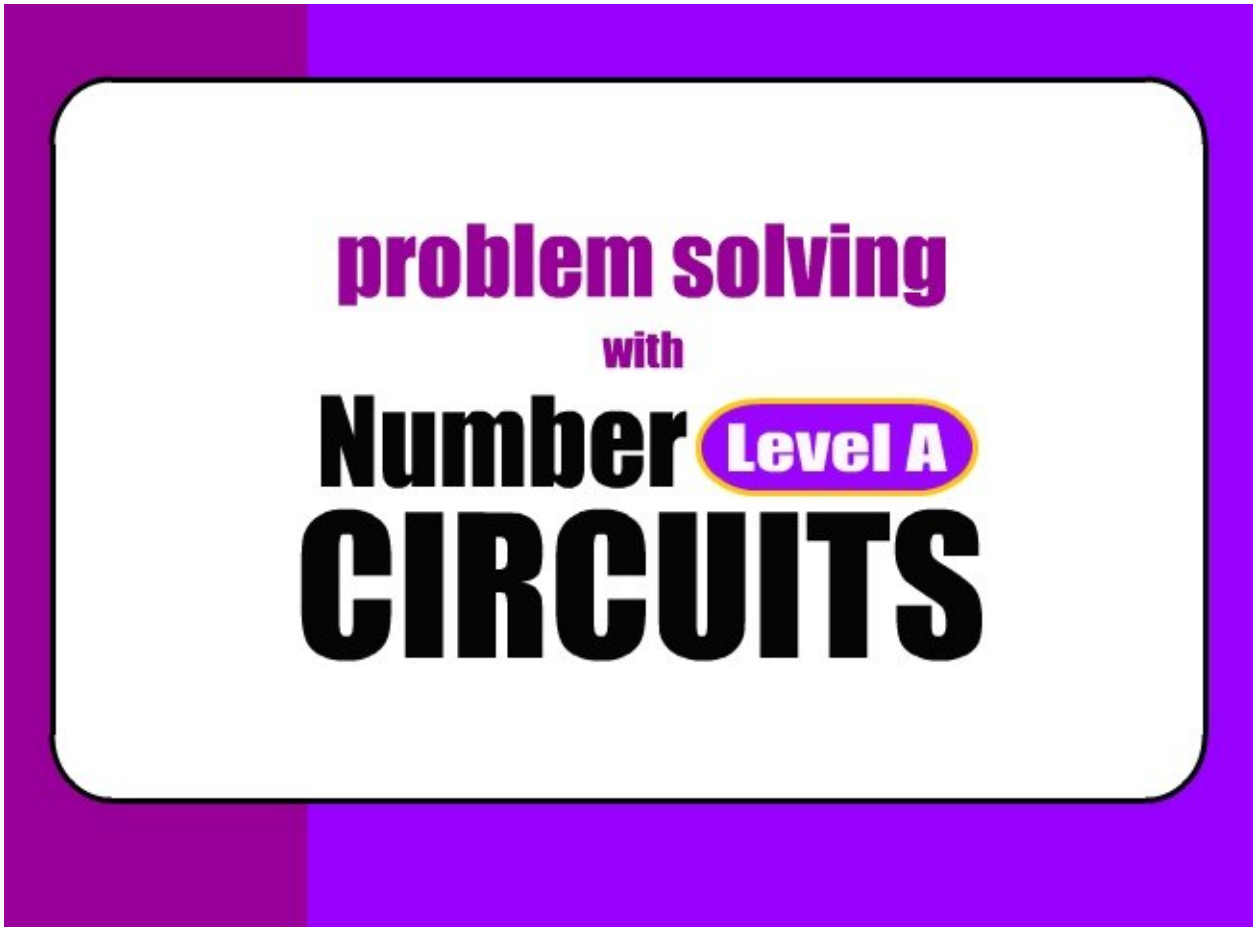

Welcome to Problem Solving with Number Circuits. This is an automated classroom presentation in which puzzles are used to present and hone problem solving skills. Puzzles often provide a great problem solving environment because they are typically stated in a concise manner with very clear objectives. Number Circuit puzzles provide just that. Each is concisely stated and ready to solve.

This presentation will step through the five steps to problem solving, highlighting key points along the way. In addition, the presentation facilitates group discussions and encourages individual contributions. Throughout the presentation, pauses occur which require the teacher to manually continue the presentation. Finally, at the end (Step 5) of the presentation two puzzles are provided which can be solved and checked interactively.

Step 1: Read the Problem

The student should always read and understand the problem first. The selected problem (illustrated in Figure 1) contains both a diagram and text. The text provides an explanation of the problem. The lesson highlights what the students should read. It's recommended that the students read this aloud. When completed, and satisfied that the students have read the problem, select the "continue" button to continue to Step 2.

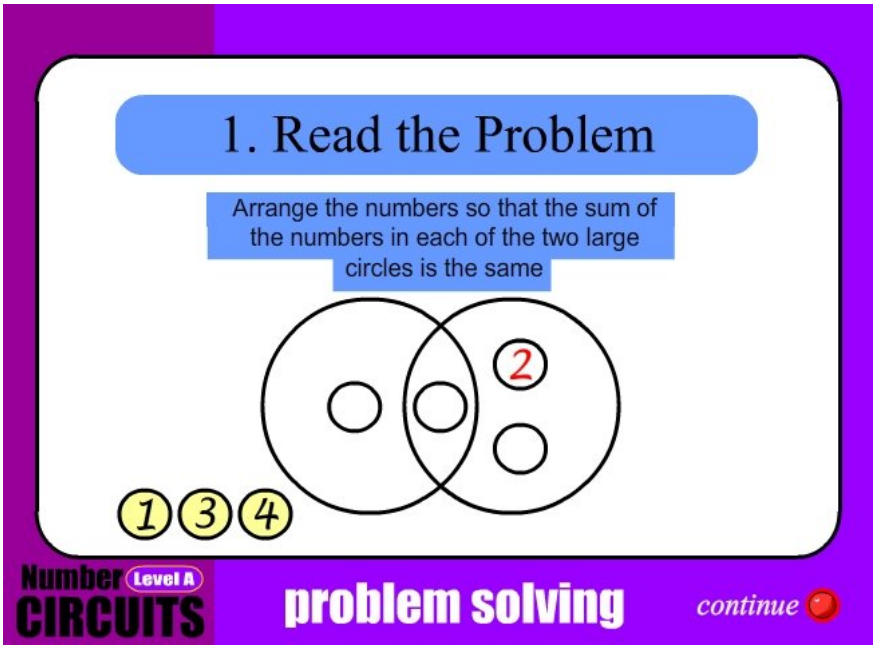

Figure 1 - Step 1: Read the Problem

Step 2: What do I know?

This section encourages the students to ask the question "What do I know?". When solving a problem, it's important to identify what it known. There are numerous key elements provided both within the text of the puzzle and the diagram.

Initially, the question "What do I know?" is presented and the presentation is paused. This is to facilitate a discussion, allowing the students a chance to provide answers to the question. There are numerous correct answers to the question, as the puzzle provides a lot of up front information. After the discussion is complete, the teacher should select the "continue" button. At that point, the presentation will highlight the answers. Figure 2 illustrates one of the answers, specifically there are two large circles, both of which are highlighted and labeled.

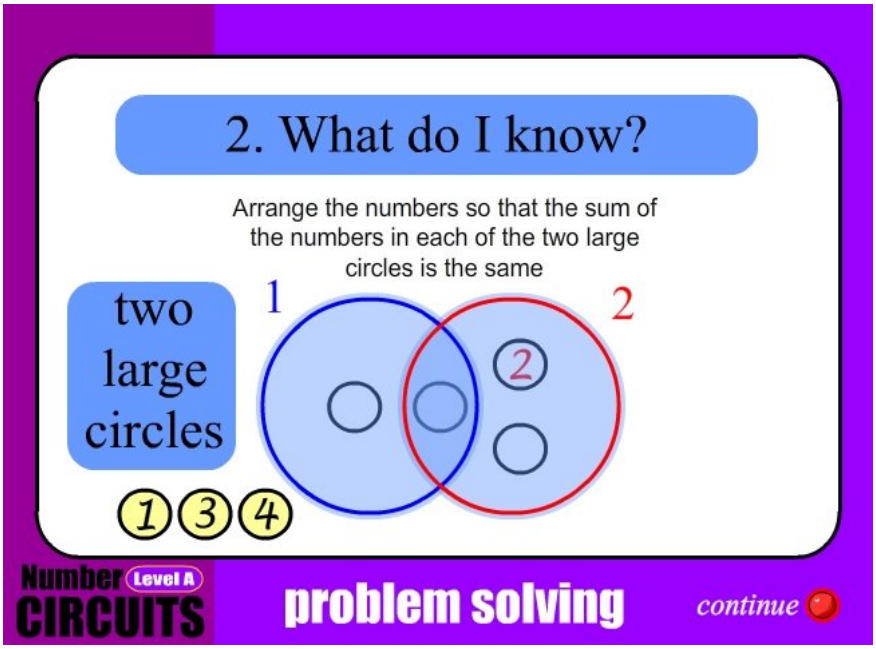

Figure 2 - What do I know? Answer 1

After each point is presented and highlighted, the presentation automatically pauses. This again facilitates discussion. The teacher should select the "continue" button to continue to the next answer.

The presentation highlights seven answers to the question "What do I know?". The highlighted answers are as follows:

- There are two large circles (Figure 2)
- The circle on the right contains 3 numbers
- The circle on the left contains 2 numbers
- The "2" is already place (in the right circle)
- The remaining numbers ("1","3" and "4") have to be used
- The sum of the 3 numbers in the right circle equal the sum of the 2 numbers in the left circle
- The number in the middle is in both circles

The students will likely have identified many of these answers within the discussion. The presentation will highlight each allowing time after each for additional discussion or clarification. After the last answer is presented, the teacher should select the "continue" button to continue to Step 3.

Step 3: What am I looking for?

This section encourages the students to ask the question "What am I looking for?". It is too often the case that students start solving a problem without fully understanding what the result and answer should look like. As in the first two steps, the presentation provides time for discussion prior to presenting the answer to the question. The teacher should select the "continue" button when satisfied with the students responses and understanding. Figure 3 illustrates what the presentation provides as an answer to the question.

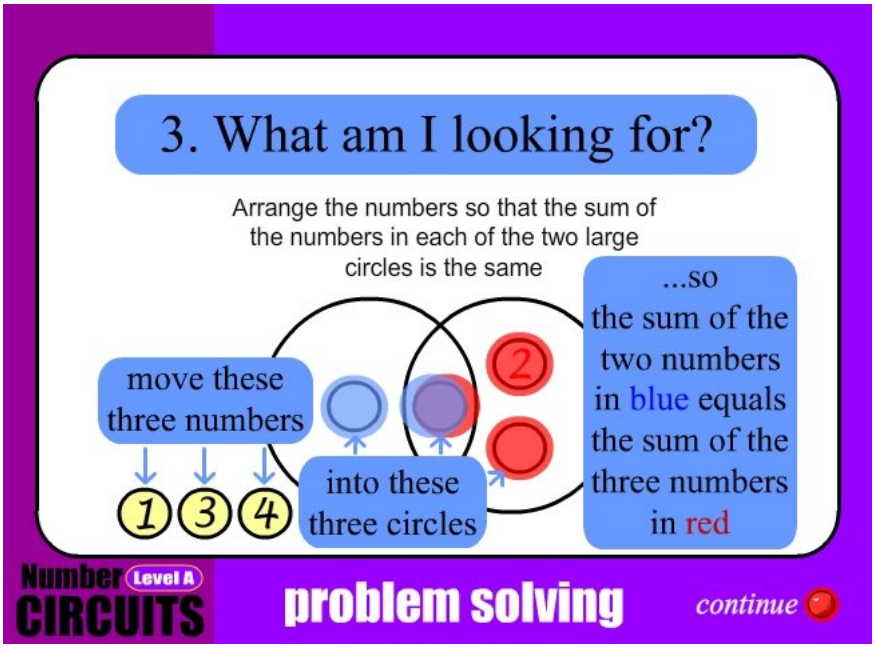

Figure 3 - What am I looking for?

The presentation answers this question as follows:

- Move three numbers ("1","3" and "4")
- Into three circles (highlighted in Figure 3)
- So the sum of the blue numbers (left circle) equals the sum of the red numbers (right circle)

When satisfied with the students response and understanding, the teacher should select "continue" to continue to Step 4.

Step 4: What can I conclude?

This section encourages the students to think. There are two discussion points that are presented. The first is illustrated in Figure 4. It indicates that the blue number (in the left circle) equals the sum of the two red numbers (in the right circle). Although this is true, it is important to understand why.

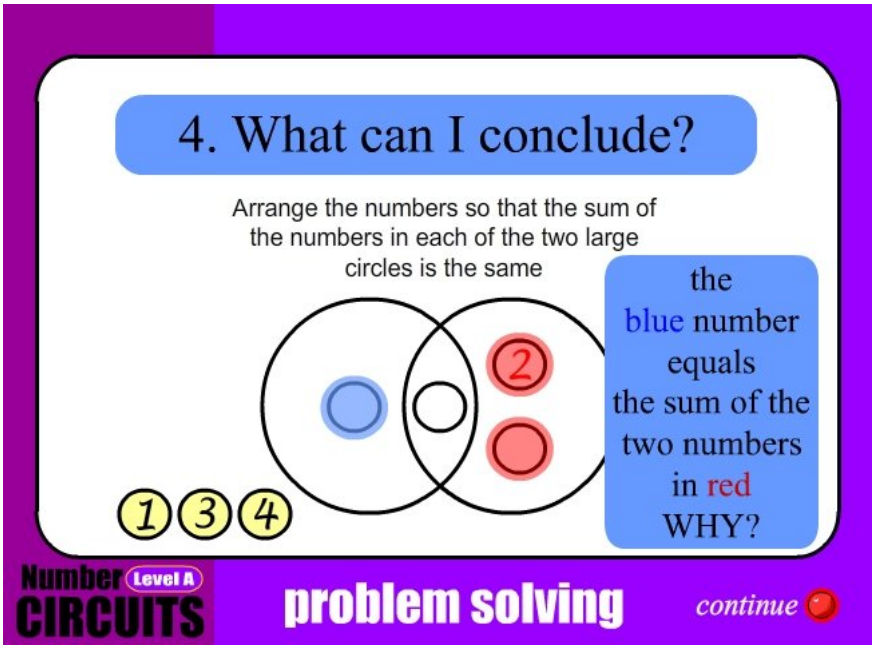

Figure 4 - What can I conclude? First Point

The reason and its explanation are a great introduction to algebra. Let the two numbers in the left circle be represented with A and B. Similarly, let the three numbers in the right circle be represented with B, C and D, where B is the same number as in the left circle (i.e. the number in both circles). Since the sum of the two numbers in the left circle equals the three numbers in the right circle, we now have:

$$A + B = B + C + D \qquad (1)$$

Take away B from both sides (treat it like a scale in which equal amounts have to be removed from each side to remain balanced), and we have:

$$A = C + D \qquad (2)$$

This shows that A (the blue circle in Figure 4) equals the sum of C and D (the red circles in Figure 4). Again this can be illustrated using a scale. If B is removed from one side, it must be removed from the other side in order to maintain balance. Understanding the scale analogy is a step in the right direction to understanding equations in algebra.

The second discussion point is illustrated in Figure 5, and asks "Where can "4" go? In this puzzle, "4" is an extreme – the largest number. It is often the case that extremes are limited. That is the case with "4", it can only go correctly into one circle. Placing it in any other circle will quickly lead to a contradiction.

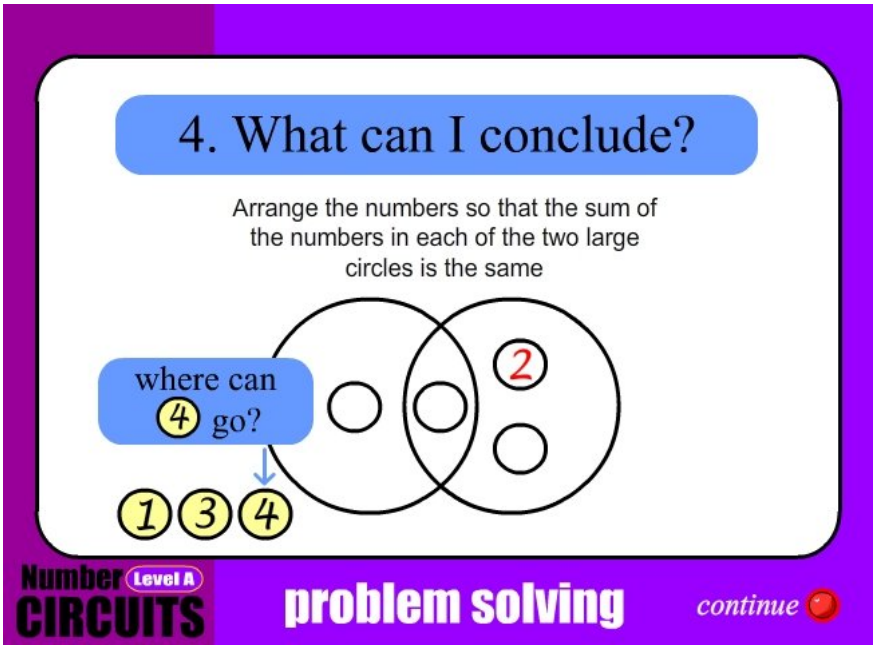

Figure 5 - What can I conclude? Second Point

It's a great exercise and discussion generator to ask why "4" can't go below the "2". After that, ask why "4" can't go in the left most circle. The students will quickly see why "4" can't go in either of these circles. If that's the case, then "4" must go in the middle circle.

When satisfied with the students response and understanding, the teacher should select "continue" to continue to Step 5.

Step 5: Solve the Puzzle

This section interactively allows you to solve the puzzle. Figure 6 illustrates what the presentation should look like at this point.

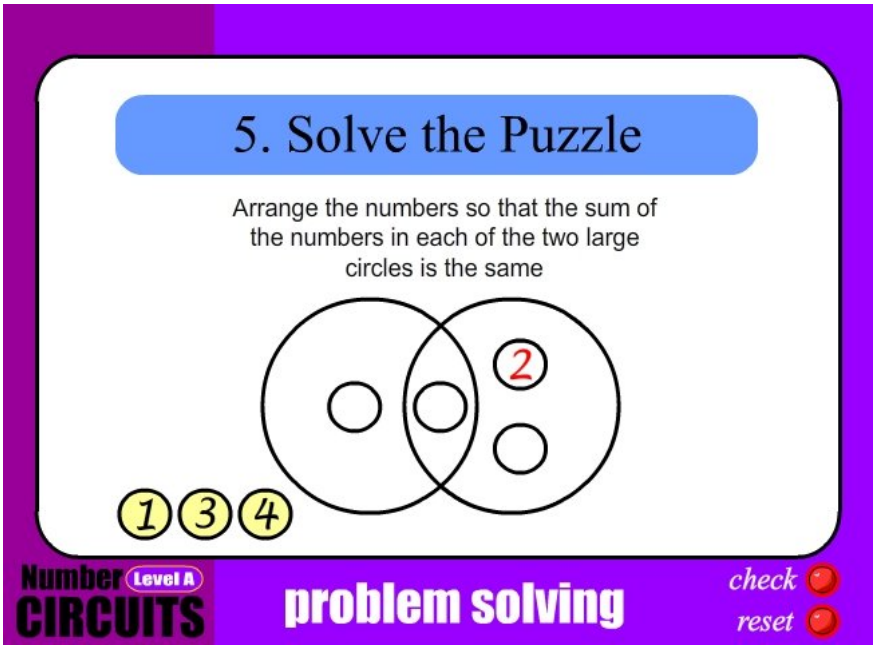

Figure 6 - Solve the Puzzle

The numbers "1","3" and "4" become active at this point. They can be dragged to the desired circle and automatically snap into place when dropped close enough. When you think you've got it, select the "check" button and the solution will be checked. If incorrect, you can try again. If correct, the presentation will move on and present a new puzzle. The students should be encouraged to step through the new puzzle much like the presentation prompted them within the first puzzle. When the second puzzle is complete, the presentation is complete.