___, ___, 49
3. 7, 9, ___, ___, 15, ___
4. 4, ___, 20, 28, ___, ___
5. 5, ___, ___, 20, 25, ___
6. ___, ___, ___, 3, –1, –5
7. ___, ___, 14, 20, __, 32
8. ___, 45, 40, ___, __, 25
9. 4, –4, __, __, __, –36
10. –12, __, __, __, 8, 13</td></tr>
<tr><td>B. Establishing a purpose for the lesson</td><td>List down the number of passengers who went down in each place.</td><td>Does the distance that Emer will run everyday show an arithmetic sequence? Why?</td><td>How did you find the activity?
How were you able to match the sequence to the 10th term, and to the rule?</td><td>How were you able to find the missing terms in the sequence?</td></tr>
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<table>
<tr><td></td><td>Does it form sequence? If it does, how is the sequence formed?</td><td></td><td></td><td></td></tr>
<tr><td>C. Presenting examples/Instances of the new lesson</td><td>Illustrative Example 1:
Using the generated sequence from the previous scenario:

Arithmetic Sequence
Subtracting two consecutive terms (i.e.: d=a_2-a_1)
1, 4, 7, 10
4-1 = 3 7-4 = 3 10 = 3
Common difference (d)</td><td>Let us take the number of kilometers that Emer will run each day. Suppose that he will continue training everyday, how many kilometers will he run in the 10th, 15th, and 20th day? How do you get them? Do you think a formula would help?
Let us take the first four terms. Let a_1 = 5, a_2 = 7, a_3 = 9, a_4 = 11.
Consider the table below and complete it. Observe how each term is rewritten.
<table><tr><td>a_1</td><td>a_2</td><td>a_3</td><td>a_4</td><td>a_5</td><td>a_6</td><td>a_7</td><td>...</td><td>a_n</td></tr><tr><td>5</td><td>5+2</td><td>5+2+2</td><td></td><td></td><td></td><td></td><td>...</td><td></td></tr></table>How else can we write the terms? Study the table and complete it.
In general, the first n terms of an arithmetic sequence with a_1 as first term and d as the common difference are
a_1, a_1+d_1, a_1+2d_1, …, a_1 +(n-1)d.
<table><tr><td>a_1</td><td>a_2</td><td>a_3</td><td>a_4</td><td>a_5</td><td>a_6</td><td>a_7</td><td>...</td><td>a_n</td></tr><tr><td>5+0(2)</td><td>5+1(2)</td><td>5+2(2)</td><td></td><td></td><td></td><td></td><td>...</td><td></td></tr></table></td><td>The formula for the nth term of an arithmetic sequence is
$a_n = a_1 + (n-1)d$,
where
a_1 = first term
a_n = last term
n = number of terms
d = common difference</td><td>Follow the instructions below then find a partner to share your answer. You may use a clean sheet of paper and a pen while doing the activity.
1. Choose two (2) different numbers.
2. Denote the smaller number as x and the larger number as y.
3. Find the mean of these two numbers. That is, add these two numbers then divide the sum by 2. In symbols, $\frac{x+y}{2}$.
4. Denote the first mean as m_2.
5. Now, find the mean of the smaller number x and m_2. In symbols, $\frac{x+m_2}{2}$.
6. Denote the second mean as m_1.
7. Then, find the mean of the larger number y and m_2. In symbols, $\frac{y+m_2}{2}$.</td></tr>
</table>

		If a_1 and d are known, it is easy to find any term in arithmetic sequence by using the rule. $a_n = a_1 + (n-1)d$		8. Denote the third mean as m_3. 9. Lastly, arrange all the numbers in the form x, m_1, m_2, m_3, y. 10. Share your answer with your partner.
D. Discussing new concepts and practicing new skills # 1	The sequence generated from the given scenario which is 1, 4, 7, 10 is an example of an Arithmetic Sequence because it is formed by adding a constant number which is 3 to the preceding term to obtain the next. The constant number 3 is the common difference, denoted as *d*, which can be obtained by subtracting two consecutive terms ($d = a_n - a_{n-1}$).	Illustrative Example 1: What is the 10th term of the arithmetic sequence 5, 12, 19, 26, …? Solution: Since a_1=5 and d = 7, then $a_{10} = 5 + (10-1)(7) = 68$ Illustrative Example 2: What is the 21st term of the arithmetic sequence 7, 13, 19, 25, …? Solution: Since a_1=7 and d = 6, then $a_{21} = 7 + (21-1)(6) = 127$	Illustrative Example 1: In the arithmetic sequence 5, 9, 13, 17, … which term is 401? Solution: The problem asks for n when a_n = 401. From the given sequence, a_1 = 5, d = 4 and a_n = 401. Substituting these values in the formula, we have $a_n = a_1 + (n-1)d$ $401 = 5 + (n-1)4$ Solving for n, we have $401 = 5 + 4n - 4$ $401 = 4n + 1$ $401 - 1 = 4n + 1 - 1$ $400 = 4n$ $400\ (14) = 4n(14)$ $\mathbf{100} = \boldsymbol{n}$ Therefore, 401 is the 100th term. Illustrative Example 2:	Does the result form arithmetic sequence? What is its common difference? What do you call m_1, m_2, m_3? How did you obtain the missing term of the arithmetic sequence? Is the common difference necessary to obtain the missing term of the sequence? How did you obtain the common difference? If we cannot solve the common difference by subtracting two consecutive terms, is there any other way to solve for it? What is an arithmetic mean? Illustrative Example 1: Insert three arithmetic means between 3 and 11. Solution 1:

			What is the common difference of an arithmetic sequence if $a_1 = 3$, $a_{45} = 179$, and n =45? Solution: The problem asks for d. From the given sequence, a_1 = 3, a_{45} = 179, and n=45. Substituting these values in the formula, we have $179 = 3 + (45 - 1)d$ $179 = 3 + (44)d$ Solving for d, we have 179 = 3 + 44d 179 - 3 = 44d 176 = 44d 4 = d Therefore, 4 is the common difference.	We look for three numbers m_1, m_2, and m_3 such that 3, m_1, m_2, m_3, 11 is an arithmetic sequence. In this case, we have a_1 = 3, n = 5, a_5 = 11. Using the general formula for arithmetic sequence, $a_n = a_1 + (n - 1)d$ $11 = 3 + (5 - 1)d$ solve for d $11 = 3 + 4d$ $11 - 3 = 3 - 3 + 4d$ $8 = 4d$ $8\left(\frac{1}{4}\right) = 4d\left(\frac{1}{4}\right)$ $d = 2$ Since d = 2, so we have $m_1 = a_1 + d$ $m_1 = 3 + 2 = 5$ $m_2 = m_1 + d$ $m_2 = 5 + 2 = 7$ $m_3 = m_2 + d$ $m_3 = 7 + 2 = 9$ Therefore, the three arithmetic means between 3 and 11 are 5, 7, and 9. Solution 2: Still we look three numbers m_1, m_2, and m_3 such that 3, m_1, m_2, m_3, 11

				is an arithmetic sequence. In this case, we nee to solve for m_2, the meanof $a_1 = 3$ and $a_5 = 11$. That is $m_2 = \frac{(a_1+a_5)}{2} = \frac{(3+11)}{2}$ $= \frac{14}{2} = 7$ Now, solve for m_1, the mean of $a_1=3$ and $m_2=7$. That is $m_2 = \frac{(a_1+m_2)}{2} = \frac{(3+7)}{2}$ $= \frac{10}{2} = 5$ Then, solve for m_3, the mean of $a_5=3$ and $m_2=7$. That is, $m_3 = \frac{(a_5+m_2)}{2}$ $= \frac{(11+7)}{2} = \frac{18}{2} = 9$ Forming the sequence 3, m_1, m_2, m_3, 11, we have 3, 5, 7, 9, 11.
E. Discussing new concepts and practicing new skills # 2	How is an Arithmetic Sequence formed? How can the common difference in an arithmetic sequence be obtained?	Think-Pair-Share Supply each blank by a correct answer following the task at the right to solve the question. a. Find a_{45} of the sequence 4,7,10,13,16, … Given: a_1 = ____ ; d = ____ ; n = ____ Solution: $a_n = a_1 + (n-1)d$	Think-Pair-Share Answer the following problems. 1. Which term of the arithmetic sequence 7, 14, 21, 28, …. is 105? Given: a_1 = ____ ; d = ____ ; a_n = ____ Solution: $a_n = a_1 + (n-1)d$ substitute the given	Think-Pair-Share Supply each blank by a correct answer following the task at the right to answer the question. a. Insert two terms in the arithmetic sequence 15, ___, ___, 36. Given: a_1 = __ ; n = __ ; a_4 = ____ Solution:

		substitute a_1, n and d a_n = ___ + (___− 1)___ subtract the terms a_n = 4 + (____)3 substitute a_1, n and d a_n = ___ + (___− 1)___ subtract the terms inside the parenthesis a_n = 4 + (____)3 multiply a_n = 4 + (____) add a_n =_____	____ = ___ + $(n-1)$____ distribute *d* 105 = 7 + ____ − ____ subtract the constants in the right side then apply APE 105 = _____ apply MPE _____ = n 2. What is the common difference of the arithmetic sequence if the first term is 5, last term is 41, and the number of terms is 13? Given: a_1 = ____ ; a_n = ____ ; n = ____ Solution: $a_n = a_1+(n-1)d$ substitute the given ___ =___ + (___−1)d multiply *d* 41 = 5 + ____d apply APE 105 = _____ apply MPE _____ = n	$a_n = a_1 + (n-1)d$ substitute a_1, n and a_4 ___ = ___ + (___−1) subtract the terms inside the parenthesis 36 = 15 + (____)d apply APE ___ = 3d apply MPE d = _____ After solving d, find the second (m_1) and the third (m_2) term. substitute a_1 and d then add. $\boldsymbol{m_1} = a_1+d$=___+___= ___ substitute m_1 and d then add. $\boldsymbol{m_2} = m_1+d$ = __+__= ___ b. Insert three arithmetic means between 12 and 56. Given: a_1=___; a_5=____ Solution: substitute a_1 and a_5 then solve for m_2. Substitute a_1 and m_2 then solve for m_1. Substitute a_5 and m_2 then solve for m_3. $m_2 = \frac{(a_1+a_5)}{2} = \frac{(\_\_+\_\_)}{2} = \frac{\_\_}{2} =$ ___ $m_1 = \frac{(a_1+m_2)}{2} = \frac{(\_\_+\_\_)}{2} = \frac{\_\_}{2} =$ ___ $m_3 = \frac{(a_5+m_2)}{2} = \frac{(\_\_+\_\_)}{2} = \frac{\_\_}{2} =$ ___

F. Developing mastery (leads to Formative Assessment 3)	"How well do you know me?" Which of the following sequences is an arithmetic sequence? Why? 1. 3, 7, 11, 15, 19 2. 4, 16, 64, 256 3. 48, 24, 12, 6, 3, … 4. 1, 4, 9, 16, 25, 36 5. 1, $\frac{1}{2}$, 0, -$\frac{1}{2}$ 6. -2, 4, -8, 16, … 7. 1, 0, -1, -2, -3 8. $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, … 9. 3x, x, $\frac{x}{3}$, $\frac{x}{9}$, … 10. 9.5, 7.5, 5.5, 3.5, …	Find Since a_n for each of the following arithmetic sequence. 1. $a_1 = 5$; d = 4 ; n = 11 2. $a_1 = 14$; d = –3 ; n = 25 3. $a_1 = 12$; d = ½; n = 16 4. –10, –6, –2, 2, 6, … n = 27 5. 3, $\frac{5}{2}$, 2, $\frac{5}{2}$,1,… n = 28	Use the nth term of an arithmetic sequence $a_n = a_1 + (n-1)d$ to answer the following questions. 1. The second term of an arithmetic sequence is 24, and the fifth term is 3. Find eth first term and the common difference. 2. Given the arithmetic sequence of 5 terms of the firs term is 8 and the last term is 100. 3. Find the 9th term of the arithmetic sequence with $a_1 = 10$ and d = $-\frac{1}{2}$. 4. Find a_1 if $a_8 = 54$ and $a_9 = 60$. 5. How many terms are there in an arithmetic sequence with a common differenceof 4 and with first terms 3 and 59 respectively?	Answer the following. 1. Insert two arithmetic means between 20 and 38. 2. Insert three arithmetic means between 52 and 40. 3. Find the missing terms of the arithmetic sequence 5, __, __, __, __, 25. 4. Find the missing terms of the arithmetic sequence 0, __, __, __, __, __, 15. 5. The fifteenth term of an arithmetic sequence is –3 and the first term is 25. Find the common difference and the tenth term.
G. Finding practical application of concepts and skills in daily living	Answer the following problem. A merchandiser in Alfa Mart was tasked to stack 22 cans of Evaporated milk	Answer the following problems. 1. You went to a hiking with your friends at *Pico de Loro* at Maragondon, Cavite. Upon	Solve the following problems. 1. *Tinapa* (smoked fish) is best paired with *Atchara* (pickled papaya). Diana, a tinapa	Answer the following problems. 1. Flower farms in Tagaytay grew different variety of flowers including anthurium.

	with 10 cans at the bottom of the stack. The illustration is shown at the right.  1. Write the number of cans per layer on the space provided below. __, __, __, __, __, __, __, __, __, __ 2. Does the number of cans in each layer of the stack show an arithmetic sequence? Explain your answer. 2. If it shows an arithmetic sequence, then what is the common difference?	reaching the summit, you drop a coin. The coin falls a distance of 4ft for the first seconds, 16ft for the next, 28ft on the third, and so on. Find the distance the coin will fall in 6 seconds? 2. Antonio is studying *Chabacano*, a native dialect from Cavite City and Ternate. He started practicing one (1) word for an hour and decided to add two more words every succeeding hour. If the pattern continues, how many Chabacano word did he learn in one day? 3. Rico bought an *e-bike* at Php29, 000. If it depreciates Php500 in value each year, what will be its value at the end of 10years?	vendor in Salinas, Rosario, Cavite, decided to sell atchara at her store. On the first week, she started to sell 15 atchara bottles and due to high demand, she decided to add 7 more bottles on each succeeding weeks. Supposed that the pattern continues, how may week is needed to sell 57 atchara bottles? 2. A Zumba Program calls for 15 minutes dancing each day for a week. Each week thereafter, the amount of time spent dancing increases by 5 minutes per day. In how many weeks will a person be dancing 60 minutes each day? 3. The 10^{th} term of an arithmetic sequence is 40 and the 20^{th} term is 30. Find the common difference and the first term. 4. If the 9^{th} floor of a building is 40 meters above the gound and the ground floor is 4 meters in height and each floor apart from the ground has equal height. Find the height of each floor.	Monica, a flower arranger, went to Tagaytay to buy anthurium. She plans to arrange the flowers following an arithmetic sequence with four (4) layers. If she put one (1) anthurium on the first layer and seven (7) on the fourth layer, how many anthurium should be placed on the second and third layer of the flower arrangement? 2. St. Mary Magdalene Parish Church in Kawit, one of the oldest churches in Cavite, established in 1624 by Jesuit Missionaries. The church is made of red bricks preserved for more than a hundred years. Suppose that the lowest part of the church wall contains five (5) layers of red bricks, 4bricks on the top and 16bricks on the bottom layer. Assuming an arithmetic sequence, how many bricks are there in the 2nd, 3rd and 4th layer of the wall? 3. In some of the Kiddie parties nowadays, Tower Cupcakes were quite popular

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<td>because it is appealing and less expensive. In Juan Miguel's 1st birthday party, his mother ordered a six (6) layer tower cupcakes. If the 1st and 4th layer of the tower contains 6 and 21 cupcakes, respectively, how many cupcakes are there in the 6th layer (bottom) of the tower assuming arithmetic sequence in the number of cupcakes?</td>
</tr>
<tr>
<td>H. Making generalizations and abstractions about the lesson</td>
<td>An arithmetic sequence is a sequence where every term after the first is obtained by adding a constant.
Common difference (d) is the constant number added to the preceding term of the arithmetic sequence. It can be calculated by subtracting any two consecutive terms in the arithmetic sequence.</td>
<td>What is the formula to find the nth term of an arithmetic sequence?</td>
<td>Other than solving directly from $a_n = a_1 + (n-1)d$, below are the formula or equation that could be used if one of these variables is unknown.
<table>
<tr><th>UNKNOWN</th><th>FORMULA / EQUATION</th></tr>
<tr><td>a_n</td><td>$a_n = a_1 + (n-1)d$</td></tr>
<tr><td>a_1</td><td>$a_1 = a_n - (n-1)d$</td></tr>
<tr><td>d</td><td>$d = \frac{a_n - a_1}{n-1}$</td></tr>
<tr><td>n</td><td>$n = \frac{a_n - a_1}{d} + 1$</td></tr>
</table></td>
<td>Arithmetic Means are the terms between any two nonconsecutive terms of an arithmetic sequence.
It is necessary to solve the common difference of an arithmetic sequence to insert terms between two nonconsecutive terms of an arithmetic sequence.
The formula for the general term of an arithmetic sequence, $\boldsymbol{a_n}$ = + ($\boldsymbol{n-1}$) and the mid-point between two numbers, $\frac{x+y}{2}$ can also be used.</td>
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<tr>
<td>I. Evaluating learning</td>
<td>Determine whether the given sequence is arithmetic sequence or not. Draw a ☆ if the</td>
<td>Find the nth term of each arithmetic sequence.
1. $a_1 = 20, d = 4, n = 37$</td>
<td>Solve the following questions.
1. Given the sequence 3, 1, –1, –3, …, find a12.</td>
<td>Use the following numbers inside the box to complete the arithmetic sequence</td>
</tr>
</table>

	sequence is an arithmetic sequence and a if NOT. If the sequence is an arithmetic sequence, find the common difference. 1. 4, 8, 16, 32, … 2. 2, 6, 10, 14, … 3. 2, 5, 10, 17, … 4. 1, 8, 9, 16, … 5. 2, 11, 20, 29, …	2. $a_1 = -3, d = 2, n = 12$ 3. $a_1 = 4, d = -3, n = 17$ 4. $a_1 = 6, d = \frac{2}{3}, n = 11$ 5. $a_1 = 16, d = \frac{3}{2}, n = 20$ 6. a_{31} for 26, 20, 14, … 7. a_{13} for 17, 313, 309, … 8. a_9 for 40, 43, 46, 49, 52, … 9. a_{25} for -29, -34, -39, -44, -49, … 10. a_{11} for -1, 3, 7, 11, …	2. Find the 9th term of the arithmetic sequence 12, 24, 36, … 3. If a1 = –17 and d = 4, find a22 of the arithmetic sequence. 4. Find the 16th term of the arithmetic sequence whose first term is 6 and the common difference is 0.25. 5. Which term is 27 in the arithmetic sequence 54, 51, 48, …?	below. You may use a number more than once. 1. 2, ___, ___, 14 2. 4, ___, ___, ___, 10 3. 6, ___, ___, ___, 16 4. 9, ___, ___, ___, __, 24 5. ___, 17, ___, ___, 11 6 7 10 11 12 13 15 18 19 21 11/2 17/2 27/2 29/2
J. Additional activities for application or remediation	1. Follow-up a. Can the common difference be negative? If so, describe the sequence. b. From the previous assignment, identify which of the following is an arithmetic sequence then find each common difference. 1, 4, 7, 10, … 9, 12, 15, 18, … 2, -10, 50, -250, … 5, 10, 20, 40, … 2, 6, 10, 14, … 3, 12, 48, 192, … 7, 12, 17, 22, … 4, 11, 18, 25, …	1. Follow-up Given the first term and common difference, find the first four terms and the formula. 1, $a_1 = 25, d = 100$ 2. $a_1 = 24, d = -15$ 3. $a_1 = 5, d = 5$ 4. $a_1 = 9, d = -50$ 2. Study: Finding the missing term of an arithmetic sequence.	1. Follow-up a. Complete the statement for each arithmetic sequence. 1. 55 is the ___th term of 4, 7, 10, … 2. 163 is the ___th term of -5, 2, 9, … 2. Study: a. Finding arithmetic means. b. How to insert terms in an arithmetic sequence.	1. Follow-up a. Find the arithmetic mean of –23 and 7. b. How many numbers are divisible by 9 between 5 and 1000? 2. Study: Sum of Arithmetic Sequence a. How to find the sum of terms in an arithmetic sequence? b. Find the sum of the following arithmetic sequence 1, 4,7,10,13, 16, 19, 22, 25 4, 11, 18, 25, 32, 39, 46, 53, 60 2, 6, 10, 14, 18, 22, 26, 30, 34

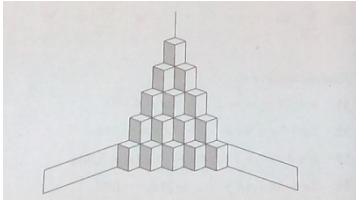
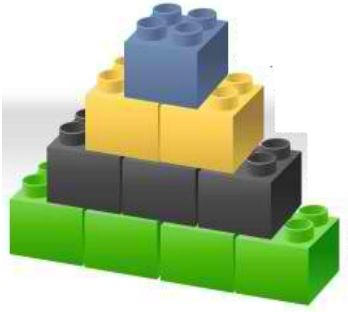
	1, 3, 9, 27, … 1, 4, 16, 64, … 2. Study: Finding the nth term of an arithmetic sequence a. Formula to find the nth term of an arithmetc sequence. b. How to find then nth term in an arithmetic sequence.			7, 12, 17, 22, 27, 32, 37, 42, 47 9, 12, 15, 18, 21, 24, 27, 30, 33
V. REMARKS				
VI. REFLECTION				
A. No. of learners who earned 80% in the evaluation				
B. No. of learners who require additional activities for remediation who scored below 80%				
C. Did the remedial lessons work? No. of learners who have caught up with the lesson				
E. Which of my teaching strategies worked well? Why did these work?				
F. What difficulties did I encounter which my principal or supervisor can help me solve?				

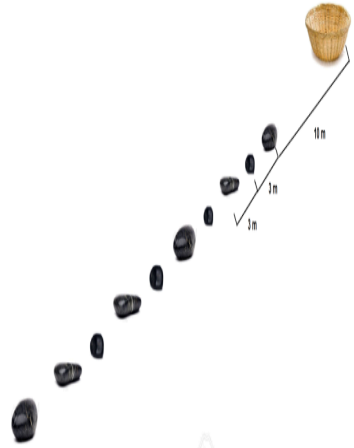
G. What innovation or localized materials did I use/discover which I wish to share with other teachers?				

GRADE 10 **DAILY LESSON LOG**	**School**		**Grade Level**	**10**
	Teacher		**Learning Area**	**MATHEMATICS**
	Teaching Dates and Time		**Quarter**	**FIRST**

	Session 1	**Session 2**	**Session 3**	**Session 4**
I. OBJECTIVES				
7. Content Standards	The learner demonstrates understanding of key concepts of sequences.			
8. Performance Standards	The learner is able to formulate and solve problems involving sequences in different disciplines through appropriate and accurate representations.			
9. Learning Competencies Objectives	The learner finds the sum of the terms of a given arithmetic sequence. **(M10AL-Ic-2)** a. find the sum of terms of a given arithmetic sequence. b. solve problems involving the sum of arithmetic sequence.	The learner finds the sum of the terms of a given arithmetic sequence. **(M10AL-Ic-2)** a. give the sum of terms of a given arithmetic sequence. b. answer problems involving the sum of arithmetic sequence.	The learner finds the sum of the terms of a given arithmetic sequence. **(M10AL-Ic-2)** a. determine the sum of terms of a given arithmetic sequence. b. solve problems involving the sum of arithmetic sequence.	The learner finds the sum of the terms of a given arithmetic sequence. **(M10AL-Ic-2)** a. find the sum of terms of a given arithmetic sequence. b. solve problems involving the sum of arithmetic sequence.

	c. appreciate the sum of arithmetic sequence in solving real life problems	c. value the sum of arithmetic sequence in solving real life problems	c. appreciate the sum of arithmetic sequence in solving real life problems	c. appreciate the sum of arithmetic sequence in solving real life problems
II. CONTENT	**Arithmetic Series**	**Arithmetic Series**	**Arithmetic Series**	**Arithmetic Series**
III. LEARNING RESOURCES				
E. References				
9. Teacher's Guide	pp. 19	pp. 19	pp. 19	pp. 19
10. Learner's Materials	pp. 16 – 17, 20 – 21	pp. 16 – 17, 20 - 21	pp. 16 – 17, 20 - 21	pp. 16 – 17, 20 - 21
11. Textbook	E – MATH 10 by Orlando A. Orence and Marilyn O. Mendoza, pp. 29-35 Simplified Mathematics 10 by Arnold V. Garces and Criselle Española Robes, pp 23-27	Next Century Mathematics by Mirla S. Esparrago, Nestor V. Reyes, Jr. And Catalina B. Manalo, pp 29-40 Our World of Math by Julieta G. Bernabe, Maricel C. Corpuz, et. al., pp.8 – 16	Next Century Mathematics by Mirla S. Esparrago, Nestor V. Reyes, Jr. And Catalina B. Manalo, pp 29-40	Math Essentials by Maria Teresa S. Angeles, Avelino Santos, et. al, pp.8, 40 Next Century Mathematics by Mirla S. Esparrago, Nestor V. Reyes, Jr. And Catalina B. Manalo, pp 29-40
12. Additional Materials from Learning Resources (LR) portal				https://www.algebra.com/algebra/homework/sequences-and-series/word-problems-on-arithmetic-progressions.lesson http://www.analyzemath.com/math_problems/arith-seq-problems.html

F. Other Learning Resources	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation
IV. PROCEDURES				
A. Reviewing previous lesson or presenting the new lesson	Motivational Activity: Perform the instructions below then answer the questions followed. 1. Form a pyramid of cans with 6 cans in the first row. 2. Place one (1) fewer cans in each successive row thereafter. 3. After forming the pyramid, how many rows does the pyramid have? 4. How many cans are there in each row? Does the number of cans in each row form an arithmetic sequence? 5. How many total cans are there in the pyramid? 	How many building blocks are stacked in a corner if there are 11 layers in all? (Refer to the picture below) 	Motivational Activity: Let us consider the following problem. Karen saves Php 50 from her monthly allowance on the first month. Php 100 on the second month, Php 150 on the third month, Php 200 on the fourth month. If she will save continuously in this manner, how much will be her total savings for the first ten months?	Michael plays with Lego bricks. He wants to build the construction shown in the figure with 4 bricks at the bottom. How many Lego bricks does he need? What if Michael will add four more bricks at the bottom to make it 8, how many more Lego bricks does he need making the top layer consist of one brick only? 

B. Establishing a purpose for the lesson	The secret of Karl What is 1 + 2 + 3 + ... + 50 + 51 + ... + 98 + 99 + 100? A famous story tells that this was the problem given by an elementary school teacher to a famous mathematician to keep him busy. Do you know that he was able to get the sum within seconds only? Can you beat that?	Motivational Activity: A conference hall has 20 rows of seats. The first row contains 18 seats, the second row contains 21 seats, the third row contains 24 seats and so on. How many seats are there in the last row? How many seats are there in the conference?	Find the sum of the first 40 terms of the arithmetic sequence whose first and third terms are 15 and 21, respectively. Based on the problem, the given are a_1, a_3 and n. And the formula $S_n = \frac{n}{2}[2a_1 + (n-1)\ d$ requires the value of d.	A rock relay is held at the Bermuda Bay. Ten rocks are placed 3m apart along a line. A basket is placed at the start of the line, 10m from the first rock. A player starts at the basket, runs to the first rock, picks it up, and returns to place the rock in the basket. Each of ten rocks is picked up and carried to the basket, one at a time. What is the total distance covered by a person who places all 10 rocks in the basket? 
C. Presenting examples/Instances of the new lesson	Discussion Method Illustrative Example:	Discussion Method Illustrative Example:	Discussion Method Find the sum of the first 40 terms of the	What is the total distance covered by a

	Find the sum of the first 20 terms of the arithmetic sequence 15, 19, 23, 27, … Solution 1: We first find a_{20} by substituting $a_1 = 15$, d = 4 and n = 20 in the formula $a_n = a_1 + (n-1)\,d$ $a_{20} = 15 + (20 - 1)\,4$ $a_{20} = 15 + (19)\,4$ $a_{20} = 15 + 76$ $a_{20} = 91$ Solving for S20, we substitute n = 20, $a_1 = 15$ and $a_n = 91$ in the formula $Sn = \frac{n}{2}(a_1 + a_n)$ $S_{20} = \frac{20}{2}(15 + 91)$ $S_{20} = \frac{20}{2}(106)$ $S_{20} = 10\,(106)$ $\boldsymbol{S_{20} = 1060}$ Therefore, the sum of the first 20 terms of the arithmetic sequence 15, 19, 23, 27, … is 1060. Solution 2: Substituting $a_1 = 15$, d = 4 and n = 20 in the formula	How many terms is needed for –3, 2, 7, … to have a sum of 116? Solution: Using the formula for the sum of arithmetic sequence $S_n = \frac{n}{2}[2a_1 + (n-1)\,d]$, substitute $S_n = 116$, $a_1 = -3$ and d = 5. We have $116 = \frac{n}{2}[2(-3) + (n-1)5]$ $116 = \frac{n}{2}[2(-3) + 5n - 5]$ $116 = \frac{n}{2}[-6 + 5n - 5]$ $116 = \frac{n}{2}[5n - 11]$ $2[116 = \frac{n}{2}(5n-11)]$ $232 = n(5n-11)$ $232 = 5n^2 - 11n$ $5n^2 - 11n - 232 = 0$ Using quadratic formula, we have, a = 5; b = –11; c = –232 $n = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ $n = \frac{-(-11) \pm \sqrt{(-11)^2-4(5)(-23}}{2(5)}$ $n = \frac{11 \pm \sqrt{121+4640}}{10}$ $n = \frac{11 \pm \sqrt{4761}}{10}$ $n = \frac{11 \pm 69}{10}$	arithmetic sequence whose first and third terms are 15 and 21, respectively. Solution: We need to solve first for d by substituting $a_1 = 15$, $a_3 = 21$ and n = 3 to the formula $a_n = a_1 + (n-1)d$ $21 = 15 + (3-1)d$ $21 = 15 + 2d$ $6 = 2d$ $d = 3$ Solving for S_{40}, substitute $a_1 = 15$, n = 40 and d = 3 to the formula $S_n = \frac{n}{2}[2a_1 + (n-1)\,d\,]$ $S_{40} = \frac{40}{2}[2(15) + (40 - 1)\,3\,]$ $S_{40} = 20\,[30 + 117]$ $\boldsymbol{S_{40} = 2940}$ Therefore, the sum of the first 40 terms is 2940.	person who places all 10 rocks in the basket? Solution: The first term $a_1 = 10$, d = 3 and n = 10. To find the distance covered by the person, we must solve for S_n. $\boldsymbol{S_n = \frac{n}{2}[2a_1 + (n-1)d]}$ $= \frac{10}{2}[2(10) + (10 - 1)\,3\,]$ $= 5\,(47)$ $\boldsymbol{S_n = 235}$ Since the person, after picking up each rock, returns to place the rocks in the basket, so we must double S_n. Thus, the total distance covered is $2\,S_n = 2\,(235) = 470$ m.

	$S_n = \frac{n}{2}[2a_1+(n-1)d]$, we have $S_{20} = \frac{20}{2}[2(15) + (20 - 1) 4]$ $S_{20} = \frac{20}{2}[2(15) + (19) 4]$ $S_{20} = \frac{20}{2}[2(15) + 76]$ $S_{20} = \frac{20}{2}(30 + 76)$ $S_{20} = \frac{20}{2}(106)$ $S_{20} = 10(106)$ $\boldsymbol{S_{20} = 1060}$ Using an alternative solution, the sum of the first 20 terms of the arithmetic sequence 15, 19, 23, 27, … is still 1060.	Since we are looking for the number of terms n, the only accepted solution is the positive solution. That is $\boldsymbol{n=8}$ Therefore, eight (8) terms of the sequence –3, 2, 7, … is needed to have a sum of 116.		
D. Discussing new concepts and practicing new skills # 1	Supply each blank by a correct answer following the task at the right to solve the problem. a. Find the sum of the first 15 terms of the arithmetic sequence 9, 12, 15, … Given: a_1 = ____ ; d = ____ ; n = ____ Solution: Solve for a_{15} $a_n = a_1+(n-1)d$	Supply each blank by a correct answer following the task at the right to solve the problem. How many terms of the arithmetic sequence 21, 28, 35, 42, … is equal/summed 9,625? What are the given? a_1 = 21, d = 7 and S_n = 9,625 We have	Supply each blank by a correct answer following the task at the right to solve the problem. Find the sum of the first 10 terms of the arithmetic sequence whose a_1 and a_4 are 5 and 38, respectively. Given: a_1 = ____ ; a_4 = ____ ; n = ____ Solution: $a_n = a_1+(n-1)d$	● *The first few terms of a sequence of positive integers divisible by 5 is given by* __, __, __, … ● *The above sequence has a first term equal to 5 and a common difference d = 5. We need to know the rank of the term 1555.* _____ = a_1 + (n – 1) d

	a_n=___+(___−1)___ substitute a_1, n and d a_n=9+(_____)3 subtract the terms inside the parenthesis a_n=9+(_____) multiply a_n=_____ add Then solve for S_{15}. S_n= $\frac{n}{2}(a_1+a_n)$ S_{15}= $\frac{\_\_}{2}$(_____+_____) substitute n, a_1 and a_{15} S_{15}= $\frac{15}{2}$(_____) add the terms inside the parenthesis S_{15}= $\frac{\_\_}{2}$ find the product of the numerator S_{15}= _____ divide	___= $\frac{n}{2}$ [2(__) + $(n-1)$ _] substitute a_1, d, and S_n ___= $\frac{n}{2}$ [__ + _n − _] multiply ___= $\frac{n}{2}$ [__n − __] add 2[___= $\frac{n}{2}$ (__n − __)] multiply _____= n (__n− __)] $7n^2 + 35n – 19, 250 = 0$ Using quadratic formula, we have, a = __; b = __; c = ___ $n = \frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $n = \frac{\_\_\pm\sqrt{(\_\_)^2-4(\_)(\_\_)}}{2(\_)}$ $n = \frac{-35\pm\sqrt{\_\_+\_\_\_\_}}{\_\_}$ $n = \frac{-35\pm\sqrt{540,225}}{14}$ $n = \frac{-35\pm735}{14}$ Since we are looking for the number of terms n, the only accepted solution is the positive solution. That is $\boldsymbol{n}$=___ Therefore, _____ terms of the sequence 21, 28, 35, 42, … is needed to have a sum of 9,625.	_____= _____+(_____−1)d substitute the given 38= 5+(_____)d subtract the terms inside the parenthesis _____= 3d apply APE d=_____ apply MPE Solve for S_{10}. S_n= $\frac{n}{2}$[2a_1+$(n-1)d$] S_n= $\frac{n}{2}$ [2(__)+(__−1)___] substitute a_1, n and d S_n= $\frac{10}{2}$[___+(___)11] multiply 2 and a_1 and then subtract the value of n and 1 S_n= $\frac{10}{2}$ [10+_____] multiply S_n= $\frac{10}{2}$ [_____] add S_n= _____[109] divide S_n= _____ multiply	*We use the formula for the nth term as follows* ● *Substitute a_1 and d by their values* _____ = __ + __(n – 1) ● *Solve for n to obtain* _____ = __n n = _____ *We now know that 1555 is the _____th term, we can use the formula for the sum as follows* S__ = (5 + 1555) S__ = _____

E. Discussing new concepts and practicing new skills # 2	A movie house has 20 rows of seats. The first row contains 20 seats, the second row contains 22 seats, the third row contains 24 seats and so on. How many seats are there in the last row? How many seats are there in the movie house?	The total seating capacity of an auditorium is 1,065. The first row has 21 seats and each row has one seat more than the row in front of it. How many rows of seats are there in the auditorium?	Find the sum of the first 21 terms of an arithmetic sequence whose first term is 3 and third term is 17.	In a pyramid of cheer dancers for the MAPEH class of Grade 10 students, the bottom row has 7 cheer dancers, 6 in the second row, 5 in the third row and so on, with 2 cheer dancers on top. How many cheer dancers are necessary for the pyramid?
F. Developing mastery (leads to Formative Assessment 3)	Find S_n for each of the following given. 1. 6, 11, 16, 21, 26, 31, 36, 41, 46; S_9 2. 10, 15, 20, 25, …; S_{20} 3. $a_1 = 25$, $d = 4$; S_{12} 4. $a_1 = 65$, $a_{10} = 101$; S_{10} 5. $a_4 = 41$, $a_{12} = 105$; S_8	Find the specified term for each arithmetic series. 1. $a_1 = 4$, $d = 4$ and $S_n = 40$; $n =$ ___ 2. $a_1 = 10$, $a_n = -8$ and $S_n = 9$; $n =$ ___ 3. $a_1 = -7$, $d = 8$ and $S_n = 225$; $n =$ ___ 4. $a_n = 16$, $d = 3$ and $S_n = 51$; $n =$ ___	Find the indicated variable in each arithmetic series. a. $a_1 = -22$, $a_n = 14$, $n = 10$; $d =$ __ $S_n =$ __ b. $a_1 = 7$, $a_n = -15$, $n = 12$; $d =$___ $S_n =$ ____ c. $a_1 = -9$, $a_n = -15$, $n = 4$; $d =$ ___ $S_n =$ ___ d. $a_1 = 6$, $a_n = 30$, $n = 7$; $d =$ ____ $S_n =$ ____	Solve each problem. 1. Find the sum of all integers that are multiples of 4 from 1 to 150. 2. Find the sum of the positive integers less than 150 but greater than 20 that are divisible by 7. 3. Find the sum of all positive integers less than 100. 4. Find the sum of all the positive even integers

				consisting of two digits.
G. Finding practical application of concepts and skills in daily living	Find S_n for each of the following given. 1. Find the sum of the first 25 terms of the arithmetic sequence 17, 22, 27, 32, ... 2. Find the sum of the first 50 terms of the arithmetic sequence if the first term is 21 and the twentieth term is 154. 3. Find the sum of all the positive integers consisting of two digits.	Find the missing for each of the following given. 1. How many numbers between 8 and 315 are exactly divisible by 6? Find their sum. 2. An auditorium has 930 seats, with 18 seats at the first row, 21 seats in the second row, 24 in the third row, and so forth. How many rows of seats are there? 3. Marlon needs P 2,520 for his Baguio tour. He save P 50 on his *baon* on the first week and ask for an additional P 20 from his *tatay* on the succeeding weeks. How many weeks does he need to request an	Do as indicated 1. Find the sum of the first 101 terms of an arithmetic sequence whose third term is -2 and whose sixth term is 10. 2. Find the sum of the first 20 terms of an arithmetic sequence whose fourth term is 6 and eleventh term is 30. 3. Find the sum of the first 15 terms of an arithmetic sequence whose sixth term is -9 and tenth term is -15.	Answer the following problems. 1. Find the seating capacity of a movie house with 40 rows of seats if there are15 seats on the first row, 18 seats in the second row, 21 seats in the third row and so on. 2. A store sells Php 1000 worth of *Suman sa Kawit*, a delicacy from Kawit, Cavite, during its first week. The owner of the store has set a goal of increasing her weekly sales by Php 300 each week. If we assume that the goal is met, find the total sales of the store during the first 15 weekof operation. 3. Francisco plans to save Php 10 every week on his Bamboo coin bank. If he will increase his savings by Php 1.50 every succeeding week, how many weeks is needed to save a total amount of Php 219?

<table>
<tr><td></td><td></td><td>additional to reach the amount he need?</td><td></td><td></td></tr>
<tr><td>H. Making generalizations and abstractions about the lesson</td>
<td>The sum of terms in an arithmetic sequence can be solve using the formula $S_n = \frac{n}{2}(a_1 + a_n)$, given the 1st and last term of the sequence or $S_n = \frac{n}{2}[2a_1 + (n-1)d]$, given the first term and the common difference.</td>
<td>The sum of terms in an arithmetic sequence can be solve using the formula $S_n = \frac{n}{2}(a_1 + a_n)$, given the 1st and last term of the sequence or $S_n = \frac{n}{2}[2a_1 + (n-1)d]$, given the first term and the common difference.</td>
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<tr><td>I. Evaluating learning</td>
<td>Each row of the table contains the values of three quantities a_1, d, a_n, or S_n of an arithmetic sequence. Complete the table below by solving the other two.
<table>
<tr><th></th><th>a_1</th><th>d</th><th>a_n</th><th>n</th><th>S_n</th></tr>
<tr><td>1.</td><td>2</td><td>5</td><td></td><td>10</td><td></td></tr>
<tr><td>2.</td><td>7</td><td>-2</td><td>-15</td><td></td><td></td></tr>
<tr><td>3.</td><td></td><td>-1.5</td><td>15</td><td>20</td><td></td></tr>
<tr><td>4.</td><td>5</td><td>7</td><td></td><td>9</td><td></td></tr>
<tr><td>5.</td><td>2</td><td></td><td>7</td><td>8</td><td></td></tr>
</table></td>
<td>Each row of the table contains the values of three quantities a_1, d, a_n, or S_n of an arithmetic sequence. Complete the table below by solving the other two.
<table>
<tr><th></th><th>a_1</th><th>d</th><th>a_n</th><th>n</th><th>S_n</th></tr>
<tr><td>1.</td><td>1</td><td>1</td><td></td><td></td><td>55</td></tr>
<tr><td>2.</td><td>2</td><td>2</td><td>98</td><td></td><td></td></tr>
<tr><td>3.</td><td>1</td><td>1</td><td>100</td><td></td><td>5050</td></tr>
<tr><td>4.</td><td>5</td><td>7</td><td></td><td></td><td>365</td></tr>
<tr><td>5.</td><td>23</td><td></td><td>159</td><td></td><td>1638</td></tr>
</table></td>
<td>Complete the table below for each arithmetic series.
<table>
<tr><th></th><th>a_1</th><th>a_n</th><th>d</th><th>S_n</th></tr>
<tr><td>1.</td><td>2</td><td>a_{200} = 200</td><td></td><td>S_{200} =</td></tr>
<tr><td>2.</td><td>5</td><td>a_{100} = 100</td><td></td><td>S_{100} =</td></tr>
<tr><td>3.</td><td>73</td><td>a_{15} = 28</td><td></td><td>S_{15} =</td></tr>
<tr><td>4.</td><td>-2</td><td></td><td></td><td>S_{10} = 205</td></tr>
</table></td>
<td>Three of the elements in a_1, a_n d, n, and S_n of the arithmetic sequence are given. Find the missing elements in each case.
1. a_1= -3, a_n = 39, n = 15
2. a_1= 24, a_n = 3, d = -3
3. a_1= $\frac{2}{3}$, d = $\frac{1}{6}$, n = 10
4. a_n = 19, d = $\frac{1}{2}$, n = 5
5. a_1 = -2, n = 14, and S_n = 20</td></tr>
</table>

J. Additional activities for application or remediation	a. Find the sum of all odd numbers from 1 to 99. b. Find the sum of all the even numbers between 1 and 100 c. Find the sum of the arithmetic sequence 15, 30, 45, 60, … 50^{th} term.	a. Find the sum of the first 40 terms of the arithmetic sequence whose first and third terms are 15 and 21, respectively. b. Find S_{24} for the sequence 2, 14, …, 12n-10, … c. Find S_{25} for the sequence -8, 7, …, 15n-23, …	a. Find the sum of the first eighteen terms of the arithmetic sequence whose general term is $a_n = 15 + 8n$ b. Find the sum of the first sixteen terms of the arithmetic sequence whose general term is $a_n = 3n + 4$	1. Follow-up a. Find the sum of all odd numbers from 1 to 99. 2. Study: Geometric Sequence a. Define geometric sequence and common ratio. b. Identify which of the following is NOT an arithmetic sequence. How did the non-arithmetic sequence formed? Identify its pattern. 1, 4, 7, 10, … 9, 12, 15, 18, … 2, -10, 50, -250, … 5, 10, 20, 40, … 2, 6, 10, 14, … 3, 12, 48, 192, … 7, 12, 17, 22, … 4, 11, 18, 25, … 1, 3, 9, 27, … 1, 4, 16, 64, …
V. REMARKS				
VI. REFLECTION				
A. No. of learners who earned 80% in the evaluation				
B. No. of learners who require additional activities				

for remediation who scored below 80%				
C. Did the remedial lessons work? No. of learners who have caught up with the lesson				
E. Which of my teaching strategies worked well? Why did these work?				
F. What difficulties did I encounter which my principal or supervisor can help me solve?				
G. What innovation or localized materials did I use/discover which I wish to share with other teachers?				

DAILY LESSON LOG	Teacher		Learning Area	MATHEMATICS
	Teaching Dates and Time		Quarter	FIRST

	Session 1	Session 2	Session 3	Session 4
I. OBJECTIVES				
10. Content Standards	The learner demonstrates understanding of key concepts of sequences.			
11. Performance Standards	The learner is able to formulate and solve problems involving sequences in different discipline through appropriate and accurate representations.			
12. Learning Competencies	Illustrates a geometric sequence. **(M10AL-Id-1)**	Differentiates a geometric sequence from an arithmetic sequence. **(M10AL-Id-2)**	Differentiates a finite geometric sequence from an infinite geometric sequence. (**M10AL-Id-3)**	The learner determines the geometric means between terms of a geometric sequence. **(M10AL-Ie-1)**
Objectives	a. Illustrate geometric sequence. b. State whether the given sequence is geometric or not. c. Develop explorative skills in doing each task.	a. Differentiate a geometric sequence from an arithmetic sequence. b. Tell whether the given sequence is geometric or arithmetic. c. Value critical thinking.	a. Differentiate a finite geometric sequence from an infinite geometric sequence. b. Tell whether the given geometric sequence is finite or infinite. c. Value critical thinking.	a. Solve the common ratio when two consecutive terms are given b. Find the common ratio when the first and last terms are given c. Appreciate the use of the common ratio in solving geometric sequence.

II. CONTENT	**Illustrating Geometric Sequence**	**Differentiating Geometric Sequence from an Arithmetic Sequence.**	**Differentiating Finite Geometric Sequence from an Infinite Geometric Sequence.**	**Finding the Common Ratio of Geometric Sequence**
III. LEARNING RESOURCES				
G. References				
13. Teacher's Guide	pp. 22 – 24	pp. 24 - 26		p. 24
14. Learner's Materials	pp. 26-28	pp. 12, 27, 39 - 40	pp. 31 – 42	p. 30
15. Textbook				Our World of Math, Julieta G. Bernarbe et. al., pp. 22 and 33
16. Additional Materials from Learning Resources (LR) portal			*http://whatis.techtarget.com/definition/infinite-sequence*	
H. Other Learning Resources	Laptop	Laptop	Laptop	Grade 10 LCTGs by DepEd Cavite Mathematics 2016 PPT, Laptop, Monitor, Activity Sheets
IV. PROCEDURES				
A. Reviewing previous lesson or presenting the new lesson	DIVIDE AND CONQUER *Direction:* 1. Choose two representatives from each group: A and B.	SPEED AND ACCURACY TEST (Using a flashcard, I will be showing a sequence, fill in the missing item. First to	LET'S GROUFIE With your own set criteria, group the following: ● Line	Hep, Hep! Hooray Identify if the given sequence is geometric or not. Say Hep, Hep!

	2. Members A will be the one to answer on the board. 3. Members B should position themselves in a row at the same distance from the board. 4. Every correct answer made by member A will allow member B to move 1 step forward. 5. The group with the second member closest to the board will be considered winner. Find the ratio of the second number to the first number. 1. 2, 8 6. 16, 32 2.-3, 9 7. -49, 7 3.1, ½ 8. ¼, ½ 4.-5, -10 9. 2/3, ¾ 5.12, 4 10. ½, 1	give the correct answer will get a price.) 1. 8, 3, -2, __, -12, … 2. 120, 60, 30, __, … 3. 5, __, 80, 320, … 4. -1, __, 17, 26, … 5. __, 1, 3, 9, …	• Line segment • 1, 2, 3, 4, 5, … 100 • 1, 2, 3, 5, 7, 11, 13, 17, … • Natural numbers • Even numbers less than 50	if geometric, otherwise say Hooray! 1. 7, -14, 21, -28 2. 20, 15, 10, 5,… 3. 1, 4, 9, 16,… 4. 9, -9, 9, -9,… 5. 1, 1/3, 1/9, 1/27,…
B. Establishing a purpose for the lesson	Ratio is a relationship between two quantities normally expressed as the quotient of one divided by the other.	Geometric and arithmetic sequences involve different operations. The given sequences are examples of both.	In the previous discussions, geometric sequence is a sequence where each term after the first is obtained by multiplying the preceding term by a nonzero	1. Which of the sequences are geometric? 2. How do we know that the sequence is geometric?

<table>
<tr>
<td></td>
<td>All answers you got in the previous activity are examples of ratio.
You need the concept of ratio in order to understand the next kind of sequence.
Let’s explore in the next activity.</td>
<td>Which are geometric sequences? Which are arithmetic sequences?
Let us find out as we consider the following activities:</td>
<td>constant called the common ratio.
There are two types of geometric sequence namely: finite geometric sequence and infinite geometric sequence.
Into what aspect they differ, that’s for us to find out.</td>
<td>3. Identify the common ratio of the given geometric sequence in the previous activity.</td>
</tr>
<tr>
<td>C. Presenting examples/Instances of the new lesson</td>
<td>WATCH AND SEE
Divide the first number by the second whenever possible. Record the result from least to greatest.

1. 54, 3
(Ans: 2, 6, 18)
2. 32, 2
(Ans: 2, 4, 8, 16)
3. 375, 5
(Ans: 3, 15, 75)

Notice the sequence formed by the quotients arranged from least to greatest.
Those are examples of geometric sequence.
The next number could be obtained by multiplying the preceding</td>
<td>READ AND ANALYZE
1. Do you remember the sitting arrangement done last year when you took the NCAE. There were 30 students in each room. The table 1 shows that the number of students varies directly as the number of rooms or as the number of rooms increases, the number of students also increases. Can you guess the number of students when there are 12 rooms used? Table 1 is an example of Arithmetic Sequence.
Table 1
<table>
<tr><td>No. of Rooms</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>No. of Students</td><td>30</td><td>60</td><td>90</td><td>120</td><td>150</td><td>180</td></tr>
</table>
2. Suppose that the number of a certain bacteria grows</td>
<td>FINDING OUT
Considering the given items above, we could group them this way:
<table>
<tr><td>Group A</td><td>Group B</td></tr>
<tr><td>Line segment</td><td>Line</td></tr>
<tr><td>1, 2, 3, 4, 5, … 100</td><td>1, 2, 3, 5, 7, 11, 13, 17, …</td></tr>
<tr><td>Even numbers less than 50</td><td>Natural numbers</td></tr>
</table>
Group A are items which suggest limit thus it is considered finite.

Group B are items whose last value cannot be determined. It has no limit, therefore, they are infinite.</td>
<td>Illustrative Examples:

1. Solve the common ratio in the geometric sequence 4, __, __, __, 64

Step 1: Identify the first term, last term and the number of terms in the problem.

$a_1 = 4$ $a_5 = 64$
n = 5

Step 2: Use the formula, $a_n = a_1r^{(n-1)}$ which we learned from our past lesson to find the common ratio.
$a_n = a_1r^{(n-1)}$
$64 = 4r^{5-1}$</td>
</tr>
</table>

	number by the divisor used. In geometric sequence, that constant number multiplied to the preceding number to obtain the next is called the common ratio.	as shown in table 2 below. At the start, there are only 1, 000 bacteria and after 1 hour the number of bacteria is doubled. It is consistent that based from the observation, the number of bacteria is always doubled every hour. Can you tell the number of bacteria after 7 hours? 10 hours? Table 2 is an example of Geometric Sequence. Table 2 No. of Hours: 0 | 1 | 2 | 3 | 4 | 5 No. of Students: 1000 | 2000 | 4000 | 8000 | 16000 | A. Facts observed in table 1: 1. The sequence of the number of students is 30, 60, 90, 120, 150, 180 2. This is an arithmetic sequence 3. The first term is increased by 30 to get the second term, and the second term is increased by 30 to get the third term, and so forth and so on. 4. 30 is known as the common difference 5. The operation involved		$64 = 4r^4$ $\frac{64}{4} = \frac{4r^4}{4}$ $16 = r^4$ $2^4 = r^4$ $\pm 2 = r$ Answer: The common ratios, r = 2 and r = -2

		is addition or its inverse. B. Facts observed in table 2: 1. The sequence of the number of bacteria is 1000, 2000, 4000, 8000, 16000 2. This is a geometric sequence 3. The first term is multiplied by 2 to get the second term, and the second term is multiplied by 2 to get the third term, and so on. 4. 2 is known as the common ratio 5. The operation involved is multiplication or its inverse.		
D. Discussing new concepts and practicing new skills # 1	Fold Me Up Do the activity with a partner. One of you will perform the paper folding while the other will do the recording in the table. 1. Start with a big square from a piece of paper. Assume that the area of the square is 64 square units.	State whether each of the following sequences is arithmetic or geometric. Name the common difference for arithmetic and the common ratio for geometric seguence. 1) 3, 7, 11, 15, 19, 23 … 2) 2, 6, 18, 54, 162 … 3) 7, 14, 28, 56, 112 … 4) 6, 24, 96, 384 …	State whether each of the following geometric sequences is finite or infinite. 1) 4, 12, 36, 108,…. 2) 2, 6, 18, 54, 162 3) 7, 14, 28, 56, 112 … 4) -3, 3, -3, 3 5) $\frac{3}{4}, \frac{3}{4}, \frac{3}{4}, \frac{3}{4}, \ldots$	1. What are the three properties of the geometric sequence that we need to know in order to solve the common ratio? 2. What is the formula to be used to solve the common ratio?

<table>
<tr>
<td></td>
<td>2. Fold the four corners to the center of the square and find the area of the resulting square.
3. Repeat the process three times and record the results in the table below.
<table><tr><td>Square</td><td>1</td><td>2</td><td>3</td></tr><tr><td>Area</td><td></td><td></td><td></td></tr></table></td>
<td>5) $9\sqrt{4}$, $7\sqrt{4}$, $5\sqrt{4}$, $3\sqrt{4}$…</td>
<td></td>
<td>3. Why do we have to multiply both sides of the exponential equation $64 = 4r^4$ by 1/4 ?

4. What do we do to number 16? Notice that 16 = r4 becomes $2^4 = r^4$.

5. Why do we cancel the exponents in the equation $2^4 = r^4$?</td>
</tr>
<tr>
<td>E. Discussing new concepts and practicing new skills # 2</td>
<td>1. What is the area of the square formed after the first fold? Second fold? Third fold?
2. Is there a pattern in the areas obtained after 3 folds?
3. You have generated a sequence of areas. What are the first 3 terms of the sequence?
4. Is the sequence a geometric sequence? Why?
5. What is the common ratio? The fourth term?</td>
<td>1. How do you find doing the activity?
2. Which of the items are arithmetic sequence and geometric sequence?
3. What are the important characteristics that you should remember in identifying arithmetic or geometric sequence?</td>
<td>1. How do you find doing the activity?
2. Which of the items are finite geometric sequence and which are infinite geometric sequences?
3. What are the important characteristics that you should remember in identifying finite or infinite geometric sequence?</td>
<td>1. Find the common ratio in the sequence 8, __, __, __, 128.

Solution:

$a_n = a_1 r^{n-1}$
$\_\_\_ = 8r^{-1}$

$\_\_\_ = 8r$

$\frac{\_\_\_}{8} = \frac{8r}{8}$

$\_\_\_ = r$

$\_\_\_ = r$</td>
</tr>
</table>

				r = ____ ; r = _____ 2. Find the common ratio in the sequence 4, __, __, 108 Solution: $an = a_1 r^{n-1}$ $\_\_\_ = \_\_ r^{4-1}$ $\_\_\_ = \_\_ r^3$ $\frac{\_\_\_}{\_\_} = \frac{\_\_ r^3}{\_\_}$ $\_\_\_ = r^3$ $\_\_\_ = r^3$ r = ____ ; r = _____
F. Developing mastery (leads to Formative Assessment 3)	State whether each of the following sequences is geometric or not. If it is, find the common ratio. 1. 5, 20, 80, 320, … 2. $7\sqrt{2}, 5\sqrt{2}, 3\sqrt{2}, \sqrt{2}, \ldots$ 3. 5, -10, 20, -40, … 4. 1, 0.6, 0.36, 0.216, …	TRY THIS… A. Examine the sequence 12, 17, 22, 27, 32, … Step 1. Subtract the second term by the first term Step 2. Check if the difference between the	TRY THIS… State whether each of the following geometric sequences is finite or infinite. 1) 3, -6, 12, 24 2) 64, 16, 4, 1, …	Give the common ratio in each of the following geometric sequences: 1) 8, __, __, __, 5000

	5. 10/3, 10/6, 10/9, 10/15, …	third term and the second term is the same with step 1. Step 3. Therefore, the sequence 12, 17, 22, 27, 32, … has a common difference (d = ___) Therefore, it is _____ B. Examine the sequence 2, 6, 18, 54, 162 … Step 1. Divide the second term by the first term Step 2. Check the result if the same operation is applicable to get the third term. Step 3. Therefore, the sequence 2, 6, 18, 54, 162 …has a common ratio (r = ___) Therefore, it is _____	3) 8 terms of the sequence 24, 4, $\frac{2}{3}$, $\frac{1}{9}$, … 4) 4 terms of the sequence $\frac{1}{3}$, $\frac{1}{9}$, $\frac{1}{27}$, $\frac{1}{81}$ 5) all terms of the sequence 1, √2, 2, 2√2	2) 3, __, __, 648 3) 7, __, __, __, __, 1701
G. Finding practical application of concepts and skills in daily living	TRY THIS… 	State whether each of the following sequences is arithmetic or geometric: 1. 4, 12, 36, 108, 324… 2. -4, 13,, 30, 47, 64… 3. 3, -6, 12, -24, -72 … 4. 3, 5, 7, 9, 11… 5. -3, 3, -3, 3, -3…	State whether each of the following geometric sequences is finite or infinite. 1) -4, -1, $-\frac{1}{4}$, $-\frac{1}{16}$, ... 2) 7 terms of the sequence $\frac{3}{20}$, $\frac{3}{2}$, 15, … 3) 6, 12, 48, …, 768	1. What is the common ratio if three geometric means are inserted between 7 and 567?

	Suppose the amount of water in the bottle doubles every second. It is consistent until the bottle is filled with water having 100ml after 1 second. a. Record your observation in 5 seconds. b. Is the sequence formed geometric? c. What is the common ratio?		4) all terms of the sequence 120, 60, 30, 15, … 5) ..., 4, 8, 16, 32, 64	2. If six terms are to be inserted between 8,748 and 4 being the first term and last term respectively, What is the common ratio? 3. The growth rate of ants is rapidly increasing. There were 10 ants at the beginning but on the 7th day, it was counted by keizelyn and she found out that the total number of ants was already 640. Make a table to show the number of ants from first day to seventh day.
H. Making generalizations and abstractions about the lesson	A geometric sequence is a sequence where each term after the first is	Arithmetic Sequence is a sequence where each term after the first is obtained by	Finite sequence is a function whose domain is the finite set { 1, 2, 3, …,	a. Determine the number of terms, first

	obtained by multiplying the preceding term by a nonzero constant called the common ratio.	adding the same constant, called the common difference. Common Difference is a constant added to each term of an arithmetic sequence to obtain the next term of the sequence. Geometric Sequence is a sequence where each term after the first is obtained by multiplying the preceding term by a nonzero constant called the common ratio. Common Ratio is a constant multiplied to each term of a geometric sequence to obtain the next term of the sequence.	n }. They have a first and a last term. Infinite sequence is a function whose domain is infinite set { 1, 2, 3, …}. A sequence that goes on forever, indicated by three dots following the last listed number.	term and last term in the given geometric sequence. b. Use the formula $a_n = a_1 r^{n-1}$ to find the common ratio. c. Substitute the first term, last term and the exponent d. Simplify the exponent e. Apply Multiplication Property of Equality to cancel the coefficient of r or make the coefficient of r equal to 1 f. Express both sides ot the exponential equation with the same exponent g. Cancell the exponent, since expressions with the same exponents are equal h. If the exponent being cancelled is

				even, there are two roots which are positive and negative roots, and i. If the exponent being cancelled is odd, there is only one root/common ratio and that is either positive or negative
I. Evaluating learning	State whether each of the following sequences is geometric or not. If it is, find the common ratio. 1.3, 12, 48, 192, 768,…. 2.½, 1, 2, 4, 8,… 3.-5, -3, -1, 1,3,… 4.-5,- 8,-13, -21,- 34,… 5.625, 125, 25, 5…..	State whether each of the following sequences is arithmetic or geometric: 1) 3, 9, 27, 81, 243 … 2) 7, 21, 63, 189, 567 … 3) 7, 14, 21, 28, 35 … 4) 5, 25, 45, 65, 85 … 5) 2, 8, 32, 128, 512	State whether each of the following geometric sequences is finite or infinite. 1) 4, -12, 36, -108 2) all terms of the sequence $\frac{5}{7}, \frac{5}{21}, \frac{5}{63}, \frac{5}{189}$ 3) 200, 100, 50, 25, … 4) 3 terms of the sequence 5, 15, 75, 225, … 5) …200, 100, 50, 25	Find the common ratio of each of the following geometric sequence: 1) 5, __, __, __, __, 160 2) 3, __, __, __, -5,625 3) 256, __, __, 4 4) 8, __, __, __, 648 5) 2, __, __, __, __, 2 243
J. Additional activities for application or remediation	A. Follow Up Think about this: Is 4, 0, 0, 0,0, … a geometric sequence?	A. Follow Up *State whether the given sequence is an arithmetic or geometric* 1) 77, 70, 63, 56, 49 …	A. Follow Up List down 5 examples of finite geometric sequence and 5 example of infinite geometric sequence.	A. Follow Up 1. Find the common ratio of the following geometric sequences (Show your solution).

	B. Differentiate a geometric sequence from an arithmetic sequence.	2) 6400, -1600, 400, -100, 25 … 3) 6, 30, 150, 750, 3750 … B. Define a finite and an infinite geometric sequences.	B. Answer: Activity 4 and 5 Learners Module pp. 28 - 29	a) -2, __, __, __,__, -64. b) 2,__, __,__, __, __, 1458 B. Study 1. Define geometric mean. 2. Insert three geometric means between 3 and -3072.
V. REMARKS				
VI. REFLECTION				
A. No. of learners who earned 80% in the evaluation				
B. No. of learners who require additional activities for remediation who scored below 80%				
C. Did the remedial lessons work? No. of learners who have caught up with the lesson				
E. Which of my teaching strategies worked well? Why did these work?				
F. What difficulties did I encounter which my principal or supervisor can help me solve?				

G. What innovation or localized materials did I use/discover which I wish to share with other teachers?				

GRADE 10 DAILY LESSON LOG	**School**		**Grade Level**	**10**
	Teacher		**Learning Area**	**MATHEMATICS**
	Teaching Dates and Time		**Quarter**	**THIRD**

	Session 1	**Session 2**	**Session 3**	**Session 4**
I. OBJECTIVES				
13. Content Standards	The learner demonstrates understanding of key concepts of sequences.			
14. Performance Standards	The learner is able to formulate and solve problems involving sequences in different disciplines through appropriate and accurate representations.			
15. Learning Competencies Objectives	Determine the geometric means between terms of a geometric sequence **(M10AL – Ie-1)** a. Find geometric means of a geometric sequence.	The Learner determines the geometric means between terms of a geometric sequence **(M10AL – Ie-1)** a. Give the geometric means of a geometric sequence,	The learner finds the sum of the terms of a given finite geometric sequence. **(M10AL – Ie-2)** a. Know the general formula of finding the sum of the first n-terms of finite	The learner finds the sum of the terms of a given infinite geometric sequence. **(M10AL – Ie-2)** a. Determine the ratio of the given infinite geometric

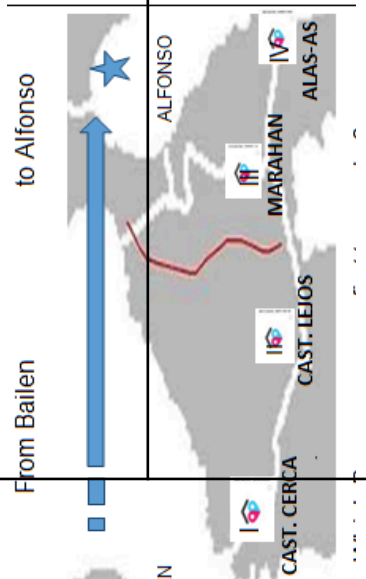
	b. Use the common ratio to find the geometric means between two terms. c. Appreciate the use of geometric sequence formula in solving real-life problems.	b. Insert geometric means given two terms of a geometric sequence. c. Solve for geometric means between two given number/s using the common ratio.	geometric sequence b. Determine the sum of finite geometric sequence using the general formula. c. Find the sum of finite geometric sequence	sequence b. Determine the sum of infinite geometric sequence. c. Solve problems involving infinite geometric sequence.
II. CONTENT	**Geometric Means of a Geometric Sequence**	**Geometric and Other Sequences**	**Sum of Finite Geometric Sequence**	**Sum of Infinite Geometric Sequence**
III. LEARNING RESOURCES				
I. References				
17. Teacher's Guide	p. 24	p. 24	pp. 22-25	p. 25
18. Learner's Materials	p.30	p. 30	pp. 31-34	pp. 35-37
19. Textbook		Intermediate Algebra by: Pastor B. Malaborbor, et. al., pp. 314 - 322	Intermediate Algebra II by: Soledad Jose – Dilao, Ed D. pp. 198	Exploring Mathematics 10-K to 12 Edition by: Elisa S. Baccay et. al pages 54 t0 57 Intermediate Algebra by Pastor Malaborbor, et. al, pages 54 t0 57 e-math Intermediate Algebra by Orlando

				A. Oronce, et. al pages 444 - 450
20. Additional Materials from Learning Resources (LR) portal	http://www.virtualnerd.com/algebra-2/sequences-series/geometric/geometric-sequences/geometric-mean-example	**https://www.slideshare.net/jamichsthermm/geometric-sequence-and-geometric-mean** **https://www.slideshare.net/kyung2/math-geometric-mean**	http://www.answers.com/Q/What_is_the_difference_between_infinite_and_finite_sequence#slide=2	http://www.answers.com/Q/What_is_the_difference_between_infinite_and_finite_sequence#slide=2 http://www.intmath.com/series-binomial-theorem/3-infinite-geometric-series.
J. Other Learning Resources	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Activity Sheets, Prepared Visual Aid, Practice Exercises LCTGs Grade 10 by DepEd Cavite
IV. PROCEDURES				
A. Reviewing previous lesson or presenting the new lesson	From Bailen, what are the barangays that you will pass by if you are going to Alfonso? How many barangays are there inside the two endpoints/towns? There are four barangays. What are those? **Answer**: Cast. Cerca, Cast. Lejos, Marahan, Alas-as. Bailen and Alfonso are endpoints. The number of barangays mentioned	A certain type of bacteria multiplies at a constant rate per day. At the end of the 1st day there were 12,000 bacteria and at the end of the 4th day there were 40,500 bacteria.How many bacteria were there at the end of the 2nd and the 3rd days? This problem translate to inserting two positive geometric means between 12,000 and 40,500.	(QUICK THINKING ONLY!) Gabriel wants to spend his 12-day Christmas break productively by working in “Alamat Restaurant” located at Picnic Grove. The manager offers 2 salary scheme: Php100 per day or Php1 on the 1st day,Php 2 on the 2nd day, Php4 on the 3rd day and double the salary each day until the 12th day. If you were Gabriel, which salary scheme are	Recall/Review Tell whether each statement is True or false.If false, justify your answer to make it true. 1. Fnite means a number value that is measurable. 2. An infinite number value means the number is so

	above has a similarity to the concept of our topic today. There are four (4) barangays that you will pass by when you started from Bailen going to Alfonso.	Guide Questions: 1. In a Geometric sequence which number represent a_1 ? a_n ? 2. At the end of day 2 and day 3,how many bacteria were there? 3. What will you do to get the number of bacteria given in 2^{nd} day and in 3^{rd} day?	you going to accept? Why? After 12 days, how much will Gabriel receive? Aside from adding all the salaries each day which day is equal to P4,095.? What is the sum of his salary ater 15 days?	large and it cannot be measured. 3. 16, 8, 4 ….. is finite geometric sequence 4. -1, -3, -9,….. -243, -725 is infinite geometric sequence 5. the number of terms in geometric sequence is finite ,the sum of the terms is called finite geometric series.
B. Establishing a purpose for the lesson	Let us take the (4) barangays between Bailen and Alfonso. 	Do these with your seatmate. 1. If the first and the last terms of Geometric Sequence are 6 and 625, what are the two Geometric means? 2. What are the missing terms in geometric sequence 2, __, __, 54 if the common ratio is 3?	WANT SUM ? Do this activity with a partner? A. Let us consider the geometric sequence 3,6,12,24,48,96… What is the sum of the first 5 terms? Let them observe how the sum of the first 5 terms of a	Quick Thinking Is it possible to get the sum of the terms of the following geometric sequence? 1. 5, 15, 45, 135,….. 2. 2, 2, 2, 2, 2, 2, ….

From Bailen

to Alfonso



3. What number is between 5 and 20 if the common ratio (r) is ±2?

geometric sequence was obtained.

Answer:
Let
$S_5 = 3 + 6 + 12 + 24 + 48$
$(2S_5 = 6 + 12 + 24 + 48 + 96)$
$-S_5 = 3 - 96$
$-S_5 = -93$
$S_5 = 93$

Guide Questions:

a. What must be done in geometric sequence 3,6,12,24,48,96… in equation 1?
b. From equation 1, what will you do to get the equation 2?
c. What fundamental operation is used to get the equation 3?
d. What is the value of S_5?

3. $\frac{3}{4}, \frac{3}{8}, \frac{3}{16}, \frac{3}{32}, \frac{3}{64}, \frac{3}{128}, \ldots$

	a) Which Barangay comes first to pass by? b) Which Barangay comes last to pass by? c) Which Barangay comes between Cast. Cerca and Alas-as? d) In geometric sequence what does Cast. Cerca represent? Cast. Lejos? Marahan? Alas –as? e) Which among the 4 Barangays represent Geometric Means?			
C. Presenting examples/Instances of the new lesson	**Activity 1.** Illustrate the geometric means in the Geometric sequence 4, 8, 16, 32, 64 a. What is the first term, $a_{1?}$ b. What is the last term, a_n? c. How many terms are inserted between 4 and	Post on the board the following illustrative examples and let the students observe how the geometric mean is/are found. Illustrative Example 1. Find the Geometric Mean between 3 and 48	From the activity above, we can derive a formula for finding the sum of the first n term of a geometric system. (This activity must be posted or presented on the board for the student interaction.) a. Let us consider the sum of the n term	To get the sum of infinite geometric sequence, the first thing to do is get the value of r. If -1**< r < 1**, then it is possible to get the sum.

	64? What are they? d. Can you guess the geometric means? To find the Geometric means of the given geometric sequence, we must follow these steps: Step 1. Find the common ratio using $a_n = a_1r^{n-1}$ Solution: $a_n = a_1r^{n-1}$ $64 = 4r^{5-1}$ substitute a_n =64, a_1 = 4 and n=5 $64 = 4r^4$ simpliy the exponent $\frac{64}{4} = \frac{4r^4}{4}$ apply MPE $16 = r^4$ simplify to make the coefficient of r is 1 $2^4 = r^4$ exponential equation $\pm 2 = r$ common ratio	To get the geometric mean multiply 3 and 48 and get the square root: $\sqrt{(3)(48)} = \sqrt{144)} = \pm 12$ Or, you could just divide 48 by 3 and get the square root. Then multiply the result by 3. $3 \times \sqrt{\frac{48}{3}} = 3 \times \sqrt{16}$ $= \pm 3 \times 4 = \pm 12$ Hence the geometric mean both ways is 12 or $\pm$ 12 You can check geometric sequence 3,12, 48 using r = $\pm$4 Note that: To solve for geometric mean between **two terms,** you can also use $\pm \sqrt{ab}$, If there are more, you can use the general term for geometric sequence $a_n = a_1r^{n-1}$ Illustrative Example 2 Insert four geometric means between 32 and 243. Solution:	of a Geometric sequence. $S_n = a_1+a_1r + a_1r^2 +\ldots. + a_1r^{n-1}$ (Equation 1) b. Multiply both sides of the equation 1 by the common ratio r. $rS_n = a_1r+a_1r^2 + a_1r^3 +... + a_1r^{n-1}+a_1r^n$ (Equation 2) c. Subtracting equation 2 from equation 1 $S_n = a_1+a_1r + a_1r^2 +\ldots. + a_1r^{n-1}$ $-(\underline{rS_n = \quad a_1r + a_1r^2 +\ldots. + a_1r^{n-1} + a_1r^n})$ $S_n - rS_n = a_1 - a1r^n$ d. Factoring both sides of the resulting equation $S_n(1 - r) = a_1 (1- r)$	If **r ≥ 1 or r ≤ -1,** then it is not possible to get the sum. Illustrative Examples a. 5, 15, 45, 135, … Solution: Since the value r is 3, then it is not possible to get the sum. b. 2, 2, 2, 2, 2, 2, 2, …. Solution: Since the value of r is 1, there are infinite terms, then it is possible to get sum. c. $\frac{3}{4}, \frac{3}{8}, \frac{3}{16}, \frac{3}{32}, \frac{3}{64}, \frac{3}{128}\ldots.$ Solution: Since the value of r is $\frac{1}{2}$, then it is

	Step 2. Multiply the first term by the common ratio r = 2 to get the second term. Repeat the process until you solve the tree geometric means. Use r = -2 to find the other geometric sequence Hence, **For r = 2** $A_2 = 4 \times 2 = 8$ $A_3 = 8 \times 2 = 16$ $A_4 = 16 \times 2 = 32$ **For r = -2** $A_2 = 4 \times -2 = -8$ $A_3 = 8 \times -2 = -16$ $A_4 = 16 \times -2 = -3$	Recall $a_n = a_1 r^{n-1}$ where $a_1 = 32$ and, n = 6 and $a_n = 243$. $243 = 32r^{6-1}$ $\frac{243}{32} = \frac{32}{32} r^5$ $r^5 = \frac{(3)^5}{(2)^5}$ $r = \frac{3}{2}$ $a_1 = 32$, $a_4 = 48 \times \frac{3}{2} = 108$ $a_2 = 32 \times \frac{3}{2} = 48$, $a_5 = 48 \times \frac{3}{2} = 162$ $a_3 = 48 \times \frac{3}{2} = 72$ $a_6 = 48 \times \frac{3}{2} = 243$ Hence, the geometric means between 32 and 243 are 48, 72, 108 and 162. Remember that If you insert an odd number of geometric means between two numbers, you will generate two geometric sequences with the common ratios negatives of each other.	e. Dividing both sides by 1 – r, where 1 - r ≠ 0. Sn = $\frac{a1(1-r^n)}{1-r}$ or $\frac{a1-a1r^n}{1-r}$, r ≠ 1 Hence Sn = $\frac{a1(1-r^n)}{1-r}$ or Sn = $\frac{a1-a1r^n}{1-r}$, is the general formula for the sum of the first n term of a Geometric Series. **Illustrative Example 1.** 1. Fnd the sum of the first 8 terms of geometric seqence: 1,2,4,8,16,32,64,128	possible to get the sum. The sum of infinite Geometric Sequence can be obtained by using the formula: $S_\infty = \frac{a1}{(1-r)}$ where a_1 is the 1st term and r is the common ratio, ($r = \frac{a2}{a1}$) since , $a_1 = \frac{3}{4}$, $r = \frac{1}{2}$ then, $S_\infty = \frac{\frac{3}{4}}{(1-\frac{1}{2})}$ $S_\infty = \frac{3}{2}$ Therefore, the sum of infinite geometric sequence: $\frac{3}{4}, \frac{3}{8}, \frac{3}{16}, \frac{3}{32}, \frac{3}{64}, \frac{3}{128}, \ldots$ is $\frac{3}{2}$

	Stress that since there are two common ratios, there are also two Geometric sequences such as: 4, 8, 16, 32, 64 and -4, -8, -16, -32, -64. Thus, the geometric means are 8, 16, 32 and -8, -16, -32 respectively	However, if you insert an even number of geometric means, you will have only one geometric sequence.	Solution Using the formula, Sn = $\frac{a1(1-r^n)}{1-r}$ a. What are the nescessary ifnormation needed to solve this problem? Answer: $a_1 = 1$, r = 2, n = 8 b. What are you going to find out in this problem? Answer: Sum of the 8 terms in the given geometric sequence or S_8 . c. What will you do to get S_8? Answer: Substitute the given $a_1 = 1$, r = 2, And n = 8 to the formula ans simpliy. Thus,	

			Sn = $\frac{a1\left(1-r^{n}\right)}{1-r}$ S_8 = $\frac{1\left(1-2^{8}\right)}{1-2}$ S_8 = 255 These formulas may also be used or the 3 possible values of r a When r < 1 then, Sn = $\frac{a1\left(1-r^{n}\right)}{1-r}$ b When r > 1 then, Sn = $\frac{a1\left(r^{n}-1\right)}{1-r}$ c When r = 1 then, Sn = na **Illustrative Example 2** Find the sum of the following finite geometric sequence. a. 2, -2, 2, - 2, 2, -, 2, 2 1. When r = -1 and n is even	

			then, $S_8 = \frac{2\left(1-(-1)^8\right)}{1-(-1)}$ = **0** b. 2, -2, 2, - 2, 2, -, 2, 2 2. When r = -1 and n is odd then, $S_7 = \frac{2\left(1-(-1)^7\right)}{1-(-1)}$ = **2 (value of a_1)** c. 2, 2, 2, 2, 2, 2, 2, 2 3. When r = 1, then $S_8 = na_1$ = 8(2) = 16	
D. Discussing new concepts and practicing new skills # 1	THINK, PAIR, SHARE Given the Geometric Sequence: 3, __, __, __, 768 Guide Questions: 1. Which term is a_n? a_1? 2. What is n in the given sequence? 3. Using $a_n = a_1r^{n-1}$, what is the value	THINK, PAIR, SHARE A. Find the positive and negative geometric mean between 5 and 20. *Solution:* $\sqrt{(5)\ x\ (\_)}$ = $\sqrt{\_\_}$ = 10 and ___	Board work Activity A. Find the sum of the first 5 terms of 1,4, 16,…. B. Find the sum if a_1 = 80, r = 2 and S	A. Given infinite geometric sequence: 8, 2, $\frac{1}{2}$, $\frac{1}{8}$, …$\frac{1}{32}$,… Answer the following questions:

	of r? How did you find it? 4. Do you have any other way of finding the value of r aside from the one illustrated in step 1? 5. What the three geometric means inserted between 3 and 768?	B. Insert two sets of geometric mean between -5 and -405. *Solution:* $\frac{-405}{-5} = \frac{-5}{-5} r^{-1}$ $81 = r^2$ $\sqrt{\_} = r$ $\pm \_\_ = r$ Hence, the geometric means between -5 and -20 are ___, ___, ___.		1. What is the value of a_1? a_2? 2. What is the common ratio (r)? How did you find r? B. Given the value of r and a_1, what is the sum of infinity?
E. Discussing new concepts and practicing new skills # 2	In activity 1 to 3, 1. How many terms are there in the geometric sequence including the first and last terms? 2. What do you need to solve first to find the geometric means of the given geometric sequence? 3. What concept or principle do you need to find the geometric means of a geometric sequence?	**a.** How did you find this activity? **b.** What concept of geometric means did you use to find the geometric means of the given geometric sequence? **c.** Can give some real life problem that can be solved using the general term of geometric means?	Do the following with a partner! Problem In text brigade relay scheme of Grade-X May Kusa, the following are the number of receivers of the text after the third transmittal. Find the total number of person who received the text after the 6^{th} transmittal, assuming that the relay is not broken and each message is successfully transmitted 1. 4, 12, 36,… .	Do the following exercises: Determine the sum of infinite geometric sequence. Fill in the blank with the correct answer. 1. 8,4,2,1, …… Determine $a_1 = \_\_$, $a_2 = \_\_$, $r = \_\_$ Write the formula: $S_\infty = \_\_\_\_\_$

	4. What did you do to find the number of terms including the first and last? 5. What is your conjecture if n in r^n is odd? even? 6. Given the first term and the common ratio, how did you find the inserted terms between two numbers of geometric sequence?		Solution Determine the values of a_1, n and r. a_1 = ____; n = _____; r = _____ Write the formula in finding the sum of finite Geometric sequence. S_n = _____ Substitute the values of a_1, n and S_n = _____ Simplify. S_n = _____ 2. 3, 6, 12, … Solution: Determine the values of a_1, n and r. a_1 = ____; n = _____; r = _____ Write the formula in finding the sum of finite Geometric sequence.	Substitute the value of a_1 and r S_∞ = _____ Simplify: S_∞ = _____ 2. $\frac{1}{2}, \frac{1}{3}, \frac{2}{9}, \frac{4}{27}, \frac{8}{81}, \frac{3}{28}, \ldots$ Determine a_1 = __, a_2 = __, r=__ Write the formula: S_∞ = _____ Substitute the value of a_1 and r S_∞ = _____ Simplify: S_∞ = _____ 3. 16, 8, 4….. Determine a_1 = __, a_2 = __, r=__ Write the formula: S_∞ = _____

			S_n = _____ _____ Substitute the values of a_1, n and r. S_n = _____ _____ Simplify S_n = _____ _____	Substitute the value of a_1 and r S_∞ = _____ Simplify: S_∞ = _____ A. Explain briefly, when was the sum of infinity possible? Not possible?
F. Developing mastery (leads to Formative Assessment 3)	Give the geometric means of the following geometric sequence: 1) 3, __, __, __, 1875 2) 6, __, __, 2058 3) 8, __, __, __, __, 1944 4) 1, __, __, 1331 5) 224, __, __, __, __, 7	Board work. 1. Give four geometric means between $\sqrt{2}$ and 8 2. Find the positive geometric mean between -8 and -2. 3. Find the positive and the negative geometric mean between 3 and 5. 4. Insert three geometric mean between 8 and 216.	A. For each given Geometric sequence, find the sum of the first 1. 25 Terms of 3, 3, 3, …. 2. 50 Terms of 4, 4, 4, 4,4, … 3. 100 Terms of -6, 6, -6, 6,-6, 6 … 4. 6 Terms of 32, 64, 128 … 5. 7 Terms of 27, 9, 3 ….	Do More Find the sum of each infinite geometric sequence, if it exists. Leave it if not. 1) 81,23, 3, … S_∞ = _____ 2) 9, 3, 1….. S_∞ = _____ 3) 4, 12, 36, … S_∞ = _____

		5. Insert geometric mean between $4x^3$ and x^3.	B. Solve the problem. Show your complete solution The game of chess was invented for a Persian king by one of his servant, Al-Khowarizhmi. Being so pleased, he asked the servant of what he wanted as a reward. Al-Khowarizhmi asked to be paid in terms of grain of wheat in a 64 square chessboard in this manner: 1 grain of wheat in the 1st square, 2 grains in the 2nd, 4 grains in the 3rd, and so on, with the amount doubling each square until the 64th square. The King was surprised for the little thing the servant had asked and granted the servant's request. How many grain of wheat will the servant be paid?	4) $\frac{2}{25}, \frac{4}{25}, \frac{8}{25}$ … S_∞ = _____ 5) $\frac{81}{8}, \frac{-27}{4}, \frac{9}{2}$ … S_∞ = _____
G. Finding practical application of concepts and skills in daily living	GROUP OF FIVE ACTIVITY (Each group will pick one question to answer)	Square Group Actvity The students will be working in a groups and will be presenting their output in class)	Solve each problem: 1. Every December, Tagaytay City Science National High School is sponsoring a Gift-giving	THINK, PAIR AND SHARE! Solve each problem.

	1. What are the three geometric means between 3 and 768? 2. What are the missing terms in the sequence 5, __, __, 320 3. Insert 5 geometric means between 6 and 4,374 4. What are the two terms between 1024 being the first term and 2 as the last term.? 5. The number of a certain bacteria is doubled every hour. If the initial number of bacteria is 800 units and becomes 25,600 on the 6th day, how many bacteria are there on the third day?	Under ideal conditions, the number of microorganism in a culture dish double every hour. If there are 10,000 microorganism at 12 noon how many microorganism will be there at 2pm, 3pm, 4pm and 5pm? **Hint**: 1pm (t_1= 10,000), 6pm (t_6 = 320,000) and r =2 (double every hour)	program for less fortunate students. A newspaper fund drive to collect fund was launch. A student promised that he will bring 2 newspapers on the launching day of the drive, 6 on the second day and triple the number of newspapers each day until the last day of the fund drive. If the fund drive is set from December 1 to December 5. a. How many newspapers will the student bring on the last day? b. What is the total number of newspapers that he will contribute? 2. Rafael is helping his mother in their small “Pasalubong Shop” `in Sky Ranch. If Rafael sold 3 buko tarts in his first day and 6 in his second day and doubles his sales every day, how many buko tarts did he sell after 10 days?	A. After one swing, pendulum covers 90% of the distance of the previous swing. If the first swing is 200 centimeters, what is the total length the pendulum traveled before it comes to a rest. B. A rubber ball is dropped on a hard surface from a height of 80 feet and bounces up and down. On each rebound, it bounces up exactly one-half the distance it just came down. How far has the ball traveled when

				it appears to come to a stop?
H. Making generalizations and abstractions about the lesson	To find the geometric means of the given geometric sequence a. Identify the number of terms in a geometric sequence (including the geometric means, the first term and the last term). b. Solve the common ratio. c. Multiply the first term by the common ratio to find the second term. d. Multiply the second term by the common ratio to find the third term, and repeat the procedure until you solve the required geometric means.	**Generalization** To solve for geometric mean between **two** t**erms,** you can use $\pm\sqrt{ab}$, If there are more, you can use the general term for geometric sequence $a_n = a_1r^{n-1}$	To find the sum of Finite Geometric Sequence, it is important to use the General formula for finding the sum of Geometric Series such as $S_n = \frac{a1(1-r^n)}{1-r}$ or $S_n = \frac{a1-a1r^n}{1-r}$, Where: Sn = the sum a_1 = the first term n = no of terms r = the constant ratio, $r \neq 1$ The formula may also be used or three possible values of r. Case 1 When r < 1 then, $S_n = \frac{a1(1-r^n)}{1-r}$ Case 2 When r > 1 then, $S_n = \frac{a1(r^n-1)}{1-r}$	The sum of infinite Geometric Sequence can be described in the form: $S_\infty = \frac{a1}{(1-r)}$, where -1**< r < 1** However, when r ≥ 1 or r ≤ -1, there is no infinite sum. Why do you think so? Can you prove it?

<table>
<tr>
<td></td>
<td>e. In $bx = r^n$, If the exponent being cancelled is odd, there is only one common ratio and that is either positive or negative; while if n is even, there are two common ratios which are positive and negative.</td>
<td></td>
<td>Case 3 When r = 1 then, Sn = na</td>
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<tr>
<td>I. Evaluating learning</td>
<td>Find the geometric means of the following geometric sequences (Show your solution)

1. Find the missing terms in the geometric sequence -2, __, __, __, __, -64.
2. Insert 4 geometric means between 3, -3072?
3. What are the 5 geometric means in the sequence 2, __, __, __, __, __, 1458?</td>
<td>Worksheet
Find the geometric means.
<table><tr><th>Insert</th><th>a_1</th><th>a_2</th><th>Geometric Means</th></tr><tr><td>[2]</td><td>6</td><td>24</td><td></td></tr><tr><td>[3]</td><td>1/2</td><td>16</td><td></td></tr><tr><td>[1]</td><td>5</td><td>6</td><td></td></tr><tr><td>[4]</td><td>9</td><td>$36\sqrt{2}$</td><td></td></tr><tr><td>[1]</td><td>8.1</td><td>12.1</td><td></td></tr></table></td>
<td>Assuming that each of the given geometric sequence is a pyramid networking. Find the total number of members in each sequence.
1. 5, 15, 45, 135, 405, 1215
2. 2, 8, 32, …. 8192
3. 4, 12, …... a_9.</td>
<td>Solve the problem and show the complete Solution.
1. A square is 16 inches on each side. It is positioned to form a new square by connecting the midpoint of the sides of the original square. Then two of the corner triangles are shaded. The process is</td>
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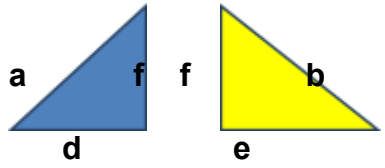
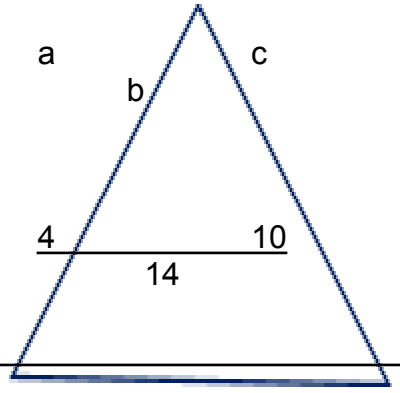
</table>

	4. Complete the geometric sequence 1782, __, __, __, 22 5. Insert 3 geometric means from 3 to 1627.			repeated until the nth time and each time, two of the corner triangles are shaded. Find the total area of the shaded region. 2. Christy suffers from allergy once she ate shrimps. Unfortunately, she accidentally ate Palabok with shrimps in Balay na Dako Restaurant in one of their family bondings. Dr. Diaz of Ospital ng Tagaytay recommends that she take 300 mg of her medication the first day, and decrease the dosage by one half each day

				until the last day. What is the total amount of medication Christy will take?
J. Additional activities for application or remediation	Answer the following problems about Geometric Means: 1. What are the four geometric means between -4 and 972? 2. What are the missing terms in the sequence 5120, __, __,__, __, 5 3. Insert 5 geometric means between 7 and 28,672 4. What are the three terms between 160 being the first term and 10 as the last? 5. Insert five geometric means to the geometric sequence 4374, __, __, __, __, __, 6	A. Follow Up Given  What is the proportion that uses f? Answer: $\frac{d}{f} = \frac{f}{e}$ Then f is the geometric mean between d and e. Given  	A. Follow Up Sum of Finite Geometric Sequence 1. In the given geometric sequence, the second term is 3 and the sixth term is 48, find the sum of the first 10 terms. 2. How many ancestors from parents to great-great-great grandparents do you have? B. Study: Sum of Infinite Geometric sequence. 1. Differentiate finite geometric	1. Follow-up: Sum of Infinite Geometric sequence Find the sum to infinity of each Geometric sequence. a. 5, $\frac{5}{4}$, $\frac{5}{16}$, $\frac{5}{64}$… b. 1, $\frac{1}{2}$, … c. 2, $\frac{2}{3}$, $\frac{2}{9}$, … 2. Study: Harmonic Sequence and Fibonacci Sequence

		Proportion $\frac{4}{a} = \frac{a}{14}$ $\frac{4}{b} = \frac{b}{10}$ $\frac{10}{c} = \frac{c}{14}$ Find the geometric mean proportional between a. 4 and 14 b. 4 and 10 c. 10 and 14 Study 1. Finite and infinite geometric sequence. 2. Sum of finite and infinite terms of geometric sequence	sequence from infinite Geometric sequence. 2. What is the formula to find the sum of infinite Geometric sequence?	a. What is Harmonic Sequence? b. What is Fibonacci Sequence?
V. REMARKS				
VI. REFLECTION				
A. No. of learners who earned 80% in the evaluation				
B. No. of learners who require additional activities				

for remediation who scored below 80%				
C. Did the remedial lessons work? No. of learners who have caught up with the lesson				
E. Which of my teaching strategies worked well? Why did these work?				
F. What difficulties did I encounter which my principal or supervisor can help me solve?				
G. What innovation or localized materials did I use/discover which I wish to share with other teachers?				

DAILY LESSON LOG	Teacher		Learning Area	MATHEMATICS
	Teaching Dates and Time		Quarter	FIRST

	Session 1	Session 2	Session 3	Session 4
I. OBJECTIVES				
16. Content Standards	The learner demonstrates understanding of key concepts of sequences.			
17. Performance Standards	The learner is able to formulate and solve problems involving sequences in different disciplines through appropriate and accurate representations.			
18. Learning Competencies	The learner illustrates other types of sequences (e.g., harmonic, Fibonacci). **(M10AL-If-1)**	The learner solves problems involving sequences **(M10AL-If-2)**	The learner solves problems involving sequences **(M10AL-If-2)**	The learner solves problems involving sequences **(M10AL-If-2)**
Objectives	a. a. Determine Harmonic and Fibonacci sequences b. Solve problems involving Harmonic and Fibonacci sequences. c. Value the presence of sequence in our daily life.	a. Determine the type of sequence involve in the problem b. Apply the formula in solving real-life problems involving arithmetic sequence c. Show enthusiasm in performing any assigned task	a. Formulate and solve real-life problems involving geometric sequence b. Create their own problem and solution involving geometric sequence c. Develop cooperation while doing the assigned task.	a. Write the corresponding arithmetic sequence **b.** Solve real-life problems involving harmonic sequence **c.** Speed and accuracy in finding the harmonic sequence of real-life problems

II. CONTENT	**Harmonic Sequence and Fibonacci**	**Problem Solving Involving Sequences**	**Problem Solving Involving Sequences**	**Problem Solving Involving Sequences**
III. LEARNING RESOURCES				
K. References				
21. Teacher's Guide	p. 26	p. 26	p. 26	p. 26
22. Learner's Materials	pp. 37 - 40	pp. 43 - 46	pp. 43 - 46	pp. 43 - 46
23. Textbook				
24. Additional Materials from Learning Resources (LR) portal	www.mathisfun.com/numbers/fibonacci-sequence.html			
L. Other Learning Resources	Grade 10 LCTGs by DEPED Cavite Mathematics 2016 Activity Sheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation
IV. PROCEDURES				
A. Reviewing previous lesson or presenting the new lesson	Activating Prior Knowledge GUESS WHAT'S NEXT!	(Pass the Message) Insert 3 Arithmetic means between 2 and 8 using the formula $a_n = a_1 + (n - 1)d$?	(QUICK THINKING ONLY) Suppose the auditorium of the Tagaytay International Convention Center (TICC) has 20	(THINK-PAIR-SHARE) A pile of bricks has 38 bricks on the first row, 34 on the second row, 30 bricks on the

	Determine the next term in each sequence 1. S, M, T, _____ 2. J, J, A, S, _____ 3. J, M, M, J, S, _____ 4. 3, 5, 8, 13, _____ 5. 2, 6, 8, _____ 6. 1, 4, 9, 16, _____ 7. 1, 8, 27, _____ 8. 4, 7, 12, 19, _____ 9. 3, 9, 27, 81, _____ 10. 1, ½, 1/3, ¼, 1/5, __		seats in the first row and that each row has 2 more seats than the previous row. If there are 30 rows in the auditorium, how many seats are in the last row?	third row. How many bricks are ther in the 9th row?
B. Establishing a purpose for the lesson	Determine whether each sequence is arithmetic, geometric or neither. If the sequence is arithmetic, give the common difference; if geometric sequence, give the common ratio. 1. 3, 9, 27, 81,…...…. 2. 1, 7, 13, 19, 25,…. 3. 1, 1, 2, 3, 5, 8,……	Can you still remember the way/process in solving arithmetic sequence? What is the formula can we use in finding the sum of arithmetic sequence?	Can you still remember the way/process in solving geometric sequence? What is the formula can we use in finding the sum of geometric sequence?	1. What sequence are we going to apply? 2. Determine the arithmetic sequence. 3. What is the reciprocal of its arithmetic sequence?

	4. ½, ¼, 1/6, 1/8,…… 5. 256, 64, 16, 4, 1,…			
C. Presenting examples/Instances of the new lesson	Other types of sequences are Harmonic and Fibonacci Sequences. Fibonacci sequence is a sequence where its first two terms are either both 1, or 0 and 1; and each term, thereafter, is obtained by adding the two preceding terms. Examples: 1. 1, 1, 2, 3, 5, 8, 13, 21,….. 2. 0, 1, 1, 2, 3, 5, 8, 13, 21,…. Harmonic sequence is a sequence whose reciprocals from an arithmetic sequence. Examples: 1. 1/24, 1/20, 1/16, 1/12,….. 2. 4/3, 1, 4/5, 2/3,….	To solve real-life problems involving sequences, remember the words " SEE, Plan, DO and CHECK". Illustrative example #1. Jackfruit tree produces 2 more fruits each year. If it bore 9 big fruits in year 2000, how many would it bear in 2012? How many Jackfruit tree will they produced by the end of the twelfth year? Solution: SEE – What kind of sequence is used in the problem? $9 + 11 + 13 + \ldots, + a_{12}$ PLAN – What is the appropriate formula to be used and	To solve real-life problems involving sequences, remember the words " SEE, Plan, DO and CHECK". Illustrative example #1. Pacita donates Php 50 on the first week to a charitable institution, Php 100 on the second week, Php 200 on the third week. The amount doubles each week. How much is her total donation for 10 weeks? Solution: SEE – What kind of sequence is involve in the problem? $50 + 100 + 200 + 400 + \ldots, + a_{10}$ PLAN – What is the appropriate formula to be used and	Illustrative example #1. A cooperative member saved a certain amount deducted from his granted amount for each loan he file. On the first loan he saved Php 9, on the second loan he saved Php16, and Php23 on the third loan, and so on. A. What is the corresponding sequence? B. What is its harmonic sequence? C. Which term of his loan did he saved is Php338? Solution: Arithmetic sequence: 9, 16, 23….338 Harmonic sequence: 1/9, 1/16, 1/23…..1/38 $A_n = a_1 + (n - 1)d$ $338 = 9 + (n - 1)7$ $338 = 9 + 7n - 7$ $338 = 2 + 7n$ $338 - 2 = 7n$ $\underline{336} = \underline{7n}$

	In activity #1, which sequence is Harmonic and which sequence is Fibonacci? To solve problems involving Harmonic sequence, convert it into an Arithmetic sequence by taking the reciprocal of each term. Use the appropriate formula in the Arithmetic sequence, and then, again get the reciprocal of the term/s. There is no formula for the sum of the terms of a harmonic sequence, simply complete the sequence and add all the terms. Illustrative example: 1. Find the 12^{th} term of the Harmonic sequence 1/9, 1/12, 1/15,…. Solution:	needed values? $A_n = a_1 + (n - 1)d$ Where a_1=9: d=2: n = 12 DO – Perform the indicated operation and simplify $A_n = a_1 + (n - 1)d$ $A_{11} = 9 + (12 - 1)2$ $= 9 + (11)2$ $= 31$ fruits in year 2011 $S_n = (n/2)(a_1 + a_n)$ $S_{12} = (12/2)(9 + 31)$ $= (6)(9 + 31)$ $= 240$ CHECK – The answer should satisfy all the given information in the problem 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 + 25 + 27 +29 + 31 = 240	needed values? $S_n = [a_1(1-r^n)]/(1-r)$ Where a_1=50: r =2: n =10 DO – Perform the indicated operation and simplify $Sn = [50(1–2^{10})]/(1–2)$ $= [50(1–1,024)]/(-1)$ $= [50 (- 1,023)] / (-1)$ $= 51,150$ CHECK – The answer should satisfy all the given information in the problem 50 + 100 + 200 + 400 + 800 + 1600 + 3200 + 6400 + 12800 + 25600 = 51,150 Illustrative example #2. The used sponge has some bacteria in it. The number of bacteria increases five times every hour. If the number	7 7 n = 48 Therefore, 1/338 is the 48^{th} term.

	Get the reciprocal of each term. 9, 12, 15, …. Solve the 12^{th} term of Arithmetic sequence using $A_n = a_1 + (n-1)d$ Find the values of n, a_1, and d n = 12; a_1 = 9; d = 3 Substitute the values in the formula and simplify, $A_n = a_1 + (n-1)d$ $A_n = 9 + (12-1)3$ $A_n = 9 + (11)3$ $A_n = 9 + 33$ $A_n = 42$ Get the reciprocal The 12^{th} term is 1/42		of bacteria is 50 on the first hour, how many bacteria are there at the end of five hours? Solution: SEE – What kind of sequence is involve in the problem? $50 + 250 + \ldots, + a_5$ PLAN – What is the appropriate formula to be used and needed values? $S_n = [a_1 - a_1r^n)]/(1-r)$ or $S_n = [a_1(1-r^n)]/(1-r)$ Where a_1 = 50: r = 5: n = 5 DO – Perform the indicated operation and simplify $Sn = [a_1(1-r^n)]/(1-r)$ $= [50 (1 – 5^5)] / (1 – 5)$ $= [50 (1 – 3,125)] /$	

			(-4) = [50 (- 3,124)] / (-4) = -156,200/-4 = 39,050 CHECK – The answer should satisfy all the given information in the problem 50 + 250 + 1250 + 6250 + 31250 = 39,050	
D. Discussing new concepts and practicing new skills # 1	Solve each problem. 1. Insert two harmonic means between 6 and 3/2. Solution: Get the reciprocals of the terms. 6 ⟶ _____ 3/2 ⟶ _____ Get now the Arithmetic sequence, determine the value of n = _____; a_1 = _____;	Do the following with a partner! 1. To replace the trees destroyed by typhoon Yolanda, the forestry department of Tagaytay has developed a ten-year plan. The first year they will plant 100 trees. Each succeeding year, they will plant 50 more trees than they planted the year before. A. How many trees will they plant during the fifth year? B. How many trees will they have	Do the following with a partner! 1. A young man gave his wife a gift of Php 400 on their wedding day. To please her, he gave her Php 800 on their first wedding anniversary, Php 1600 on their second wedding anniversary, and so on. A. How much would she receive on their 9th wedding anniversary? B. Compute the total amount the wife	Do the following by group! 1. The Grade 10 students of Bagbag National High School have a research on who is the inventor of the worldwide web (www). All they need to do is to open a password by solving situation given by the teacher.

d = _____

Use the formula $A_n = a_1 + (n-1)d$, Find the value of d.

Use the Arithmetic means using
$a_2 = a_1 + d$;
$a_3 = a_2 + d$

Get the reciprocal of each term.

6, _____, _____, 3/2

2. Find the sum of 2/3, ½, 2/5, __, __, __, __, 1/5
Solution:
Get the reciprocals of the terms.
2/3 ⟶ _____
1/2 ⟶ _____

Get now the Arithmetic sequence, determine the value of n = _____;
planted by the end of the tenth year?

Solution:

Complete the table:

# of yrs	1	2	3	4	5	6	7	8	9	10
# of trees	100	150	200							

What type of sequences involve in the problem?
What formula is appropriate to solve the problem?
What are the values that you need to answer the problem?

A. Determine the values of a_1, n and d.
a_1 = ___; n = __; d = ___
Substitute the values of a_1, n and r
A_n = _____
Simplify.
A_{10} = _____

B. Write the formula.
S_n = _____
Substitute the values of a_1, n and d
S_n = _____
Simplify
S_{10} = _____
had received as gifts from their wedding day up to their ninth wedding anniversary?

Solution:
Complete the table:

# of yrs	1	2	3	4	5	6	7	8	9
Amt. of gifts	400	800	1600						

What type of sequences involve in the problem?
What formula is appropriate to solve the problem?
What are the values that you need to answer the problem?

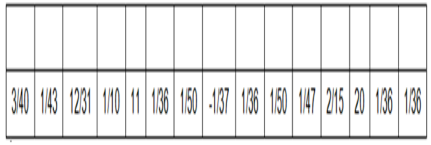
A. Determine the values of a_1, n and r.
a_1 = __; n = __; r = __
Substitute the values of a_1, n and r
A_n = _____
Simplify.
A_g = _____

B. Write the formula.
S_n = _____

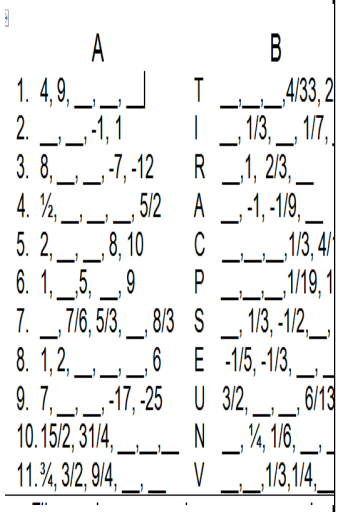
Substitute the values of a_1, n and r
S_n = _____

R 1/8, 1/11, 1/14...n = 15	**-**. 2,3,4,....8th term
E ¼, 1/11, 1/18...n=9	**M** 3,7,11,...10th term
I The tenth term of a harmonic sequence 1/7, 1/11, 1/15	**N** The 12th term of a harmonic sequence -1/4, -1/7, -1/10
S If a_1 = 1/2, d = 1/5 ; find the 10th term	**T** If a_1 = 3/4, d = 1/2 ; find the 7th term
L In the harmonic sequence 1/4, 1/9, 1/14,..which term is 1/99	**B** In the harmonic sequence 1/3, 1/13, 1/23,..which term is 1/113

WHO INVENTED THE WORLDWIDE WEB (WWW)?

	a_1 = _____; d = _____ Complete the Arithmetic sequence by using $a_4 = a_3 + d$ $a_5 = a_4 + d$ $a_6 = a_5 + d$ $a_7 = a_6 + d$ Write the complete Arithmetic sequence __, __, __, __, __, __, __, __ Get the reciprocal of each term 2/3, ½, 2/5, __, __, __, __, 1/5 Add all the terms S_n = 2/3 + ½ + 2/5 + __ + __ + __ + __ + 1/5		Simplify S_n = _____	
E. Discussing new concepts and practicing new skills # 2	1. Using Two-Column Chart Method, compare or differentiate Arithmetic sequence from Harmonic sequence.	1. How can you determine if the given problems involve arithmetic sequence? 2. What is the appropriate formula to be used in arithmetic sequence?	1. How can you determine if the given problems involve geometric sequence? 2. What is the appropriate formula to be used? 3. Is there another way to get the correct	1. How can you find the nth term of an harmonic sequence? 2. What is the appropriate formula to be used? 3. Is there another way to get the correct answer? Explain briefly your solution.

	2. Is the sum of the Harmonic sequence the reciprocal of the sum of the arithmetic sequence? Verify your answer. 3. How can you find the nth term of a Harmonic sequence?	3. Is there another way to get the correct answer? Explain briefly your solution.	answer? Explain briefly your solution.	
F. Developing mastery (leads to Formative Assessment 3)	Find the indicated sum in each sequence. 1. 3/2, 6/7, ___, 6/13 2. 2, 1, 2/3, ___, ___, 1/3 3. ___, 1/3, 1/5, 1/7, ___ 4. 1, 1, 2, 3, 5, 8,…, 55 7, 10, 17, 27, 44, 71, 115, …a_{10}	Solve the problem. Show your complete solution. 1. Mrs. Pamienta gave her daughter Arlene Php300 on her 7th birthday, and intends to increase this by Php250 each year. How much will the daughter receive on her debut?	Solve the problem. Show your complete solution. 1. Rico qualified as a basketball varsity player of Tagaytay City Science National High School. As part of his training, his coach asked him to run 2km farther each week than he ran the week before. The first week he ran 3 km. If he keeps up this pattern, how many km will he be able to run at the end of the tenth week?	Solve the problem. Show your complete solution. 1. Yolanda gets a starting salary of Php7,000 a month and an increase of Php500 annually. What would be her salary during the seventh year?
G. Finding practical application of concepts and skills in daily living	Remember This! The sequences in column A are all Arithmetic. Supply the	Group Activity Solve each problem:	Solve each problem: Your father wants you to help him build a dog	Solve each problem:

	missing terms in Column A and match them in Column B which are Harmonic. Write the letter that corresponds to the answer in the box.  A 1. 4, 9, __, __, __ 2. __, __, -1, 1 3. 8, __, __, -7, -12 4. ½, __, __, __, 5/2 5. 2, __, __, 8, 10 6. 1, __,5, __, 9 7. __, 7/6, 5/3, __, 8/3 8. 1, 2, __, __, __, 6 9. 7, __, __, -17, -25 10. 15/2, 31/4, __,__,__ 11. ¾, 3/2, 9/4, __, __ B T __,__,__,4/33, 2 I __, 1/3, __, 1/7, R __,1, 2/3, __ A __, -1, -1/9, __ C __,__,__,1/3, 4/ P __,__,__,1/19, 1 S __, 1/3, -1/2,__, E -1/5, -1/3, __, _ U 3/2, __, __, 6/13 N __, ¼, 1/6, __, _ V __,__,1/3,1/4,__	1. To raise fund, Math Club Officers collect old newspapers and bottles. On the first day, they collected goods amounting Php750, on the second day they collected Php600, and Php450 on the third day. A. How much will they collect on the fifth day? B. How much is the total collection at the end of the fifth day?	house in your backyard. He says he will pay you Php10 for the first week and add an additional Php20 each week thereafter. The project will take 5 weeks. How much money will you earn, in total, if you work for the 5 weeks?	1. Your room is too cold so you decide to adjust the thermostat. The current temperature of the room is 60° Fahrenheit. In an attempt to get warmer, you increase the temperature to 62°. When this doesn't warm the the room enough for you decide to increase thermostat to 64°. This temperature still isn't warm enough , so you continue to increase it in this manner until you reached its 12^{th} term. What is its 12^{th} term and its harmonic sequence?
H. Making generalizations and abstractions about the lesson	Fibonacci sequence is a sequence where its first two terms are either both 1, or 0 and 1; and each term, thereafter, is obtained by adding the two preceding terms. Harmonic sequence is a sequence whose	To solve problems involving sequences: 1. Determine the type of sequence involve in the problem. 2. Use the appropriate arithmetic formula. 3. Substitute the needed values 4. Perform the indicated operation and simplify	To solve problems involving sequences: 1. Determine the type of sequence involve in the problem. 2. Use the appropriate geometric formula. 3. Substitute the needed values and simplify	To solve problems involving harmonic sequence: 1. Determine the corresponding arithmetic equence. 2. Use the appropriate formula. 3. Substitute the needed values and simplify 4. Take its reciprocal

	reciprocals from an arithmetic sequence. To solve problems involving Harmonic sequence, convert it into an Arithmetic sequence by taking the reciprocal of each term. Use the appropriate formula in the Arithmetic sequence, and then, again get the reciprocal of the term/s. There is no formula for the sum of the terms of a harmonic sequence, simply complete the sequence and add all the terms.			
I. Evaluating learning	Solve by showing your complete solution. One type of rabbit breeds in such a manner that a pair produces another pair of rabbits at the end of one month. The next month, the original pair produces	Solve each problem and show the complete solution. 1. If Mr. Bautista, a field engineer, could not finish his building project on the agreed date, he will be fined Php12, 000 on the first day of delay, Php16,500 on the	Solve each problem and show the complete solution. 1. Mrs. Valencia planted sugarcane cuttings, and after 6 months she had 5 sugarcanes. She planted that 5 sugarcanes and in 6 months she had 25 sugarcanes. She continued to plant for 2	Solve each problem and show the complete solution. 1. Your mother gives you Php100 to start a “Tipid Impok” Saving Account. She tells you that she will add Php20 to your saving account each month, if you will add Php10 each month. Assuming that both of you will do your part, how much will you save

	another pair and then stops breeding. All pairs of rabbits of this type breed this way: give birth to a pair of rabbits on the first and second months and then stop breeding. Assuming that none die, and the females always give birth to one male and one female.) 1. How many pair of rabbits will be there after the fourth? Seventh month? 2. How many rabbits are there after one year?	second day, Php21,000 on the third day and so on. If he is delayed 12 days, how much is his fine on the 10^{th} day only.	years. How many sugarcanes did she gather assuming all were healthy plants?	at the end of one year in its harmonic sequence?
J. Additional activities for application or remediation	Fibonacci Numbers in Nature (Experimental Procedure) a. Pick a flower in your garden and count the number of petals. Does the number of petals equal to a	Follow up: Problems about Sequences 10 months from now, your parents will celebrate their silver wedding anniversary and you want to give them a small present. In order to do that, you start to save	Follow up: Problems about Sequences Every year, Php500,000 vehicles depreciates by 20% of its value at the beginning of the year. What is its value at the end of the 5^{th} year?	Follow up: Construct problems about sequences.

	Fibonacci number? What is the mean of the flower? b. Pick a pineapple and count the number of its “mata”. Is it a Fibonacci number? c. Cut a piece of fruit in half so that you create a cross-section. Count the number of seeds in the fruit. Do you discover any more Fibonacci numbers? d. Start your own investigation and list down what part of nature you can find Fibonacci number.	Php100 on the first month, Php200 on the second month, Php300 on the third month, and so on for the period of 11 months. How much money will you save?		
V. REMARKS				
VI. REFLECTION				
A. No. of learners who earned 80% in the evaluation				

B. No. of learners who require additional activities for remediation who scored below 80%				
C. Did the remedial lessons work? No. of learners who have caught up with the lesson				
E. Which of my teaching strategies worked well? Why did these work?				
F. What difficulties did I encounter which my principal or supervisor can help me solve?				
G. What innovation or localized materials did I use/discover which I wish to share with other teachers?				

GRADE 10 DAILY LESSON LOG	School		Grade Level	10
	Teacher		Learning Area	MATHEMATICS
	Teaching Dates and Time		Quarter	FIRST

	Session 1	Session 2	Session 3	Session 4
I. OBJECTIVES				
19. Content Standards	The learner demonstrates understanding of key concepts of factors of sequences, polynomials and polynomial equations.			
20. Performance Standards	The learner is able to formulate and solve problems involving sequences, polynomials and polynomial equations in different disciplines through appropriate and accurate representations.			
21. Learning Competencies	The learner performs division of polynomial using long division and synthetic division. **(M10AL-Ig-1)** a. State the division algorithm of polynomials.	The learner performs division of polynomial using long division and synthetic division. **(M10AL-Ig-1)** a. State the division algorithm of polynomials.	The learner performs division of polynomial using long division and synthetic division. **(M10AL-Ig-1)** a. Illustrate the process of synthetic division.	The learner performs division of polynomial using long division and synthetic division. **(M10AL-Ig-1)**

Objectives	b. Divide polynomials by another polynomials using long division. c. Express each quotient using division algorithm accurately and systematically.	b. Divide polynomials by another polynomials using long division. c. Express each quotient using division algorithm accurately and systematically.	b. Divide polynomials P(x) by another polynomial D(x) in the form (x – a) using synthetic division. c. Express each quotient using division algorithm accurately and systematically.	a. Illustrate the process of synthetic division. b. Divide polynomials P(x) by another polynomial D(x) in the form (x – a) using synthetic division. c. Express each quotient using division algorithm accurately and systematically.
II. CONTENT	**Division of Polynomial (Long Division)**	**Division of Polynomial (Long Division)**	**Division of Polynomial (Synthetic Division)**	**Division of Polynomial (Synthetic Division)**
III. LEARNING RESOURCES				
M. References				
25. Teacher's Guide	pp. 48 – 50	pp. 48– 50	pp. 48 – 50	pp. 48 – 50
26. Learner's Materials	pp. 57 – 62	pp. 57 - 62	pp. 57 - 62	pp. 57 – 62
27. Textbook	Algebra 2 with Trigonometry by Bettye C. Hall, et. al, pages 464 – 474 Skill book in Math IV (BEC) by Modesto G. Villarin, Ed.D., et. al, pages 80- 81	Algebra 2 with Trigonometry by Bettye C. Hall, et. al, pages 464 – 474 Skill book in Math IV (BEC) by Modesto G. Villarin, Ed.D., et. al, pages 80- 81	Algebra 2 with Trigonometry by Bettye C. Hall, et. al, pages 464 – 474 Skill book in Math IV (BEC) by Modesto G. Villarin, Ed.D., et. al, pages 80- 81	Algebra 2 with Trigonometry by Bettye C. Hall, et. al, pages 464 – 474 Skill book in Math IV (BEC) by Modesto G. Villarin, Ed.D., et. al, pages 80- 81

28. Additional Materials from Learning Resources (LR) portal	http://www.mathsisfun.com/algebra/polynomials-division-long.html http://www.youtube.com/watch?v=dd-T-dTtnX4 http://purplemath.com/modules/polydiv2.htm	http://www.mathsisfun.com/algebra/polynomials-division-long.html http://www.youtube.com/watch?v=dd-T-dTtnX4 http://purplemath.com/modules/polydiv2.htm	http://www.mathsisfun.com/algebra/polynomials-division-long.html http://www.youtube.com/watch?v=dd-T-dTtnX4 http://purplemath.com/modules/polydiv2.htm	http://www.mathsisfun.com/algebra/polynomials-division-long.html http://www.youtube.com/watch?v=dd-T-dTtnX4 http://purplemath.com/modules/polydiv2.htm
N. Other Learning Resources	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation
IV. PROCEDURES				
A. Reviewing previous lesson or presenting the new lesson	(Quick Thinking Only!) Divide and Write Example: 19 ÷ 5 = 3 + 4/5 ⟷ 19 = 3(5) + 4 1. 29 ÷ 5 = ______ ⟷ ______ 2. 34 ÷ 7 = ______ ⟷ ______ 3. 145 ÷ 11 = ______ ⟷ ______ 4. 122 ÷ 7 = _____ ⟷ ______ 5. 219 ÷15 = _____ ⟷ ______	Complete me if you can? Give the missing term/s to make each polynomial complete. 1. $x^4 + x^3 - 3$ 2. $12x^4 + 3$ 3. $24x^4 + 6x^3 - 3$ 4. $9x^4 - 2x + 1$ 5. $21x^7 - 9x^3 + 5$	Write each polynomial in descending order of x and give its degree. 1. $x^3 + x^2 – 22x - 25x^5 + 2$ 2. $4x^2 + 21x^5 - 26x^3 + 28x - 10 + 5x^4$ 3. $6 – 31x + 3x^3 – 2x^4$ 4. $x^3 + 7x^2 + 5x^4 – 25x + 5$ 5. $x^3 + 7x^2 + 5 – 25x + 5x^5$	Write the numerical coefficient of each polynomial in descending order of x. 1. $x^4 + x^3 - 3$ 2. $12x^4 + 3$ 3. $24x^4 + 6x^3 - 3$ 4. $9x^4 - 2x + 1$ 5. $21x^7 - 9x^3 + 5$

B. Establishing a purpose for the lesson	Perform the indicated operations: 1. $(x^3 + 11x^2 - 9) + (x^3 + x^2 - 4x - 9)$ 2. $(x^3 + 11x^2 - 4x - 9) - (x - 2)$ 3. $(4x - 9)(x - 2)$ 4. $(x^3) \div (x)$	(Quick Thinking Only!) Divide 1. $x^4 \div x^3$ 2. $12x^4 \div 3x^2$ 3. $24x^4 \div 6x^3$ 4. $9x^4 \div 2x$ 5. $21x^7 \div 9x^3$	Give the numerical coefficient of each polynomial in descending order of x. 1. $x^3 + x^2 - 22x - 25x^5 + 2$ 2. $4x^2 + 21x^5 - 26x^3 + 28x - 10 + 5x^4$ 3. $6 - 31x + 3x^3 - 2x^4$ 4. $x^3 + 7x^2 + 5x^4 - 25x + 5$ 5. $x^3 + 7x^2 + 5 - 25x + 5x^5$	Choose Your Partner. Divide the given polynomials using long division and synthetic division. 1. $(x^3 + 11x^2 - 4x - 9) \div (x + 1)$ 2. $(x^4 + 2x^3 - 3x + 6) \div (x - 2$
C. Presenting examples/Instances of the new lesson	Divide: 1. $(x^3 + 11x^2 - 4x - 9) \div (x - 2)$ 2. $(2x^4 + 5x^3 + 2x^2 - 7x - 15) \div (2x - 3)$ 3. $(5x^2 - 2x + 1) \div (x + 2)$	Divide: 1. $(x^4 + 2x^3 - 3x + 6) \div (x + 2)$ 2. $(30x^5 - 50x^4 - 21x^2 + 3x - 1) \div (3x - 5)$	Illustrative example 1. Divide $(6x^3 + 11x^2 - 4x - 9) \div (x + 2)$ 1. Arrange on the line the coefficients of the polynomial (order is in descending powers). Insert a zero for the coefficient of the missing power of x. 2. Write **a,** the divisor, on the left. 3. Bring down the first coefficient on the third line. Multiply the first coefficient by **a**. Write the product on the second line below the second coefficient.	Illustrative example 1. Divide $(30x^5 - 50x^4 - 21x^2 - 29x - 8) \div (3x - 5)$ 1. Arrange on the line the coefficients of the polynomial (order is in descending powers). Insert a zero for the coefficient of the missing power of x. 2. Write **a,** the divisor, on the left. 3. Bring down the first coefficient on the third line. Multiply the first coefficient by **a**. Write the product on the second line below the second coefficient.

			4. Find the sum of the product and the second coefficient then write the sum on the third line below the product. 5. Multiply this sum by **a**, add the product to the next coefficient and write again the new sum on the third line, and so on. 6. Do the same process until a product has been added to the final coefficient. 7. The last sum in the third line is the remainder. The preceding numbers are the numerical coefficient of the quotient. The quotient is a polynomial of degree one less than the degree of P(x). Illustrative example 2. Divide $(x^4 + 2x^3 – 3x + 6) \div (x + 2)$	4. Find the sum of the product and the second coefficient then write the sum on the third line below the product. 5. Multiply this sum by **a**, add the product to the next coefficient and write again the new sum on the third line, and so on. 6. Do the same process until a product has been added to the final coefficient. 7. The last sum in the third line is the remainder. The preceding numbers are the numerical coefficient of the quotient. The quotient is a polynomial of degree one less than the degree of P(x). Illustrative example 2. Divide $(4x^5 + 8x^4 + x3 + 7x2– x - 10) \div (2x + 3)$

D. Discussing new concepts and practicing new skills # 1	Do the following with a partner! Use long division to find the remainder when the following polynomials are divided by the corresponding linear expression 1. $(x^3 + 7x^2 + 15x + 14) \div (x + 3)$ 2. $(3x^3 - 7x^2 + x - 7) \div (x – 3)$ 3. $(x^4 - 4x^3 - 7x^2 + 22x + 18) \div (x + 2)$	Do the following with a partner! Use long division to find the remainder when the following polynomials are divided by the corresponding linear expression 1. $(5x^3 + 3x - 8) \div (x - 1)$ 2. $(2x^3 - 54) \div (x – 3)$ 3. $(4x^5 + 18x^4 + 7x^2 – x - 100) \div (2x + 3)$	Do the following with a partner! Use synthetic division to find the remainder when the following polynomials are divided by the corresponding linear expressions 1. $(x^3 + 7x^2 + 15x + 14) \div (x + 3)$ 2. $(3x^3 - 7x^2 + x - 7) \div (x - 3)$ 3. $(x^3 + 8x^2 – 5x - 84) \div (x + 5)$ 4. $(2x^4 + x^3 - 9x^2 - x + 6) \div (x + 2)$	Do the following with a partner! Use synthetic division to find the remainder when the following polynomials are divided by the corresponding linear expressions 1. $(5x^3 + 3x - 8) \div (x - 1)$ 2. $(2x^3 - 54) \div (x – 3)$ 3. $(4x^5 + 18x^4 + 7x^2 – x - 100) \div (2x + 3)$
E. Discussing new concepts and practicing new skills # 2	1. What are the steps to divide a polynomial by another polynomial? 2. How can you determine if the answer is correct or not? 3. Is there another way to get the correct answer? Explain briefly your solution.	1. What are you going to do if some terms of the given polynomials is/are missing? 2. How can you determine if the answer is correct or not? 3. Is there another way to get the correct answer? Explain briefly your solution	1. What are the steps to divide polynomial by another polynomial using synthetic division? 2. Why do you have to change the sign of the constant of the divisor? 3. Which is easier to perform, long division or synthetic division? Explain briefly your answer.	1. What are you going to do if some terms of the given polynomials is/are missing? 2. Why do you have to change the sign of the constant of the divisor? 3. Which is easier to perform, long division or synthetic division? Explain briefly your solution.
F. Developing mastery (leads to Formative Assessment 3)	Divide the given polynomials. Show your complete solution. And express your answer in	Divide the given polynomials. Show your complete solution. And express your answer in the form P(x) = Q(x) D(x) + R(x)	Do the following. Use synthetic division to find the remainder when the following polynomials are	Do the following. Use synthetic division to find the remainder when the following polynomials

	the form P(x) = Q(x) D(x) + R(x) 1. $(x^3 + 2x^2 – x - 2) ÷ (x - 1)$ 2. $(x^5 + 2x^4 + 6x + 4x^2 + 9x^3 - 2) ÷ (x + 2)$	1. $(3x^3 + 4x^2 + 8) ÷ (x + 2)$ 2. $(4x^5 + 6x + 4x^2 - 9x^3 - 2) ÷ (x + 2)$	divided by the corresponding linear expressions 1. $(x^3 + 7x^2 + 15x + 14) ÷ (x + 3)$ 2. $(3x^3 - 7x^2 + x - 7) ÷ (x - 3)$ 3. $(4x^5 + 8x^4 + x^3 + 7x^2 - x - 10) ÷ (x + 3)$	are divided by the corresponding linear expressions 1. $(3x^3 + 4x^2 + 8) ÷ (x + 2)$ 2. $(x^5 + 2x^4 + 6x + 4x^2 + 9x^3 - 2) ÷ (x + 2)$
G. Finding practical application of concepts and skills in daily living	The given polynomial expressions represent the volume and the height of a Casssava cake sold at Loumar's Delicacies, respectively. What expression can be used to represent the area of the base of each Cassava cake? 1. $(x^3 + 7x^2 + 5x – 25)$ cm^3 and $(x + 5)$ cm 2. $(2x^3 - 13x^2 – 5x + 100)$ cm^3 and $(x - 5)$ cm 3. $(6x^3 - 23x^2 + 33x - 28)$ cm^3 and $(3x - 7)$ cm	Divide the given polynomials. Show your complete solution. And express your answer in the form P(x) = Q(x) D(x) + R(x) 1. $(2x^4 + 7x^3 + 10x^2 + 8)$ and $(2x^2 + x - 1)$ 2. $(4x^5 + 6x^4 +5x^2 – x - 10)$ and $(2x^2 + 3)$	Divide, using synthetic division. Express your answer in the form: Dividend = (Quotient) (Divisor) + Remainder 1. $(x^3 + 8x^2 – 5x - 84) ÷ (x + 5)$ 2. $(2x^4 + x^3 - 9x^2 - x + 6) ÷ (x + 2)$ 3. $(x^4 - 5x^3 + 11x^2 – 9x - 13) ÷ (x - 3)$ 4. $(x^4 + 10x^3 - 16x - 8) ÷ (x + 2)$ 5. $(3x^3 - 15x^2 + 7x + 25) ÷ (x - 4)$	Divide, using synthetic division or long division. Express your answer in the form: Dividend = (Quotient) (Divisor) + Remainder 1. $(2x^4 + 7x^3 + 10x^2 + 8)$ and $(x - 1)$ 2. $(4x^5 + 6x^4 +5x^2 – x - 10)$ and $(2x + 3)$
H. Making generalizations and abstractions about the lesson	To divide polynomial by another polynomial using long division 1. Arrange the terms in both the divisor and the dividend in descending order. 2. Divide the first term of the dividend by the	To divide polynomial by another polynomial using long division 1. Arrange the terms in both the divisor and the dividend in descending order. If there is/are missing terms, supply the missing term/s using	To divide polynomial P(x) by another polynomial D(x) in the form (x – a) using synthetic division 1. Arrange on the line the coefficients of the polynomial (order is in descending powers). Insert a zero for the	To divide polynomial P(x) by another polynomial D(x) in the form (x – a) using synthetic division 1. Arrange on the line the coefficients of the polynomial (order is in descending

	first term of the divisor to get the first term of the quotient. 3. Multiply the divisor by the first term of the quotient and subtract the product from the dividend. 4. Using the remainder, repeat the process, thus finding the second term of the quotient. Continue the process until the remainder is zero or the remainder is of a lower degree than the divisor	zero as the numerical coefficient. 2. Divide the first term of the dividend by the first term of the divisor to get the first term of the quotient. 3. Multiply the divisor by the first term of the quotient and subtract the product from the dividend. 4. Using the remainder, repeat the process, thus finding the second term of the quotient. Continue the process until the remainder is zero or the remainder is of a lower degree than the divisor	coefficient of the missing power of x. 2. Write **a,** the divisor, on the left. 3. Bring down the first coefficient on the third line. Multiply the first coefficient by **a**. Write the product on the second line below the second coefficient. 4. Find the sum of the product and the second coefficient then write the sum on the third line below the product. 5. Multiply this sum by **a**, add the product to the next coefficient and write again the new sum on the third line, and so on. 6. Do the same process until a product has been added to the final coefficient. 7. The last sum in the third line is the remainder. The preceding numbers are the numerical coefficient of the quotient. The quotient is a polynomial of degree one less than the degree of P(x).	powers). Insert a zero for the coefficient of the missing power of x. 2. Write **a,** the divisor, on the left. 3. Bring down the first coefficient on the third line. Multiply the first coefficient by **a**. Write the product on the second line below the second coefficient. 4. Find the sum of the product and the second coefficient then write the sum on the third line below the product. 5. Multiply this sum by **a**, add the product to the next coefficient and write again the new sum on the third line, and so on. 6. Do the same process until a product has been added to the final coefficient. 7. The last sum in the third line is the remainder. The preceding numbers

				are the numerical coefficient of the quotient. The quotient is a polynomial of degree one less than the degree of P(x).
I. Evaluating learning	Determine the remainder using long division and show the complete solution. 1. $(x^3 + x^2 – 22x - 25) ÷ (x + 2)$ 2. $(4x^4 + 21x^3 - 26x^2 + 28x - 10) ÷ (x + 5)$ 3. $(6x^3 - 25x^2 – 31x + 20) ÷ (3x - 2)$	Determine the remainder using long division and show the complete solution. a. $(4x^6 + 21x^5 - 26x^3 + 28x - 10) ÷ (x + 5)$ b. $(6x^3 - 25x^2 – 31x + 20) ÷ (3x - 2)$	Guess Who? Divide using synthetic division. Each problem was given a corresponding box below. The remainder of these problems are found in column B. Write the corresponding letter in the box provided for the question Column A 1. $(2x^3 + 3x^2 - 15x – 16) ÷ (x - 3)$ 2. $(x^3 + 4x^2 – 7x - 14) ÷ (x - 2)$ 3. $(2x^3 + 5x^2 - 7x - 12) ÷ (x + 3)$ 4. $(x^4 - 5x^2 - 10x – 12) ÷ (x + 2)$ 5. $(6x^3 + 3x^2 + 10x + 14) ÷ (2x - 3)$ Column B -4 (B) 20 (A) 4 (E) 56 (V) 0 (U)	Tagaytay comes from the phase “taga Itay”. According to history, what animal did the father and son try to kill in the hill? (To answer the question, solve the following using synthetic division, then write the letter on the blank that corresponds to the answer.) **A** $\frac{x^4 – 6x^2 + 7x - 6}{x + 3}$ **R** $\frac{x^4 – 6x^3 + 30x – 9}{x – 3}$ **B** $\frac{x^3 – 12x^2 - 5x + 50}{x – 2}$ **O** $\frac{x^3 – 6x^2 + 7x + 6}{x – 3}$ $x^2 – 10x – 25$ _____ $x^2 – 3x - 2$ _____ $x^3 – 3x^2 + 3x - 2$ ___

				$x^3 – 3x^2 – 9x + 3$ ___
J. Additional activities for application or remediation	A. Follow up: Dividing Polynomials using long division 1. $(4x^4 - 2x^3 - 15x^2 + 9x - 6) \div (x - 3)$ 2. $(3x^4 + 6x^2 + 2x^3 + 4x - 4) \div (x + 2)$ B. Study: Division of Polynomials. 1. What are the steps to divide polynomials using synthetic division?	Follow up: Dividing Polynomials using long division 1. $(4x^4 - 2x^3 + 9x - 6) \div (x - 3)$ 2. $(3x^4 + 2x^3 - 4) \div (x + 2)$ B. Study: Division of Polynomials. 1. What are the steps to divide polynomials using synthetic division?	A. Follow up: Dividing Polynomials using synthetic division 1. $(4x^4 - 2x^3 + 9x - 6) \div (x - 3)$ 2. $(3x^4 + 2x^3 - 4) \div (x + 2)$ B. Study: Remainder Theorem and Factor theorem. 1. What is the remainder theorem? 2. What is the factor theorem?	A. Follow up: Dividing Polynomials using synthetic division or long division 1. $(4x^5 - 12x^3 + 9x - 6) \div (x - 1)$ 2. $(3x^5 + 12x^2 - 4) \div (x + 1)$ B. Study: Remainder Theorem and Factor theorem. 1. What is the remainder theorem? 2. What is the factor theorem?
V. REMARKS				
VI. REFLECTION				
A. No. of learners who earned 80% in the evaluation				
B. No. of learners who require additional activities for remediation who scored below 80%				

C. Did the remedial lessons work? No. of learners who have caught up with the lesson				
E. Which of my teaching strategies worked well? Why did these work?				
F. What difficulties did I encounter which my principal or supervisor can help me solve?				
G. What innovation or localized materials did I use/discover which I wish to share with other teachers?				

GRADE 10 **DAILY LESSON LOG**	**School**		**Grade Level**	**10**
	Teacher		**Learning Area**	**MATHEMATICS**
	Teaching Dates and Time		**Quarter**	**FIRST**

	Session 1	**Session 2**	**Session 3**	**Session 4**
I. OBJECTIVES				

22. Content Standards	The learner demonstrates understanding of key concepts of polynomials and polynomial equations.			
23. Performance Standards	The learner is able to formulate and solve problems involving polynomials and polynomial equations in different disciplines through appropriate and accurate representations.			
24. Learning Competencies Objectives	The learner proves the Remainder Theorem and the Factor Theorem **(M10AL-1g-2)** a. Find the remainder using the Remainder Theorem. b. Evaluate the given polynomial function. c. Develop patience on how to solve exercises in remainder theorem.	The learner proves the Remainder Theorem and the Factor Theorem **(M10AL-1g-2)** a. Prove the Factor Theorem. b. Use the Factor Theorem to determine whether the binomial (x-r) is a factor of the given polynomials. c. Develop patience on how to solve exercises in factor theorem.	The learner factors polynomials. **(M10AL-lh-1)** a. Factor polynomials b. Use synthetic division and remainder theorem in factoring polynomials c. Appreciate the use of synthetic division in factoring	The learner factors polynomials. **(M10AL-lh-1)** a. Factor polynomials b. Use synthetic division in factoring polynomials c. Appreciate the use of synthetic division in factoring
II. CONTENT	**Proves the Remainder Theorem**	**Proves the Factor Theorem**	**Factoring Polynomials**	**Factoring Polynomials**
III. LEARNING RESOURCES				
O. References				
29. Teacher's Guide	pp. 51 – 54	pp. 51 – 54	pp. 54 - 58	pp. 54 - 58

30. Learner's Materials	pp. 76 – 81	pp. 76 – 81	pp. 78 - 79	pp. 78 - 79
31. Textbook		E- Math Worktext in Mathematics, Orlando A. Orence and Marilyn O. Mendoza, pages 118-122	Work Text in Advanced Algebra Trigonoetry and Statisticsby, Ferdinand Malapascua, pages 193-196 Advanced Algebra with Trigonometry and Statistics, Efren L. Valencia, pages 36-37 E-Math, Orlando A. Orence, pages 115-119	Work Text in Advanced Algebra Trigonoetry and Statisticsby, Ferdinand Malapascua, pages 193-196 Advanced Algebra with Trigonometry and Statistics,Efren L. Valencia, pages 36-37 E-Math, Orlando A. Orence, pages 115-119
32. Additional Materials from Learning Resources (LR) portal				
P. Other Learning Resources	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation
IV. PROCEDURES				

<table>
<tr>
<td>A. Reviewing previous lesson or presenting the new lesson</td>
<td>Determine the remainder when the first number is divided by the second number.
1. 30, 7
2. 125, 15
3. 200, 10
4. 356, 14
5. 169,13</td>
<td>Activity :
DECODE MY CODE
Evaluate the polynomial at the given values of x. Next, determine the letter that matches your answer. When you are done, you will be able to decode the message.
A. $P(x) = x^3 + x^2 + x + 3$
<table>
<tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td></tr>
<tr><td>P(x)</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>message</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
A. 17 C. –3 E. 5 I. 18
M. 3 N. 78 O. 2 O. 30
P. 6 R. 0 S. –6 T. 23

Guide question:
1. How did you find the value of a polynomial expression P(x) at a given value of x?</td>
<td>Activity :
(THINK- PAIR- SHARE)
Use remainder theorem to find the missing factor in each of the following.
1. $x^3 - 8 = (x - 2)$ (_____)
2. $2x^3 + x^2 - 23x + 20 =$ $(x + 4)$(_____)
3. $3x^3 + 2x^2 - 37x + 12 = (x -$ 3)(_____)
Guide questions
1. What are the other factors of the polynomial equation?
2. How did you arrive at your answer?
3 What processes did you used to get the answer?</td>
<td>Activity: True or False
1) (x - 2) and (x + 3) are factors of $x^2 + x - 6$
2) (3x - 1) and (x + 2) are factors of $3x^2 + 5x - 2$
3) The factors of $2x^3 + 3x^2 - 2x - 3$ are (x - 1) ,(2x - 3) and (x+1)</td>
</tr>
</table>

		2. What message did you obtain?		
B. Establishing a purpose for the lesson	Activity: Correct me if I am wrong When $P(x) = x^3 - 7x + 5$ is divided by x-1 the remainder is -1 The remainder is -9 when $P(x) = 2x^3 - 7x + 3$ is divided by x-1.	Complete the tree diagram. 1 * 24 (a) 2 * ___(b) 24 3 * ___ (c) 4 * ___ (d) Therefore, a. 24=( )( ) b. 24=( )( ) c. 24=( )( ) d. 24=( )( )	Use the factor theorem to determine whether or not the first polynomial is a factor of the second polynomial. 1. $x - 1, x^2 + 2x + 5$ 2. $x - 1, x^3 - x - 2$ 3. $x - 4, 2x^3 - 9x^2 + 9x - 20$	Use synthetic division to show that 1. $(x - 2)$ and $(x^2 + 2x + 4)$ are factors of $x^3 - 8$ 2. The factors of $x^3 - 2x^2 - 5x + 6$ are $(x-3)$, $(x+2)$ and $(x-1)$
C. Presenting examples/Instances of the new lesson	Activity : Directions: Fill in the blanks with words and symbols that will best complete the statements given below. Suppose that the polynomial P(x) is divided by (x – r), as follows: If P(x) is of degree n, then Q(x) is of degree _____. The remainder R is a constant because _____. Now supply the reasons	Consider the division algorithm when the divisor is of the form x- r $P(x) = (x-r) Q(x) + R$ Dividend Divisor Quotient Remainder By the remainder Theorem, the remainder R is P(r), so we can substitute the P(r) for R. Thus $P(x) = (x-r) Q(x) + P(r)$. Note that if the P(r)=0 then	Activity : Use synthetic division to show a. $(x + 2)$ and $(3x – 2)$ are factors of $3x^4 – 20x^3 + 80x – 48$. b. $(x – 7)$ and $(3x + 5)$ are not factors of $6x^4 – 2x^3 – 80x^2 + 74x – 35$	

	for each statement in the following table. The previous activity shows the proof of the Remainder Theorem: The Remainder Theorem If the polynomial P(x) is divided by (x – r), the remainder R is a constant and is equal to P(r). R = P(r) Thus, there are two ways to find the remainder when P(x) is divided by (x – r), that is:	P(x) = (x-r) Q(x) so that x-r is a factor of P(x). This means that given a polynomial function of P(x), if p(x) is equal to zero then (x-r) is a factor of p(x). Reverse the process and see what happens when x-r is a factor of P(x). This means that P(x)= (x-r) Q(x) If we replace x with r, we have P(r) = (r-r) Q(r)=0 Thus, if x-r is a P(x), then P(r)=0.		

STATEMENT	REA-SON
1. P(x) = (x – r) • Q(x) + R	
2 .P(r) = (r – r) • Q(r) + R	
3. P(r) = (0) •Q(r) + R	
4. P(r) = R	

	(1) use synthetic division, or (2) calculate P(r). Similarly, there are two ways to find the value of P(r): (1) substitute r in the polynomial expression P(x), or (2) use synthetic division.			
D. Discussing new concepts and practicing new skills # 1	Use the Remainder Theorem to find the remainder R in each of the following. 1. $(x^4 – x^3 + 2) ÷ (x + 2)$ 2. $(x^3 – 2x^2 + x + 6) ÷ (x – 3)$ 3. $(x^4 – 3x^3 + 4x^2 – 6x + 4) ÷ (x – 2)$	Use the Factor Theorem to determine whether the given binomial is a factor of the given polynomials. 1. $P(x) = x^3 – 7x + 5$ a. $x – 1$ b. $x + 1$ c. $x – 2$ 2. $P(x) = 2x^3 – 7x + 3$ a. $x – 1$ b. $x + 1$ c. $x – 2$	Find the missing factor in each of the following. 1. $x^3+2x^2-11x+20=$ $(x+5)$(_____) 2. $3x^3 - 17x^2 + 22x – 60 =$ $(x-5)$(_____) 3. $4x^4 - 2x^3 - 4x^2 + 16x – 7 = (2x-1)$(_____)	Find the factors of the following polynomials 1. $x^2 + 4x - 5$ 2. $x^3 + x^2 - 9x - 9$ 3. $3x^3 + 7x^2 - 4$

E. Discussing new concepts and practicing new skills # 2	Use the Remainder Theorem to find the remainder R in each of the following and check using synthetic division. 1. $P(x) = x^4 - x^3 + 2$ a. x – 1 b. x + 1 c. x – 2 2. $P(x) = 3x^3 + 4x^2 + 17x + 7$ a. 2x – 3 b. 2x + 3 c. 3x – 2	Use the Factor Theorem to determine whether the given binomial is a factor of the given polynomials. 1. $P(x) = 4x^4 – 3x^3 – x^2 + 2x + 1$ a. $x – 1$ b. $x + 1$ c. $x – 2$ 2. $P(x) = 2x^4 – 3x^3 + 4x^2 + 17x + 7$ a. $2x – 3$ b. $2x + 3$ c. $3x – 2$	Which of the following binomials are factors of the P(x). 1. $P(x) = 8x^4 + 12x^3 -10x^2 + 3x + 27$ A. 2x - 3 B. 2x + 3 C. 3x - 2 2. $P(x) = 2x^4 - 3x^3 + 4x^2 + 17x + 2$ A. 2x - 3 B. 2x + 3 C. 3x - 2	Activity: Find my Factors Use any method to find the factors of $x^5-4x^4-6x^3+17x^2+6x-9$
F. Developing mastery (leads to Formative Assessment 3)	Activity: Show the Proof Verify if the given is the correct remainder when P(x) is divided by x-r $P(x) = x^3 - 2x^2 + 4x - 1 \div (x-1)$, R=2 $P(x) = x^4 - 3x^3 + 5x + 3 \div (x-2)$, R=5 $P(x) = 2x^6 - 4x^5 + x - 3 \div (x+1)$, R=2	Answer the following questions and verify. Is x+2 a factor of $3x^4 - 20x^3 + 80x - 48$? Why? Is 3x - 2 a factor of 3x4 - $20x^3 + 80x - 48$? Why?	Answer the following questions and verify. 1. How can we say that x - 7 is a factor of $6x^4 – 2x^3 – 80x^2 + 74x – 35$ 2. Is (x-1) a factor of $3x^3 - 8x^2 + 3x + 2$	Determine the value of k so that 1. (x-2) is a factor of $x^3 + kx^2 - 7x + 2$ 2. (x+1) is a factor of $2x^4 + 3x^3 + kx^2 + 2x - 2$
G. Finding practical application of concepts and skills in daily living	Which of the following binomial divisors will give a remainder of -3, when $P(x) = x^5 - 3x^3 - 4x + 3$ is divided by x-r 1. x+1	Apply the factor theorem to answer the following problem. Show that	Solve the following problems: 1. A rectangular garden in a backyard has an area of $(3x^2 + 5x – 6)$ square meters. Its width is (x + 2) meters.	Factor the following polynomials 1. $x^3 - 3x^2 – x - 1$

	2. x-1 3. x+2 4. x-2	a.(x+2) and (3x-2) are factors of $3x^4 - 20x^3 + 80x - 48$. b. (x-7) and (3x+5) are not factors of $6x^4 - 2x^3 - 80x^2 + 74x - 35$.	Find the length of the garden. 2. If one ream of bond paper costs (3x – 4) pesos, how many reams can you buy for ($6x^4 – 17x^3 + 24x^2 – 34x + 24$) pesos?	2. $9x^2 - 12x - 8$ 3. $x^3 + 2x^2 - 19x - 20$
H. Making generalizations and abstractions about the lesson	The Remainder Theorem If the polynomial P(x) is divided by (x – r), the remainder R is a constant and is equal to P(r). R = P(r) Thus, there are two ways to find the remainder when P(x) is divided by (x – r), that is: (1) use synthetic division, or (2) calculate P(r). Similarly, there are two ways to find the value of P(r): (1) substitute r in the polynomial expression P(x), or	The Factor Theorem Let P(x) be a polynomial. A. If P(r)=0, then x-r is a factor of P(x) B. If x-r is a factor of P(x), then P(r)=0	How do we factor polynomials using synthetic division? Step 1: Arrange the coefficients of P(x) in descending powers of x, placing 0s for the missing terms. The leading coefficient of P(x) becomes the first entry of the third row. Step 2: Place the value of r in the upper left corner. In this example, Step 3: multiply r with the first coefficient of x the write the product below the 2nd coefficient of x then add	How do we factor polynomials using synthetic division? Step 1: Arrange the coefficients of P(x) in descending powers of x, placing 0s for the missing terms. The leading coefficient of P(x) becomes the first entry of the third row. Step 2: Place the value of r in the upper left corner. In this example, Step 3: multiply r with the first coefficient of x the

	(2) use synthetic division.		Step 4 Repeat step 3 Step 5.write the quotient, Note that the exponent of q(x) is one less than the largest exponent in original equation	write the product below the coefficient of x then add Step 4 Repeat step 3 Step 5.write the quotient, Note that the exponent of q(x) is one less than the largest exponent in original equation
I. Evaluating learning	Give the remainder when P(x) is divided by x-r. Use synthetic division 1. $P(x)= 3x^{100} - 2x^{75}+3$ a. x - 1 b. x + 1 2. $P(x) = x^5+3x^3 - x+1$ a. x - 2 b. x + 3	Determine the value of A so that A. x-1 is a factor of $2x^3 + x^2 + 2Ax + 4$ B. x+1 is a factor of $x^3 + x^2 - 2Ax - 16$	Solve. The volume of a rectangular solid is $(x^3 + 3x^2 + 2x – 5)$ cubic cm, and its height is (x + 1) cm. What is the area of its base?	Answer the following: 1. If (x-1) is one of the factors of $x^3 + 4x^2 – x - 4$, What are the other two factors? 2. What is the value of m if (x+3) is a factor of $x^3 + mx^2 + 2x - 3$?

J. Additional activities for application or remediation	A. Follow up Use the remainder theorem to find the remainder when P(x) is divided by x – r 1. $3x^4 + x - 1$, (x+2) 2. $x^3 + 2x^2 + x - 2$, (x+1) B. What is Factor Theorem?	A. Follow up 1 Determine whether x-3 is a factor of a. $2x^3 - 13X^2 - 17X + 12$ b. $3X^3 - 14X^2 + 3X – 18$ B. Determine the real roots of (x+1)(x-3)=0	Find the factors of polynomial 1) $24 x^2 - 22 x - 35$ 2) $2x^3 + 3 x^2 - 17 x - 30$ 3) $x^3 - 3 x^2 - x + 3$ 4) $x^3 + 4 x^2 - 7 x + 2$ 4) $18 x^3 - 57 x^2 - 85 x + 100$	A. Follow up Are (x-1) (x+2) (x+1) factors of $x^3 - 2x^2 + 3x - 2$ B. 1.What is polynomial equation? 2. How to find the roots of polynomial equations?
V. REMARKS				
VI. REFLECTION				
A. No. of learners who earned 80% in the evaluation				
B. No. of learners who require additional activities for remediation who scored below 80%				

C. Did the remedial lessons work? No. of learners who have caught up with the lesson				
E. Which of my teaching strategies worked well? Why did these work?				
F. What difficulties did I encounter which my principal or supervisor can help me solve?				
G. What innovation or localized materials did I use/discover which I wish to share with other teachers?				

GRADE 10	**School**		**Grade Level**	**10**
DAILY LESSON LOG	**Teacher**		**Learning Area**	**MATHEMATICS**
	Teaching Dates and Time		**Quarter**	**FIRST**

	Session 1	**Session 2**	**Session 3**	**Session 4**
I. OBJECTIVES				
25. Content Standards	The learner demonstrates understanding of key concepts of polynomials and polynomial equations.			

26. Performance Standards	The learner is able to formulate and solve problems involving polynomials and polynomial equations in different disciplines through appropriate and accurate representations.			
27. Learning Competencies Objectives	The learner illustrates polynomial equations. **(M10AL-li-1)** a. Determine the roots of polynomial equation b. Illustrate polynomial equations c. Appreciate the process of getting the roots of polynomial equation	The learner illustrates polynomial equations. **(M10AL-li-1)** a. Determine the roots of polynomial equation b. Illustrate polynomial equations c. Appreciate the process of getting the roots of polynomial equation	The learner proves rational root theorem. **(M10AL-li-2)** a. Prove the Rational Roots Theorem b. Apply the Rational Roots Theorem c. Develop patience in proving rational roots theorem	The learner proves rational root theorem. **(M10AL-li-2)** a. State the rational root theorem b. Find the rational roots of polynomial equation c. Develop patience in finding the rational roots of polynomial equations
II. CONTENT	**Polynomial equations**	**Polynomial equations**	**Polynomial equations** **(Rational Root Theorem)**	**Polynomial equations** **(Rational Root Theorem)**
III. LEARNING RESOURCES				
Q. References				
33. Teacher's Guide	pp. 54 – 57	pp. 54 – 57	pp. 54 - 55	pp. 54 - 55
34. Learner's Materials	pp. 82 – 86	pp. 82 – 86	pp. 87 - 90	pp. 87 - 90

35. Textbook			Work Text in Advanced Algebra Trigonoetry and Statisticsby, Ferdinand Malapascua, pages 193-196 Advanced Algebra with Trigonometry and Statistics, Efren L. Valencia, pages 36-37 E-Math, Orlando A. Orence, pages 115-119	Work Text in Advanced Algebra Trigonoetry and Statisticsby, Ferdinand Malapascua, pages 193-196 Advanced Algebra with Trigonometry and Statistics,Efren L. Valencia, pages 36-37 E-Math, Orlando A. Orence, pages 115-119
36. Additional Materials from Learning Resources (LR) portal				
R. Other Learning Resources	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation	Grade 10 LCTGs by DepEd Cavite Mathematics 2016, Worksheets and PowerPoint presentation

IV. PROCEDURES				
A. Reviewing previous lesson or presenting the new lesson	Identify which of the following are polynomials 1. $x^3 + x^2 - 3x + 1$ 2. $2x^{-3} + x - 2$ 3. $3/x + 4x^2 - 2$ 4. $x^3 + 2x^{1/2} + 3$ 5. $5x$	Activity 1 Determine the number of real root(s) of the following equation. 1. $x^6 + x^2 + 11x^3 - 6 = 0$ 2. $3x^4 - 2x^3 + 3x^2 - 4x - 2 = 0$ 3. $x^5 - 32 = 0$ 4. $(x + 1)(x - 3)(2x + 5) = 0$ 5. $x^2(x^3 - 1) = 0$ 6. $(x^3-8)(x^7+1) = 0$ 7. $x(x-3)(x-1)^4 = 0$ 8. $x^3(x^5 + 1) = 0$ 9. $6x(x-1)(x + 2)^5 = 0$ 10. $x(x - 3)^5(3x + 1) = 0$	Activity: True or False Say boom boom if the statement is true and panes if the statement is false 1. $x^4 + 2x^3 - x^2 + 14x - 56 = 0$ in factored form is $(x^2+7)(x-2)(x+4) = 0$. 2. $x^4 + 2x^3 - 13x^2 - 10x = 0$ in factored form is $x(x - 5)(x + 1)(x + 2) = 0$ 3. $x^3 - 4x^2 + x + 6 = 0$ in factored form is $(x-1)(9x-2)(9x+3) = 0$	Activity: BE PRODUCTIVE Say that the product of a word is the product of the numbers corresponding to the letters. For example, the word **ZERO** has value 26*5*18*15=35,100. What is the product of the word **RATIONAL**
B. Establishing a purpose for the lesson	Activity 1 Determine the real root(s) of each equation. 1. $x - 2 = 0$ 2. $x + 3 = 0$	Determine the real roots of each polynomial equations by inspection. Roots of multiplicity n are counted n times 1. $(x - 2)(x + 1)^2(x - 1)^3 = 0$ 2. $x^4(x^5 - 1) = 0$ 3. $2x(x^3 - 2)^3 = 0$	Fill in the blanks with appropriate words, numbers or symbols to complete the solution. In $2x^4-11x^3+11x^2-11x-9=0$, the leading coefficient is _____. Its factors are _____and _____. The	Fill each blank to make a true statement. 1. In $-x^4 + 4x^2 + 4 = 0$, the leading coefficient is

	3. $x(x – 4) = 0$ 4. $(x + 1)(x – 3) = 0$ 5. $x^2 + x – 2 = 0$ Guide Question: 1. What do you call the given equations? 2. Describe the roots of an equation. 3. In finding the roots of an equation with degree greater than 1, what have you noticed about the number of roots? Can you recall a principle that supports this? 4. Describe how to solve for the roots of an equation. 5. How many roots does the equation $x^2 + 2x + 1 = 0$ have?	4. $x^3 - 10x^2 + 32x – 32 = 0$ 5. $x^2 - 11x + 24 = 0$	constant term is _____ and its factors are _____,_____, and _____. The possible rational roots of the equations are _____,_____,_____,_____,_____,_____ and _____.	_____, the constant term is _____ and the possible rational roots are the quotients of _____ and _____. 2. The possible rational zeros of $x^3 + 2x^2 - 5x - 6$ are _____, _____, _____ and _____
C. Presenting examples/Instances of the new lesson	Some polynomial equations are given below. Complete the table and answer the	Is x= -1 a real root of the equation? Using synthetic division, -1 1 6 11 6	Find the possible rational roots of the equation given below:	*Find the zeros of $12x^4 + 8x^3 - 7x^2 - 2x + 1 = 0$* *Solution:*

	questions that follow. (If a root occurs twice, count it twice; if thrice, count it three times, and so on. The first one is done for you) Polynomial Equation | degree | Real roots of an equation | Number of real roots	The remainder is _____. Therefore, _____ The 3rd line of the synthetic division indicates that $\frac{x^3+6x^2+11x+6}{X+1} =$ _____ The expression on the right, when equated to zero is called a depressed equation of the given polynomial equation. The roots of depressed equations are also roots of the given polynomial equation. The roots of this depressed polynomial equation are_____ and _____ Therefore, the roots of the polynomial equation $x^3+6x^2+11x+6=0$ are _____,_____ and _____.	$2x^3 + x^4 - 7x^2 - 4x + 12 = 0$ **Solution :** Given equation $2x^3 + x4 - 7x^2 - 4x + 12 = 0$ Arranging it in descending order, we get $x^4 + 2x^3 - 7x^2 - 4x + 12 = 0$ The numerator p of the rational roots would be the factors of the constant term 12; i.e. ±1, ± 2, ± 3, ± 4, ± 6, ± 12. Similarly, the denominator q of the rational roots would be the factors of the leading coefficient 1 ; i.e. ±1. Therefore, the possible fraction will be ± 1,2,3,4,6,121 Thus the list of possible roots is given below:	p: ± 1 Q: ± 1, ± 2, ± 3, ± 4, ± 5 $\frac{p}{q}$: ± ½, ± ½, ± , ± ¼, ± ½ By Synthetic Division: 12 8 -7 -2 1 1 12 20 13 11 12 20 13 11 12 There is a remainder of 12, so 1 is not a root of the equation 12 8 -7 -2 1 -1 -12 4 3 -1 12 -4 -3 1 0 The remainder is 0, so -1 is one of the Zeros. 12 -4 -3 1 ½ 6 1 -1 12 2 -2 0 Using some possible rational zeros. Hence, -½ is another zero. 12 2 -2 - ½

	1. $(x+1)^2(x-5)=0$	3	-1 (2 times) 5	3		1, -1, 2, -2, 3, -3, 4, -4, 6, -6, 12, -12	-6 2 12 -4 0 And also, -½ is another zero
	2.						
	3. $(x-2)=0$						

	4. (x – 3) (x + 1)(x – 1) = 0 5. x(x – 4) (x + 5)(x – 1) = 0					
D. Discussing new concepts and practicing new skills # 1	Consider the following polynomial equations. At most how many real roots does each have? a. $x^{20} – 1 = 0$ b. $x^3 – 2x^2 – 4x + 8 = 0$ c. $18 + 9x^5 – 11x^2 – x^{23} + x^{34} = 0$		Write TRUE if the statement is true. Otherwise, modify the underlined word(s) to make it true. 1. The <u>roots</u> of a polynomial equation in x are the values of x that satisfy the equation.	Complete the table. Verify the given numbers in the last column of the table are rational roots of the corresponding polynomial equation	For each equation List all possible rational zeros Use synthetic division to test the possible rational zeros and find an actual zero Use the possible zeros in b to find all zeros of polynomial equation

2. Every polynomial equation of degree n has <u>n-1</u> real roots

3. The equation $2x^3-6x^2+x-1=0$ has <u>no rational root</u>

4. The possible roots of $3x^5-x^4+6x^3-2x^2+8x-5=0$ are <u>3/5,+3, and +5</u>

5. The only real root of the equation $x^3+6x^2+10x+3=0$ is <u>3</u>

Polynomial Equation	**Leading Coefficient**	**Constant**	**Term Roots**
1. $x^3 + 6x^2 + 11x - 6 = 0$	1		1, 2, 3
2. $x^3 - x^2 - 10x - 8 = 0$		−8	−2, −1, 4

1. $x^3 - 3x - 2 = 0$

2. $x^4 - 13x^2 + 36 = 0$

3. $3x^3 + 8x^2 - 15x + 4 = 0$

			3. $x^3 + 2x^2 - 23x - 60 = 0$	1		$-4, -3, 5$	
			4. $2x^4 - 3x^3 - 4x^2 + 3x + 2 = 0$	2		$1/2, -1, 1, 2$	
			5. $3x^4 - 16x^3 + 21x^2 + 4x - 12 = 0$		$-\frac{1}{2}$	$-2/3, 1, 2, 3$	
			Guide question: 1. Look at the roots of each polynomial equation in the table. Are these roots in the				

			list of rational numbers in Question 1? 2. Refer to Equations 1 – 3 in the table. The leading coefficient of each polynomial equation is 1. What do you observe about the roots of each equation in relation to the corresponding constant term?	
E. Discussing new concepts and practicing new skills # 2	Find the roots of the following polynomial equations by applying the Zero- Product Property. 1. $(x + 3)(x – 2)$ $(x + 1)(x – 1) = 0$ 2. $(x + 5)(x – 5)$ $(x + 5)(x – 1) = 0$ 3. $(x + 4)^2(x – 3)^3 = 0$ 4. $x\,(x – 3)4(x + 6)^2 = 0$ 5. $x^2(x – 9) = 0$	One of the roots of the polynomial equation is given, find the other roots 1. $x^4 - 3x^2 + 2 = 0$, x = 1 2. $x^4 - x^3 - 7x^2 + 13x – 6 = 0$, x = 1 3. $x^5 - 5x^4 - 3x^3 + 15x^2 - 4x + 20 = 0$, x = 2	For each given polynomial equation, determine the possible rational roots. 1. $2x^4 - 3x^3 - 18x^2 + 6x + 28 = 0$ 2. $2x^4 + 7x^3 - 4x^2 - 27x – 18 = 0$	Think-pair-share Answer the following Show that $x^4 - 2x^3 - 3x^2 + 2x + 2 = 0$ has two rational zeros. Find the other zeros of $6x^4 + 19x^3 + 14x^2 - x - 2$ if -1/2 and 1/3 are its zeros

F. Developing mastery (leads to Formative Assessment 3)	Determine the real root(s) of each equation. 1. $x^2(x - 9)(2x + 1) = 0$ 2. $(x + 4)(x^2 – x + 3)=0$ 3. $2x\ (x^2 – 36) = 0$ 4. $(x + 8)(x – 7)$ $(x^2 – 2x + 5) = 0$ 5. $(3x + 1)^2(x + 7)$ $(x – 2)^4 = 0$	Determine the real root(s) of each equation. 1. $2x^4-7x^3+13x^2+53x+21=0$ 2. $(x-3)^2\ (x^3+1) = 0$	One of the rational root of the polynomial equation is given find the other roots 1. $3x^3 + 2x^2 - 7x + 2,\ x = -2$ 2. $2x^3 + 3x^2 - x - 6,\ x = 2$	Show that $4x^3 + 8x^2 + 5x + 1 = 0$ has zero -1/2 with multiplicity 2, 1/3 is one of the zeros of $6x^4 + x^3 - 7x^2 – x + 1 = 0$, find the other 3 zeros.
G. Finding practical application of concepts and skills in daily living	Find all real roots of the following equations. Next, write each polynomial on the left side of the equation in factored form. Show your complete solutions. 1. $x^3 – 10x^2 + 32x – 32 = 0$ 2. $x^3 – 6x^2 + 11x – 6 = 0$ 3. $x^3 – 2x^2 + 4x – 8 = 0$ 4. $3x^3 – 19x^2 + 33x – 9 = 0$ 5. $x^4 – 5x^2 + 4 = 0$	Fill in the blanks with appropriate words, numbers or symbols to complete the solutions Solve $x^3 + x^2 - 12x – 12 = 0$ and write the polynomial in factored form. Solutions: The equation has at most _____real roots. The leading coefficient is _____, and its factors are _____ and_____. The constant term is _____, and its factor are _____,_____,_____,_____,_____,_____,_____,_____,_____,_____,_____,_____,_____,_____. The possible roots of the equation are	Say Hep hep if the statement is true and hooray if the statement is false 1. The possible rational roots of $3x^3 - 2x^2 + x - 5$ are +1,-1,+5,-5,+1/3,-1/3. 2. -3 is the only rational root of $x^5 - 4x^4 - x^3 + 17x^2 + 6x – 9 = 0$	Group Activity: What do you call the fear of strangers? Find the zeros of the following polynomial equations. Write the letters corresponding to the zeros of the equations in the boxes below. A. $3x^3+5x^2-16x-12=0$ B. $3x^3-4x^2-12x+16=0$ E. $2x^3-3x^2-29x-30=0$ H. $3x^3-x^2-38x-24=0$ O. $2x^3-3x^2-8x+27=0$ N. $3x^3+5x^2-16x-18=0$ C. $2x^3+3x^2-29x+30=0$ I. $4x^4-5x^2+1=0$ P. $4x^4-45x^2+81=0$ O. $6x^4+x^3-7x^2-x+1=0$

		_____,_____,_____,_____, _____,_____ and _____.		X.$4x^4-4x^3-3x^2+4x-1=0$ 1, -1, ½, ½ 5, -2, -3/2 -3, 2, -2/3 3, 3, 3/2 3, -3, 3/2, -3/2 -3, 4, -2/3 1, -1, 1/2, -1/3 2, -2, 4/3 1, -1, 1/2, -1/2
H. Making generalizations and abstractions about the lesson	The roots of the polynomial equations can be determined by using A. Fundamental theorem of algebra B. Zero-product property C. Other factoring techniques	The roots of the polynomial equations can be determined by using a. Fundamental theorem of algebra b. Zero-product property c. Synthetic Division d. Depressed Equation e. Other factoring techniques	Rational Root Theorem- Let $a_{n-1}x^{n-1}+ a_{n-2}x^{n-2} +….+a_1x + a_0 = 0$ be a polynomial equation of degree n. if p/q, in lowest terms, is a rational root of the equation, then p is a factor of a0 and q is a factor of an.	The **Rational** Zeros Theorem. The **Rational** Zeros Theorem states: If P(x) is a polynomial with integer coefficients and if is a zero of P(x) (P( ) = 0), then p is a factor of the constant term of P(x) and q is a factor of the leading coefficient of P(x) .

I. Evaluating learning	Set up a polynomial equation that models each problem below. Then solve the equation, and state the answer to each problem. 1. One dimension of a cube is increased by 1 inch to form a rectangular block. Suppose that the volume of the new block is 150 cubic inches. Find the length of an edge of the original cube. 2.The dimensions of a rectangular metal box are 3 cm, 5 cm, and 8 cm. If the first two dimensions are increased by the same number of centimeters, while the third dimension remains the same, the new volume is 34 cm3 more than the original volume. What is the new dimension of the enlarged rectangular metal box?	Deepen your skills by discussing the solution to each polynomial equation with your seatmates 1. $x^3 - 2x^2 – x + 2 = 0$ 2. $X^3 + 9x^2 + 23x + 15 = 0$	Find the rational roots of the following polynomial equations. 1. $6x^3 - 7x^2 - 21x – 10 = 0$ 2. $5x^3 - 11x^2 + 7x – 1 = 0$	Answer the following: 1. When can you use the rational zero theorem to determine the possible rational zeros of a polynomial equations? 2. Describe the possible rational zeros when the leading coefficient of a polynomial equation is one.

J. Additional activities for application or remediation	One of the roots of the polynomial equation is given. Find the other roots. 1. $-2x^4 + 13x^3 - 21x^2 + 2x + 8 = 0$; x= -1/2 2. $x^4 - 3x^2 + 2 = 0$; x = 1 3. $x^4 - x^3 - 7x^2 + 13x - 6 = 0$; x= 1 4. $x^5 - 5x^4 - 3x^3 + 15x^2 - 4x + 20 = 0$; x= 2 5. $2x^4 - 17x^3 + 13x^2 + 53x + 21 = 0$; x= –1	A. Find the real roots of the following equations a) $x^3 + 6x^2 + 11x + 6 = 0$ b) $(X^4-1)(x^4+1) = 0$ B.1. Give a polynomial equation with integer coefficient that has the following root a) 1. -1,3,-6 b) 2,3,3/5 2. What is Rational Root Theorem	A. Follow up 1. Find all rational zeroes of each polynomial equation. Indicate the multiplicity of each zero. A. $x^2(x-3)^2(x+4)^2 = 0$ B. $(4x-3)(9x^2-16)^2(2x^2+x-3) = 0$	A. Follow up Find all the rational zeros of $4x^4 + 3x^2 - 1 = 0$? B. What is a polynomial function?
V. REMARKS				
VI. REFLECTION				
A. No. of learners who earned 80% in the evaluation				
B. No. of learners who require additional activities for remediation who scored below 80%				
C. Did the remedial lessons work? No. of learners who have caught up with the lesson				

E. Which of my teaching strategies worked well? Why did these work?				
F. What difficulties did I encounter which my principal or supervisor can help me solve?				
G. What innovation or localized materials did I use/discover which I wish to share with other teachers?				

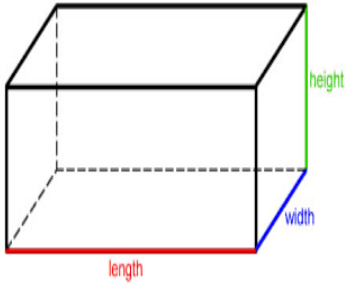
GRADE 10 DAILY LESSON LOG	School		Grade Level	10
	Teacher		Learning Area	MATHEMATICS
	Teaching Dates and Time		Quarter	FIRST

	Session 1	Session 2	Session 3	Session 4
I. OBJECTIVES				
28. Content Standards	The learner demonstrates understanding of key concepts of sequences, polynomials and polynomial equations.			
29. Performance Standards	The learner is able to formulate and solve problems involving sequences, polynomials and polynomial equations in different disciplines through appropriate and accurate representations.			
30. Learning Competencies Objectives	The learner solves polynomial equations. (**M10AL-lj-1**) a. solve polynomial equations b. develop patience on how to solve exercises in polynomial equations.	The learner solves polynomial equations. (**M10AL-lj-1**) a. solve polynomial equations b. develop patience on how to solve exercises in polynomial equations.	The learner solves problems involving polynomials and polynomial equations. (**M10AL-lj-2**) a. translate verbal sentences into polynomial equations b. solve problems involving	The learner solves problems involving polynomials and polynomial equations. (**M10AL-lj-2**) a. translate verbal sentences into polynomial equations b. solve problems involving polynomial

			polynomial equations c. appreciate the use of polynomials in solving word problems.	equations c. appreciate the use of polynomials in solving word problems
II. CONTENT	**Polynomial Equations**	**Polynomial Equations**	**Problems Involving Polynomial and Polynomial Equations**	**Problems Involving Polynomial and Polynomial Equations**
III. LEARNING RESOURCES				
S. References				
37. Teacher's Guide	pp. 68 - 69	pp. 68 - 69	pp. 69 - 74	pp. 69 - 74
38. Learner's Materials	pp. 89 - 93	pp. 89 - 93	pp. 94 - 95	pp. 94 - 95
39. Textbook			Basic Probability and Statistics, pp. 120-121 Elementary Statistics: A Step by Step Approach, pp. 221-223	Basic Probability and Statistics, pp. 120-121 Elementary Statistics: A Step by Step Approach, pp. 221-223
40. Additional Materials from Learning Resources (LR) portal				
T. Other Learning Resources	Grade 10 LCTGs by DepEd Cavite Mathematics 2016,	Grade 10 LCTGs by DepEd Cavite Mathematics 2016,	Grade 10 LCTGs by DepEd Cavite Mathematics 2016,	Grade 10 LCTGs by DepEd Cavite Mathematics 2016,

	Worksheets and PowerPoint presentation	Worksheets and PowerPoint presentation	Worksheets and PowerPoint presentation	Worksheets and PowerPoint presentation
IV. PROCEDURES				
A. Reviewing previous lesson or presenting the new lesson	By inspection, determine the number of real roots of each polynomial equation. Note that roots of multiplicity $\boldsymbol{n}$ are counted $\boldsymbol{n}$ number of times. 1. $(x+2)(x-3)(x+1)(x-6) = 0$ 2. $x(x-2)(x+3)^2 = 0$ 3. $x^3(x^3+8) = 0$ 4. $(x^3-1)(x^2+1) = 0$ 5. $5x(x^3-8)^2 = 0$	Write **TRUE** if the statement is true. Otherwise, modify the underlined word(s) to make it true. 1. The <u>roots</u> of a polynomial equation in x are the vales of x that satisfy the equation. 2. Every polynomial equation of degree n has <u>n – 1</u> real roots. 3. The equation $2x^3 - 6x^2 + x - 1 = 0$ has <u>no rational root.</u> 4. The possible roots of $3x^5 - x^4 + 6x^3 - 2x^2 + 8x - 5 = 0$ are $\pm\frac{3}{5}$, ± 3 *and* ± 5. 5. The only rational root of the equation $x^3 + 6x^2 + 10x + 3 = 0$ is <u>3</u>	Write a polynomial expression or equation for each of the following using x as the variable 1. five times a number decreased by four. 2. the sum of a number and its square. 3. a number decreased by three. 4. the difference between six times a number and ten. 5. The quotient of nine times a number and seven is equal to eight more than the number.	Write a polynomial expression or equation for each of the following using x as the variable 1. The area of a rectangle with length 2 inches more than the width is 32 square inches. 2. The sum of three consecutive even integers is 60. 3. The volume of a rectangular box with length 3 inches more than the width, and width 1 inch more than the height is 220 square inches.
B. Establishing a purpose for the lesson	When do we say that a real number, say r, is a root of a given polynomial equation in x?	Were you able to find the number of roots of polynomial equations by inspection?	a. How are polynomial equations related to other fields of study?	a. How are polynomial equation used in solving real-life problems and in decision making?

			b. How are these used in solving real-life problems and in decision making?	b. What are the steps in solving word problem?
C. Presenting examples/Instances of the new lesson	In solving polynomial equation, we are looking for the value(s) of the variable that will make the **Roots of the Equation.** Illustrative example: If a polynomial equation is expressed in factored form, the roots are easily determined, and it is much easier to solve. 1. Let's have $x (x^2 – 4) (x + 3) = 0$ Solution: $x (x^2 – 4) (x + 3) = 0$ Equate each of the factor to zero, and then solve for x, that is $x = 0$ $\quad x^2 – 4 = 0$ $x + 3 = 0$ $\quad x^2 = 4$ $x = -3$ $\quad x = \sqrt{4}$ $x = \pm 2$ Therefore the roots of the polynomial equation	In solving polynomial equation, we are looking for the value(s) of the variable that will make the **Roots of the Equation.** Illustrative example: If a polynomial equation is expressed in factored form, the roots are easily determined, and it is much easier to solve. 1. Let's have $x (x – 3)^4 (x + 6)^2 = 0$ Solution: $x (x – 3)^4 (x + 6)^2 = 0$ Equate each of the factor to zero, and then solve for x, that is $x = 0$ $\quad x – 3 = 0$ $x = 3$ the root is multiplicity of 4 $x + 6 = 0$ $x = 6$ the root is multiplicity of 2 Therefore the roots of the polynomial equation	Solving problems can be fun, but we don't know where to begin, it can be very frustrating. Problem solving skills can be improved greatly with consistent practice. Problem solving skills is a process, and consists of several steps which are applied sequentially. A. Understand the Problem Read the problem. What are the given facts? B. Plan Your Approach Choose a strategy C. Complete the Work Apply the strategy. Use the algebra you know to apply the strategy to solve the problem D. Interpret the Results	Problem solving skills is a process, and consists of several steps which are applied sequentially. A. Understand the Problem Read the problem. What are the given facts? B. Plan Your Approach Choose a strategy C. Complete the Work Apply the strategy. Use the algebra you know to apply the strategy to solve the problem D. Interpret the Results State your answer then check. Does your answer make sense? Does it satisfy the conditions of the problem?

	$x(x^2 - 4)(x + 3) = 0$ are 0, 2, -2 and -3 The difficulty of finding the roots of polynomial increases when the polynomial is not expressed in factored form. 2. Let's solve the equation $6x^4 - 19x^3 - 22x^2 + 7x + 4 = 0$ Solution: This is 4th degree polynomial, then it has at most 4 real roots. The leading coefficient is 6, thus its factors are 1, 2, 3 and 6 The constant term is 4 and its factors are 1, 2 and 4 By the rational root theorem, the possible roots are $\pm 1, \pm \frac{1}{2}, \pm \frac{1}{3}, \pm \frac{1}{6}, \pm 2,$ By synthetic division: Trial 1: x = 1 1 ⌋ 6 -19 -22 7 4 6 -13 -35 -28	$x(x - 3)^4 (x + 6)^2 = 0$ are 0, 3 multiplicity of 4 and 6 multiplicity of 2 The difficulty of finding the roots of polynomial increases when the polynomial is not expressed in factored form. 2. Let's solve the equation $x^3 - 10x^2 + 32x - 32 = 0$ Solution: This is 3rd degree polynomial, then it has at most 3 real roots. The leading coefficient is 1, thus its factors is 1. The constant term is 32 and its factors are 1, 2, 4, 8, 16 and 32 By the rational root theorem, the possible roots are $\pm 1, \pm 2, \pm 4, \pm 8, \pm 16, and;$ By synthetic division: Trial 1: x = 2 2 ⌋ 1 -10 32 -32 2 -16 32 1 -8 16 0	State your answer then check. Does your answer make sense? Does it satisfy the conditions of the problem? Illustrative Example: In the TLE Class at Trece Martires City National High School, the boys of G10 – Aguinaldo was asked to build a huge wooden rectangular container with a volume of $60m^3$.The width of the rectangular container is 2 m less than the length and the height is 1 m less than the length. Find the dimensions of the container.  Solution: Understand the Problem	Illustrative Example: 1. The dimension of a rectangular metal box is 3 cm, 5 cm and 8 cm. If the first two dimensions are increased by the same number of centimetres, while the third dimension remains the same, the new volume is 34 cm^3 more than the original volume. What is the new dimension of the enlarged rectangular metal box? Solution: Assign variables to represent the unknown Let x = the amount of increment x + 3 = height of the new box x + 5 = width of the new box (length) (width) (height) = volume $8(x + 5)(x + 3) =$ $3(5)(8) + 34$

	6 -13 -35 -28 -24 Thus, x = 1 is not a root. Trial 2: x = - 1 -1 ⌋ 6 -19 -22 7 4 -6 2 -3 4 6 -25 3 4 0 Thus, x = -1 is one of the roots, and $6x^3 – 25x^2 + 3x + 4 = 0$ the first depressed equation. Trial 3: x = 4 4 ⌋ 6 -25 3 4 24 -4 - 4 6 - 1 -1 0 Since the remainder is equal to zero, then x = 4 is also one of the root, and $6x^2 - x - 1 = 0$ is the second depressed equation. Solving the quadratic equation $6x^2 - x - 1 = 0$ $(3x + 1)(2x - 1) = 0$ $3x + 1 = 0$ $2x - 1 = 0$ $3x = -1$ $2x = 1$ $x = -1/3$ $x = ½$ Therefore the roots of	Thus, x = 2 is one of the roots, and $x^2 - 8x + 16 = 0$ the first depressed equation. Solving the quadratic equation $x^2 - 8x + 16 = 0$ $(x - 4)(x - 4) = 0$ $x – 4 = 0$ $x - 4 = 0$ $x = 4$ $x = 4$ Therefore the roots of $x^3 - 10x^2 + 32x - 32 = 0$ are 2 and 4 multiplicity of 2	After reading and understanding the problem, sometimes it is much easier to understand if we draw a diagram. Plan Your Approach Choose a strategy. The strategy to use is to translate the facts in the problem into an equation. Then solve to find the answer. Assign variables to represent the unknown Let x represent the length, then x -2 will be the width and x-1 the height (length)(width)(height) = volume $x(x – 2)(x – 1) = 60$ $x^3 – 3x^2 + 2x = 60$ $x^3 – 3x^2 + 2x - 60 = 0$ Complete the work Solve the equation $x^3 – 3x^2 + 2x - 60 = 0$ If x = 2 2⌋ 1 -3 2 -60 2 -2 0 1 -1 0 -60	$8(x^2 + 8x + 15) = 154$ $8x^2 + 64x + 120 = 154$ $8x^2 + 64x – 34 = 0$ $4x^2 + 32x – 17 = 0$ Complete the work Solve the equation $4x^2 + 32x – 17 =$ $(2x –1)(2x + 17) = 0$ $x = ½$ $x = -17/2$ Since the dimension cannot be negative, take x = ½ as the amount of increment. Interpret the Results The rectangular metal box is 3.5 cm long, 5.5 cm wide and 8 cm high.

	$6x^4 – 19x^3 - 22x^2 + 7x + 4 = 0$ are 1, 4, -1/3 and 1/2		X = 2 is not a solution Try x = 5 5⌋ 1 -3 2 -60 2 -2 0 1 -1 0 -60 X = 5 is one of the solution Then using the depressed equation and quadratic formula: $x^2 + 2x + 12 = 0$ $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ $x = \frac{-2 \pm \sqrt{2^2-4(1)(2)}}{2(1)}$ $x = \frac{-2 \pm \sqrt{-44}}{2}$ Reject the solutions, since they are not real numbers Therefore, x = 5 x – 2 = 3 x – 1 = 4 Interpret the Results The container is 5m long, 3 m wide and 4m high. Is the volume of the container $60m^3$? 5 x 3 x 4 = 60 60 = 60	

D. Discussing new concepts and practicing new skills # 1	1. Solve the equation $x^3 + 6x^2 + 11x + 6 = 0$ Solution: The equation has at most _____ real roots. The leading coefficient is _____, and its factors are _____ and _____. The constant term is _____, and its factors are _____,_____,_____,_____,_____,_____,_____,_____,_____,_____ and _____. The possible roots of the equation are _____, _____,_____,_____._____ and _____. To test if 1 is a root of the given equation, use synthetic division 1 ⌋ 1 6 11 6 _____ Since the remainder is _____, therefore 1 is _____ of the equation. Test if -1 is a root of the equation. -1 ⌋ 1 6 11 6	1. Solve the equation $x^3 + x^2 - 12x - 12 = 0$ Solution: The equation has at most _____ real roots. The leading coefficient is _____, and its factors are _____ and _____. The constant term is _____, and its factors are _____,_____,_____,_____,_____,_____,_____,_____,_____,_____,_____,_____ and _____. The possible roots of the equation are _____, _____,_____,_____._____ and _____. To test if 1 is a root of the given equation, use synthetic division 1 ⌋ 1 1 -12 -12 _____ Since the remainder is _____, therefore 1 is _____ of the equation. Test if -1 is a root of the equation. -1 ⌋ 1 1 -12 -12 _____	Find four rational numbers such that the product of the first, third and fourth numbers is 54. Also the second number is 2 less than the first number, the third is 5 less than the second, and the fourth is 3 less than the third. Solution: Understand the Problem: You are asked to find _____ rational numbers that satisfies the given conditions. Plan Your Approach Let x represent the first number. Then _____ represent the second number. (The second is 2 less than the first.) _____ represent the third number. (The third is five less than the second.) _____ represent the fourth number. (The fourth is three less than the third.)	Solve completely: The diagonal of a rectangle is 8m longer than its shorter side. If the area of the rectangle is 60 square meter, find its dimensions.

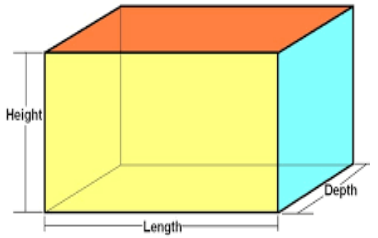
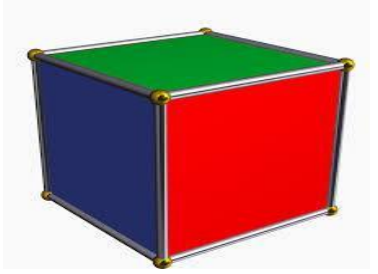
	_____ Since the remainder is _____, therefore -1 is _____ of the equation. This implies that $\frac{x^3 + 6x^2 + 11x + 6}{x + 1} = x^2 + 5x + 6$ We can obtain the other roots of $x^3 + 6x^2 + 11x + 6 = 0$ by solving for the roots of $x^2 + 5x + 6 = 0$ by factoring or by using the quadratic formula. If the roots are _____ and _____. To check, simply substitute each of these values to the given equation. Therefore the real roots of the polynomial equation $x^3 + 6x^2 + 11x + 6 = 0$ is _____.	Since the remainder is _____, therefore -1 is _____ of the equation. This implies that $\frac{x^3 + x^2 - 12x - 12}{x + 1} = x^2 - 12$ We can obtain the other roots of $x^3 + x^2 - 12x - 12 = 0$ by solving for the roots of $x^2 - 12 = 0$ by factoring or by using the quadratic formula. If the roots are _____ and _____. To check, simply substitute each of these values to the given equation. Therefore the real roots of the polynomial equation $x^3 + x^2 - 12x - 12 = 0$ are _____, _____ and _____. The factored form of the polynomial $x^2 + x^2 – 12x - 12$ is _____.	The product of the first, third and fourth number is 54. Therefore, the equation will be: _____ □ Complete the work: Using Synthetic Division, test if 1 is a solution: 1⌋ ____ ____ _____ ____ _____ To see if there are other rational solutions, use the quadratic formula to solve the depressed equation. □ Interpret the Results: The numbers are _____, _____, _____, _____. Is the product of the first, third and fourth numbers 54?	

E. Discussing new concepts and practicing new skills # 2	Solve: $(2x –1) (x +3)(x- 2) = 0$ 1. Is there a relationship between the number of roots and the degree of a polynomial equation? 2. What are the different theorems or strategies we can use to solve polynomial equations?	Find the roots of each polynomial equation $x^4 - 5x^2 + 4 = 0$ 1. Is there a relationship between the number of roots and the degree of a polynomial equation? 2. What are the different theorems or strategies we can use to solve polynomial equations?	In an art class, the students are ask to make and design an open box with a volume of $64cm3$ by cutting a square of the same size from each corner of a square piece of card board 12 cm on a side and folding up the edges. What is the length of a side of the square that is cut from each corner Solve 1. How do you solve a problem? Do you follow a step by step procedure? 2. Can we use polynomial equations in solving word problems?	Solve : The area of a triangle is $44m^2$. Find the lengths of the legs if one of the legs is 3m longer than the other leg. a. How do you solve a problem? b. Do you follow a step by step procedure?
F. Developing mastery (leads to Formative Assessment 3)	Solve the polynomial equation 1. $x^4 - x^3 –11x^2 + 9x +18 = 0$ 2. $x^4 + 5x^3 + 5x^2 – 6 = 0$	Find the roots of each polynomial equation. 1. $x^3 - 6x^2 + 11x – 6 = 0$ 2. $(x^3 - 8) (x + 3)^2 = 0$	Solve completely: One dimension of cube is increased by 1 inch to form a rectangular block. Suppose the volume of the new block is 150 cubic inches, find the length of an edge of the original cube?	Solve the problem. 1. Packaging is one of the important features in producing quality products. A box designer needs to produce a package for a product in the shape of a pyramid with a square base having a

				total volume of 200 cubic inches. The height of the package must be 4 inches less than the length of the base. Find the dimensions of the product. Solution: Let _____ = area of the base _____= height of the pyramid If the volume of the pyramid is V = 1/3 (base) (height), Then, the equation that will lead to the solution is 36 = _____ The possible roots of the equation are : _____ Using synthetic division the roots are: _____ Therefore the length of the base of the package is _____ and its height is _____ 2. One side of a rectangle is 3 cm shorter than the other side. If we increase the length of each side by 1

				cm, then the area of the rectangle will increase by 18 cm^2. Find the lengths of all sides
G. Finding practical application of concepts and skills in daily living	THINK-PAIR-SHARE Find the roots of each polynomial equation. 1. $x^3 + 2x^2 – 25x –50 = 0$ 2. $x^4 – 6x^3 – 9x^2 + 14x = 0$	THINK-PAIR-SHARE Find the roots of each polynomial equation. 1. $3x^3 - 19x^2 + 33x –9 = 0$ 2. $x^3 – 2x^2 + 4x - 8 = 0$	Solve completely: 1. Find four consecutive even numbers such that the product of the first, third and fourth is 2240.	Solve the problem 1. A tree is supported by a wire anchored in the ground 5 feet from its base. The wire is 1 foot longer than the height that it reaches on the tree. Find the length of the wire. 2. The sum of a number and its square is 72. Find the number.
H. Making generalizations and abstractions about the lesson	A root of a polynomial equation is a value of the variable which	A root of a polynomial equation is a value of the	Problem solving skills is a process, and consists of several steps which are applied sequentially.	Problem solving skills is a process, and consists of several

	makes the polynomial equal to zero. In solving polynomial equations, we may use: a. Zero Product Property b. Synthetic division c. The Remainder Theorem d. The Factor Theorem e. The Rational Root Theorem	variable which makes the polynomial equal to zero. In solving polynomial equations, we may use: a. Zero Product Property b. Synthetic division c. The Remainder Theorem d. The Factor Theorem e. The Rational Root Theorem	A. Understand the Problem Read the problem. What are the given facts? B. Plan Your Approach Choose a strategy C. Complete the Work Apply the strategy. Use the algebra you know to apply the strategy to solve the problem D. Interpret the Results State your answer then check. Does your answer make sense? Does it satisfy the conditions of the problem?	steps which are applied sequentially. A. Understand the Problem Read the problem. What are the given facts? B. Plan Your Approach Choose a strategy C. Complete the Work Apply the strategy. Use the algebra you know to apply the strategy to solve the problem D. Interpret the Results State your answer then check. Does your answer make sense? Does it satisfy the conditions of the problem?
I. Evaluating learning	Solve each polynomial equation, Show your complete solution. 1. $x^3 – 2x\ 2 – 4x + 8 = 0$ 2. $x^2 (x^3 – 1) (x – 4) = 0$	One of the roots of the polynomial equation is given. Find the other roots. 1. $– 2x^4 + 13x^3 – 21\ x^2 + 2\ x + 8 = 0$	Solve completely: The Yes - O club of TMCNHS launches a recycling campaign. In support of the program, the G 10 –	1. The length of a rectangle is 1 m less than twice the width. If the area is 55 m^2, find the perimeter

		$x_1 = -\frac{1}{2}$ 2. $x^4 - 3x^2 + 2 = 0$ $x_1 = 1$	Newton collected all their waste papers and constructed two boxes, a cube and a rectangular box. The volume of the cube is $7cm^3$ more than twice the volume of the rectangular box. The length of the box is 2cm greater than the length of an edge of the cube, its width is 2 cm less than the length of an edge of the cube, and its height is 1 cm less than the length of an edge of the cube. Find the dimensions of the cube and the box.  	2. The sum of two numbers is 27 and their product is 50. Find the numbers. 3. The length of a rectangle is 5 cm more than its width and the area is $50cm^2$. Find the length, width and the perimeter.

J. Additional activities for application or remediation	1. Follow-up: Solve the polynomial equation. a. $x^5 - 7x^3 - 2x^2 + 12x + 8 = 0$	1. Follow-up: Solve the polynomial equation. a. $x^4 - x^3 - 7x^2 + 13x - 6 = 0$ 2. Study LM pages 94-95, Applying polynomial equations in real life situations	1. Follow-up: One dimension of a cube is increased by1 inch to form a rectangular block. Suppose that the volume of the new block is 150 cubic inches . Find the length of an edge of the original cube.	1. Follow Up: The product of two numbers is 20. The sum of squares is 41. Find the numbers 2. Study: Polynomial Functions, Grade 10 Mathematics LM, page 99, 106-107
V. REMARKS				
VI. REFLECTION				
A. No. of learners who earned 80% in the evaluation				
B. No. of learners who require additional activities for remediation who scored below 80%				
C. Did the remedial lessons work? No. of learners who have caught up with the lesson				
E. Which of my teaching strategies worked well? Why did these work?				
F. What difficulties did I encounter which my principal or supervisor can help me solve?				
G. What innovation or localized materials did I				

use/discover which I wish to share with other teachers?				