Linear Probing

15 54 13 10 135 114 49 174 27 24

15 % 13 = 2

54 % 13 = 2 → collision w/ 2 → 3

13 % 13 = 0

10 % 13 = 10

135 % 13 = 5

114 % 13 = 10 → collision w/ 10 → 11

49 % 13 = 10 → 11 → 12

174 % 13 = 5 → 6

27 % 13 = 1

24 % 13 = 11 → 12 → 0 → 1 → 2 → 3 → 4

Linear

0	13
1	27
2	15
3	54
4	24
5	135
6	174
7	empty
8	empty
9	empty
10	10
11	114
12	49

Double Hashing

N=21

34 56 78 90 12 23 45 67 89 11 33 55 77 99 21

34 % 21 = 13

56 % 21 = 14

78 % 21 = 15

90 % 21 = 9

12 % 21 = 12

23 % 21 = 2

45 % 21 = 3

67 % 21 = 4

89 % 21 = 5

11 % 21 = 11

33 % 21 = 12 → 1 + (33 % 20) = 1 + 13 = 14 → 15 → 16

55 % 21 = 13 → 1 + (55 % 20) = 1 + 15 = 16 → 17

77 % 21 = 16 → 17 → 18

99 % 21 = 15 → 1 + (99 % 20) = 1 + 19 = 20

21 % 21 = 0

0	21
1	
2	23
3	45
4	
5	89
6	
7	
8	
9	90
10	
11	11
12	12
13	34
14	56
15	78
16	33
17	55
18	77
19	
20	99

Bucket Hashing

15 54 13 10 135 114 49 174 27 24

	Bucket	
15 % 10 = 5	0	[10]
54 % 10 = 4	1	
13 % 10 = 3	2	
10 % 10 = 0	3	[13]
135 % 10 = 5	4	[54, 114, 174, 24]
114 % 10 = 4	5	[15, 135]
49 % 10 = 9	6	
174 % 10 = 4	7	[27]
27 % 10 = 7	8	
24 % 10 = 4	9	[49]

Quadratic probing

15 54 13 10 135 114 49 174 27 24

15 % 13 = 2

54 % 13 = 2 → (2 + 1^2) = 3

13 % 13 = 0

10 % 13 = 10

135 % 13 = 5

114 % 13 = 10 → (10 + 1^2) → 11

49 % 13 = 10 → 11 → (11 + 1^2) → 12

174 % 13 = 5 → (5 + 1^2) → 6

27 % 13 = 1

24 % 13 = 11 → 12 → 3 → (11 + 3^2) → 4

	Quad
0	13
1	27
2	15
3	54
4	24
5	135
6	174
7	
8	
9	
10	10
11	114
12	49

Linear Quotient Probing

15 54 13 10 135 114 49 174 27 24

15 % 13 = 2

54 % 13 = 2 → (2+4) → 6

13 % 13 = 0

10 % 13 = 10

135 % 13 = 5

114 % 13 = 10 → 11

49 % 13 = 10 → 11 → 12

174 % 13 = 5 → (5+4) → 9

27 % 13 = 1

24 % 13 = 11 → 3

Linear

0	13
1	27
2	15
3	24
4	
5	135
6	54
7	
8	
9	174
10	10
11	114
12	49