Task 4.1P Answer Sheet

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1. How many Counter objects were created?
   A total of 2 counter objects was created.

2. Variables declared in main() are different to the objects created when we call new. What is the relationship between the declared variables in main and the objects created?
   When we create new instances of the Counter class and assign them to the elements of the myCounters array, we are actually assigning references to these instances in heap memory to the elements. In other words, the myCounters array in main() does not store the Counter objects themselves, but rather references to them.

3. Resetting the counter in myCounters[2] also changes the value of the counter in myCounters[0]. Why causes this to happen?
   myCounters[0] and myCounters[2] point to the same object in heap memory. Therefore, resetting myCounters[2] also resets myCounters[0].

4. The key difference between memory on the heap compared to the stack and the heap is that the heap holds dynamically allocated memory. What does this mean?
   Dynamically allocated memory refers to memory that is allocated at run-time. When we create an object, we do not know beforehand how much memory it will need, so memory will have to be dynamically allocated on the heap to accommodate the object.

5. On which are objects allocated (heap or stack)? On which are local variables allocated (heap or stack)?
   Objects are allocated on the heap, whereas local variables are allocated on the stack.

6. What does the new() method do when called for a particular class? What does it do and what does it return?
   The new method calls the constructor of the class to create a new instance of that class. After creating the new object in the heap, it returns a reference to that object.

7. Draw a diagram showing the locations of the variables and objects in main and their relationships to one another.

Stack

Heap

[myCounters[0], myCounters[1], myCounters[2]]

Counter Object (Counter 1)   Counter Object (Counter 2)

Main

i (int)

myCounters
(Array of
Counters)