Discipline: Mathematics
Standard Category: Algebra and Functions
Lesson Focus: Finding a missing addend

PA Standard(s):	Related TESOL Standard(s):
2.8.3B: Use concrete objects and trial and error to solve number sentences and check if solutions are sensible and accurate. 2.8.3C: Substitute a missing addend in a number sentence.	Goal 2: To use English to achieve academically in all content areas. Standard 2: Students will use English to obtain, process, construct, and provide subject matter information in spoken and written form.

Key Objectives in Accordance with TESOL Level:

Pre-Conversational/ Beginning	Intermediate	Advanced
Students will be able to: • Substitute a missing addend in a number sentence using manipulatives.	Students will be able to: • Substitute a missing addend in a number sentence using manipulatives • Model strategies used to find missing addends.	Students will be able to: • Substitute a missing addend in a number sentence using manipulatives • Discuss strategies used to find missing addends using appropriate math vocabulary.

Materials:
1. Beans
2. Copies of teacher-generated missing addend worksheet
3. Overhead projector
4. Paper cups
5. Pencils

Procedures: (ELL suggestions are in italics.)
1. Model the computation of a few simple addition problems at the chalkboard. (ex. 2+7=9)
2. Choose one problem and identify the addends, plus sign, equal sign, and sum.
   Display an addition problem on the chalkboard labeling each number as an addend and the answer as the sum. Allow students to use this as a model to follow.
3. Review and explain the process of solving addition problems which includes known values (the numbers or addends) when added together equals the unknown number (the sum or total). The problems to solve in this lesson will include one addend and the sum. The missing addend will need to be found.
4. Place 12 beans on the overhead projector.

Suggested Level:
Primary

Lesson Focus:
Missing addends

Teaching Strategies:
Whole group instruction

Manipulatives

Cooperative groups

Assessment Strategies:
Multiple choice

Open-ended response

- Count the beans aloud in unison.
- The total amount is 12, which will also be the sum
- Write ___+___=12 on the board.

5. Instruct students to close their eyes.
   - Use a paper cup to cover 7 beans and leave 5 beans showing.
   - Instruct students to open their eyes and count how many are now showing.
   - Write 5 in one of the remaining blanks: ___+5=12.
6. Ask students how many beans are under the cup.
   - Uncover the beans to verify the correct answer.
   - Complete the problem: 7+5=12.
7. Repeat the procedure until the students are comfortable with the process.
   Teacher modeling is very important. Beginning ELL students need to see the procedure as the teacher explains it.
8. Distribute a worksheet with eight to ten missing addend problems. (ex. ___+6=12, 14=7+___)
9. Students work in pairs to solve the problems using the following procedure:
   - (Sample problem: ___+6=12)
   - Child A looks at the sum of the problem and sets out 12 beans.
   - Child B counts all of the beans and then covers his/her eyes.
   - Child A sets 6 beans aside and covers the rest.
   - Child B chooses a strategy to solve how many beans are under the cup to find the missing addend and complete the number sentence.
10. Students switch roles and continue the process until all of the problems are solved.
    Pair beginning ELL students with more proficient students so that they have some support while completing the activity.
11. After students have completed the activity, discuss and model the different strategies they might have used to find the missing addend. Strategies may include:
    - Counting up to the sum
    - Subtracting the known addend from the sum.
12. Demonstrate the strategies to show the relationship between the addends and the sum. Display vocabulary for reference, "Count–up," "Subtract"
13. Pair students to practice the count up strategy.
14. Pair students to practice the subtraction strategy.
    In the last two steps beginning ELL students can demonstrate understanding by the physical gestures displayed in the movement of the beans.
    Intermediate students may count out loud forward in the count up strategy and backward in subtraction.
    Advanced students can use the appropriate vocabulary to explain the process

Assessment:
Beginning
Assess by assigning a few multiple-choice problems independently to

check for understanding. Students should be permitted to use manipulatives if necessary.

Example:

6+____=13

a. 9 b. 7 c. 10

Intermediate

Assess the students as they model how to create and solve the problems when given a cup full of beans. Students should demonstrate both strategies using the manipulatives.

Advanced

Assess the students as they demonstrate how to create and solve the problems when given a cup full of beans. Students must "think aloud" to explain the strategy they are using while working through the problem.

Notes:

- This activity was adapted from an activity in: Mantre, E., Moser, J., Lobato, J., & Morrow, L. (1996). Heath Mathematics Connections Level 2. D.C. Heath & Company
- Expect intermediate and advanced students to be able to use the vocabulary discussed in the warm-up. ELL students must be exposed to the academic vocabulary used in mathematics in order to perform well in higher-level math classes and on standardized tests.
- Beginning and Intermediate ELL students may have a difficult time discussing strategies, but may still be able to act out or model the strategies used.