| Grade Level/Course: |
| :--- |
| Grade 1 |
| **Lesson/Unit Plan Name:** |
| Problem Solving with Unknown Numbers |
| **Rationale/Lesson Abstract:** |
| Students are introduced to solving equations and word problems with unknown addends by using manipulatives, bar models, and equations. |
| **Timeframe:** |
| 45 minutes to 1 hour for lesson on solving equations with unknownaddends |
| 40 minutes for lesson on problem solving with unknown addends in the equations. |
| **Common Core Standard(s):** <br><br> 1.OA.1  Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings and equations with a symbol for the unknown number to represent the problem. <br><br> 1.OA.8  Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. |

**Instructional Resources/Materials:**
Paper Plates
Counters
Popsicle sticks (or pencils)
White boards or paper for student work

**Warmup:**

Play "Pirate Steals your Treasure" to introduce missing addend in a story scenario.

- Explain that you keep your gold in your room but each night the pirate comes and steals some.
- Display 5 paper plates that represent the 5 pieces of gold. Make a Part/Part/Whole box like the one below and fill in 5 for the Total.
- Tell the students they will "go to sleep" and the Pirate will take some of the gold (students put their heads down and close their eyes.)
- Take 3 plates from the display and have the students "wake up" by saying, "Aaargh, I got your treasure."
- Decide as a class how much gold the pirate left you (2) and then see if anyone can figure out how much he took. Ask students to explain how they got the answer.
- If students struggle with finding the amount the pirate took, show them how to count on from 2 to find the answer.

**Total**

5

2 | ?

**Part (the pirate left)** | **Part (the pirate took)**
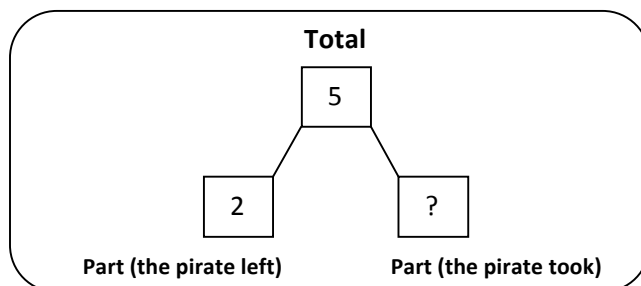
- Repeat the game using different amounts of gold (plates). You can call up students to be the pirate.

**Activity/Lesson:**

Review equations and part/part/totals (wholes)

| **Total** | |
|:---:|:---:|
| 7 | |
| **Part** | **Part** |
| 4 | 3 |

$$4 + 3 = 7$$

**Part + Part = Whole/Total**

Give students 10 counters and a popsicle stick (or they can use their pencil)

**Direct Instruction:**

Display equation:  $4 + \square = 9$

Ask:  *What do we know?   We know one part and the total.  One part is 4 and the total is 9*
Ask:  *What don't we know?  We don't know the other part.  We need to find the other part.*
*Let's start with what we know to help us figure out that unknown part.*

Model counting out the total with counters.  Draw a part/part/whole box on the board and fill in the known information.

$\bigcirc\bigcirc\bigcirc\bigcirc\bigcirc\bigcirc\bigcirc\bigcirc\bigcirc$

| Total |  |
|---|---|
| 9 |  |
| Part | Part |
| 4 | ? |

*We know that one part is 4 so I will use my stick (pencil) to break the 9 apart.  The rest must be the missing part.*

$\bigcirc\bigcirc\bigcirc\bigcirc \mid \bigcirc\bigcirc\bigcirc\bigcirc\bigcirc$
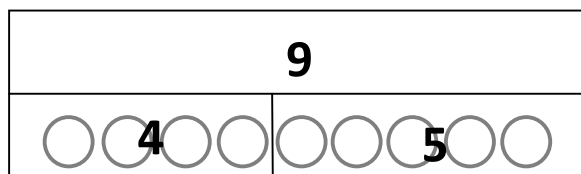
$$4 \quad + \quad \square \quad = 9$$
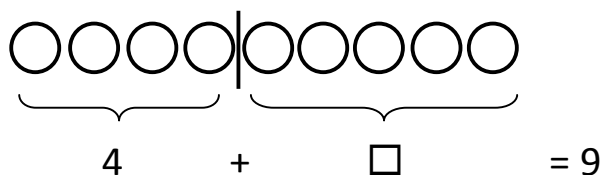
*What is the missing part that goes in the equation?*   $4 + \boxed{5} = 9$

Students can make the jump from part/part/whole to bar models by drawing the counters inside the model.  Model drawing 9 circles under the total in the bar model.

| 9 |
|---|
| $\bigcirc\bigcirc\bigcirc\bigcirc\bigcirc\bigcirc\bigcirc\bigcirc\bigcirc$ |
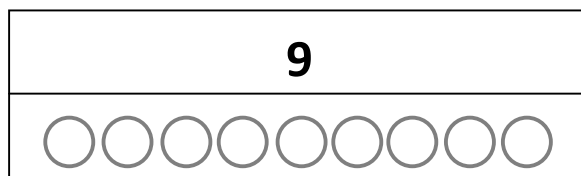
Draw a line separating the part that we know (4) and count the other part (5)

| 9 | |
|---|---|
| $\bigcirc\bigcirc$**4**$\bigcirc\bigcirc$ | $\bigcirc\bigcirc$**5**$\bigcirc\bigcirc$ |

**Guided Practice:**

Guide students through using their popsicle stick to find the unknown addend using the below equations. Each time, create a bar model with student help on the board. Students could also practice creating their own bar models on a white board as you create them on the board.

1) $3 + \square = 8$
2) $2 + \square = 6$
3) $4 + \square = 8$

**You Try:**

Have them solve the following problems with unknown addends using their counters and popsicle stick (or a pencil). Students should then draw a bar model for each equation.

1) $1 + \square = 6$
2) $5 + \square = 7$
3) $4 + \square = 10$

Have students share their work with a partner to check their answer. Choose students to share their work and explain how they solved the problem.

**Problem Solving:**

Students can extend the skill by practicing unknowns in equations with word problems. Students can act out these scenarios about pancakes using paper plates. You can choose students from the class to come up and act out the different word problems while students attempt to solve them with drawings or counters and their sticks at their desks.

**Guided practice:**

Give one student 4 paper plates and the other student 6 paper plates. Students should act out the scenario for the class by repeating the script below. You can provide sentence frames if you wish.
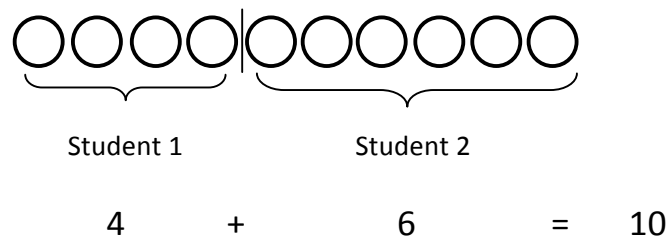
Student 1: I made 4 pancakes (student should display the 4 plates on the easel of the board)
Student 2: I made some pancakes too. (student holds the stack of plates without displaying them)
Student 1: Together we made 10 pancakes. (teacher writes equation up $4 + \square = 10$)
Student 2: How many pancakes did I make?

Guide the rest of the class in solving the word problem by using their counters and sticks to find the amount of the unknown pancakes.

$$\underbrace{\text{OOOO}}_{\text{Student 1}} \Big| \underbrace{\text{OOOOOO}}_{\text{Student 2}}$$

Student 1          Student 2

4        +          6          =        10

Guide students in creating a bar model for the word problem as done in the problems above.

| 10 |
|:--:|
| OO**4**O OO**6**OOO |
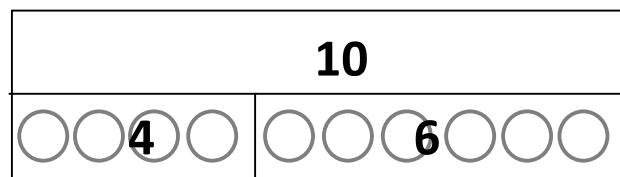
Practice several other pancake scenarios using different equations for guided and independent practice.  See if students can write the equation independently using the box for the missing addend.  Students should solve it with their counters and also draw a bar model.

Have students share their work with a partner to check their answer.  Choose students to share their work and explain how they solved the problem.

**Assessment:**
Assessment follows on the next page.  Read the word problem to the students.

Name:_____

Ana made 3 pancakes. James made some more pancakes. Together they made 10 pancakes. How many did James make? Write an equation and draw a bar model to solve.

| Equation | Bar Model |
|---|---|
|  |  |

Solve each equation by finding the missing addend. Draw a bar model to support your answer.

| Equation | Bar Model |
|---|---|
| $6 + \boxed{\phantom{0}} = 9$ |  |
| $2 + \boxed{\phantom{0}} = 8$ |  |
| $5 + \boxed{\phantom{0}} = 10$ |  |

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