CSE 130 Lab 11
Prime Number Design

Pseudocode:

```
GET number from user                                                              A

ASSERT number >= 2

SET prime <- []
FOR i <- 2 ... number + 1                                                         B
        APPEND i to prime                                                         C

SET factor <- 2                                                                   D
WHILE factor <= sqrt(number)                                                      E
        IF factor in prime                                                        F
                FOR multiple <- factor * 2 ... number + 1, increment by factor    G
                        IF multiple in prime                                      H
                                REMOVE multiple from prime                        I
        SET factor <- factor + 1                                                  J

PUT prime                                                                         K

END
```

Algorithmic Efficiency:
O(n log n) Efficiency
Two loops: There are two loops in the algorithm which are both controlled by the size of the input.
Nested loops: One loop is in the body of the other loop.

Program Trace:
Your program trace is to include a single test case: the primes at or below 10.

	number	prime	i	factor	multiple
A	10	/	/	/	/
B	10	[]	2	/	/
C	10	[2]	2	/	/
B	10	[2]	3	/	/
C	10	[2, 3]	3	/	/
B	10	[2, 3]	4	/	/
C	10	[2, 3, 4]	4	/	/
B	10	[2, 3, 4]	5	/	/
C	10	[2, 3, 4, 5]	5	/	/
B	10	[2, 3, 4, 5]	6	/	/
C	10	[2, 3, 4, 5, 6]	6	/	/

B	10	[2, 3, 4, 5, 6]	7	/	/
C	10	[2, 2, 4, 5, 6, 7]	7	/	/
B	10	[2, 3, 4, 5, 6, 7]	8	/	/
C	10	[2, 3, 4, 5, 6, 7, 8]	8	/	/
B	10	[2, 3, 4, 5, 6, 7, 8]	9	/	/
C	10	[2, 3, 4, 5, 6, 7, 8, 9]	9	/	/
B	10	[2, 3, 4, 5, 6, 7, 8, 9]	10	/	/
C	10	[2, 3, 4, 5, 6, 7, 8, 9, 10]	10	/	/
B	10	[2, 3, 4, 5, 6, 7, 8, 9, 10]	10	/	/
D	10	[2, 3, 4, 5, 6, 7, 8, 9, 10]	/	2	/
E	10	[2, 3, 4, 5, 6, 7, 8, 9, 10]	/	2	/
F	10	[2, 3, 4, 5, 6, 7, 8, 9, 10]	/	2	/
G	10	[2, 3, 4, 5, 6, 7, 8, 9, 10]	/	2	4
H	10	[2, 3, 4, 5, 6, 7, 8, 9, 10]	/	2	4
I	10	[2, 3, 5, 6, 7, 8, 9, 10]	/	2	4
G	10	[2, 3, 5, 6, 7, 8, 9, 10]	/	2	6
H	10	[2, 3, 5, 6, 7, 8, 9, 10]	/	2	6
I	10	[2, 3, 5, 7, 8, 9, 10]	/	2	6
G	10	[2, 3, 5, 7, 8, 9, 10]	/	2	8
H	10	[2, 3, 5, 7, 8, 9, 10]	/	2	8
I	10	[2, 3, 5, 7, 9, 10]	/	2	8
G	10	[2, 3, 5, 7, 9, 10]	/	2	10
H	10	[2, 3, 5, 7, 9, 10]	/	2	10
I	10	[2, 3, 5, 7, 9]	/	2	10
G	10	[2, 3, 5, 7, 9]	/	2	10
J	10	[2, 3, 5, 7, 9]	/	3	/
E	10	[2, 3, 5, 7, 9]	/	3	/
G	10	[2, 3, 5, 7, 9]	/	3	6
H	10	[2, 3, 5, 7, 9]	/	3	6
G	10	[2, 3, 5, 7, 9]	/	3	9
H	10	[2, 3, 5, 7, 9]	/	3	9
I	10	[2, 3, 5, 7]	/	3	9
G	10	[2, 3, 5, 7]	/	3	9
J	10	[2, 3, 5, 7]	/	4	/
E	10	[2, 3, 5, 7]	/	4	/
K	10	[2, 3, 5, 7]	/	/	/