**Initial Setup:**

1.  Separate the kids into groups of two or let them sort themselves if you wish. Sit them down in these pairs.

2.  Give each student a copy of the handout in appendices A as well as a writing utensil.

3.  Give a basic introduction to algorithms. Ask the kids if they have heard of algorithms before, briefly go over the definition of an algorithm, and see if the kids can come up with some examples of algorithms.

**Terms to Know:**

bubble sort: *a simple sorting algorithm that repeatedly steps through the list to be sorted, compares each pair of adjacent items and swaps them if they are in the wrong order.*

merge sort: *a recursive algorithm that continually splits a list in half. If the list is empty or has one item, it is sorted by definition (the base case). If the list has more than one item, we split the list and recursively invoke a merge sort on both halves.*

**Activity 1: Sorting Studnets by Height**

*Goal: Sort the kids in one line, shortest to tallest (bubble sort)*

1. For this initial activity, gather the students in a random single file line, shoulder-to-shoulder. Be sure to make the line as straight as possible in order to avoid confusion.

2. Instruct the students to sort themselves in a line that is arranged from shortest to tallest. Each student may only switch places with his/her neighboring classmate. This process can be repeated with new neighbors, and should result in the slow rearrangement of the entire line to the order desired.

3.

3. After reviewing the results, discuss the importance of creating an efficient solution to use the least amount of resources. Explain how, much like this simple puzzle's objective, computers use different algorithms to develop the most efficient code.

4. If possible, show them an example using google maps showing different paths from point A to point B. There will be a shortest path and 1 or 2 time efficient paths.
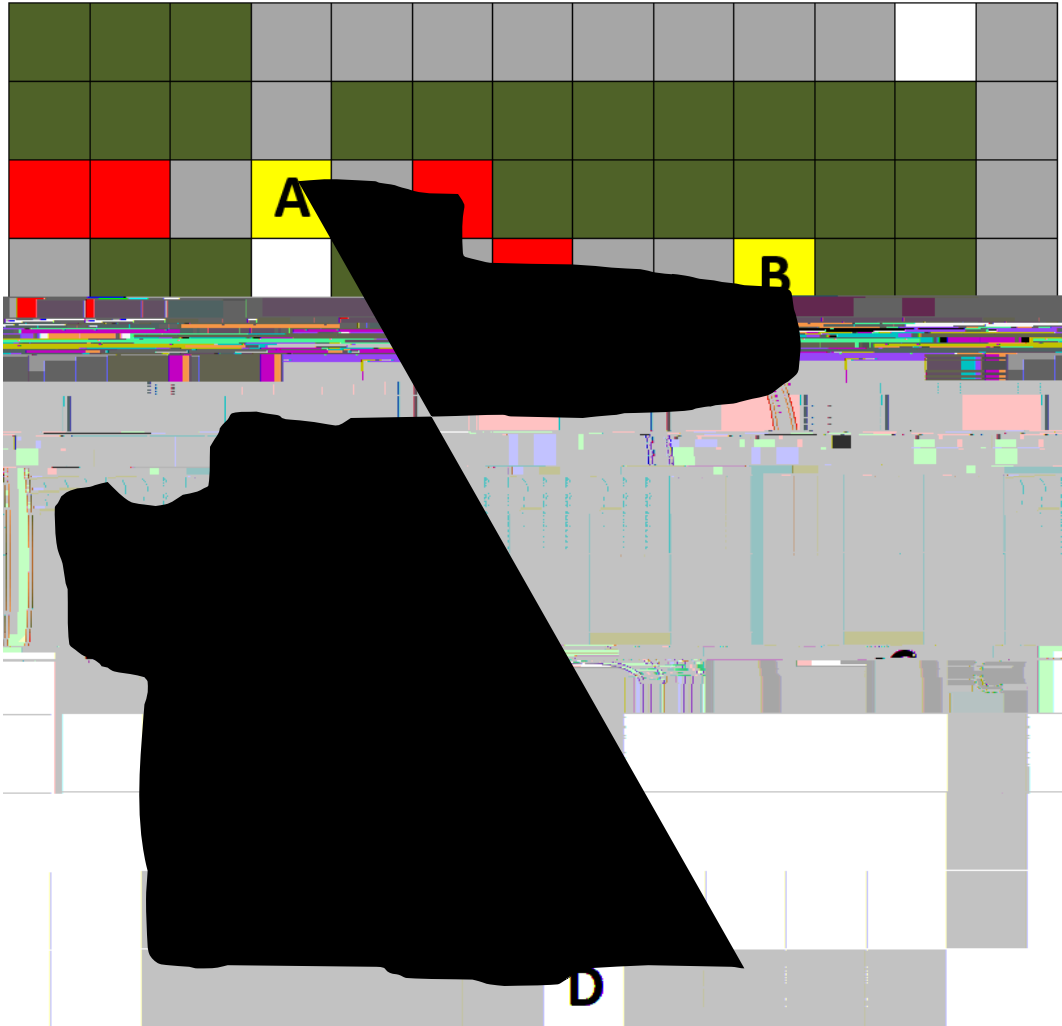
**Closing Thoughts:**

Once the students have finished the activities deliver a closing talk that gives examples of how algorithms such as the ones in the activities, are used in the real world. Allow the children to ask any questions they may have. Collect the writing utensils from each student and give each of

Appendices A: Modified Traveling Salesman
*Includes the worksheet that is to be handed out to the kids. It is included on the next page.*

*Rules:*

1. *The objective is to find the most efficient path that runs through points A to E by accumulating the least amount of gallons.*

2. *Start at A. Moving can only done in a horizontal or vertical direction.*

3. *Once you start on a bridge, you must continue until the bridge has ended*
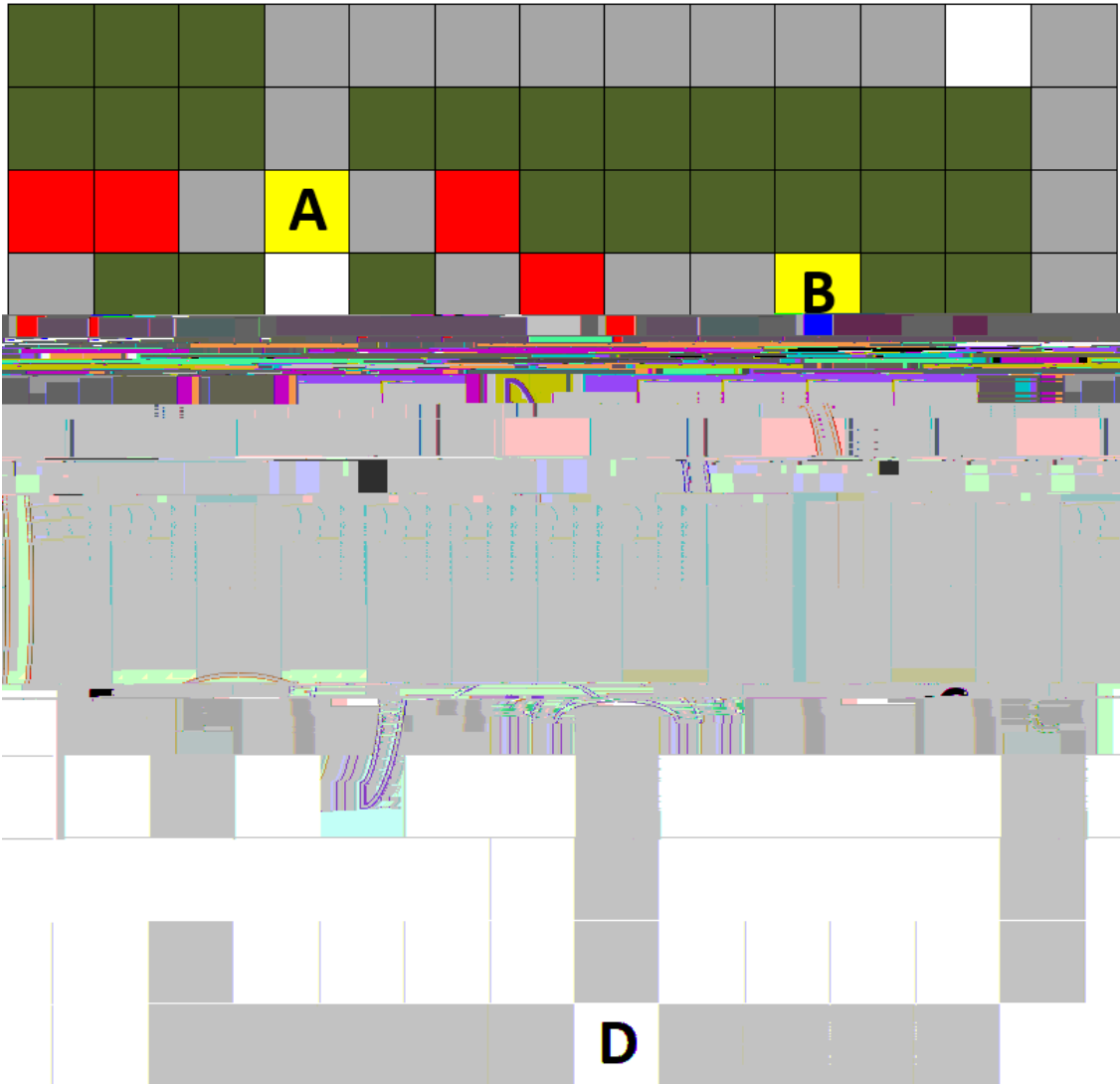
Appendices B: Sources for kids
*The sources listed below are additional online resources for interested students.*

http://www.thekidzpage.com/learninggames/logic_games/index.html
This website has a variety of logic puzzles for kids.

http://www.squiglysplayhouse.com/PencilPuzzles/
This website has a greater variety of puzzles.

http://courses.cs.vt.edu/csonline/Algorithms/Lessons/
A basic introduction to algorithms.

https://www.khanacademy.org/computing/computer-programming
Khan Academy - introduction to different aspects of programming.