ICAC Activity Summary – Information Hiding

This CS Unplugged activity uses cryptographic techniques (the practice and study of techniques for secure communication) that will enable us to share information with other people, but with a high level of privacy. By doing this activity, the students will learn how computer use similar processes to protect our personal information (i.e. bank information).

Content Standards:
- MA(4) – Solve multistep word problems posed with whole number and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for an unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. [4-OA3]
- MA(4) – Fluently add and subtract multi-digit whole numbers using the standard algorithm. [4NBT4]
- MA(5) – Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method, and explain the reasoning used. [5-NBT7]

Materials:
- A small pad of paper and pencil for each student group of 6 to 10 children

Resources:
- http://csunplugged.org/information-hiding

Activity Summary:

- Divide the class into groups of 6 to 10 students. Tell the students that the goal of their group is to determine the average age of the group without revealing the individual ages of each group member.
- Give the first child in each group the small notepad and pencil and have him/her write a random three-digit number on it (ex. 342). Based on your students' abilities you can challenge them to write a random four-digit number.
- Ask the first child of each group to add their age to the random number on the first page and write the resulting sum on the second sheet of paper in the notepad. Have the student rip off the first piece of paper to hide their age, and pass the notepad with the new sum to the second student in the group.

- Have the second child add their age to the number on the second sheet of paper and place the answer on a third sheet of paper in the notebook. The child should rip off the sheet of paper with their age to make sure that they age stays hidden.
- Continue this process until all children in the group are accounted for.
- Return the final sheet with the final sum to the first child in the group and have him/her subtract the original random number (ex. 342) from it. Have the first child share this number with the rest of the group.
- Have the children in the group divide the shared number by the number of children in the group to find the average age. Check the work of each group without sharing the age of each student with the group.
- Since each child destroyed their papers with their ages on it, it is impossible for anyone to work out everyone's individual age. Relate this activity to the real world by sharing with the students that computers use similar processes to protect our personal information every time we make a transaction or payment with our credit cards. Otherwise, the information shared could be used to obtain personal information.