**Groups of Things**

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| In this lesson, students explore the concept of multiplication by thinking about things that come in groups. They connect equations to story problems that involve equal groups, use various strategies to solve those problems, and share their thinking by communicating their reasoning and sharing solutions.  |

**NC Mathematics Standard(s):**

**Operations and Algebraic Thinking**

**NC.3.OA.1** For products of whole numbers with two factors up to and including 10:

* Interpret the factors as representing the number of equal groups and the number of objects in each group.
* Illustrate and explain strategies including arrays, repeated addition, decomposing a factor, and applying the commutative and associative properties.

**NC.3.OA.3** Represent, interpret, and solve one-step problems involving multiplication and division.

* Solve multiplication word problems with factors up to and including 10. Represent the problem using arrays, pictures, and/or equations with a symbol for the unknown number to represent the problem.
* Solve division word problems with a divisor and quotient up to and including 10. Represent the problem using arrays, pictures, repeated subtraction and/or equations with a symbol for the unknown number to represent the problem.

**Additional/Supporting Standards:**

**NC.3.OA.9** Interpret patterns of multiplication on a hundreds board and/or multiplication table.

**Standards for Mathematical Practice:**

1. Make sense of problems and persevere in solving them

4. Model with mathematics

7. Look for and make use of structure.

8. Look for and express regularity in repeated reasoning.

**Student Outcomes:**

* I can explain the meaning of multiplication.
* I can write a multiplication equation to represent story problems.
* I can use repeated addition, skip counting and/or visual representations to solve a problem for finding the total number in several groups.
* I can share my thinking and solution by communicating my reasoning.

**Math Language:**

* equal groups
* multiplication
* strategy
* repeated addition
* skip counting

**Materials:**

* Chart paper labeled 2’s, 3’s, 4’s, 5’s, 6’s, 7’s, 8’s, 9’s, 10’s
* Markers
* Activity Sheet
* 1 egg, 1 stick of gum, 1 shoe, 1 glove or mitten

**Advance Preparation**:

* When assigning groups numbers 2-9, be aware that some numbers are harder than others! Choose which number you will assign each group based on students who can handle an extra challenge (or not).

**Launch:**

1. What Do These Things Have in Common? (10 minutes)

Bring in, or show pictures of the following items: 1 egg, 1 stick of gum, 1 shoe, and 1 glove or mitten. Ask students to think about what these items have in common. Give them time to think without answering so that each student has time to consider how the items are alike.

Allow students to respond until someone suggests the idea that these items are found in groups. Eggs are normally sold by the dozen, gum in packs, shoes in pairs, and gloves in pairs.

Today’s lesson will focus on things that come in groups.

**Explore:**

1. Finding Things That Come in Groups (20 minutes)

Divide students into 9 groups. Each group will be assigned a number from 2-10. Ask each group to generate a list of things that come in groups of their number and record it on a sheet of paper.

As you monitor each group’s work, be prepared to make ask questions or make suggestions to groups who are struggling with their list.

* What things do we use in the classroom that come in groups?
* When are people found in equal groups? (sports teams, multiple births, rollercoaster seats, car seats, etc. )
* What body parts are found in groups?
* What kinds of things come in packages?

More ideas for finding groups might be: things in nature, packages of food or snacks, sports teams and scoring, money, and geometric shapes. See the chart below for a list of possible answers.

After students have had time to generate some ideas, regroup as a whole class so that each group can share their posters. As each group shares, record their ideas on a single chart that will be posted in the classroom. Some groups may suggest items that may be in multiple groups (i.e. crayons, bracelets, pencils.) Either agree on one group to place them in, or suggest that you choose a different item to record.

Ask the following questions:

Which groups do you think were the easiest to find ideas? Why?

Which groups do you think were the most difficult? Why?

Explain that you can add to this chart over the next few days if anyone discovers additional items that come in groups.

**Discuss:**

1. Multiple Groups 20 min.

Pick an item from one of the categories (fingers on a hand) to use as an example. Ask how we can use the numbers of fingers on one hand to find the number of fingers on four hands.

Draw or trace 4 hands, then write the following sentence frames on the board:

**Here are 4 hands.**

**There are 5 fingers on each hand.**

**There are \_\_\_\_\_\_ fingers altogether.**

On whiteboards or math journals, ask students to copy the sentence frames, draw a picture of what is represented in the sentences, then show their work for solving the problem. Ask some of them to share their solution and their strategy for solving. Most will solve by skip counting or adding. If no one suggests counting each finger separately, ask them if that would be a useful strategy. Ask them if they could get the correct solution by counting each finger.

How could these pictures be represented by each of the strategies? Write the equation for counting each finger separately (1 + 1 + 1 + 1… = 20), then write the equation 5 + 5 + 5 + 5 = 20. Ask how these equations are alike, and how they are different. Do they represent the same problem? Where are the 5’s found in the equation with all of the 1’s? Ask someone to come up and group the 1’s in the equation into 5’s (maybe by circling five 1’s together).

Ask students how many 5’s they see in the equation and where they find that number of groups in the picture and in the sentence frame. Ask which representation helps us think of the picture as groups of things. Ask why we might want to think in terms of groups of fingers, rather than each separate finger.

How could these pictures be represented with skip counting? Write 5, 10, 15, 20. Ask students how many times they skip counted to find the answer. Ask where that represented in the picture and the sentence frames. How could we show this on a hundreds board? How is the skip counting strategy related to the addition strategy? Students should recognize that both strategies involve counting 4 groups of 5.

Tell them that we can represent 4 groups of 5 as 4 x 5 = 20. Write this equation under the other representations. Ask students to explain to a partner where the number of groups is represented in the equation, and then the number in each group. Point out that there are 4 groups of hands, with 5 fingers on each hand, and 20 represents the total number of fingers. Use the sentence frames in the chart below to summarize each part of the problem and solution.

Explain that you would like for them to choose from the class poster one thing that comes in groups. (You may limit this to a smaller number if you wish.) On a sheet of paper, or in their journals, they need to draw a picture of several of the items. Under the picture, they will copy the sentence frames found below and fill in the blanks, solve by showing their work, then write an equation that represents their strategy.

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| **Here are \_\_\_\_­­­\_\_\_ \_\_\_\_\_\_\_\_\_.** **(how many) (groups)****There are \_\_\_\_\_\_\_\_ in each \_\_\_\_\_\_\_.** **(number) (group)****There are \_\_\_\_\_\_ altogether.** **(total number)****\_\_\_\_\_ groups of \_\_\_\_\_ = \_\_\_\_\_****\_\_\_\_\_\_ X \_\_\_\_\_ = \_\_\_\_\_** | **Example:****Here are 5 faces.****There are 2 eyes on each face.****There are 10 eyes altogether****5 groups of 2 = 10****5 x 2 = 10** |

**Additional Activities (if needed)**

Groups of Things (15 min.)

Ask students to complete the Activity Sheet.

**Evaluation of Student Understanding**

Informal Evaluation:

Formal Evaluation/Exit Ticket: As students are making their groups of things problems. As you monitor student work, look for:

* an accurate picture representation of the objects that they chose
* strategies, such as repeated addition or skip counting that represents multiplicative thinking. If a student is counting each individual object, ask him/her to point out the groups and label each group with the number in the group. Ask how they might be able to find the total number of objects without counting each one separately.
* an equation that represents their strategy. If they are unable to write an equation, ask them to explain their strategy. Have them label their representation with numbers, then describe the operation they used.

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

**Intervention:** Limit the number of groups or number in each group to 5 or less.

**Extension:** Students use the chart of Things that Come in Groups to create additional Groups of Things stories. Have them use the sentence frames as a starting point to draw pictures, write repeated addition equations, multiplication equations, then solve.

**Possible Misconceptions/Suggestions:**

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| **Possible Misconceptions** | **Suggestions** |
| Student adds the number of groups instead of the number in each group. | Have student refer to their picture, then write the number in each group under each picture. |
| Student adds the number of groups to the number in each group. | Ask them to use the picture to check the reasonableness of their solution. Walk them through a repeated addition equation for the picture, asking them to identify the number of groups and number in each group.  |

**Possible Solutions:**

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| 2’s | Eyes, ears, arms, legs, feet, shoes, socks, gloves, twins,  |
| 3’s | Sides on a triangle, wheels on a tricycle, triplets,  |
| 4’s  | Legs on a dog, sides of a square, wheels on a car, quarters in a dollar, legs on a table |
| 5’s | players on a basketball team, points on a star, sides on a pentagon |
| 6’s | Insect legs, faces on a cube, hexagon sides |
| 7’s | Days in a week, colors of a rainbow |
| 8’s | Tentacles on an octopus, sides on an octagon, spider legs, hot dogs in a pack |
| 9’s | Squares on a tic-tac-toe board, innings in a baseball game, players on a baseball team |
| 10’s | Fingers, toes, dimes in a dollar,  |

Groups of Things Activity Sheet

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| 1. 30 fingers  | 2. 24 wheels | 3. 36 legs |

**Groups of Things**

**Draw a picture of each problem. Write an addition equation, a multiplication equation, then solve.**

**1. Here are 6 hands.**

 **There are 5 fingers on each hand.**

 **There are \_\_\_\_\_\_ fingers altogether.**

**2. Here are 8 tricycles.**

**There are 3 wheels on each tricycle.**

**There are \_\_\_\_\_\_ wheels altogether.**

**3. Here are 6 ladybugs.**

 **Each ladybug has 6 legs.**

 **There are \_\_\_\_\_\_ legs altogether.**