**Yellow and Red Birds**

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| **This is lesson five in a series of six lessons focused around developing a mathematical community at the beginning of the school year. The goal is to promote the idea of persevering while solving problems.**  |

**NC Mathematics Standards:**

**Represent and solve problems.**

**NC.1.OA.1** Represent and solve addition and subtraction word problems, within 20, with unknowns, by using objects, drawings, and equations with a symbol for the unknown number to represent the problem, when solving:

• Add to/Take from-Change Unknown

• Put together/Take Apart-Addend Unknown

• Compare-Difference Unknown

**Standards for Mathematical Practice:**

1. Make sense and persevere while solving problems in mathematics.
2. Reason abstractly and quantitatively.

4. Model with mathematics.

**Student Outcomes:**

* I can work with classmates to choose a strategy to solving a math problem.
* I can persevere while solving a math problem.
* I can explain to my teacher and classmates how I solved a math problem.

**Math Language:**

* Join, Part, Total

**Materials:**

* Multi-link cubes, Two-color counters

**Advance Preparation**:

* Gather materials.

**Launch:**

1. Ask students *What does it mean to* ***persevere****?* Explain to students that persevering means that you keep working and trying to accomplish a task even when it is hard. Give examples if needed, such as The Little Engine that Could, or other relatable stories.

**Explore:**

1. Give the students the task ***There are 10 birds. Some are yellow and some are red. How many of each could there be? We want to find as many combinations of yellow and red birds as we can.***

Give students access to multi-link (pop) cubes or two-color counters if they choose to use them. Also consider giving them a part-part-whole mat or ten frame that is attached.

Ask the class to think for a second about the problem. Reread it if needed. Then have students retell the problem to you in their own words.

As students begin working on the task with partners or in small groups observe how they start and support them by asking questions.

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| **Observation** | **Questions to Ask** |
| Students grab more than 10 objects and start organizing them OR Students do not have a way to start exploring the task.  | * *What does the problem tell us?*
* *How can we use manipulatives/objects to help us?*
 |
| Students make two piles of 10 objects and then start moving them around. | * *What does the problem tell us?*
* *Are there 10 yellow and 10 red birds or 10 birds total?*
 |

**Discuss:**

* + Bring the students back together to discuss their strategies and solutions. As you record the solutions consider using a 2 column table. An example is below.

|  |  |
| --- | --- |
| **Yellow** | **Red** |
| 1 | 9 |
| 2 | 8 |
| 3 | 7 |
| 4 | 6 |
| 5 | 5 |
| 6 | 4 |
| 7 | 3 |
| 8 | 2 |
| 9 | 1 |

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| **Sample Questions** | **Possible Responses****(in order of least to most sophisticated)** |
| * *How did you explore this task?*
 | * I put 10 2 color counters out. I put some so they were yellow and some so they were red. I counted and wrote it down. Then I flipped some yellow ones to make them red and counted and wrote. I did this a few times.
* I put 2 color counters on the ten frame mat with 5 red and 5 yellow. Then I turned each red one to yellow until I had 9 red and 1 yellow. Then I started again with 5 red and 5 yellow but this time turned each yellow one to red until I had 9 yellow and 1 red.
* I used red and yellow pop cubes. I started with 9 yellow and 1 red since that was the most yellow we could have. Then I took away 1 yellow and added 1 red and recorded each combination.
 |
| * *Why is the number 2 in both columns of our table?*
 | * I notice that 2 is paired with 8 in both rows. In one case it is 2 yellow birds and 8 red birds and in the other case it means 2 red birds and 8 yellow birds.
* I know that 2 joined with 8 is 10. Based on the table I see that 8 joined with 2 is also 10. Switching the 2 and the 8 does not change the answer.
 |
| * *Is 10 and 0 a possible combination? Why or why not?*
 | * The problem says that there are some red and yellow birds so 10 and 0 is not a possible combination.
 |

The teacher could have the class also explore a number less than 10 as a follow-up task or proceed to the additional activities (centers) described below.

Finish the discussion by sharing: *In this task you had to persevere and keep trying since our task had many possible answers. In math we always want to try to persevere and work hard because that will make us a better mathematician.*

**Additional Activities:**

 Consider having students complete these activities as centers.

Yellow and Red Birds (follow up)

Students choose (or are given) a number between 5 and 10. They then explore the possible combinations of that number. Teachers may want to do this in a teacher-facilitated small group.

Toss the Counters

Students choose (or are given) between 5 and 10 red and yellow counters. They repeatedly drop them and record the number of red and yellow counters each turn in their mathematics journal or on paper.

For example, if a student drops 7 counters they could have:

|  |  |  |
| --- | --- | --- |
| Total | Red | Yellow |
| 7 | 5 | 2 |
| 7 | 6 | 1 |
| 7 | 2 | 5 |
| 7 | 0 | 7 |

 Number Picture

Students choose (or are given) between 5 and 10 multi-link (pop) cubes. They arrange them in a picture on paper. All of the cubes should be connected and share at least 1 side with other cubes. The students should draw a picture of their cubes. Then the student should draw a circle around part of the picture and another circle around the other part of the picture. The student should then count the number of cubes in each group.

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Hiding Cubes

Students work in pairs. Students choose (or are given) between 5 and 10 pop cubes. They make them into one connected line and ask their partner to close their eyes. They break off some cubes and hide them. Their partner then opens their eyes and has to determine how many cubes are hidden.

**Evaluation of Student Understanding:**

**Informal Evaluation:**

* During the Explore activity and/or centers activity, question and make observations about students’ strategies and look for evidence that students understand or are struggling with concepts.

**Formal Evaluation**

* The work from the Explore task or the Yellow and Red Birds additional activity could be used as a formal evaluation.

**Meeting the Needs of the Range of Learners:**

**Interventions:**

* Complete the opening task with 5 or 6 cubes instead of 10.

**Extensions:**

* Add rigor to the opening task in two ways: have students find combinations to 11, 12, or 13 OR have students work with combinations to 10 but add to the initial task that there were more red birds than yellow birds so students have to consider that constraint as well.

**Possible Misconceptions/Suggestions:**

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| **Possible Errors****and Misconceptions** | **Suggestions** |
| Students may struggle setting up the initial task. | Reduce the number of birds in the task.Scaffold with questions.  |

**Special Notes:**

* This is the fifth lesson in a series of six lessons. The Additional Activities can be used as centers at other times during the year.

Part Part Whole Mat

|  |  |
| --- | --- |
| Part | Part |
| Whole |

Ten Frames

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