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| Teacher’s Name:  |  | GRADE: 7 |  | UNIT: 3 | Algebraic Sequences | DATE: |  |
| TEXTBOOK and PAGE NUMBER:Alabikan book from page 111 - 116 | LESSON TITLE:**Predicting the 20th Term, Position-Term** |
| ***CURRICULUM STANDARDS*:** 7.8.1 Extend and find missing terms in numeric or geometric patterns or sequences using words, diagrams, or symbols (term-position or position-term rules).7.8.3 Generalise the relationship between one term of a sequence and the next, or between the number of the term and the term, using words or symbols. |
| ***NPST:****(National Professional Standards for Teachers)* | **[ ]  1** | **[ ]  2** | **[ ]  3** | **[ ]  4** | **[ ]  5** | **[ ]  6** | **[ ]  7** | **[ ]  8** | **[ ]  9** | **[ ]  10** | **[ ]  11** | **[ ]  12** |
| **LESSON OBJECTIVE:**Students will be able to:1. Predict the number of tiles in the 20th term of an arithmetic sequence using position-term.
2. Represent the 20th term as a numeric expression based on the geometric representation of the pattern (how it looks).
3. Represent each term as a numeric expression based on the geometric representation of the pattern (how it looks).
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| **KEY VOCABULARY:** term, position, numeric expression, algebraic expression, represent | **RESOURCES:** **The main resources needed for the lesson:**

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| Whiteboard ❒  | OHP/data show ❒  | Manipulative ❒  |
|  Textbook ❒  | Internet/Websites ❒  | Demonstration Tools ❒  |
| PowerPoint ❒  | Calculators ❒  | Worksheet, Handouts ❒  |
| Other ❒  |

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| **STARTER**  10 minutes | Revise on the previous lesson by giving the students the growth patterns worksheet.Ask the students to solve the worksheet independently then review it in peers. |
| **MAIN ACTIVITY :**  |
| **TEACHER’S ROLE:** | **STUDENT’S ROLE:** | **Time**10 min10 min10 min |
| In our previous work with growth patterns we talked about numeric and geometric changes.What is the difference between a numeric and a geometric change? | [Numeric change is how many are being added or subtracted each time and geometric change is how the picture is changing each time or the “look” is changing.] |
| [Show PPT]The little girl on the left was taken from her family when she was 7 years old. 30 years later police were able to use a computer to generate the picture on the right which was an estimation of what she would look like at 37. They advertised this picture and they found her.The technology was created because there are 11 bones in the face that grow in a very predictable pattern. By calculating how the bones grow (in mass AND in shape), computer scientists were able to work with researchers to predict how the pattern of bone growth would LOOK after 30 years. Our bones determine many features about how our face ages.The mass is a numeric change, the shape is a geometric change. This is a real world reason why we look for a pattern’s geometric and numeric change. Math is a way to represent the growth patterns in nature. |  |
| [Show PPT]Before, we discussed all of the different ways that we saw changes from term to term.How is the pattern changing from term to term? | [Adding 2 each time. Students may have different ways of describing how 2 is being added each time.] |
| In today’s class, we will find a relationship between our term and our position number.Its position is its place in the sequence. The first term is in the position of 1. The second term is in the position of 2.We will define our term as the total number of tiles.[Fill in the table on the PPT]

|  |  |  |
| --- | --- | --- |
| Position |  | Term, Total Tiles |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |

Before, we predicted our next term, by making the same change that we had seen from term to term. Now we are going to use the position to help us know the term.That way, we can predict any term as long as we know its position.  |  |
| Continue building this pattern: Do you remember what the 20th term would look like?How many tiles would be in the 20th term? How do you know? [Ask questions so that they describe how they found it based on how it looks. Write the numeric expression that they describe on the board. Relate the numeric expression to the position. Check to make sure that the numeric expression would evaluate as 39 tiles. Make sure that students are basing their numeric expressions on what the pattern looks like and not simply manipulating numbers.]  | [Students might know the total number of tiles is 39. They should record the work you do as a class on the table.]Examples: “The bottom row is always the same as the position so it has 20 and the top is one less so it has 19.”You write 20 + (20 – 1).You say, “So the term is 20 so I write 20 for the bottom row. And you added the top row which is 1 less than the bottom row or 20 – 1.”“There are 2 rows and each has 19 tiles so I doubled that and then I added 1 more because the bottom row has an extra.”You write, 2 x 19 + 1.You say, “How did you know there were 19 in each row?” to help the student relate what they are thinking to the position.Then write, 2 x (20 – 1) + 1Other possible numeric expressions: 2 x 20 – 1, 19 + 19 + 1 |
| We are able to make predictions about future terms in our pattern because we can relate what the term will look like and how many tiles it will have to each position.A table can help us see how the term relates to the position.When I see the first term, I only see 1.When I see the second term, I see 1 + 2.

|  |  |  |
| --- | --- | --- |
| Position | What I See | Term, Total Tiles |
| 1 | 1 | 1 |
| 2 | 1 + 2 | 3 |
| 3 | 2 + 3 | 5 |
| 4 | 3 + 4 | 7 |
| 5 | 4 + 5 | 9 |
|  |  |  |
| 20 | 19 + 20 | 39 |

Which of the numeric expressions does that match? Why do you say that?What are some other ways that I might see this pattern growing? | [Students might say 20 + (20 – 1). Listen carefully to their responses to make sure that it is a match.]Other Examples (but not all):

|  |  |  |
| --- | --- | --- |
| Position | What I See | Term, Total Tiles |
| 1 | 1 | 1 |
| 2 | 1 + 2 | 3 |
| 3 | 1 + 2 + 2 | 5 |
| 4 | 1 + 2 + 2 + 2 | 7 |
| 5 | 1 + 2 + 2 + 2 + 2 | 9 |
|  |  |  |
| 20 | 1 + 19 x 21 + (20 – 1) x 2 | 39 |

|  |  |  |
| --- | --- | --- |
| Position | What I See | Term, Total Tiles |
| 1 | 1 | 1 |
| 2 | 1 + 2 | 3 |
| 3 | 2 + 2 + 2 – 1  | 5 |
| 4 | 2 + 2 + 2 + 2 – 1  | 7 |
| 5 | 2 + 2 + 2 + 2 + 2 – 1  | 9 |
|  |  |  |
| 20 | 20 x 2 – 1 | 39 |

 | 10 min |

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| Our tables can help us see the numeric expressions that we use to represent or describe the 20th term.Activity Directions:1. Complete the handout.
2. At the end of the activity, we will compare to see the group that found the most numeric expressions.
3. You must be able to justify your expression with a picture.
4. Graph the sequences.

Questions to ask as students are working:*Assessing Understanding:*1. How many different numeric expressions can you find related to what you see?
2. How does the position relate to the term?
3. How many tiles would the 100th term have?

*Giving Feedback/Helping with Misunderstanding:*1. How are you adding tiles each time? What would that look like with numbers?
2. Draw a diagram of what you think the 20th term would look like. How did you know that?
3. Can you relate any of the numbers in your expression to the position of the term?

*Extending:*1. How could we represent these numeric expressions with an algebraic expression?
2. What stays the same? What is changing?
 | [Students may find it easier to find the expression for the 20th term and then work backwards. Ask them to try to find as many ways as possible.] | 20 min |
| Sharing Work:1. Ask the Blue member from each group to come to the chart and list the number of numeric expressions they found and a picture to demonstrate how it relates to the picture.
2. Review the lists and cross out the common ones. Ask members of each group to justify any “unique” expressions that they found.
3. The group with the most expressions “wins.”
 | Chart:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| GROUP | 1 | 2 | 3 | 4 | 5 | 6 |
| Pattern #1 |  |  |  |  |  |  |
| Pattern #2 |  |  |  |  |  |  |
| Pattern #3 |  |  |  |  |  |  |
| Pattern #4 |  |  |  |  |  |  |

 | 10 min |
| Discussion:How were the sequences different? How were they the same?What was changing in each pattern? What stayed the same? | [Pattern #1 and Pattern #2 had a constant change of 2, but the first terms were different. Pattern #3 and Pattern #4 had a constant change of 3, but the first terms were different.The change in tiles stayed the same. The total number of tiles changed. Sometimes there was a fixed number.]  | 10 min |
| **CLOSURE:** 10 minutes | Self- AssessmentReview each question on your handout.Write ☺ if you understand it.Write 😐 if you think you understand.Write ☹ if you do not understand.Graph these sequences. What will the graphs of these sequences look like? How will they be the same? How will they be different? [Record student predictions on chart paper for each pattern.] |
| ***DIFFERENTIATION / ACCOMODATIONS***Process differentiated by learning style.Tactile-Using TilesVisual-Drawing pictures, Work is organized in a tableAuditory-Oral instructions, Group work so students hear ideas from other students |
| ***ASSESSMENT STRATEGIES:***

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| **❒ Teacher Observation, Conferencing with Student**  | **❒ Criteria based assessment** | **❒ Quiz** | **❒ Work from textbook/booklet** | **❒ Project** |
| **❒ Peer assessment** | **❒ Self assessment** | **❒ Pre/post test** | **❒ Investigation** | **❒ Activity Sheet** |

 | **HOMEWORK:** |
| ***METHODOLOGY (TEACHING STRATEGIES)***

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| ❒ Brainstorm Mind map | ❒ Student writing | ❒ Picture Photo activity | ❒ Think-pair-share | ❒ Role Play | ❒ Research | ❒ Problem Solving | ❒ Venn diagram |
| ❒ Shared writing | ❒ KWL chart | ❒ Graphicorganizer | ❒ Cooperative group activity | ❒ Learning stations | ❒ Modeling | ❒ Student reading | ❒ Jigsaw |
| ❒ Shared reading | ❒ Group debate or discussion | ❒ Projects | ❒ Other  |  |   |  |

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