Activity Title: **Subject**: Computer Science **Grade**: 8th	**Teacher**: Ms Wingreen **Duration**: 45 mins

Summary/Timeline of Activity:

- **Do Now:**

  Solve the following word problem:

  You are going apple picking with your friends. You start out with an empty bag to put your apples in.

  1. How many apples do you have?

  You pick 7 apples and put them in your bag.

  2. Now how many apples do you have?

  You see that 2 apples are rotten so you toss them back. You eat one of your remaining apples.

  3. Now how many apples do you have?

  Your friend didn't have a bag so she puts her 5 apples in your bag.

  4. Now how many apples do you have?

  5. Write a math expression for each of the previous statements.

  Answer the following questions:

  6. Write an expression that takes in 4 as an input and outputs 15.
  7. Write an expression that takes in 8 as an input and outputs 5.
  8. Without using addition or subtraction, write an expression that takes an input of 125 and outputs 10.

  If time, teacher can live code some of the methods that students come up with. Otherwise, they can be used for the following unplugged activity.

- **Mini-lesson:** Unplugged activity
  - 3 students are assigned to be either a variable (carry a whiteboard) and 3 students are assigned to be a method (have an Expo marker)
  - Methods students are assigned expressions, e.g. add 2; if even subtract 1, if odd multiply by 3; multiply by 10
  - The variables walk around to the different methods and have their values changed accordingly (see tables below for the first 3 rounds traced out for each student)
  - As students are walking around, teacher will trace out on the board what is happening in real time. If students seem to be understanding the variable and methods activity, the teacher can call on 3 students to come up to the board to trace out what is happening in the room.
  - All students should be copying the trace table into their notebooks along with the teacher (or after if they are participating in the activity)

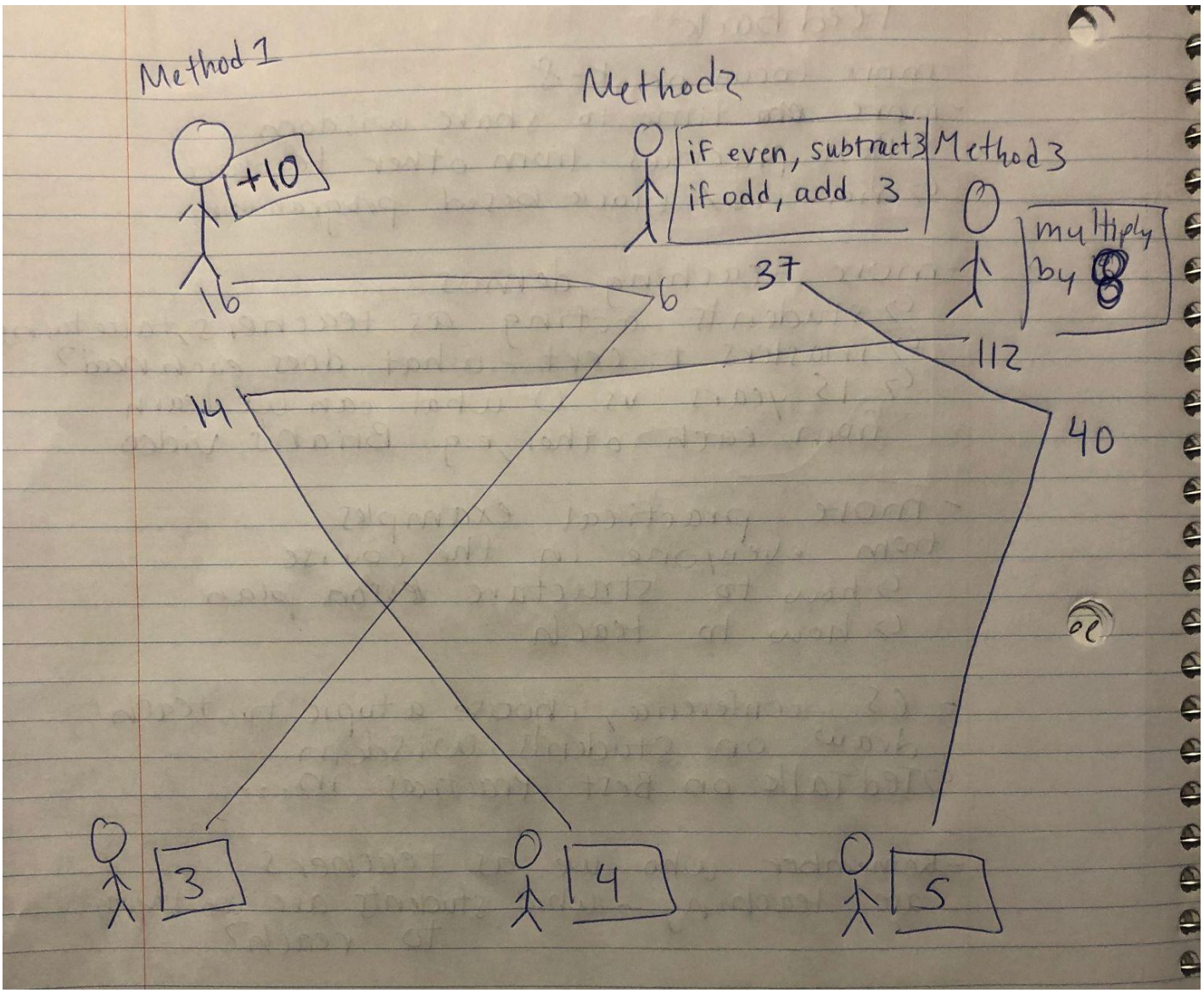
Sample trace table that teacher will write on the board in real time:

Student 1			
	Input	**Method**	**Output**
Round 1:	4	+2	6
Round 2:	6	x3	18
Round 3:	18	-5	13

Student 2			
	Input	**Method**	**Output**
Round 1:	10	x3	30
Round 2:	30	-5	25
Round 3:	25	+2	27

Student 3			
	Input	**Method**	**Output**
Round 1:	-4	+2	-2
Round 2:	-2	-5	-7
Round 3:	-7	x3	-21

- **Independent Work Time**:
    - Students will come up with their own examples of variables and methods and draw out on paper what the birds eye view of their unplugged activity would look like
    - Once students draw the unplugged activity they will represent their picture as a trace table
    - Extension: write out methods and variables in code if finished with table



Student 1			
	Input	**Method**	**Output**
Round 1:	3	If even subtract 3, If odd, add 3	6
Round 2:	6	+10	16

Student 2			
	Input	**Method**	**Output**
Round 1:	4	+10	14
Round 2:	14	x8	112

Student 3			
	Input	**Method**	**Output**
Round 1:	5	x8	40
Round 2:	40	If even subtract 3, If odd, add 3	37

- **Exit Ticket:**
  - Turn in independent work

Desired Results		
Common Core Standards: • Design or remix a program that uses a variable to maintain the current value of a key piece of information. • The focus is on understanding that variables can be used to track the value of a concept in a program as it changes over time.	**Vocabulary**: • Variable • Method • Value • Store • Trace	**Resources** (provide URLs): • Story Problems • Blank trace tables

Learning Objectives: The student will be able to... ● Understand that a variable stores a single number (int) ● Trace (using pencil and paper) how the variable's value changes when different methods are applied	**End product**: The student will create... ● A trace table in their notebook ● Table to replicate the Unplugged activity, using their own variables and methods

Student Trace Tables

Student 1			
	Input	**Method**	**Output**
Round 1:			
Round 2:			
Round 3:			
Round 4:			
Round 5:			

Student 2			
	Input	**Method**	**Output**
Round 1:			
Round 2:			
Round 3:			
Round 4:			
Round 5:			

Student 3			
	Input	**Method**	**Output**
Round 1:			
Round 2:			
Round 3:			
Round 4:			
Round 5::			