

# Placement Drive Coding Round Percentage Breakage

30%	20%	20%	20%	10%
<u>Binary Search</u> (Recursion) + Back Tracking + Dynamic Programming	Arrays Strings Search Sort Algos	Trees Graphs Heaps Tries	Bit Masking Greedy Special Algos	

\* VTU Syllabus : (Search Space)  $\rightarrow$  (Array)  $\rightarrow$  Sorted Array  
 \* Square root (Integral Part) of a number using Binary Search.  $x \times x = 36$

$\frac{13}{2} \rightarrow 6 \times 6 = 36$   
 $\frac{11}{2} \rightarrow 5 \times 5 = 25$   
 $\frac{11}{2} \rightarrow 6 \times 6 = 36$

ans = mid = 3, s = 0, e = 36  
 S = mid = 18, e = 18  
 S = mid = 9, e = 9  
 S = mid = 4, e = 4  
 S = mid = 2, e = 2  
 S = mid = 1, e = 1  
 S = mid = 0, e = 0

Integral Part 37  $\rightarrow$  6  
 Square 18x18 m m

3x3 = 9 < 36  
 ans = 3  
 s = m+1 = 4

5x5 = 25 < 36  
 ans = 5  
 s = m+1 = 6

7x7 = 49 > 36  
 ans = 7  
 s = m+1 = 8

8x8 = 64 > 36  
 ans = 8  
 s = m+1 = 9

9x9 = 81 > 36  
 ans = 9  
 s = m+1 = 10

10x10 = 100 > 36  
 ans = 10  
 s = m+1 = 11

11x11 = 121 > 36  
 ans = 11  
 s = m+1 = 12

12x12 = 144 > 36  
 ans = 12  
 s = m+1 = 13

13x13 = 169 > 36  
 ans = 13  
 s = m+1 = 14

14x14 = 196 > 36  
 ans = 14  
 s = m+1 = 15

15x15 = 225 > 36  
 ans = 15  
 s = m+1 = 16

16x16 = 256 > 36  
 ans = 16  
 s = m+1 = 17

17x17 = 289 > 36  
 ans = 17  
 s = m+1 = 18

18x18 = 324 > 36  
 ans = 18  
 s = m+1 = 19

19x19 = 361 > 36  
 ans = 19  
 s = m+1 = 20

20x20 = 400 > 36  
 ans = 20  
 s = m+1 = 21

21x21 = 441 > 36  
 ans = 21  
 s = m+1 = 22

22x22 = 484 > 36  
 ans = 22  
 s = m+1 = 23

23x23 = 529 > 36  
 ans = 23  
 s = m+1 = 24

24x24 = 576 > 36  
 ans = 24  
 s = m+1 = 25

25x25 = 625 > 36  
 ans = 25  
 s = m+1 = 26

26x26 = 676 > 36  
 ans = 26  
 s = m+1 = 27

27x27 = 729 > 36  
 ans = 27  
 s = m+1 = 28

28x28 = 784 > 36  
 ans = 28  
 s = m+1 = 29

29x29 = 841 > 36  
 ans = 29  
 s = m+1 = 30

30x30 = 900 > 36  
 ans = 30  
 s = m+1 = 31

31x31 = 961 > 36  
 ans = 31  
 s = m+1 = 32

32x32 = 1024 > 36  
 ans = 32  
 s = m+1 = 33

33x33 = 1089 > 36  
 ans = 33  
 s = m+1 = 34

34x34 = 1156 > 36  
 ans = 34  
 s = m+1 = 35

35x35 = 1225 > 36  
 ans = 35  
 s = m+1 = 36

36x36 = 1296 > 36  
 ans = 36  
 s = m+1 = 37

37x37 = 1369 > 36  
 ans = 37  
 s = m+1 = 38

38x38 = 1444 > 36  
 ans = 38  
 s = m+1 = 39

39x39 = 1521 > 36  
 ans = 39  
 s = m+1 = 40

40x40 = 1600 > 36  
 ans = 40  
 s = m+1 = 41

41x41 = 1681 > 36  
 ans = 41  
 s = m+1 = 42

42x42 = 1764 > 36  
 ans = 42  
 s = m+1 = 43

43x43 = 1849 > 36  
 ans = 43  
 s = m+1 = 44

44x44 = 1936 > 36  
 ans = 44  
 s = m+1 = 45

45x45 = 2025 > 36  
 ans = 45  
 s = m+1 = 46

46x46 = 2116 > 36  
 ans = 46  
 s = m+1 = 47

47x47 = 2209 > 36  
 ans = 47  
 s = m+1 = 48

48x48 = 2304 > 36  
 ans = 48  
 s = m+1 = 49

49x49 = 2401 > 36  
 ans = 49  
 s = m+1 = 50

50x50 = 2500 > 36  
 ans = 50  
 s = m+1 = 51

51x51 = 2601 > 36  
 ans = 51  
 s = m+1 = 52

52x52 = 2704 > 36  
 ans = 52  
 s = m+1 = 53

53x53 = 2809 > 36  
 ans = 53  
 s = m+1 = 54

54x54 = 2916 > 36  
 ans = 54  
 s = m+1 = 55

55x55 = 3025 > 36  
 ans = 55  
 s = m+1 = 56

56x56 = 3136 > 36  
 ans = 56  
 s = m+1 = 57

57x57 = 3249 > 36  
 ans = 57  
 s = m+1 = 58

58x58 = 3364 > 36  
 ans = 58  
 s = m+1 = 59

59x59 = 3481 > 36  
 ans = 59  
 s = m+1 = 60

60x60 = 3600 > 36  
 ans = 60  
 s = m+1 = 61

61x61 = 3721 > 36  
 ans = 61  
 s = m+1 = 62

62x62 = 3844 > 36  
 ans = 62  
 s = m+1 = 63

63x63 = 3969 > 36  
 ans = 63  
 s = m+1 = 64

64x64 = 4096 > 36  
 ans = 64  
 s = m+1 = 65

65x65 = 4225 > 36  
 ans = 65  
 s = m+1 = 66

66x66 = 4356 > 36  
 ans = 66  
 s = m+1 = 67

67x67 = 4489 > 36  
 ans = 67  
 s = m+1 = 68

68x68 = 4624 > 36  
 ans = 68  
 s = m+1 = 69

69x69 = 4761 > 36  
 ans = 69  
 s = m+1 = 70

70x70 = 4900 > 36  
 ans = 70  
 s = m+1 = 71

71x71 = 5041 > 36  
 ans = 71  
 s = m+1 = 72

72x72 = 5184 > 36  
 ans = 72  
 s = m+1 = 73

73x73 = 5329 > 36  
 ans = 73  
 s = m+1 = 74

74x74 = 5476 > 36  
 ans = 74  
 s = m+1 = 75

75x75 = 5625 > 36  
 ans = 75  
 s = m+1 = 76

76x76 = 5776 > 36  
 ans = 76  
 s = m+1 = 77

77x77 = 5929 > 36  
 ans = 77  
 s = m+1 = 78

78x78 = 6084 > 36  
 ans = 78  
 s = m+1 = 79

79x79 = 6241 > 36  
 ans = 79  
 s = m+1 = 80

80x80 = 6400 > 36  
 ans = 80  
 s = m+1 = 81

81x81 = 6561 > 36  
 ans = 81  
 s = m+1 = 82

82x82 = 6724 > 36  
 ans = 82  
 s = m+1 = 83

83x83 = 6889 > 36  
 ans = 83  
 s = m+1 = 84

84x84 = 7056 > 36  
 ans = 84  
 s = m+1 = 85

85x85 = 7225 > 36  
 ans = 85  
 s = m+1 = 86

86x86 = 7396 > 36  
 ans = 86  
 s = m+1 = 87

87x87 = 7569 > 36  
 ans = 87  
 s = m+1 = 88

88x88 = 7744 > 36  
 ans = 88  
 s = m+1 = 89

89x89 = 7921 > 36  
 ans = 89  
 s = m+1 = 90

90x90 = 8100 > 36  
 ans = 90  
 s = m+1 = 91

## $O(\log N)$ Recursive Binary Search

\* First Occurrence | Last Occurrence | Total Number of Occurrences of an element in an array using Binary Search :  $\rightarrow \log n$

First = 2, Last = 5, Total = 4

ans = -1, key = 3, Lo = 0, Hi = 7

if (arr[mid] == key) ans = mid, s = mid+1, e = mid-1

if (arr[mid] < key) s = mid+1

if (arr[mid] > key) e = mid-1

if (s < e) return find(s, e, arr, key)

return ans

Time Complexity :  $O(\log n)$

Space Complexity :  $O(1)$

Important/Expected Coding Questions on Binary Search

(i) Square Root

(ii) First, Last, Total Occurrences

(iii) Missing Element in an Array

(iv) Peak in a Mountain Array

(v) Search in a 2D Matrix

(vi) Aggressive Cows

(vii) Book Allocation Problem

(viii) Printer's Partition Problem

LeetCode, Coding Ninjas

Have been asked in

companies like

Microsoft, Oracle,

Accenture, Wipro,

Netflix, IBM,

Infosys, TCS

etc.

array

mid

ans

1 2 3 4 5 6 7

0 1 2 3 4 5 6 7

1 2 3 4 5 6 7

2 3 4 5 6 7

3 4 5 6 7

4 5 6 7

5 6 7

6 7

7

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