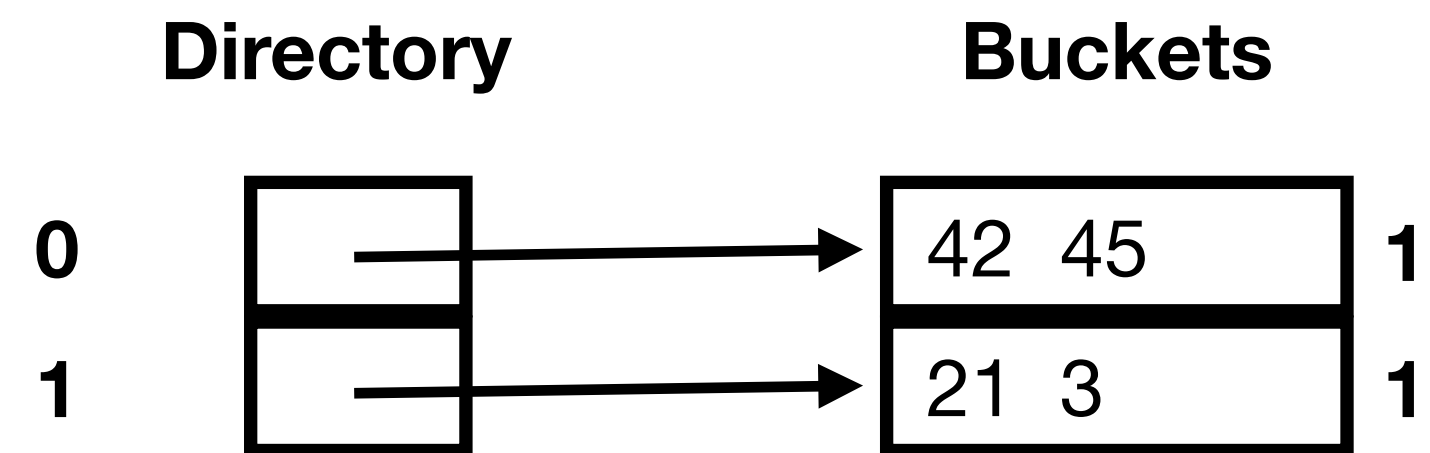# Quiz 11 Solution

1. What does an extendable hash table with a bucket size of 2 look like after the following values are inserted. Redraw the table each time the directory size doubles. Assume the values are inserted in the order shown below and the initial directory size is 2.

Table After 21, 42, 3 and 45 are added
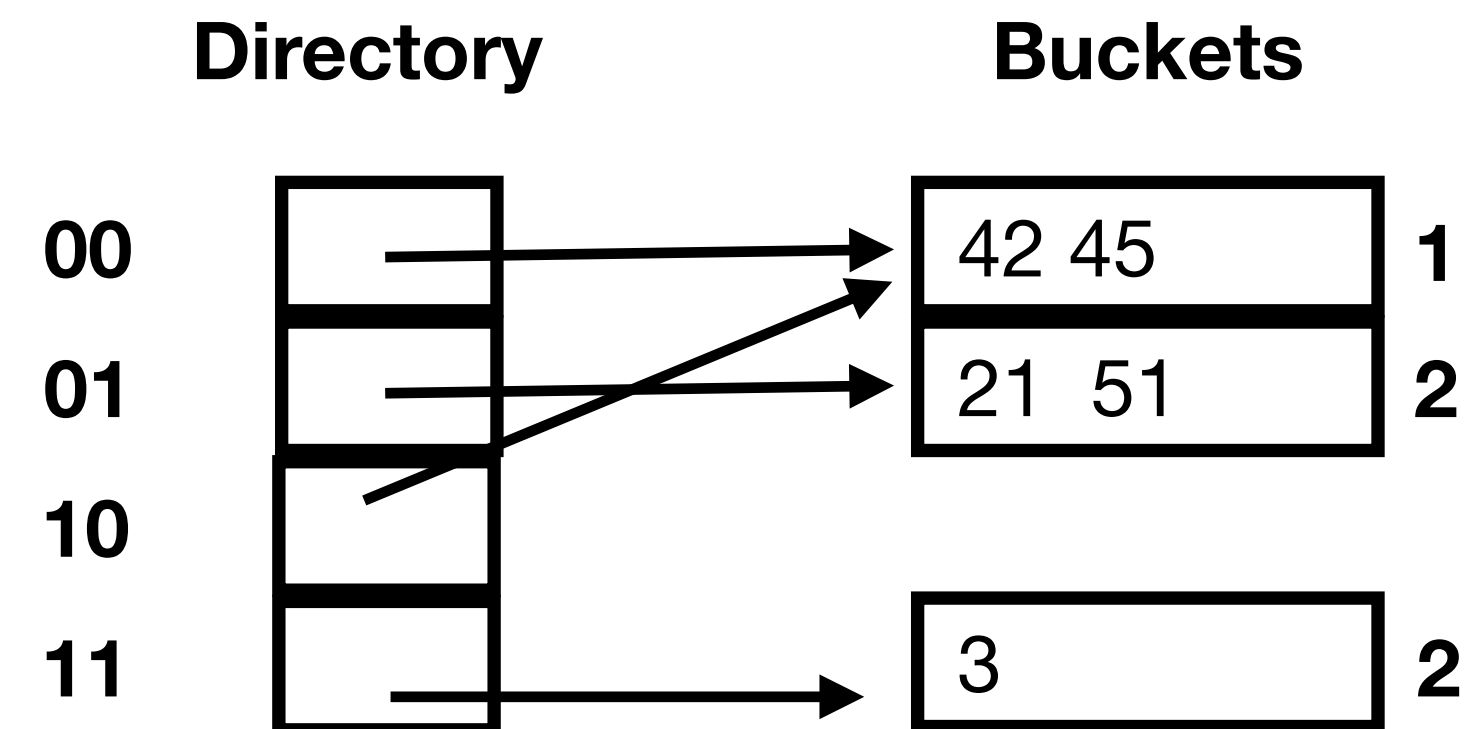
Directory   **Buckets**

Key Hash Values

21	0001
42	0010
3	0011
45	0100
51	0101
6	0110
70	0111
18	1000
9	1001
14	1010

0 → 42 45   **1**

1 → 21 3   **1**

1. What does an extendable hash table with a bucket size of 2 look like after the following values are inserted? Redraw the table each time the directory size doubles. Assume the values are inserted in the order shown below and the initial directory size is 2.

Table After 51 is added

Directory   **Buckets**

Key	Hash Values
21	0001
42	0010
3	0011
45	0100
51	0101
6	0110
70	0111
18	1000
9	1001
14	1010

Directory:
- 00
- 01
- 10
- 11

Buckets:
- 42 45   **1**
- 21 51   **2**
- 3   **2**

1. What does an extendable hash table with a bucket size of 2 look like after the following values are inserted? Redraw the table each time the directory size doubles. Assume the values are inserted in the order shown below and the initial directory size is 2.
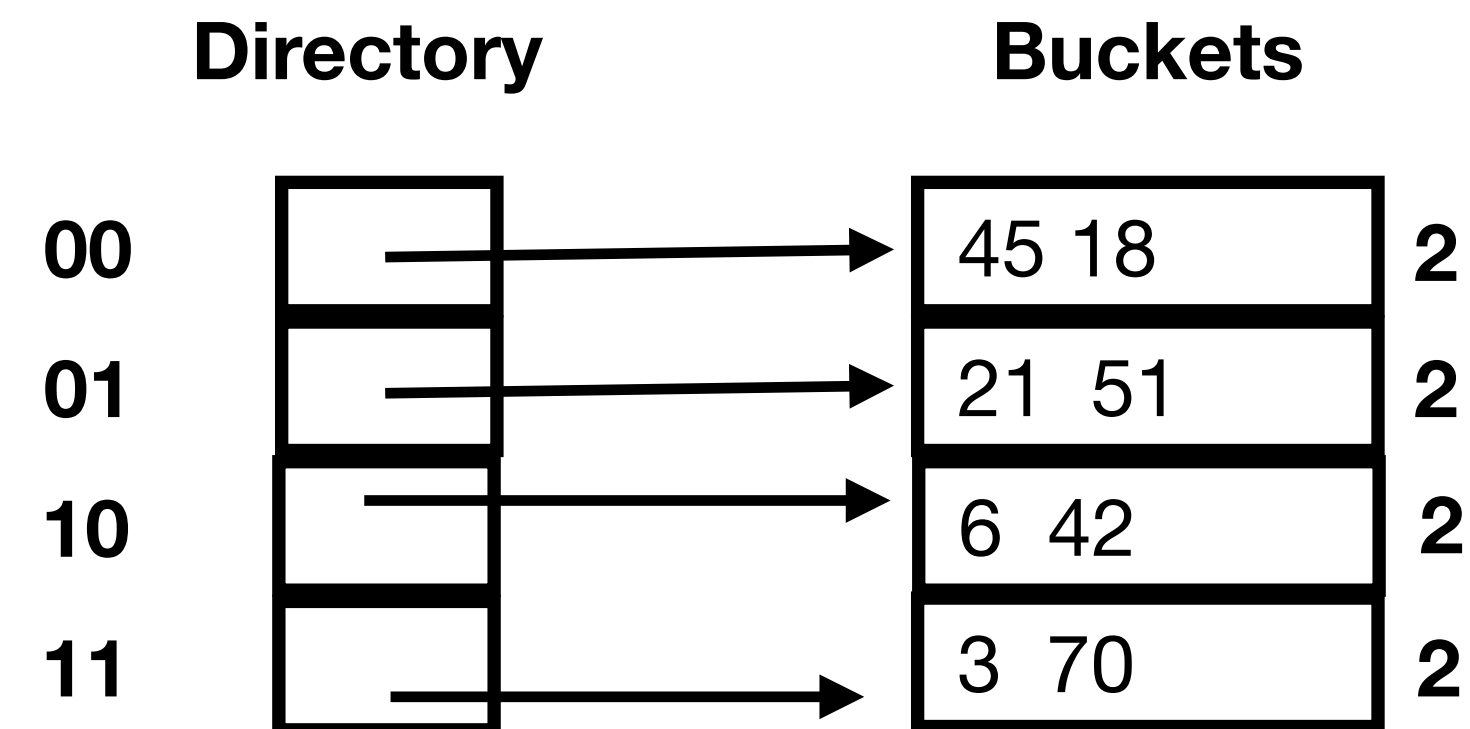
Table After 6, 70 and 18 are added

Key	Hash Values
21	0001
42	0010
3	0011
45	0100
51	0101
6	0110
70	0111
18	1000
9	1001
14	1010

Directory

Buckets

00	45 18 **2**
01	21 51 **2**
10	6 42 **2**
11	3 70 **2**

1. What does an extendable hash table with a bucket size of 2 look like after the following values are inserted? Redraw the table each time the directory size doubles. Assume the values are inserted in the order shown below and the initial directory size is 2.
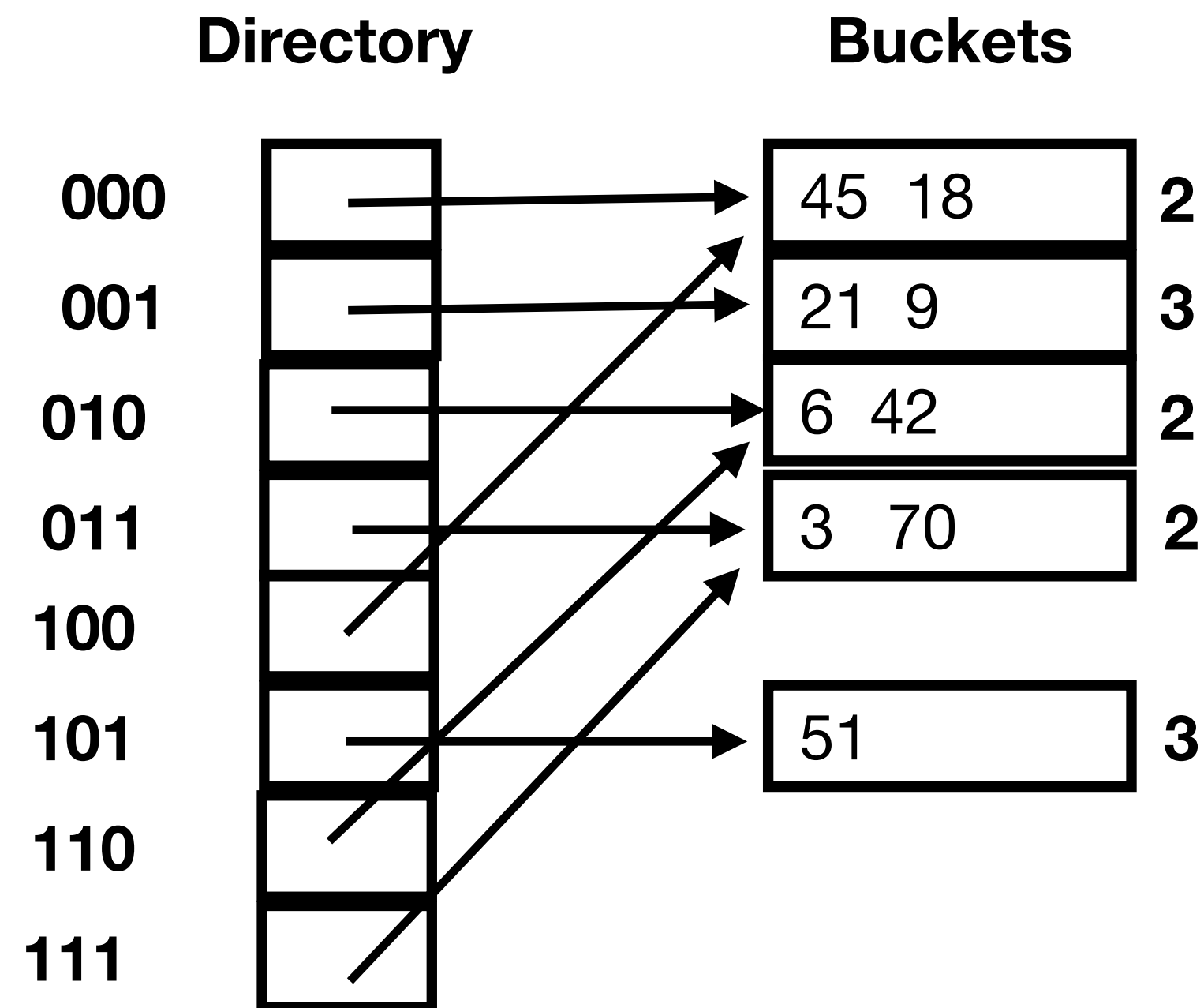
Table After 9 is added

Directory   **Buckets**

Key Hash Values

21	0001
42	0010
3	0011
45	0100
51	0101
6	0110
70	0111
18	1000
9	1001
14	1010

000 → 45 18   **2**

001 → 21 9   **3**

010 → 6 42   **2**

011 → 3 70   **2**

100

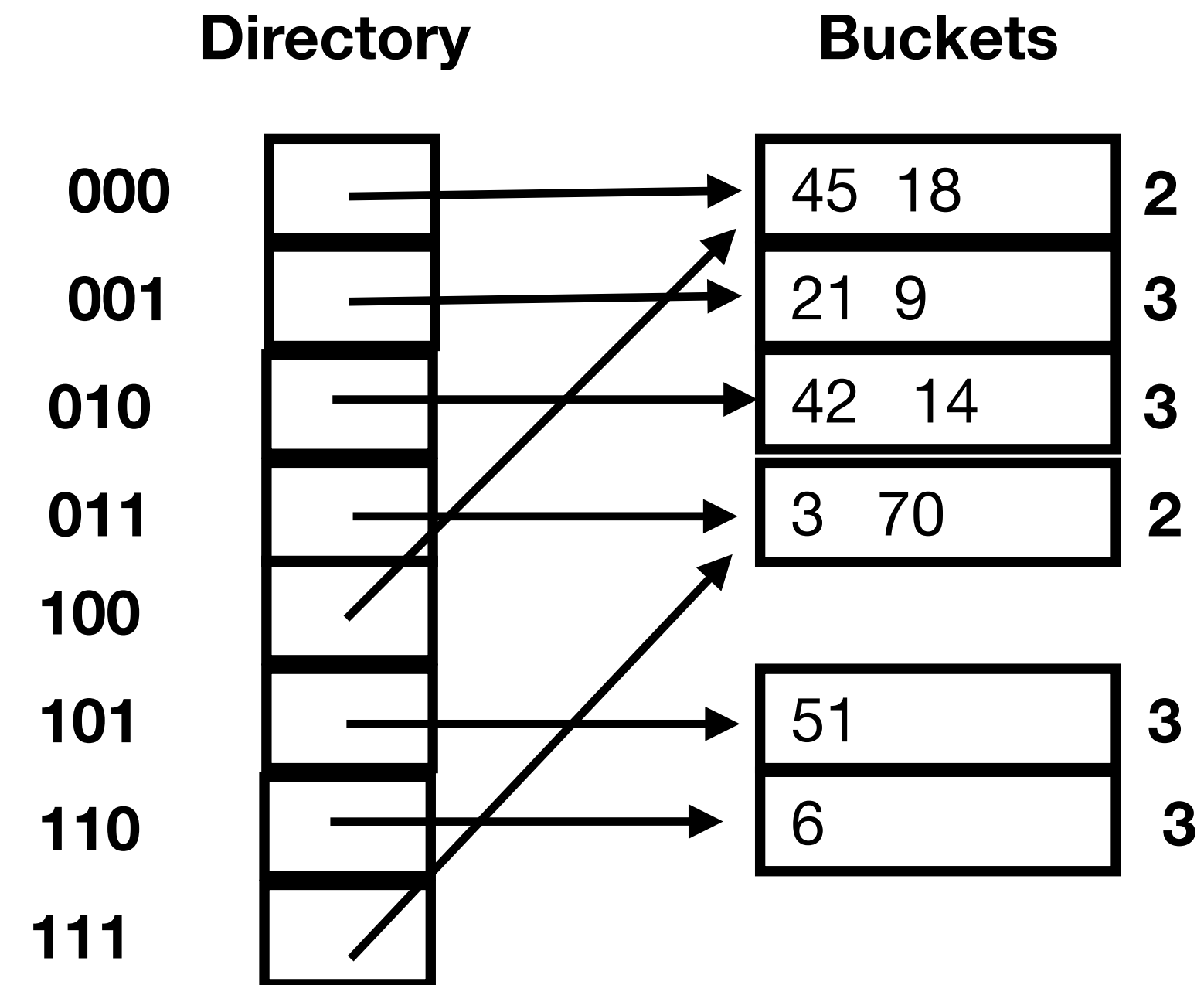**101** → 51   **3**

110

111

1. What does an extendable hash table with a bucket size of 2 look like after the following values are inserted? Redraw the table each time the directory size doubles. Assume the values are inserted in the order shown below and the initial directory size is 2.

Table After 14 is added

Key Hash Values

Key	Hash Values
21	0001
42	0010
3	0011
45	0100
51	0101
6	0110
70	0111
18	1000
9	1001
14	1010

Directory

```
000
001
010
011
100
101
110
111
```

Buckets

45 18	2
21 9	3
42 14	3
3 70	2
51	3
6	3

2. Show what your answer to problem 1 looks like after the following values are removed. Assume they are removed in the order shown. Redraw the table each time the directory is made smaller.

Table After 3 and 9 are removed

Directory   **Buckets**

Key	Hash Values
3	0011
9	1001
6	0110
18	1000
51	0101

```
000  ──────────────────►  45  18     2
001  ──────────────────►  21  51     2
010  ──────────────────►  42   14    3
011  ──────────────────►  70         2
100
101
110  ──────────────────►  6          3
111
```

2. Show what your answer to problem 1 looks like after the following values are removed. Assume they are removed in the order shown. Redraw the table each time the directory is made smaller.

Table After 6, 18 and 51 are removed

Key	Hash Values
3	0011
9	1001
6	0110
18	1000
51	0101

Directory   **Buckets**

00	45 **2**
01	21 **2**
10	42 14 **2**
11	70 **2**