

# Activities for Solving Equations

[October 10, 2012](#) by [lzlomek](#)

**By the Shapes** Activity that I got at an NCTM conference years ago, but don't know who the presenter was. If these are your creation, please let me know so I can credit you!

Summary of Activity: Students work in groups of 4 to determine the value of each of 3 shapes, using 4 clue cards (equations). The [By the Shapes Teacher Notes](#) say to use counters, but I don't. I put the [By the Shapes Recording Sheet](#) in a plastic sleeve and students record the value of each shape on the sleeve. When they have the solution, they raise their hands and show me. If they are correct ([By the Shapes Answers](#)), they mark off that clue set number at the bottom of the recording sheet (to keep track of which sets they have completed) and I give them another set. The best part of this activity is the conversation that happens within the groups. Students engage in some really good discussions about the value of each shape, verifying solutions by substituting the values into each of the 4 clues (equations) and eliminating possible values of the shapes based on the clues.

Preparation: Copy the [By the Shapes cards](#) onto card stock. There is page of icons that can be copied onto the back of each clue page, but this isn't really necessary...just pretty. It's nice if each clue set is a different color. I made 2 sets of clues (16 sets total) so that as groups finished I could be sure to give them one they hadn't done yet. Give each group 1 By the Shapes Recording sheet and a dry erase marker/eraser. It helps to do the Teacher demo so they have an idea of what they are supposed to do. I told them to use all the clues at the same time to figure out the value of each shape.



## *By The Shapes Teacher Notes*

**Objective:** Students will solve simultaneous equations using manipulatives.

**Materials:** counters (color tiles) - optional  
By the Shapes recording sheet – 1 per group  
1 set of 4 clue cards (8 sets)  
1 transparency By the Shapes for teacher demonstration  
overhead color tiles

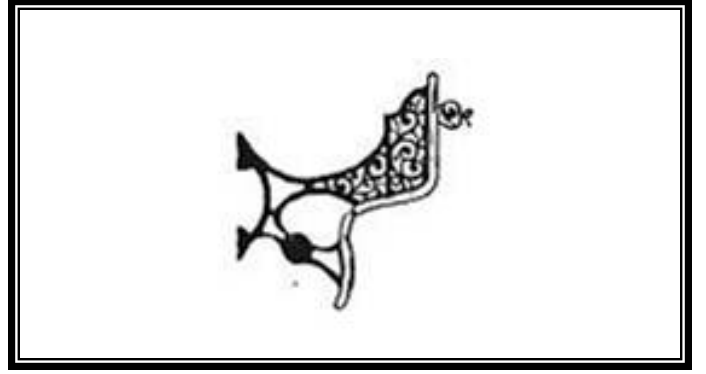
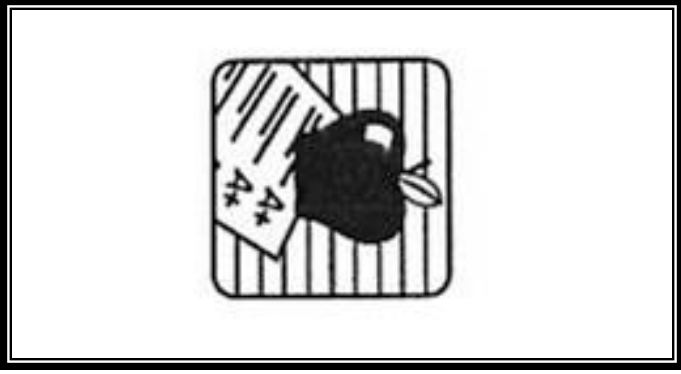
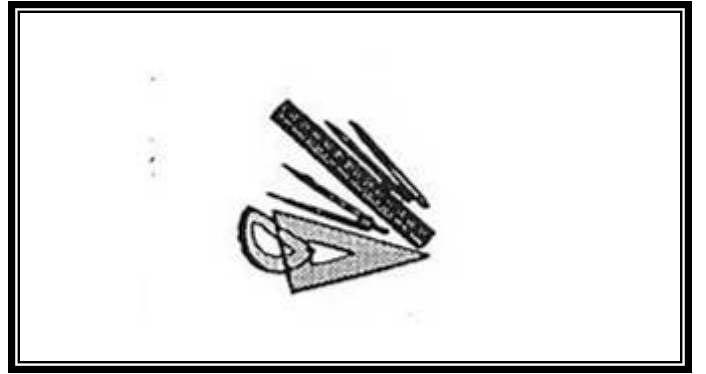
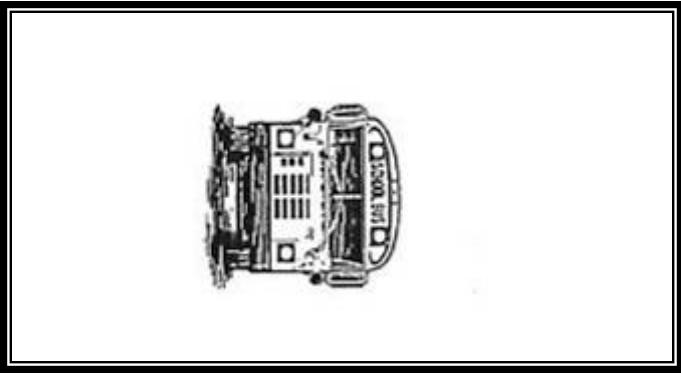
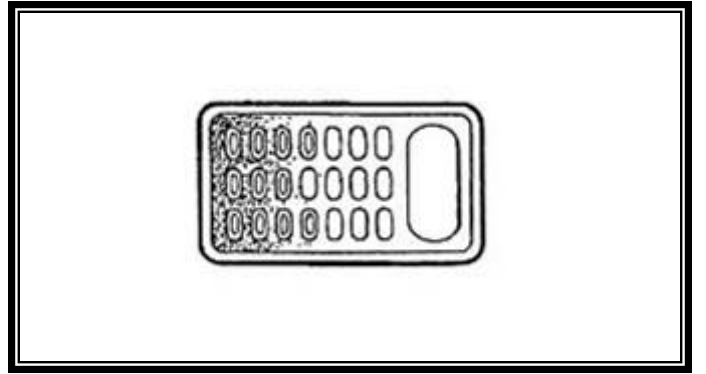
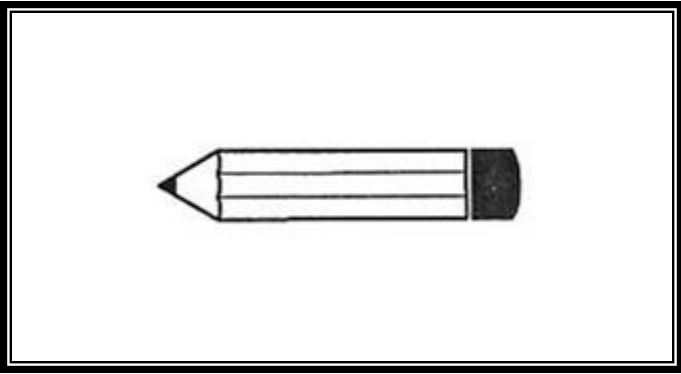
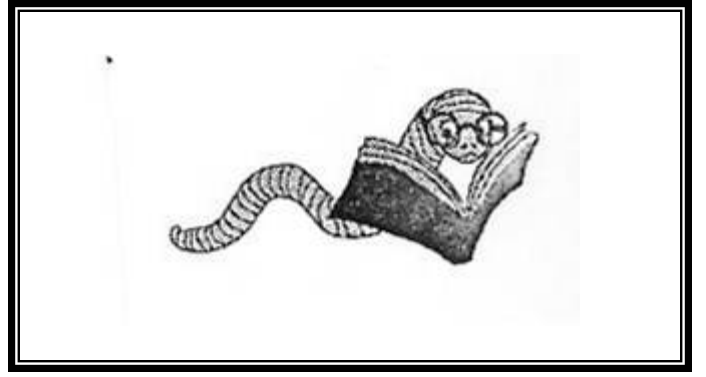
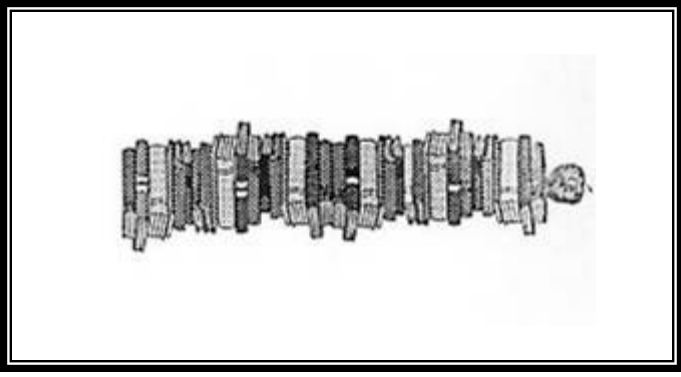
**Procedure:**

Demonstration:

1. Place the By the Shapes Mat transparency on the overhead.
2. Mask all four clue cards.
3. Explain to the students that their task is to determine the number of counters that go in each shape. Ask if they know how many go in each shape? (No, because they don't have any information.)
4. Show the top left clue card. Ask students "What can you tell me about the number of counters in the shapes now?" (The sum of the circle and triangle is 7)
5. "What could go in those shapes?" (1 & 6; 2 & 5; 3 & 4; and their commutatives)
6. Now show the bottom right clue card. Ask students "How does this influence your thinking about the number of counters in the circle and triangle?" (Since the triangle is 3, the circle must be 4)
7. Place 3 counters in the triangle and 4 counters in the circle and ask the students if this is OK.
8. Show the top right clue card. Ask students, "What needs to go in the square and how do you know you are correct?" (8 needs to go in the square because  $4 + 4 = 8$ )
9. Show the final clue card. Ask students to think about this clue and discuss it with their partner. ( $3 + 8 = 11$ )

Student Activity:

1. Distribute By the Shapes recording sheet, clue cards, and counters to groups of 4 students.
2. Students use only one set of clues at a time. (each set is distinguished by a different icon)
3. Each student reads their clue card to the group. Collectively the students are to solve the common problem (determine the number of counters to go in each shape).
4. Raise hands when they determine the value of each shape
5. Get new set of clue cards



**By the Shapes #7**



$$1 + \bigcirc = \square$$

**By the Shapes #8**



$$\triangle = 6$$

**By the Shapes #7**



$$\triangle + 2 = \square$$

**By the Shapes #8**



$$\triangle - \square = \bigcirc$$

**By the Shapes #7**



$$\triangle + 3 + \bigcirc = 2 * \square$$

**By the Shapes #8**



$$\triangle - 1 = \bigcirc + 1$$

**By the Shapes #7**



$$\triangle - 1 = 3$$

**By the Shapes #8**



$$\triangle + \bigcirc = 2 * \bigcirc + \square$$

**By the Shapes #5**



$$\square = 3$$

**By the Shapes #6**



$$\triangle + \bigcirc = \square$$

**By the Shapes #5**



$$5 - \square = \triangle$$

**By the Shapes #6**



$$\square - \bigcirc = \triangle$$

**By the Shapes #5**



$$\triangle + \bigcirc = \square$$

**By the Shapes #6**



$$\square - \triangle = 4$$

**By the Shapes #5**



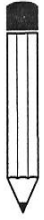
$$\bigcirc = \frac{\square}{\square}$$

**By the Shapes #6**



$$\triangle + \triangle = 4$$

**By the Shapes #3**



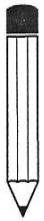
$$\bigcirc - \square = 4 * \triangle$$

**By the Shapes #4**



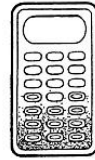
$$2 * \bigcirc + \triangle = \square$$

**By the Shapes #3**



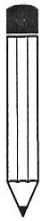
$$\square + \square + \triangle = \bigcirc$$

**By the Shapes #4**



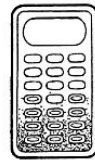
$$\frac{\triangle - 1}{\bigcirc} = \frac{\square}{\square}$$

**By the Shapes #3**



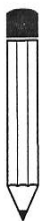
$$\bigcirc + \square + \triangle = 11$$

**By the Shapes #4**



$$\square - 2 * \triangle = 2$$

**By the Shapes #3**



$$\triangle + 1 + \triangle = \square$$

**By the Shapes #4**



$$3 * \bigcirc + 1 = \square$$

**By the Shapes #1**



$$\triangle + \bigcirc = 6$$

**By the Shapes #2**



$$\bigcirc + \triangle = 11$$

**By the Shapes #1**



$$\bigcirc + \bigcirc = \triangle$$

**By the Shapes #2**



$$\bigcirc - \square = 2$$

**By the Shapes #1**



$$\triangle + \square = 9$$

**By the Shapes #2**



$$\square + \triangle = \bigcirc$$

**By the Shapes #1**




$$\square = 5$$


**By the Shapes #2**




$$\square + 1 = 8$$



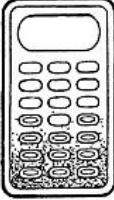
$\triangle = 4$   
 $\circ = 2$   
 $\square = 5$




$\triangle = 2$   
 $\circ = 9$   
 $\square = 7$




$\triangle = 1$   
 $\circ = 7$   
 $\square = 3$




$\triangle = 4$   
 $\circ = 3$   
 $\square = 10$




$\triangle = 2$   
 $\circ = 1$   
 $\square = 3$



$\triangle = 2$   
 $\circ = 4$   
 $\square = 6$



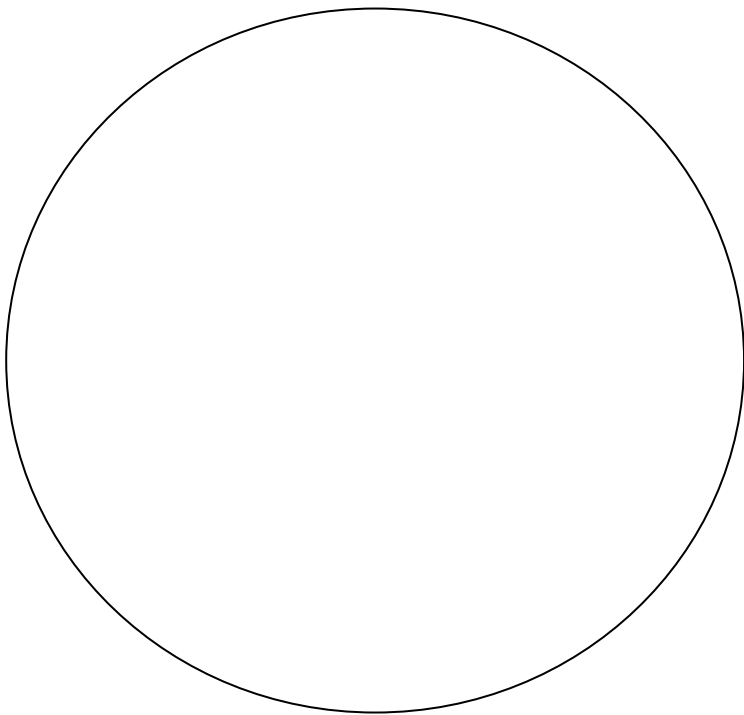
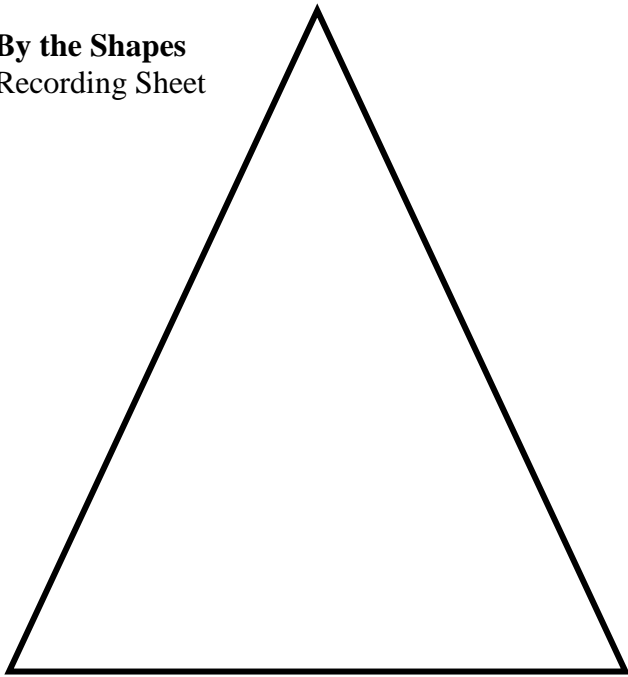
$\triangle = 4$   
 $\circ = 5$   
 $\square = 6$



$\triangle = 6$   
 $\circ = 4$   
 $\square = 2$



**By the Shapes**  
Recording Sheet



We have solved set #:

- 1   2   3   4   5   6   7   8