Sample Basic Facts:

Addition and Subtraction Concepts Activities 1–2

College- and Career-Ready Standards Addressed:

K.OA.1. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.

Understand and apply the relationship between addition and subtraction.
1.OA.4. Understand subtraction as an unknown-addend problem. For example, subtract 10 – 8 by finding the number that makes 10 when added to 8. Add and subtract within 20.

Activity One: Representing Addition and Subtraction with Objects

Purpose: To add and subtract with concrete objects

Principles of Intensive Intervention Illustrated:

- Provide concrete learning opportunities (including use of manipulatives).
- Provide explicit error correction, and have students repeat the correct process.
- Use precise, simple language to teach key concepts or procedures.
- Use explicit instruction and modeling with repetition to teach a concept or demonstrate steps in a process.
- Provide repeated opportunities to practice each step correctly.

Materials:

- One-sided flashcards with addition and subtraction problems (addends should fall between 0 – 5; minuends should not exceed 10 and subtrahends should fall between 0 – 5; see Supplemental Materials)
- Concrete objects (teachers choice)
- Worksheet: Basic Facts: Addition Concepts (for extra practice)
- Worksheet: Basic Facts: Subtraction Concepts (for extra practice)

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Modeling Addition:

1. Present addition problem (2 + 5 =)
2. Use colored bears or other concrete manipulative.
3. Show the number 2 by counting out 2 bears of the same color.
4. Place the two bears underneath the number 2.
5. Show the 5 by counting out 5 bears of a different color than the 2.
6. Place the five bears underneath the number 5.
7. Explain to students that the plus sign tells us to add.
8. Explain that when we add, we put things together.
9. Say, "To solve the problem, we put the 2 bears together with the 5 bears. Our answer is the number of bears. Let's count together. 1, 2, 3, 4, 5, 6, 7.
10. Say, "The answer to 2 + 5 = 7."
11. When we add, the amount gets bigger.

Guided Practice Addition:

1. Teacher presents addition problem (4 + 1 =)
2. Have students use colored bears or other concrete manipulative.
3. Students show the 4 by counting out 4 bears.
4. Students place the 4 bears underneath the "4."
5. Students show the number 1 by counting out 1 bear of a different color than the 4.
6. Students place 1 bear underneath the number 1.
7. Students explain the plus sign tells us to add.
8. When we add, we put things together.
9. Students put the 4 bears together with the 1 bear.
10. Students count the total.
11. Students say that the answer to 4 + 1 = 5.
12. When we add, the amount gets bigger.

(Teacher should prompt students through the sequence of activities as needed.)

Modeling Subtraction:

1. Present subtraction problem (8 - 5 =)
2. Use colored bears or other concrete manipulative.
3. Show the 8 by counting out 8 bears of the same color.
4. Explain to students that the minus sign tells us to subtract.
5. Explain that when we subtract, we take away.
6. To solve the problem, we take away 5 of the 8 bears. (Make sure the 5 bears are not a new set; students should be focused only on the 3 bears. This is important so the distinction between addition and subtraction is obvious.)
7. Say, "Let's count 5 of the bears to take away."
8. Teacher and students count 1, 2, 3, 4, 5.
9. Say, "Our answer is the number of bears we have left. Let's count together. 1, 2, 3."
10. Say, "The answer to 8 - 5 = 3."
11. When we subtract, the amount gets smaller.

Guided Practice Subtraction:

1. Teacher presents subtraction problem (6 - 2 =)
2. Student uses colored bears or other concrete manipulative.
3. Student shows the number 6 by counting out 6 bears of the same color.
4. Student explains the minus sign tells us to subtract.
5. Student explains that when we subtract, we take away.
6. Student decides to take away 2 of the bears.
7. Student counts 2 of the bears to take away.
8. Student counts 1, 2 and moves those bears to the side.
9. The answer is the number of bears left. The student counts 1, 2, 3, 4.
10. The answer to 6 – 2 = 4.
11. When we subtract, the amount gets smaller.

(Teacher should prompt students through the sequence of activities as needed.)

Corrective Feedback:

Example 1

Student demonstrates incorrect counting of concrete manipulatives and struggles with one-to-one correspondence.

Teacher demonstrates hand over hand counting. Teacher and student count together. Make sure student demonstrates he or she can count before moving forward. Teacher redirects and models counting the bears one at a time. Teacher encourages student to slow down while counting.

Activity Two: Solve Subtraction Problem as an Unknown-Addend Problem

Purpose:

Develop understanding of the relationship between addition and subtraction

Principles of Intensive Intervention Illustrated:

- Provide concrete learning opportunities (including use of manipulatives).
- Provide explicit error correction, and have students repeat the correct process.
- Use precise, simple language to teach key concepts or procedures.
- Use explicit instruction and modeling with repetition to teach a concept or demonstrate steps in a process.
- Provide repeated opportunities to practice each step correctly.

Materials:

- One-sided flashcards with subtraction problems (minuends should not exceed 18 and subtrahends should fall between 0–9; see Supplemental Materials)
- Concrete objects (teachers choice)
- Worksheet: Basic Facts: Addition Concepts (for extra practice)
- Worksheet: Basic Facts: Subtraction Concepts (for extra practice)

Modeling:

1. Present subtraction problem (12 - 7 =)
2. Use colored bears or other concrete manipulative.
3. Show the number 12 by counting out 12 bears of the same color.
4. Explain to students that the minus sign tells us to subtract.
5. When we subtract, we take away, and the amount gets smaller.

6. To solve the problem, we take away 7 of the bears.
7. Let's count 7 of the bears to take away.
8. Teacher and students count 1, 2, 3, 4, 5, 6, 7.
9. Say, "Our answer is the number of bears we have left. Let's count together."
10. Say, "The answer to 12 – 7 = 5." Write the answer: 5.
11. Explain that you can also think of 12 – 7 as an addition problem. 7 + (? or the answer to the subtraction problem) = 12.
12. Demonstrate with the bears.
13. Count 12 bears (use red).
14. Count 7 bears (use yellow).
15. Line up the 7 yellow bears underneath the 12 red bears.
16. Place 5 green bears under the remaining red bears.
17. Explain to students that there are 12 red bears in this row.
18. This row shows 7 yellow bears plus 5 green bears.
19. You can solve the problem 12 – 7 = 5 by thinking about adding.
20. 7 + 5 = 12, which is what the green and yellow bears show when they are put together.
21. Explain that this is how you can use addition to check your subtraction work.

Guided Practice:

1. Teacher presents subtraction problem (11 - 8 =)
2. Use colored bears or another concrete manipulative.
3. Students show the number 11 by counting out 11 bears of the same color.
4. Students explain that the minus sign tells us to subtract.
5. Students explain subtraction means to take away, and the amount gets smaller.
6. Students take away 8 of the bears.
7. Students counts 1, 2, 3, 4, 5, 6, 7, 8.
8. Students explain the answer to 11 – 8 = 3. Write the answer: 3.
9. Teacher prompts student to now think of 11 – 8 as an addition problem to solve it.

10. Students writes 8 + (? The answer to the subtraction problem) = 11.
11. Students lines up 11 bears with 1 color.
12. Students show 8 bears underneath the first 8 of the original 11 bears with a different color.
13. Students place 3 bears under the remaining original 11 bears.
14. Students explain that this shows 11 bears in the first row.
15. Students explain the second row shows 8 bears plus 3 bears is the same as 11 bears.
16. Student explains you can solve the problem 11 – 8 = 3 by thinking about adding.
17. 8 + 3 = 11, which is what the second row shows, so 11 – 8 = 3.

Corrective Feedback:

Example 1

Student demonstrates incorrect counting of concrete manipulatives and struggles with one-to-one correspondence.

Teacher redirects and models counting the bears one at a time. Teacher encourages student to slow down while counting. Teacher demonstrates hand over hand counting. Teacher and student count together. Make sure student demonstrates he or she can count before moving forward.

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Sample Basic Fact Fluency:

Addition and Subtraction Activity 1

College- and Career-Ready Standard Addressed:

1.OA.6. Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making 10 (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a 10 (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows that 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).

Activity One: Addition and Subtraction Flashcards: Know it or Find it

Purpose: Develop fluency with retrieval of basic addition and subtraction facts.

Principles of Intensive Intervention Illustrated:

- Provide concrete learning opportunities (including use of manipulatives).
- Provide explicit error correction, and have students repeat the correct process.
- Use precise, simple language to teach key concepts or procedures.
- Use explicit instruction and modeling with repetition to teach a concept or demonstrate steps in a process.
- Provide repeated opportunities to practice each step correctly.

Materials:

- Double-sided flashcards with addition and subtraction problems and answers (totals should not exceed 20; minuends should not exceed 20; see Supplemental Materials)
- Scorecard or chart (see Supplemental Materials)
- Worksheet: Basic Fact Fluency: Addition (for extra practice)
- Worksheet: Basic Fact Fluency: Subtraction (for extra practice)
- Stopwatch or timer

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Modeling:

1. Explain that the students will take turns solving addition and subtraction problems using flashcards.
2. Teacher explains as a group (this works best in a group of 3 students) that students will try to answer as many flashcards as they can correctly in 2 minutes.
3. The goal of the game is for students to improve their scores every time they play.
4. First, the teacher explains the fastest way to answer a problem is to **know** it right away.
5. If a student knows it, he or she states the answer, and then it's the next person's turn.
6. If a student does NOT know it, he or she must **find** the answer before moving to the next person.
7. Teacher reviews strategies for finding the answer. These include:
   - Counting on (using fingers; see Step 8)
   - Using scratch paper to find the answer
   - Any other useful strategy the teacher deems reasonable
8. Teacher gives an example of all the different ways to find the answer.
   - Counting On Strategy (Example: 7 + 2 =)
     - Start with the bigger number (7).
     - Count on the other number (2, so student counts on 2 from 7: 8, 9).
     - Last number counted (9) is the answer!
   - Counting On Strategy (Example: 7 – 2 =)
     - Start with the minus number (2).
     - Count on to the other number with fingers (7, so the student counts from 2 to 7).
     - Number of fingers (5) is the answer!

Guided Practice

1. Teacher explains they'll practice the flashcard activity before doing the activity for the timed 2 minutes.
2. Student presents basic fact flashcard to first student in the group.
3. If student knows it, the next student gets a flashcard.

4. If student does not know it, he or she finds the answer.
    - Teacher provides help with counting on strategy (using fingers)
    - Teacher also demonstrates how to make marks to add with scratch paper
5. This process is repeated until all students in the group have completed one flashcard per person.
6. Students play the game for 2 minutes.
7. Teacher records the number of correct problems and puts the information on a chart.
8. Students try to beat their score in subsequent games.
9. The score is for the group.

(If only one student needs fluency practice, this would be an individual score.)

Corrective Feedback:

Corrective feedback is built in to the activity to happen immediately when mistakes are made. (See Modeling, Step 7.) The immediate corrective feedback causes the student to take more time during the activity; thereby, lowering the score.

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Sample Basic Facts:

Multiplication and Division Concepts Activity 1–2

College- and Career-Ready Standard Addressed:

3.OA Represent and solve problems involving multiplication and division.
Interpret products of whole numbers (e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each and interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each).

Activity One: Representing Multiplication Concepts with Concrete Objects

Purpose:

To multiply using concrete objects

Principles of Intensive Intervention Illustrated:

- Provide concrete learning opportunities (including use of manipulatives).
- Provide explicit error correction, and have students repeat the correct process.
- Use precise, simple language to teach key concepts or procedures.
- Use explicit instruction and modeling with repetition to teach a concept or demonstrate steps in a process.
- Provide repeated opportunities to practice each step correctly.

Materials:

- Flashcards with multiplication problems (factors should fall between 0-9; see Supplemental Materials)
- Worksheet: Basic Facts: Multiplication Concepts (for extra practice)
- Concrete objects (teachers choice)
- Small paper plates

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Modeling:

1. Present multiplication problem (3 × 5 =)
2. Use colored round chips or other concrete manipulative.
3. Explain that 3 times 5 means 5 + 5 + 5 or 3 groups of 5.
4. To show 3 times 5, we need 3 small paper plates.
5. Count 3 plates together. Explain each plate is a "group."
6. We put 5 chips on each of the 3 plates.
7. Count 1, 2, 3, 4, 5, and place 5 chips on a plate.
8. Repeat for the remaining plates.
9. Explain you've shown 3 groups of 5.
10. Point to the chips on the plate and say, "We have 1, 2, 3, 4, 5 times 1, 2, 3" (point to each plate).
11. The answer is the total number of chips.
12. Say, "Let's count the chips together."
13. Count together "1, 2, 3, 4, ...15."
14. 3 × 5 = 15.

Guided Practice

1. Teacher presents multiplication problem (4 × 4 =).
2. Use colored round chips or other concrete manipulative.
3. Teacher asks student what 4 times 4 means.
4. Student explains that 4 times 4 means 4 + 4 + 4 + 4 or 4 groups with 4 in each group. (This will likely take several session of practice for student to understand meaning of multiplication.)
5. Teacher asks student to show 4 times 4 with the chips and plates.
6. Student chooses 4 small paper plates.
7. Student counts 4 plates.
8. Student explains that he or she can show 4 times 4 by putting 4 chips on each of the 4 plates.
9. Student counts 1, 2, 3, 4 chips and places them on one of the plates.
10. Student repeats for the remaining plates.
11. Student explains that he or she has shown 4 times 4.

12. The student points to the chips on one plate and says, "We have 1, 2, 3, 4 times 1, 2, 3, 4" (point to each plate).
13. The answer is the total number of chips.
14. Student counts the chips together.
15. Count together "1, 2, 3, 4, . . . 16."
16. 4 × 4 = 16.

Corrective Feedback:

Students should interpret multiplication problems as "__ groups of __." It is important to teach students the commutative property of multiplication (i.e., the order of numbers does not matter). It's easier to do 3 groups of 9 (3 × 9) instead of 9 groups of 3 (9 × 3). The commutative property also allows students to build fluency quickly because if he or she knows 3 × 9 = 27, then he or she also knows that 9 × 3 = 27.

Students should also understand multiplication as repeated addition. Using the plates and manipulatives helps with understanding 3 times 5 is 1, 2, 3, 4, 5. 6, 7, 8, 9, 10. 11, 12, 13, 14, 15.

Activity Two: Representing Division Concepts with Concrete Objects

Purpose: To divide using concrete objects

Principles of Intensive Intervention Illustrated:

- Provide concrete learning opportunities (including use of manipulatives).
- Provide explicit error correction, and have students repeat the correct process.
- Use precise, simple language to teach key concepts or procedures.
- Use explicit instruction and modeling with repetition to teach a concept or demonstrate steps in a process.
- Provide repeated opportunities to practice each step correctly.

Materials:

- Flashcards with division problems (Problems presented should all work out evenly; dividends should be divided by a factor of that number; divisors should fall between 1–9; see Supplemental Materials)
- Worksheet: Basic Facts: Division Concepts (for extra practice)
- Concrete objects (teachers choice)
- Small paper plates

Modeling:

1. Present division problem (12 ÷ 4 =)
2. Use colored round chips or other concrete manipulative.
3. Explain that 12 ÷ 4 is 12 divided into 4 equal groups.
4. To show 12 divided by 4, we need 12 chips and 4 smaller plates.
5. Count 12 chips. Count 4 small plates.
6. Teacher explains that to divide correctly we take 1 chip at a time and divide them equally among the small plates.
7. We go in order until we've placed all chips on plates.
8. Put 1 chip on each plate. Explain that now we go back to the first plate and continue distributing 1 chip at a time.
9. We repeat this process until all 12 chips are placed on plates.
10. Explain you've shown 12 divided into 4 equal groups.
11. Point to the chips on the plate and say, "We have.... have 1, 2, 3 chips on one plate."
12. The answer is the number of chips on one plate.
13. 12 ÷ 4 = 3

Guided Practice

1. Teacher presents division problem (18 ÷ 6 =)
2. Use colored round chips or other concrete manipulative.
3. Teacher asks student to explain what 18 divided 6 means.
4. Student explains that 18 ÷ 6 is 18 divided into 6 equal groups.
5. Teacher asks what student needs to show 18 divided into 6 groups.
6. Student explains that to show 18 divided by 6, he or she needs 18 chips and 6 small plates.
7. Student counts 18 chips and 6 smaller plates.
8. Teacher asks what to do next.
9. Student explains that he or she will place one chip at a time on the smaller plates and repeat until he or she has used all 18 chips.
10. Student puts 1 chip on each plate and repeats this process until all 18 chips are placed on one of the small plates.
11. Teacher asks student to explain what he or she did.

12. Student explains he or she has shown 18 divided into 6 equal groups.
13. Teacher asks student to explain 18 ÷ 6.
14. Student points to the plate and says, “We have 1, 2, 3 chips on one plate.”
15. The answer is the number of chips on one plate.
16. 18 ÷ 6 = 3

Corrective Feedback:

Students may struggle with distributing the chips *equally* among the groups. Emphasize placing one chip on each plate and then going back and doing that again and again until all the chips have been distributed.

Students may also struggle with the answer. Emphasize the answer is the number of chips on one plate.

Adaptation

The activities described above model multiplication and division concepts through concrete objects. Once students are comfortable with these activities, teachers should move students toward representational and abstract understanding of multiplication and division. This is the concrete-representational-abstract (CRA) sequence. See below for steps to modify both activities for a representational lesson.

1. Instead of plates and chips, teachers should demonstrate how to make circular regions on scratch paper for the plates, and how to use hash marks, X’s, or dots for the chips.
2. Teacher should demonstrate the same procedures for counting and making sure the marks are distributed equally within the regions.

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