1A. Algorithm

In the test class the program runs a loop 10 times. In each loop it generates a random number and inserts it into the heap. When inserting a number the system checks that the value of the inserted value is greater than it's parent and if not the system will swap the child and parent up the tree until it is in the write place in the heap.If after the insertion the heap array is full then the system will "double" the array size by creating a new empty array with twice the size and then entering the elements from the old array one-by-one. Once the system has added 10 values to the heap it will then display the heap and then the program ends.

C.

The trial I set up was that the program would create a binary heap of 10,000 elements and the heap would double when it filled to a certain percentage, either 100, 75, or 50 percent. I looped this 100 times and took the average time to perform this task. On average, doubling at 100 percent resulted in the fastest runtime and doubling at 50 percent resulted in the slowest runtime.