Zero Subtraction

0 –

0

1 - 0

2 - 0 = ___

1

0 1 2 3 4 5 6 7 8 9

FACTastic
MATH STRATEGY CARDS

Player's Guide

REGION 13
EDUCATION SERVICE CENTER

References

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Sample

Strategy Sequence:

Beginning strategies are often strategies students develop on their own and already have in their toolbox of problem-solving skills. Advance strategies employ the knowledge of one or more of the beginning strategies and therefore should be taught after beginning strategies are mastered.

Purpose:

Teaching of strategies to recall basic facts builds flexible thinking in students. Students with flexible thinking are able to see a number in several forms and use the knowledge and skills they already possess to find a solution. Counting is not an efficient or effective strategy. "If drill is undertaken when counting is the only strategy available, all you get is faster counting." (Van de Walle & Lovin, 2005). Strategies encourage a deeper understanding of numbers and their relationships. The ultimate goal of fact strategies is to develop students' automaticity of the facts.

The more students use strategies to solve basic computation, the more likely that strategy and fact will become an innate skill for them. In most cases, students scaffold the strategies individually. Once students feel comfortable with their own strategy and confident in their knowledge of the fact, their use of the strategy will become less and less apparent.

Many students are able to develop their own strategies and should be encouraged to do so, as long as their strategy is efficient and effective. Students who struggle in math may not be able to develop efficient and effective strategies independently. The strategies in this series are designed to help students who struggle with mathematics build fact fluency. For these students, explicit and systematic instruction is most effective.

Each strategy is introduced by a short activity that includes examples of think-aloud techniques and key points to emphasize to students. The activities follow the same sequence for each strategy: objective, materials, preview, activate background knowledge, teacher demonstration, guided practice, and then independent or partner practice. The guided and independent practices are listed separately because these same instructions apply to each strategy activity.

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Productive Practice:

Remember, practice makes permanent, not perfect. When a new strategy is being introduced, work with a small group of students so you can deliver explicit and systematic instruction. Introduce the strategy through concrete and visual representations. Use teacher think-aloud to help students develop their own internal monitoring system.

Once students understand the strategy and can demonstrate basic mastery of the strategy in a small group, move on to independent practice, which includes partner work to practice the facts and strategies. Monitor the students' progress by going through the set of strategy fact cards with them individually. Collect data on the number of correct problems, speed of recall, and which facts the student continues to struggle with in the set.

When the student shows mastery of the strategy set, move the student on to a new strategy set. However, always continue to have the student practice the strategies already mastered so that the facts are not lost. Have the student practice the facts learned in the strategy set using basic flashcards without the strategy hint on the front. This will allow the student to build automaticity of the strategy.

Send strategy cards home for parents to work with their children. Provide a short explanation with the intent of the cards, or let parents know where to purchase their own household set of FACTastic Math Strategy Cards (www.store.esc13.net). Assigning fact practice time as homework sets an expectation that fact fluency is important.

Mastery of the strategies will take more time than just the demonstration of the strategy.
The following guided and independent practices apply to each strategy to expand upon the students' understanding and ensure mastery.

Guided Practice:

Practice facts as a group first. Students should state the full problem and answer instead of just calling out the answer. When practicing with the group, have the students wait three seconds before they are allowed to respond. Cue the students by holding up three fingers and counting down. This will allow students some time to think and make sure everyone has a chance to practice the fact. The group expectation is to respond in unison.

When you feel the group has a clear understanding of the strategy, play the game Beat the Teacher. Show each card, one at a time. If the group gets it right, the card is placed in a student stack. If the group is incorrect, the card is placed in the teacher stack. After the group reviews the cards, count the stacks to see who "won." Then have the students practice the teacher stack again to earn back those points lost. Another variation of Beat the Teacher is having one student at a time in the group answer the fact. Go around in a circle showing a fact card to one student at a time. That student must answer the problem. If correct, it goes in the student stack; if incorrect, it goes into the teacher stack.

Independent Practice:

Once students have been introduced to the strategy and can restate the strategy in their own words, the strategy cards can be added to their practice piles for pair or independent practice. Set clear expectations for how the students are to prompt their partner if their partner gets stuck. Also, model appropriate wait time so that the students have a clear understanding of how to be encouraging and patient with one another's learning. When the strategy is new, students should be allowed as much time as they need. Once the students have practiced with a particular strategy, wait time should decrease; ultimately, students should recall the solution to the fact in roughly three seconds.

Sample
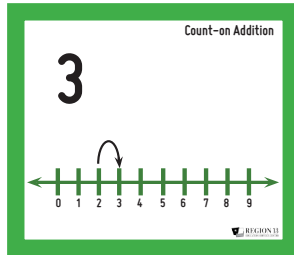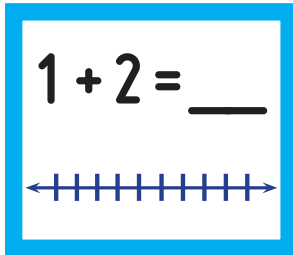
Count-on Addition:

Objective:

Students will be able to count-on 1, 2, or 3 more than a given number using their knowledge of the number line as a tool to solve the problem.

Materials:

Set of Count-on Addition Strategy Cards, 0-20 number line for each student or student group.

Preview:

"Today we will work on an addition strategy that we can use to strengthen our mental math ability. We will use the number line as our memory tool for this strategy."

Activate Background Knowledge:

Have students explain how to use the number line to add two numbers together. Have students make "jumps" on their number line using their finger to trace the jump from one number to the next. Have students close their eyes and describe a number's location on the number line. For example, 5 is after 4 but before 6. It is 5 jumps away from 0. It is between 0 and 10.

Demonstration:

1. Show the students the Count-on Addition Strategy cards. Present the cards in order of the sums, least to greatest. Start with plus 1, then move on to plus 2 and plus 3.
2. Use think-aloud techniques to talk through the first few problems. Most students will know 2 + 1 automatically but use think-aloud to verbalize the use of the strategy.
3. Prompt students to look at the fact, then picture the greater number on the number line. The student will then visualize the number of jumps (the lesser addend) to find the answer.
4. After the first run-through with the cards, mix the cards up. Remind the student to think about the greater number on the number line and then make the number of jumps to find the answer.

Sample

Make 10 Plus More Addition:
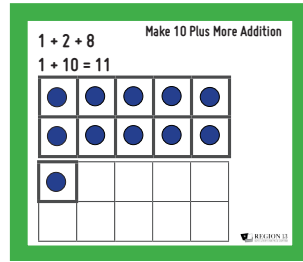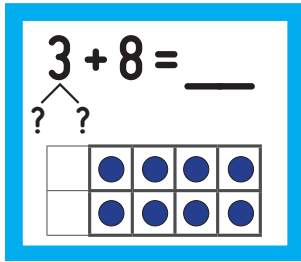
Objective:

Students will use ten-frames to help with memorization of addition facts with a sum greater than 10.

Materials:

Set of Make 10 Plus More Addition Strategy Cards and Make 10 Addition Strategy Cards, double ten-frame mat and 20 counters for each student or student group.

Preview:

"Today we will work on learning addition facts that have a sum greater than 10. This knowledge will help to strengthen our mental math ability. We will use the ten-frame as our memory tool for this strategy."

Prerequisite Skills:

Count-on strategy, Make 10 strategy, introduction to a ten-frame.

Activate Background Knowledge:

Review the Make 10 strategy and the Make 10 Strategy cards. Practice decomposing numbers in various ways. Ask students to name two parts of 3 (1 and 2 or 2 and 1). Continue by having students break apart numbers into parts. For example, 4 can be broken into 1 and 3, 3 and 1, or 2 and 2.

Demonstration:

1. Show the students the Make 10 Plus More Addition Strategy cards. Begin with 3 + 8. Direct students' attention to the ten-frame on the front of the card.

2. Distribute 20 counters and double ten-frame mats to each student. Ask student to make their ten-frame look like the one of the card.

3. Have the students place 3 counters above the ten-frame but not on the ten-frame. Say, "Look at the ten-frame. How many more counters do you need to make ten?" *(2)* "If you use 2 of the counters from the 3 that are being added to 8, how many will you have left?" *(1)* "What is 1 plus 10?" *(11)* "Place the last counter in the next ten-frame to show that 3 plus 8 is greater than 10."

4. Repeat this process with all of the cards in this strategy pack. Have students continue to use the counters to be able to see how to split one number to make 10 with the other number. Discuss with students why the strategy asks you to first make 10. Students should mention that adding a number to 10 is easier because there is 0 in the ones place.

5. After students have worked with the counters, move the counters to the side and review the cards without manipulatives. Students may need more time to talk through the strategy when solving. Encourage students to "think-aloud" and verbalize what they are doing when solving. For example, to solve the problem "4 + 8, I can take 2 from 4 to make 8 into 10. Then I have 2 more left from the 4. Now I have a new problem: 2 + 10. 2 plus 10 equals 12, so 4 plus 8 equals 12."

Sample

10 Plus More Subtraction:
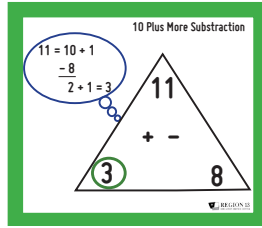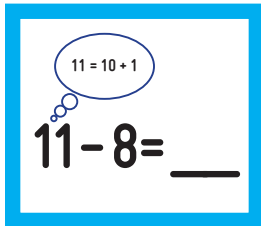
Objective:
Students will decompose numbers to create a simpler fact they know to help solve unknown subtraction facts.

Materials:
Set of 10 Plus More Subtraction Strategy Cards, Make 10 Subtraction Strategy Cards, whiteboard and markers for each student or student group.

Preview:
"Today we will use what we know to help solve problems we do not know yet. We will use our knowledge of subtracting from 10 to help strengthen our mental math ability. We will also use our knowledge of fact families to help solve."

Prerequisite Skills:
Mastery of Make 10 subtraction strategy, decomposing of numbers, tens and ones place value.

Activate Background Knowledge:
Review Make 10 Subtraction Strategy cards. Have students decompose teen numbers into tens and ones.

Demonstration:

1. Show the students the 10 Plus More Subtraction cards. Use thinking-aloud teacher talk to demonstrate how to use the strategy. For example, "For the problem 11 – 3, the bubble above the 11 reminds me that I can think of 11 as 10 plus 1. If I think of 11 as 10 plus 1, I can subtract 3 from 10. I already know how to make 10 and how to subtract from ten. 10 minus 3 equals 7. So I know 7, but I am not done. I have found the difference of 10 and 3 but not 11 and 3. I know 11 is 10 plus 1. I already subtracted the 3 from the 10 so now I just need to add back the 1. I have 7 when I subtract 3 from 10, so when I add back the 1, my answer is 8. 11 minus 3 equals 8." It is best to write out the steps as you talk through the problem.

2. Use a whiteboard to write the steps in the same format as the thought bubble on the back of the card.

3. Show the back of the card and remind students of the fact family triangle. For example, you can say, "The triangle is there to remind us that when we know 11 – 3 = 8, we also know 11 – 8 = 3.

4. Show another card and use the same think-aloud strategy, demonstrating each step on the whiteboard.

5. Then have the students join in, writing the steps on the whiteboard as the group talks through the problem together. Give students opportunities to verbalize their thinking.

Extra Practice:
Have students work every problem in the card stack on their whiteboard, writing out the steps of the strategy. Students may need to write out this strategy for a while before they are able to mentally produce the strategy without the written assistance. Give students the option to continue to use their whiteboard as long as they need to when working on this particular strategy. Once all students are off their whiteboards and able to follow the steps mentally, begin to practice as a group. Remind the students to break the number into 10s and 1s, then subtract from 10 first.

Sample

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