**Standards addressed by these problems: 3.OA.3, 3.OA.4, and 3.OA.5 (addressed by all problem types)**

* **3.OA.7 – if students use a fluent strategy**
* **3.OA.1 – multiplication problem types**
* **3.OA.2 & 3.OA.6 – division problem types**

Overall purpose of these problem types: *To encourage students to use their understanding of multiplication and division and properties of operations to solve multiplication and division problem types.*

***Teacher Note: Problem types are listed as CGI problem type names/CCSS problem situation names***

***\*According to the CCSSM, the goal in this unit is to have students reason about the meaning of multiplication and division. Furthermore, the standards want students to understand the meaning behind each number within the number sentence. For example: see the following three problem type examples.***

|  |  |  |
| --- | --- | --- |
| **Multiplication** | **Measurement Division** | **Partitive Division** |
| Matthew has 3 packages of markers. Each package has 8 markers. How many markers does he have altogether? | Matthew has 24 markers. He puts 8 markers in each package. How many packages will he need for his markers? | Matthew has 24 markers. He puts his markers in 3 packages. How many markers are in each package? |
| **3 x 8 = 24*** **3 represents the number of groups**
* **8 represents the number in each group**
* **The total (24) is unknown**

**Students may write 8 x 3 = 24 for this story. Although this is mathematically correct (based on the commutative property of multiplication) it is imperative that we have discussions in which we discuss what number sentence/equation goes with the story. Students need to understand what each number represents.** | **24 ÷ 8 = 3*** **24 represents the total**
* **8 represents the number in each group**
* **The number of groups (3) is unknown**
 | **24 ÷ 3 = 8*** **24 represents the total**
* **3 represents the number of groups**
* **The number in each group (8) is unknown**
 |

**\*For standard 3.OA.3 the CCSSM states that students will move through three levels (direct modeling, counting, and using algebraic reasoning) in solving multiplication/division problems within 100. Students are not required to memorize these multiplication/division facts within this unit; students just need to have a valid strategy for solving the problems. This means students can use drawings and/or manipulative to solve these problems.** *The teachers’ role is to help students to connect their strategy to a number sentence. As mentioned in the table above, students need to understand the meaning behind each number within the number sentence. Teachers are encouraged to foster a discussion in the classroom that displays the different strategies used by the students in solving the problems (see Mathematical Practices).* **In unit 2, the students are using these authentic experiences in working with multiplication/division problem types to help move toward fluency.****By the end of the year, 3.OA.7 states that students should be fluent multiplying and dividing within 100.**

**Multiplication and Division Word Problems**

**Additional Resource**

Children’s Mathematics – Cognitively Guided Instruction by Carpenter, Fennema, Franke, Levi, Empson

***\*See page 33-53 in for background knowledge on multiplication and division problem types and information on how students solve these types of problems.***

**Multiplication (Arrays) / Unknown Product (Arrays)**

* During the assembly, Mrs. Welsh’s third grade class sat in 2 rows. Each row had \_\_\_\_ students. How many students from Mrs. Welsh’s class were at the assembly?

(5) (10)

* In Farmer Ted’s garden he had \_\_\_\_ rows of cabbage. Each row had \_\_\_\_ cabbages. How many cabbages are in Farmer Ted’s garden altogether?

(2, 4) (4, 2) (4, 4) (4, 3)

* The third graders at Rockefeller Elementary put out chairs for their author’s tea. They put the chairs into \_\_\_\_ rows with \_\_\_\_\_ chairs in each row. How many chairs did the third graders use for their author’s tea?

(3, 5) (4, 5) (5, 5) (10, 5)

**Measurement Division (Arrays) / Number of Groups Unknown (Arrays)**

* If \_\_\_ chairs are arranged into equal rows of \_\_\_ chairs, how many rows would that be?

(40, 10) (40, 4) (25, 5) (16, 4)

* Mrs. Ellis was organizing her classroom for the upcoming year. She had \_\_\_ desks that she arranged into equal rows of \_\_\_ desks. How many rows would that be?

(25, 5) (20, 5) (20, 4) (16, 4)

* Harp’s grocery store made a window display using apples. They arranged the apples into rows. On each row they put \_\_\_ apples using \_\_\_ apples altogether. How many rows of apples did their window display have?

(4, 12) (4, 16) (4, 20) (5, 20)

**Partitive Division (Arrays) / Group Size Unknown (Arrays)**

* Jose is helping his dad tile the bathroom floor. They use \_\_\_ tiles altogether and they put the tiles into \_\_\_ rows. If they put the same number of tiles in each row, how many tiles would that be in each row?

(50, 5) (50, 10) (40, 10) (30, 10)

* Wal-Mart wants to make a outside display of their pumpkins. They decided to stack \_\_\_ pumpkins into \_\_\_ rows. They made sure to put the same number of pumpkins in each row, how many pumpkins would that be?

(40, 10) (40, 4) (20, 4) (12, 4)

* The kindergarteners from Old Wire Elementary were so excited to go on a hayride at the pumpkin patch. Not all of classes could take the hayride at the same time. Mrs. Yates had her students sit on the hay in rows. She put her kids into \_\_\_ rows. Altogether she had 20 students. If she made sure she had an even number of kids in each row, how many kids would that be?

(2) (4) (5)