Patterns
Standard: 3.A.1.6

Recognize, describe, extend, and create patterns.
*Create, describe, and extend numeric and geometric patterns including multiplication patterns.
*Whole number patterns that increase or decrease as a result of adding, subtracting, multiplying, or dividing. (ex. 4,9,14,... or 2, 4, 8, ...)

Concept Skill:
Patterns: ________________________________________________

A **pattern** is a sequence of numbers or pictures that follows a rule. Patterns can be repeating, increasing, or decreasing.

**Number Pattern:**

A number pattern is a list of numbers that follow a certain sequence or pattern.

**Examples:**

1, 4, 7, 10, 13, 16, 19, 22, 25, ...
This sequence has a difference of 3 between each number. The pattern is continued by adding 3 to the last number each time.

3, 8, 13, 18, 23, 28, 33, 38, ...
This sequence has a difference of 5 between each number. The pattern is continued by adding 5 to the last number each time.
**Arithmetic Sequences**

An Arithmetic Sequence is made by **adding** some value each time.

**Example: 1**

**What is the next number in the pattern?**

1, 4, 7, 10, 13, 16, 19, 22, 25,...

**Step 1: Is the number increasing or decreasing?**

If the number is **increasing**, it is adding numbers.

If the number is **decreasing**, it is subtracting numbers.

This sequence has a difference of 3 between each number. The pattern is increasing by adding 3 to the last number each time.

**What is the next number in this pattern?**

3, 8, 13, 18, 23, 28, 33, 38, ...

**Step 1: Is the number increasing or decreasing?**

This sequence has a difference of 5 between each number. The pattern is increasing by adding 5 to the last number each time.
Special Sequences

Triangular Numbers

Example: 2

Can you figure out this pattern?

1, 3, 6, 10, 15, 21, 28, 36, 45, ...

Step 1: Is the number increasing or decreasing?

This sequence is generated from a pattern of dots which form a triangle.

By adding another row of dots and counting all the dots we can find the next number of the sequence:
**Geometric Sequences**

A Geometric Sequence is made by multiplying by some value each time.

**Example: 3**

What do you think the pattern is here?

**Step 1: Is the pattern increasing or decreasing?**

2, 4, 8, 16, 32, 64, 128, 256, ...

This sequence has a factor of 2 between each number. The pattern is continued by multiplying the last number by 2 each time.

3, 9, 27, 81, 243, 729, 2187, ...

This sequence has a factor of 3 between each number. The pattern is continued by multiplying the last number by 3 each time.
Write your answers to parts (a) and (b) of open-response in the spaces provided.

Michael wrote the number pattern shown below.

57, 53, 49, 45, 41

a. What could be the rule for Michael’s pattern?

b. Use the rule you wrote in part (a) to write the next three numbers in Michael’s pattern.

57, 53, 49, 45, 41, ____, ____, ____
Crystal enjoys collecting cards. The following are the cards Crystal collected in 5 weeks.

2  4  8  16  32
Week 1  Week 2  Week 3  Week 4  Week 5

If the pattern continues, how many cards will Crystal have collected on week 6? Explain your answer
Look at the pattern:

96, 81, 66, 51, ____

Write the number on the blank that comes next in the pattern.

Explain how you found the number that comes next.

___________________________________________
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Carlos enjoys eating apples. He has put some apples in one basket and takes some from another basket. He has a pattern that he is following when counting the apples. Can you figure out his pattern?

23, 25, 20, 18, 20, ___, ___, ___

Explain how you found the numbers that came next in the pattern.

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Michael wrote the number pattern shown below.

\[57, \ 53, \ 49, \ 45, \ 41\]

c. What could be the rule for Michael’s pattern?

The rule for Michael’s pattern could be \((-4)\). You are subtracting 4 every time from each number.

d. Use the rule you wrote in part (a) to write the next three numbers in Michael’s pattern.

\[57, \ 53, \ 49, \ 45, \ 41, \ 37, \ 33, \ 29\]
Crystal enjoys collecting cards. The following are the cards Crystal collected in 5 weeks.

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4</td>
<td>8</td>
<td>16</td>
<td>32</td>
</tr>
</tbody>
</table>

If the pattern continues, how many cards will Crystal have collected on week 6? Explain your answer.

64

If the pattern continues, Crystal will have collected 64 cards by week 6. Every week, the number is being___doubled. Week 1 was 2 when doubled, it was 4. 4___doubled is 8, 8 doubled is 16, 16 doubled is 32, and 32 doubled is 64. You can also multiply each number by__two. For example, 2x2=4, 4x2=8, 8x2=16, 16x2=32, and 32x2=64.
Look at the pattern:

96, 81, 66, 51, 36

Write the number on the blank that comes next in the pattern.

Explain how you found the number that comes next.

To find my answer, I subtracted. 96 – 81 = 15, 81 – 66 = 15, 66 – 51 = 15. It was subtracting 15 each time therefore, I had to subtract 15 from 51 to get my answer of 36.
Carlos enjoys eating apples. He has put some apples in one basket and takes some from another basket. He has a pattern that he is following when counting the apples. Can you figure out his pattern?

23, 25, 20, 22, 18, 20, 17, 19, 17

Explain how you found the numbers that came next in the pattern.

I added and subtracted each time. From 23 to 25, it was adding 2. From 25 to 20, it was subtracting 5. From 20 to 22 it was + 2. From 22 to 18 it was -4. From 18 to 20 it was + 2. From 20 to 17 it was -3. From 17 to 19 it was + 2 and from 19 to 17, it was -2.