Comparing Problems

Grade 2

Activity #228

Lesson Overview

Students use mathematical reasoning to compare two addition number sentences and to name the larger sum. They also compare two subtraction number sentences and name the larger difference. They use blocks to model the problems and to check their answers.

Objectives

Thinking Skills: Students consider relative sizes of numbers and the effect of operations (+ and -) on them. They examine properties of addition and subtraction through examples and make generalizations based on their discoveries.

Mastery Skills: Students use math reasoning to predict which of two sums or which of two differences will be greater.

Materials

Each student, group of students, etc. needs:

- "Problem Pairs" Activity Sheet
- Supply of blocks to model problems and check answers, as needed

Class Introduction (15 minutes)

Explain to the class that they will be comparing answers to addition and subtraction problems. Tell students they will not name the exact answers to

the problems right away, but instead they will use their math sense to help them decide how the answers compare.

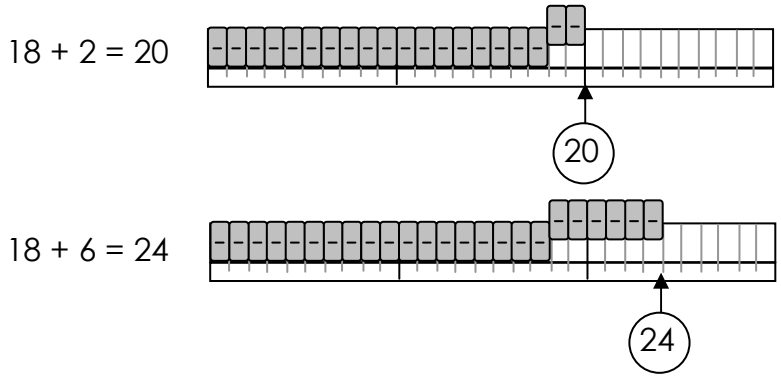
Example #1

Write the following pair of problems on the board:

18 + 2 **18 + 6**

Say, ***Without telling me the answers*** **to each problem, tell me which problem has the larger sum. Explain how you know this without actually finding the exact answers.**

- Students should explain that because one addend is the same (18), all they need to do is compare the second addends (2 and 6) to predict which sum will be greater.
- Model this with blocks to clarify.



Repeat with similar problem pairs, such as 26 + 14 and 26 + 9.

Example #2

Continue with:

16 + 5 **5 + 16**

Ask, **Which problem will have the greater sum?**

- The answer is neither, as they are both the same.
  Use blocks to illustrate the commutative property of addition, and have students give examples and justify that it "works" for larger numbers, too.

Example #3

Try a second type of problem pair, such as:

12 + 24 **16 + 9**

Ask, **Which problem will have larger sum? How do you know without actually finding the exact answers?**

- Students should explain that because the addends in the first problem are each greater that the addends in the second, the sum will be greater.
- Point out that 16 is greater than 12, to encourage students to explain that they are comparing the 12 with 9 and the 24 with 16.

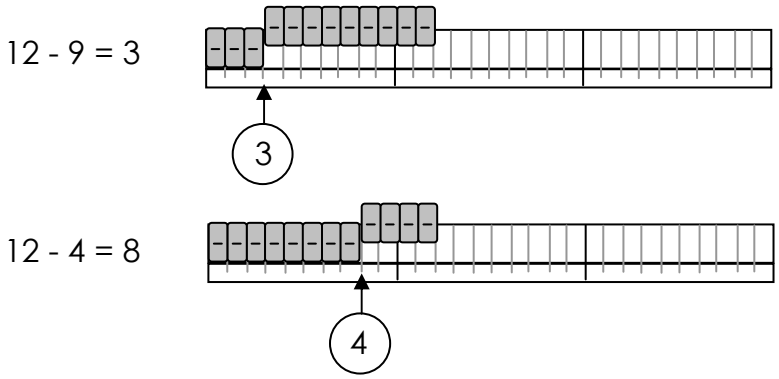
Example #4

Next, present some subtraction problem pairs. Begin with:

12 – 9 **12 - 4**

Ask, **Which problem will have the larger answer, or difference?**

- Some students may be mislead by 9 being larger than 4, and decide that 12 - 9 will be greater.
- Give students a chance to discuss their thinking, to predict the greater difference, and then to model both problems.



- Students will conclude that taking away a larger amount means that the answer will be smaller. This can be a challenging idea for many students! Be sure they really see this by modeling with blocks. Provide additional examples if necessary.

Example #5

Allow children to discover that although addition is commutative, subtraction is not. Present the following pair of problems:

16-5 **5-16**

Depending on students' level of understanding, continue to develop the ideas above. Help students express their thinking through discussion and help them model the concepts with blocks to check their understanding.

Activity **(15 minutes)**

Explain to students that they will be working with a partner to compare the answers to different problems.

- They will need to use their "math sense," not the blocks, to predict which problem has the larger answer. They will need to think about the size of the numbers in each problem and how the operation affects those numbers.
- They must write about their thinking in the space next to each problem pair.
- Once they have made their predictions, they check their answers using blocks.

Give each pair a copy of "Problem Pairs" Activity Sheet.

- Clarify directions and let students begin working.
- To help students write about their thinking, have them "rehearse" what they will write as they explain their thinking aloud to their partners.
- It may be a good idea to provide the blocks only after students have completed a few problems, as the goal of this activity is for students to develop more abstract reasoning skills.

Closure **(10-15 minutes)**

Have students describe how they decided on the larger answer for each problem pair. Help students make generalizations about the properties of operations and relative sizes of sums/differences. Make a list of their observations (including an example) *in their own words*. Students may come up with ideas, such as the following:

Observations for Addition:

- 2 larger numbers have a greater sum than 2 smaller numbers: 24 + 62 is more than 12 + 45.
- It does not matter which number comes first when you add 2 numbers: 3 + 4 = 4 + 3 and 458 + 532 = 532 + 438!

Observations for Subtraction:

- If you get more and if you take more away you get less: 10 – 2 = 8 and 10 – 5 = 5. (Note: This assumes that you start with the same amount.)
- Subtraction is not commutative.

Assessment

During the Introduction and as students are working, observe and note:
Do they -

- Understand the meaning of the operation?
- Compare numbers in a pair of problems and use their relative sizes to help them make a judgment about the sizes of the answers?
- Explain their thinking (how they know what they know) with mathematical understanding and clarity?
- Feel confident in their reasoning, or do they need to check each problem to get an actual answer?

During the Closure discussion, do students –

- Make a generalization based on examples?
- Name additional examples of problem pairs that exhibit the same "rule"?

Extensions

- Create problem pairs using "really big" numbers! Have students predict the greater (or smaller) answer. Use a calculator to check answers.
- Have students use the >, < and = signs to compare problem pairs.