**Pattern Block Graph**

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| In this lesson, students build pattern block animals inspired by literature, describe and graph the shapes used, and interpret the data by asking and answering questions to develop the concepts of geometry and graphing.  |

**NC Mathematics Standard(s):**

**Represent and interpret data.**

 **NC.1.MD.4** Organize, represent, and interpret data with up to three categories.

* Ask and answer questions about the total number of data points.
* Ask and answer questions about how many in each category.
* Ask and answer questions about how many more or less are in one category than in another.

**Additional/Supporting Standards:**

**Reason with shapes and their attributes.**

**NC.1.G.1** Distinguish between defining and non-defining attributes and create shapes with defining attributes by:

● Building and drawing triangles, rectangles, squares, trapezoids, hexagons, circles

● Building cubes, right rectangular prisms, right circular cones, spheres, and right circular cylinders.

**NC.1.G.2**  Create composite shapes by**:**

**●** Making a two-dimensional composite shape using rectangles, squares, trapezoids, triangles, and half-circles naming the components of the new shape.

● Making a three-dimensional composite shape using cubes, right rectangular prisms, right circular cones, and right circular cylinders naming the components of the new shape.

**Standards for Mathematical Practice**

1. Reason abstractly and quantitatively
2. Construct viable arguments and critique the reasoning of others
3. Model with mathematics
4. Use appropriate tools strategically
5. Attend to precision

**Student Outcomes:**

* I can organize and represent data.
* I can analyze and interpret data.
* I can answer questions based upon my collected data.
* I can reason with shapes and their attributes.

**Materials:**

* An owl book (Owl Moon by Jane Yolen, This is Owl by Kayleigh O’Mara, Owl Howl by Paul Friester & Philippe Goosens)
* Pattern Blocks
* Blackline Master of Pattern Block Graph
* Pattern block stamps or paper cut-out pattern blocks

**Advance Preparation**:

* Duplicate the Blackline Master of Pattern Block Graph per student.
* If using the paper cut-out pattern blocks, have them ready to use.

**Directions:**

1. The teacher reads an owl book such as Owl Moon by Jane Yolen, This is Owl by Kayleigh O’Mara, Owl Howl by Paul Friester & Philippe Goosens.
2. During the discussion of the book, the teacher will ask the students to describe the owl in the book.
3. The students will create an owl using pattern blocks. During this time, the teacher will ask students to tell the defining attributes of the pattern block shapes. The following are examples of defining attributes of the green triangle pattern block: a closed shape and a three-sided shape.
4. Pattern block stamps or paper cut-out pattern blocks will be used to make a duplicate copy of his/her pattern block owl.
5. The students will pose and write a question on the blackline master of Pattern Block Graph.
6. Each student will organize and represent his/her data onto the blackline master of Pattern Block Graph. This includes labeling the axes of the graph.
7. Students need to analyze their graphs. Analyzing a graph includes the total number of data points, how many in each category, and how many more or less are in one category than in another.
8. Next, each student will interpret his/her graph by reading the posed questions and checking to see if the data answers the question.
9. Students will display their graphs and explain the graphs to the whole group. The sharing student will ask the other students if they agree that the graph shows the answer to the question and if they have any other questions about the data collected.

**Questions to Pose:**

During designing pattern block owls:

1. What pattern blocks are you using and how do you know that pattern block is a ?

During graphing:

1. What information will your data show you?
2. How do you know how many green triangles you used?
3. How do you know how many red trapezoids spaces to color?
4. How many pattern blocks did you use and how do you know?
5. Which pattern block shape did you use the most of and how do you know?
6. What data shows the least amount of pattern block shapes that you used?
7. Which pattern block shape was used least and how do you know?

After:

1. What can you tell me about your owl by looking at this pattern block graph?
2. What does the shape of your data tell you?
3. How is Student 1’s graph the same and/or different from Student 2’s graph?
4. Point to a hexagon, what other shapes could you have used here?
5. Which pattern block shape do you think the class used the most and how could we check to see?
6. Which pattern block shape do you think the class used the least and how could we prove it?

**Possible Misconceptions/Suggestions:**

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| **Possible Misconceptions** | **Suggestions** |
| Students cannot transfer the data to the graph. | Have students use the paper pattern blocks onto the graph to represent the data. |
| Students cannot tell how many more or less are in one category than in another. | Have students use the paper pattern blocks or actual pattern blocks of the two categories and match shapes one-to-one to see how many more or how many less. |

**Special Notes:**

The blackline master of the pattern block graph may be used for any design. Tasks such as this one can and should be repeated many times during the year. An extension of this task would be for students to create another owl and compare their two owls.

**Solutions:**

Students’ graphs will vary.

**Example of the Blackline Master of Pattern Block Graph:**

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| Student’s Posed Question will be written here. |
| Student will label this axis here. | 10 |  |  |  |  |  |  |  |  |  |  |
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| 8 |  |  |  |  |  |  |  |  |  |  |
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| 6 |  |  |  |  |  |  |  |  |  |  |
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| 3 |  |  |  |  |  |  |  |  |  |  |
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| 1 |  |  |  |  |  |  |  |  |  |  |
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| Student will label this axis here. |

**Blackline Master of Pattern Block Graph**

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