Grade 5

Number Talks

Purposes:

To develop computational fluency (accuracy, efficiency, flexibility) in order to focus students' attention so they will move from:

- figuring out the answers any way they can to . . .
- becoming more efficient at figuring out answers to . . .
- just knowing or using efficient strategies

Description:

The teacher gives the class an equation to solve mentally. Students may use pencil and paper to keep track of the steps as they do the mental calculations. Students' strategies are shared and discussed to help all students think more flexibly as they work with numbers and operations.

Materials:

- Prepared problems to be explored
- Chalkboard, white board, or overhead transparency
- Individual white boards or pencil and paper
- Optional: Interlocking cubes; base ten materials; decimal squares

Time: 15 minutes maximum

Directions:

Example: 9.8 + 8.7

1. Write an expression **horizontally** on the board (e.g., 9.8 + 8.7).

2. Ask students to think first and estimate their answer before attempting to solve the problem. Post estimates on the board. This will allow you to see how the students are developing their number sense and operational sense.

3. Ask students to mentally find the solution using a strategy that makes sense to them. Encourage students to "think first" and then check with models, if

needed. Have tools available to help students visualize the problem if they need them (e.g., base ten blocks; 100 grids; decimal squares).

4. Ask students to explain to a partner how they solved the problem.

5. While students are discussing their strategies, walk among the groups listening to the explanations. Find those strategies you want to call attention to for the whole class. Choose strategies for discussion that you might want other students to think about and possibly experiment with.
   For example, in the problem 9.8 + 8.7 you might see the following strategy and want other students to think about and possibly experiment with it:

   9.8 + 8.7 =
   8.7 – .2 = 8.5
   9.8 + .2 = 10
   10 + 8.5 = 18.5

6. Call on a student to <u>fully</u> explain the steps he/she followed to solve the problem.

7. Record the steps precisely as the student explains them to you. Ask clarifying questions as needed to ensure that you understand the flow of the child's thinking. Be explicit about the mathematics.

   • "Why did you subtract .2 from 8.7?"
   • "Does this strategy always work? How do you know?"
   • "What did you know about the number 8.7 that allowed you to do that?"

8. As time allows, ask other students to share different methods they used for solving the equation. Follow up on each strategy shared by asking similar questions to those included in step 7. Publicly record these methods as well.

9. It is very important to facilitate a discussion about how the different representations/strategies relate to each other and result in the same answer.

   See the following examples:

<u>Example - Guiding the Share-Out:</u>

Scenario 1: 6.3 – 2.7

<u>Public Recording</u>	<u>Student's Explanation</u>
2.7 + .3 = 3.0 6.3 + .3 = 6.6 6.6 – 3.0 = 3.6	"I added the same amount to both numbers to keep the difference the same. I chose 0.3 because it makes the 2.7 into a "friendly" number to subtract."

Possible teacher response

"You said you added 0.3 to both numbers. How does adding 0.3 to both numbers keep the difference the same? Use a model to convince me."

Scenario 2: 6.3 – 2.7

Public Recording	Student's Explanation
2.7 + **0.3** = 3.0 3.0 + **3.0** = 6.0 6.0 + **0.3** = 3.6 **0.3 + 3.0 + 0.3** = 3.6	"I added 0.3 to 2.7 which makes 3.0. Then, I added 3 more to make 6. Then I added 0.3 more to make 6.3. I added together all the numbers I used. The answer is 3.6.

Possible teacher response

"So, you used an "adding up" strategy. How does adding numbers help to find the difference? Why did you choose to add the numbers that you did? How did you keep track of the numbers you added? Each strategy is different, yet each arrives at the same answer for 6.3 – 2.7. Why do you think this is so?"

Scaffold:

- When beginning Number Talks, make sure that the problems and quantities are accessible and within each child's zone of proximal development. The numbers must be accessible so that the students are solving the equations mentally.

- If you have students in your classroom who are performing at diverse instructional levels, select 3 different problems for students to solve at 3 different levels. Allow students to choose the problem which they will solve. Select problems with varying levels of difficulty so that all students have access to a problem and all students are working at a level that pushes them to their optimal level. For example:

  4.63 – 0.27 6.3 – 2.7 6.3 – 0.7

- As the students' flexibility, accuracy and efficiency improve, increase the rigor of the problems by adjusting the numbers or operations.

- Allow the students to document on paper their intermediate steps **as** they are solving the problem.

Test Prep:

Some children who understand many mathematical ideas do not fare well on a standardized test given in a multiple-choice format. Often, children guess a "letter" rather than reasoning through the problem. To improve children's test taking strategies while building number and operational sense, the following strategies are suggested:

- Pose a problem just as a problem would be posed with a "Number Talk." For example:

  40% of 250

  Ask students to think about the problem in a way that makes sense to them.

- Only after the children have thought about the problem, show them an A., B., C., and D. response. Ask them to choose the answer that is closest to their thinking. For example:

  A. 50
  B. 100
  C. 150
  D. 200

- Ask students to publicly share the methods they used for solving the problem. For example:

  "I know that 50% of 250 is 125 because all I have to do is divide it by 2. 40% is 10% less than 50%. I know that 10% of 250 is 25 because all I have to do is divide it by 10. 125 – 25 = 100. So, 40% of 25 must be 100. The answer is B."

  or

- *"I know that 10% of 250 is 25 because all I have to do is divide it by 10. I know that 4 x 10% is 40%. 4 x 25 equals 100, so 40% of 250 must be 100. The answer is B."*

- When it fits the problem, facilitate conversations about the reasonableness of each choice (e.g. *"Which choices could you eliminate immediately? Why? Why would A not have been a reasonable choice? Why would D not have been a reasonable choice?*).

- As students "guess" less and "reason" more, pose the problem along with the A., B., C., and D responses. Ask students to think about the problem in a way that makes sense to them and then select the closest answer to their thinking. Ask students to share with a partner which responses they would eliminate immediately and why.

- The important piece is that students take the time to think and reason about the problem before they choose an answer (or guess). This must be a "habit of mind" whenever they are confronted with a problem to solve. Using this format once a

week beginning very early in the school year could help students "break" the habit of guessing and assist in higher scores on standardized tests.

Notes about Number Talks:

A. Keep them short.

B. Encourage sharing and clarify students' thinking

C. Teach intentionally

- Start where your children are.
- Choose related sequences of problems.
- Chart the students' thinking so that it can be saved and referred to later.

D. Create a safe and supportive environment

- Accept answers without praise or criticism.
- Allow students to ask questions of each other.
- Encourage students to listen to each other.
- Encourage students to self-correct.

E. Vary the Number Talks to meet the range of needs.

- Vary the sharing strategies used.

  Pair share
  Share whole group
  Explain someone else's strategy

- Vary the level of difficulty within a Number Talk.

  Use written problems
  Use story problems

- Allow access to tools when appropriate.

  Number line
  Decimal grids

- Record the students' thinking using correct notation on the board, on the overhead, or on chart paper.

F. Give students lots of practice with the same kinds of problems.

G. When planning or implementing a Number Talk, consider the following:

- How do students get their answers?
- Can students use what they know for related problems?
- How well can students verbalize their thinking?
- Are errors way off or are they reasonable?

H. The role of the teacher during a Number Talk is to facilitate and guide the conversation.

- The teacher purposefully chooses children to share strategies that will move the class toward computational fluency.

- The teacher asks questions that draw attention to the relationships among strategies.
- **It is important to focus on the mathematics, not just the variety of strategies.** *Mathematically, why does the strategy work?*

Examples:

Division

245 ÷ 7	829 ÷ 9	1 1/2 ÷ 1/4
0.45 ÷ 0.3	6/8 ÷ 1/4	2/3 ÷ 1.6
48 ÷ 1.2	2.4 ÷ 1/5	16,000 ÷ 2,000

Addition and subtraction of fractions

1 – 3/5	1/4 + 1/2	4/6 – 1/3
3/4 + 1/2	1 3/4 + 1/2	1/4 +2/4
4/6 – 1/3	3/12 + 1/4	5/8 – 1/2

Inequalities

Greater than, less than, or equal to? 89 + 15 ☐ 85 + 19

Greater than, less than, or equal to? 89 x 15 ☐ 85 x 19

Greater than, less than, or equal to? 16 x 38 ☐ 18 x 36

Greater than, less than, or equal to? 32 x 18 ☐ 38 x 12

Integers

-98 + (-97)	- 27 - (13)	100 + (- 49)

Expressions for students who need support

156 - 38	62 - 33	100 - 49
750 + 250	372 + 98	59 + 36
864 - 500	370 + 99	855-56
104 – 39	87 + 49	58 – 39
91 – 53	37 + 86	499 + 76
17 x 8	25 x 6	450 ÷ 45

20 x 4 x 2

15 x 30

16 x 5