Given the hash function **h(k) = k mod 12**, answer the following question on hashing *(Note: Read both questions at once before beginning)*.

a) Insert the following keys into the hash table below. Use the **linear probing** collision resolution technique when appropriate. *Note: Implementation of this technique includes wrapping around the array when you run out of slots at the end.*

Insert keys *: 18, 41, 22, 44, 58, 32, 34

18 – hashes to 6, no collision

41 – hashes to 5, no collision

22 – hashes to 10 – no collision

44 – hashes to 8 – no collision

58 – hashes to 10 – COLLISION, put in 11.

32 – hashes to 8 – COLLISION, put in 9

34 – hashes to 10 – COLLISION, put in 0

34					41	18		44	32	22	58
0	1	2	3	4	5	6	7	8	9	10	11

Remove keys *: 22

Remove 22 – found at hashed location 10.

34					41	18		44	32		58
0	1	2	3	4	5	6	7	8	9	10	11

Insert 73 and 20

73 - hashed to 1 – no collision

20 – hashes to 8 – COLLISION, put in 10

34	73				41	18		44	32	20	58
0	1	2	3	4	5	6	7	8	9	10	11

b) <u>How many</u> keys (in total) and <u>which ones</u> caused an initial collision when being inserted (list them with commas)?

ANSWER: Four keys caused collisions with insertion: 58, 32, 34, 20.