**Division Number Talks**

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| In this lesson, students solve division problems mentally and share strategies. Number Talks build understanding of quantities, numerical relationships, and procedural fluency. |

**NC Mathematics Standard(s):**

**Operations and Algebraic Thinking**

**NC.3.OA.7** Demonstrate fluency with multiplication and division with factors, quotients and divisors up to and including 10.

* Know from memory all products with factors up to and including 10.
* Illustrate and explain using the relationship between multiplication and division.
* Determine the unknown whole number in a multiplication or division equation relating three whole numbers.

**NC.3.OA.2** For whole-number quotients of whole numbers with a one-digit divisor and a one-digit quotient:

* Interpret the divisor and quotient in a division equation as representing the number of equal groups and the number of objects in each group.
* Illustrate and explain strategies including arrays, repeated addition or subtraction, and decomposing a factor.

**NC.3.OA.6** Solve an unknown factor problem, by using division strategiesand/or changing it to a multiplication problem.

**Standards for Mathematical Practice:**

2.  Reason abstractly and quantitatively.

3. Construct viable arguments and critique the reasoning of others.

4.  Model with mathematics.

6.  Attend to precision.

**Student Outcomes:**

* I can mentally solve division problems and share my thinking.

**Math Language:** What words or phrases do I expect students to talk about during this lesson?

* **factor**
* **quotient**
* **divisor**
* **decompose**
* **dividend**

**Materials:**

* Anchor chart or board
* Markers of various colors

**Advance Preparation**:

* Select problems to pose to students that will highlight particular division strategies
* Before you begin your first number talk, establish the number talk routine norms. Students gather in a common meeting area near the board or chart. They will not need paper or pencil for this activity. Teachers pose a problem and students will mentally solve the problem in whatever way makes sense to them. When students have a solution and can describe their strategy, they will place a quiet thumb at their chest to communicate with the teacher that they are ready to share their solution and strategy. As additional wait time passes, students are encouraged to think of different strategies and hold up additional fingers to show the number of solution strategies they have.

**Launch:**

1. Posing the Problem (2 minutes)

Write the following problem on chart/board: (Note: The first division strategy we are thinking about is multiplying up, which is the reason we are beginning with a multiplication problem.)

 9 x 2

**Explore:**

1. Solving the Problem (3-5 minutes)

Give students private think time to solve the problem mentally. They hold up their thumb to indicate when they have a solution and can share their strategy. Giving ample wait time is imperative.

**Discuss:**

1. Sharing Our Thinking (5-10 minutes)

Ask students to share their answers. Record all given answers. Ask several students to share their solutions. Use a different color to record each student's’ strategies, and press for clarification when needed. Listen, write and ask clarifying questions to ensure students’ thinking is accurately represented. Resist putting words in their mouths.

Repeat this process (Launch, Explore, and Discuss) with the following problems:

9 x 4

9 x 5

72 **÷** 9

**Evaluation of Student Understanding**

**Informal Evaluation:**

Observation during the number talk: What strategies do students share? Who participates? What do they say? How do they explain their thinking?

**Formal Evaluation/Exit Ticket:**

Create an exit ticket with a problem similar to the one you have posed to see what strategy students use.

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

**Intervention:**

* Conduct a small group number talk, modifying the numbers to give equal access to the strategy.
* One on one interview, posing an equation and conducting a Number Talk with the specific student.

**Extension:**

* Ask students in their math journal to explain connection between strategies shared in the Number Talk.

**Possible Misconceptions/Suggestions:**

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| **Possible Misconceptions** | **Suggestions** |
| 1. Students may think fast is better.
2. Students may try to multiply 72 and 9 instead of divide.
3. Students may have difficulty keeping track of their steps in multiplying up-careful recording of their thinking will help with this.
 | 1. Give long wait time.
2. Elicit and record multiple strategies that can be applied to other problems.
3. Ask the student to model their thinking with cubes, pictures, number lines.
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**Special Notes:**

* Sometimes you may want to make connections between strategies.
* If the strategy you are hoping to elicit does not surface:
	+ Continue to give similar problems in subsequent number talks. As students become comfortable with mental math and talking about their thinking, hopefully they will begin exploring other strategies.
	+ Pose a question about a “student next door” who used 9 x 5 to think about 72 **÷** 9. How do you think this student used 9 x 5? What was his/her next step?

**Possible Solutions:**

The above string of problems was chosen to highlight the strategy of multiplying up to divide. The multiplication problems are intended to support students’ use of this strategy. You may have to ask prompting questions such as, “Could you use 9 x \_\_ to help you solve 72 **÷** 9? How? Why can we use multiplication to help us solve division problems?”

**Activity Sheet (for teacher)**

The following sets of problems can be used in subsequent number talks to continue developing flexibility in strategy use for division.

**Division**

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| **4 x 2****4 x 4****4 x 5****36 ÷ 4****Strategy: Multiplying Up** | **5 x 5****5 x 2****5 x 10****60 ÷ 5****Strategy: Multiplying Up** | **54 ÷ 6****Strategy: Multiplying Up- Application- Use problems like this to see if students will apply the strategy without giving them suggested multiplication combinations to help.** |
| **30 ÷ 6****18 ÷ 6****48 ÷ 6****Strategy: Partial Quotients** | **40 ÷ 8****8 ÷ 8****80 ÷ 8****Strategy: Partial Quotients** | **56 ÷ 8****Strategy: Partial Quotients- Application- Use problems like this to see if students will apply the strategy and decompose the dividend in ways that make sense to get partial quotients.** |

This lesson is adapted from:

* Making Number Talks Matter by Cathy Humphries & Ruth Parker
* Number Talks by Sherry Parrish