To solve this question, you need to use a combination of algebra and simultaneous equation.

11 a) List out the following simultaneous equations:

A) $3 + a + b = 15$

B) $a + b + c = 15$

C) $b + c + d = 15$

D) $c + d + 5 = 15$

From equation A, we can deduce that $a + b = 12$.
Put that into equation B to get $c = 3$

From equation D, we can deduce that $c + d = 10$.
Put that into equation C to get $b = 5$
Now that we know the values of b and c, we can put them into B to get $a = 7$ and into C to get $d = 7$

Hence, the numbers in the box are:
3 7 5 3 7 5

11 b) Repeat the same steps as in 11a):

A) $8 + a + b = 17$

B) $a + b + c = 17$

C) $b + c + d = 17$

D) $c + d + e = 17$

E) $d + e + f = 17$

F) $e + f + 7 = 17$

Following similar steps as detailed in 11a) you should get:

$a = 7 \quad b = 2 \quad c = 8$

$d = 7 \quad e = 2 \quad f = 8$

Hence, the numbers in the box are:

8 7 2 8 7 2 8 7

11 c) From the answers we got from 11a) and 11b), we can deduce that the pattern of numbers repeats at every set of 3 numbers.

To find out the 100th number, repeat the same formula:
A) $6 + a + b = 19$
B) $a + b + c = 19$
C) $b + c + d = 19$
We know that $a + b = 13$, hence $c = 6$
Putting these numbers into the first 6 boxes, we have:
6 a b 6 d e…

As you can deduce from above, the pattern 6-a-b repeats as the first set, and since the set is in a multiple of 3, we know that the number just after 99 (which is the end of a set) MUST be a 6.

Hence, the number in the 100th box must be 6

11 d) i) 3 8 3 3 8
3 8 3 8 3
3 8 8 3 8

d) ii) As you can deduce from above, the first and third row of the set pattern begins with a 3, therefore the 100th box must begin with a 3 as well.
In the second row however, the pattern 3-8 repeats at every 2 numbers. Following that, the 100th box must begin with a 3 as well since this set pattern is a multiple of 2.

Hence, the number in the 100th box must be 3