Grade 3

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 and/or base ten materials

Time: 15 minutes maximum

Directions:

Example: 98 + 87

1. Write an expression **horizontally** on the board (e.g. 98 + 87).

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. interlocking cubes, base ten blocks).

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. In the example *98 + 87*, you might want to call attention to any of the following strategies:

   87 – 2 = 85
   98 + 2 = 100
   100 + 2 = 185

   98 is almost 100 which is a friendly number
   100 + 87 = 187
   187 – 2 = 185

   90 + 80 = 170
   8 + 7 = 15
   170 + 15 = 185

6. Call on a student to fully 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 be sure you understand the flow of the student's thinking process. Be sure to be explicit about the mathematics. For example:

   • "Why does this strategy work?"
   • "Will this strategy always work?" How do you know?"
   • "What did you know about the number 87 that allowed you to do that?"
   • "Why did you need to subtract 2?"
   • "Where did the 90 come from? The 80? The 8? The 7?"

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. Record these methods.

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.

Example - Guiding the Share-Out:

Scenario 1: 63 – 27

Public Recording

63 + 3 = 66
27 + 3 = 30
66 – 30 = 36

Student's Explanation

"I added the same amount to both numbers to keep the difference the same. I chose 3 because it makes the 27 a "friendly" number to subtract."

Possible teacher response

"You said you added 3 to both numbers. How does adding 3 to both numbers keep the difference the same? How can you convince me? How can you show that?"

Scenario 2: 63 - 27

Public Recording	Student's Explanation
27 + **3** = 30 30 + **30** = 60 60 + **3** = 63 **3 + 30 + 3** = 36	"I added 3 to 27 to make 30. I added 30 more to make 60. Then I added 3 more to make 63. I added together all the numbers I used to get to 63."

Possible teacher response:

"So you used, an "adding up" strategy. How does adding numbers help to find a difference? What did you know about subtraction that made you think of adding the numbers you did? How did you keep track of what numbers to add?

Scenario 3: 63 - 27

Public Recording	Student's Explanation
63 – 20 = 43 7 = 3 + 4 43 – 3 = 40 40 – 4 = 36	"I subtracted 20 from 63 and that made 43. I broke 7 into 3 + 4 and subtracted the 3 from the 43. That made 40. I still had to take 4 away from the 40, so the answer is 36."

Possible teacher response:

"Why did you begin by subtracting 20? Where did the 20 come from? Why did you break the 7 up into a 3 and 4? Why did you subtract the 3 before you subtracted the 4? Why do you think all of these strategies work to find the same answer?"

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.

- 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.

- 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. Give students the choice of which problem they will solve. Select problems with different size numbers 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:

  463 – 27 63 – 27 63 – 7

- As you begin to introduce the multiplication module, include number talks focusing on strategies that help students making meaning of the multiplication facts. For example: 9 x 3

  9 + 9 + 9 = 27
  10 + 10 + 10 – 3 = 27
  (10 x 3) – 3 = 27
  (4 x 3) + (5 x 3) = 27
  (2 x 9) + 9 = 27

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:

  A company has 6 big trucks. Each truck has 18 wheels. How many wheels is this in all?

  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. 24
  B. 96
  C. 108
  D. 116

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

"I know that the total is 6 groups of 18. I know that 18 is 10 + 8. Six groups of ten are 60. Six groups of eights are the same as two eights three times [(8 + 8) + (8 + 8) + (8 + 8)]. 16 + 16 + 16 = 30 + 12 + 6 = 48. 48 plus 60 equals 108. There are 108 wheels in all. The answer is C.

or

- *"I know that 6 times 10 equals 60. I know that 6 times 8 equals 48. 48 plus 60 equal 108. There are 108 wheels in all. The answer is C.*

- When it fits the problem, facilitate conversations about the reasonableness of each choice (e.g. *"How did you know which operation to use? Which choices could you have eliminated immediately? Why? Why would A not have been a reasonable choice? What number would have to be in the one's place? Why?*).

- 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.

Examples:

87 + 49	37 + 86	58 –39
91 – 53	370 + 99	499 + 76
864 – 500	104 – 39	372 + 98
855 – 56	750 + 250	359 + 36
100 – 49	156 – 38	462 – 33
1200 – 49	7200 – 49	1156 – 38
9956 - 38	2462 – 33	10,462 – 33
3 x 15	11 x 9	9 x 52

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.
- Focus students' thinking:

  See if you can . . .
  How many will there be if . . . ?
  What if . . . ?
  Can you use what you know about the last problem to help you think about this problem?

- Encourage students to "think first" and then check with models, if needed.
- 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 smaller numbers
  Use story problems

- 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?