

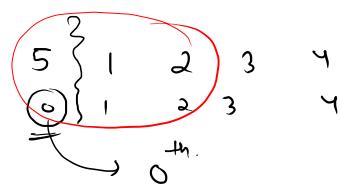
Revision.

10.

```

4 public class Solution {
5     public static int solve(int [] A){
6         int low = 0;
7         int high = A.length-1;
8         int ans = -1;
9
10        while(low <= high){
11            int mid = (low + high) / 2;
12            if(A[mid] > A[mid+1]){
13                ans = mid;
14                break;
15            }
16            else if (A[mid] < A[mid-1]){
17                ans = mid-1;
18                break;
19            }
20            else if(A[low] <= A[mid]){
21                low = mid + 1;
22            }
23            else if(A[mid] <= A[high]){
24                high = mid-1;
25            }
26        }
27        return ans;
28    }

```

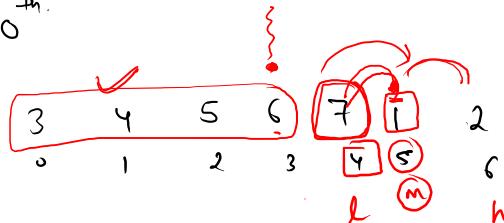


$O(\log n)$ .

$O(1)$

$O(1)$

$\underline{ans = 4}$ .



$m = 3$ .

$m = 5$ .

$l =$

✓ find an ele in sorted rotated array



$\circled{1} = \underline{ans}$ .

$(\log n)$       }       $3 \log n \Rightarrow O(\log n)$

bs      bs

# Find GCD of Array

Problem Submissions Leaderboard Discussions

gcd

1. Given an integer array `nums`, return the greatest common divisor of the smallest number and largest number in `nums`.

2. The greatest common divisor of two numbers is the largest positive integer that evenly divides both numbers.

$$\begin{array}{r} \text{gcd} \\ \underline{12, 36} \\ = 12 \\ = 4. \\ = \end{array}$$

Sample Input 0

5  
7 5 6 8 3

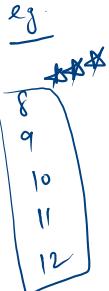
Sample Output 0

1

$$\begin{array}{c} 7 \quad 5 \quad 6 \quad 8 \quad 3 \\ 1. \left\{ \min = 3 \right. \\ 2. \left\{ \gcd(3, 8) = ? \right. \end{array}$$

```

1 import java.io.*;
2 import java.util.*;
3
4 public class Solution {
5     public static int gcd(int x, int y){
6         int ans = Math.min(x, y);
7         while(ans >= 1){
8             if( x % ans == 0 && y % ans == 0){
9                 break;
10            }
11            ans--;
12        }
13        return ans;
14    }
15
16    public static void main(String[] args) {
17        Scanner scn = new Scanner(System.in);
18        int n = scn.nextInt();
19        int [] A = new int[n];
20        for(int i = 0; i < n; i++){
21            A[i] = scn.nextInt();
22        }
23
24        //-----
25        int min = A[0];
26        int max = A[0];
27
28        for(int i = 1; i < n; i++){
29            min = Math.min(min, A[i]);
30            max = Math.max(max, A[i]);
31        }
32        System.out.println(gcd(min, max));
33    }
34 }
```

eg.  


$$\begin{array}{r} 1 \quad 7 \quad 9 \quad 12 \\ 0 \quad | \quad 1 \quad 2 \quad 3 \end{array}$$

$$\begin{array}{l} \min = 6 \\ \max = 12 \end{array} \rightarrow \gcd(6, 12)$$

$$\text{ans} = 6$$

$$\begin{array}{l} \geq 1 \\ 6 \cdot 1 - 6 = 0 \\ 12 \cdot 1 - 6 = 6 \end{array}$$

$$\gcd(8, 12)$$

$\Rightarrow$

$$\begin{array}{l} 8 > \\ \underline{\gcd > 8} \end{array}$$

# Trailing Zeros In factorial

Problem Submissions Leaderboard Discussions

1. Given an integer  $n$ , return the number of trailing zeroes in  $n!$ .

2. Note that  $n! = n \times (n-1) \times (n-2) \times \dots \times 3 \times 2 \times 1$ .

eg. 1.  $n=5$   $5!=120$   $\boxed{n}$   $\times$   $\circlearrowleft$

ans = 1

eg. 2.  $n=5$   $\circlearrowleft$   $\circlearrowleft$   $\circlearrowleft$   $\circlearrowleft$   $\circlearrowleft$

$n=150!$

$n=5$   $1 \times \textcircled{2} \times 3 \times 4 \times \textcircled{5} = 120$  ✓

$\circlearrowleft 2,5 \rightarrow \circlearrowleft 1$  ans.

$1 \times \textcircled{2} \times 3 \times 4 \times \textcircled{5} \times 6 \times 7 \times 8$   $\circlearrowleft 0$

$[2, 5]$   $\rightarrow 0$

$n=26$   $26!$

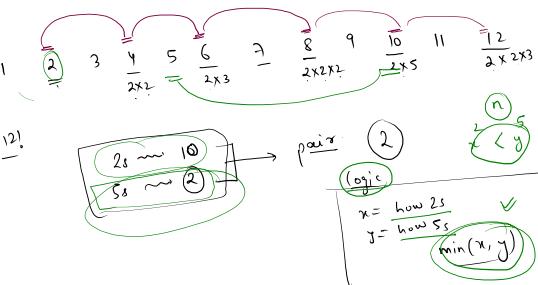
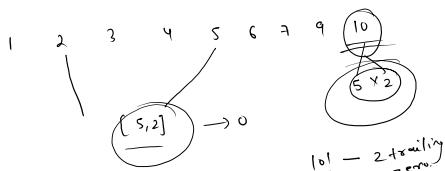
$1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10 \quad 11 \quad 12$   $\left[ \frac{10}{2^5} \times \frac{11}{2^5} \times \frac{12}{2^5 \times 3} \right]$

$\frac{1}{2} \times 1 \quad \frac{2}{2} \times 2 \quad \frac{3}{2} \times 3 \quad \frac{4}{2} \times 2 \quad \frac{5}{2} \times 1 \quad \frac{6}{2} \times 3 \quad \frac{7}{2} \times 1 \quad \frac{8}{2} \times 2 \quad \frac{9}{2} \times 1 \quad \frac{10}{2} \times 5 \quad \frac{11}{2} \times 1 \quad \frac{12}{2^5 \times 3}$

$12! \quad [5, 2] \quad (10) \quad 8 \cancel{(5)} \quad \sim 25 \quad \sim 5 \quad 00 \quad 00$

$\begin{array}{c} 2 \\ | \\ 5 \\ | \\ 2 \\ | \\ 2 \end{array} \quad 2^4 \quad 2^5 \quad 2^6$

$15 \quad 16 \quad 17 \quad 18 \quad 19 \quad 20 \quad 21 \quad 22 \quad 23 \quad 13 \quad \frac{14}{2 \times 7}$



$$1 \quad \underline{2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10 \quad 11 \quad 12}$$

$\frac{12}{2 \times 2 \times 2}$

$$\frac{12}{5} = 2 \quad \checkmark$$

ans.

$$1 \quad \underline{2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10 \quad 11 \quad 12 \quad 13 \quad 14}$$

$\frac{15}{5} = 3$

$$n=25$$

$\left[ \frac{26}{5} \right] = 5$

$\left[ \frac{26}{25} \right] \rightarrow 1$

$$126$$

$\frac{126}{5} = 25$

$\left( \frac{126}{25} \right) = 5$

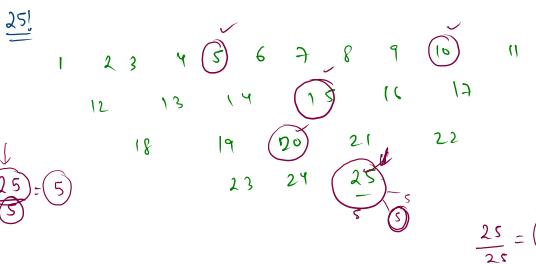
$\frac{126}{125} = 1$

$$150!$$

$\frac{150}{5} = 30$

$\frac{150}{25} = 6$

$\frac{150}{125} = 1$



$$\frac{25}{25} = 1$$

25!  $\frac{75}{5} = 15$      $\frac{75}{25} = 3 \Rightarrow 18$

$$\underline{1 \ 2 \ 3 \dots - - - \ 25 \dots - - - 75}$$

$$83!$$

$$\frac{83}{5} = 16$$

$$\frac{83}{(25)} = 3$$

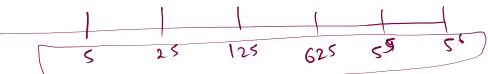
$10+3=19$

$$\frac{125}{5} = 25$$

$$\frac{125}{25} = 5$$

$$\frac{125}{125} = 1$$

$= 31$



(n)  $\rightarrow$   $\frac{n}{5} + \frac{n}{25} + \frac{n}{125} + \frac{n}{625} + \dots$

15625  $\rightarrow 37$

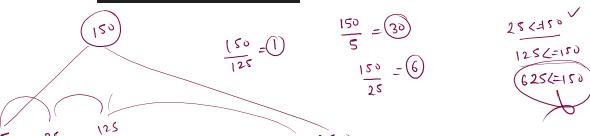
5 linear

$= < n$

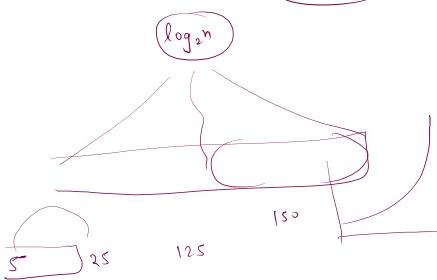
```

public static void main(String[] args) {
    Scanner scn = new Scanner(System.in);
    int n = scn.nextInt();
    int ans = 0;
    for(int i = 1; i <= n; i = i * 5) {
        ans += n / i;
    }
    System.out.println(ans);
}

```



(3)  $\log_5^n$



$$5, 25, 125, 625, \dots$$

$$s^1, s^2, s^3, s^4$$

$$s^x = 625$$

$$x \log s = \log(625)$$

$$\left[ n - \frac{n}{s} + \frac{n}{s^2} + \frac{n}{s^3} + \frac{n}{s^4} + \dots + 1 \right]$$

$$\frac{140!}{6^3}$$

$$\frac{(140)!}{6^3!}$$

$$\text{Pattern } \frac{n}{s^x} = 1$$

$$n = s^x$$

$$n = \log_5^n$$

## Reach Target

$$\underline{-1} + \underline{5} = 4$$

Problem Submissions Leaderboard Discussions

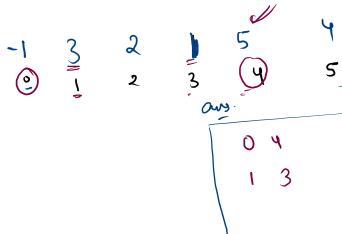
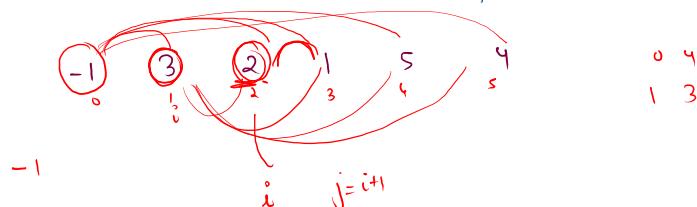
Take the target as an integer input. Then print the indices of the two numbers such that they add to the target.  
Note that the array is not sorted here. Two pointer, answer must be unique.

Sample Input 0

```
6
-1 1 2 3 4 5
4
```

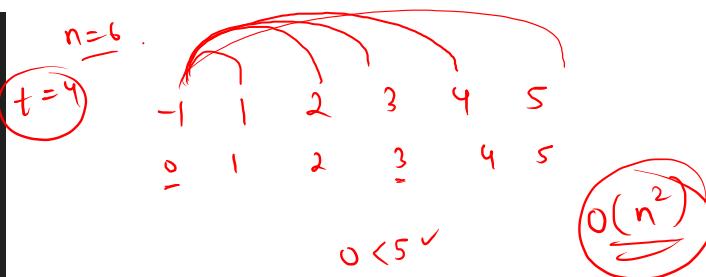
Sample Output 0

```
0 5
1 3
```

tar=4tar=4

```
public class Solution {
    public static void main(String[] args) {
        Scanner scn = new Scanner(System.in);
        int n = scn.nextInt();
        int [] A = new int[n];
        for(int i = 0; i < n; i++){
            A[i] = scn.nextInt();
        }
        int tar = scn.nextInt();

        for(int i = 0; i < n-1 ; i++){
            for(int j = i+1; j < n; j++){
                if(A[i] + A[j] == tar){
                    System.out.println(i + " " + j);
                }
            }
        }
    }
}
```

n=6O < 5 ✓O(n<sup>2</sup>)

$i = \cancel{\cancel{0}}$   
 $j = \cancel{\cancel{1}} \neq \cancel{\cancel{2}} \neq \cancel{\cancel{3}} \neq \cancel{\cancel{4}}$

$j < n$   
 $s < 6$   
 $c < 6$

Reach Target 2 (page 6).

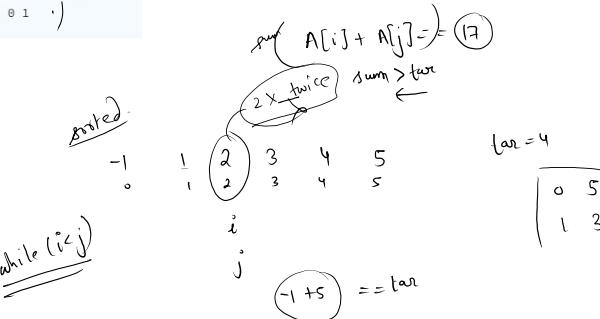
\* sorted.

tar = 9

4  
2 7 11 15  
9

2 7 11 15  
0 1 2 3  
i j

Sample Output 0



$$\begin{array}{c} \text{tar} = 4 \\ | \\ 0 \quad 5 \\ | \quad 3 \end{array}$$

```
public static void main(String[] args) {  
    Scanner scn = new Scanner(System.in);  
    int n = scn.nextInt();  
    int [] A = new int[n];  
    for(int i = 0; i < n; i++){  
        A[i] = scn.nextInt();  
    }  
    int tar = scn.nextInt();  
  
    int i = 0;  
    int j = n-1;  
  
    while( i < j){  
        if(A[i] + A[j] == tar){  
            System.out.println(i + " " + j);  
            i++;  
            j--;  
        }  
        else if(A[i] + A[j] > tar){  
            j--;  
        }  
        else{  
            i++;  
        }  
    }  
}
```

-1 1 2 3 4 5       $i = 4$   
0 1 2 3 4 5  
i j       $j = 4$

$$5 - 1 = 4$$

# Find Distance B/W Two Characters

[Problem](#)[Submissions](#)[Leaderboard](#)[Discussions](#)Page (10).

Given a string and two characters. Print the minimum distance between two given characters a and b in a string.

**Sample Input 0**

Geeks

G

S

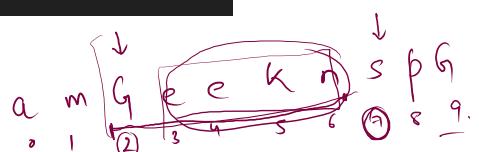
**Sample Output 0**

$$\text{idx1} = \text{str. indexof(ch1)}$$
$$\text{idx2} = \text{str. indexof(ch2)}$$
$$\text{idx2 - idx1 - 1}$$

```
public static void main(String[] args) {  
    Scanner scn = new Scanner(System.in);  
    String str = scn.nextLine();  
    char ch1 = scn.next().charAt(0);  
    char ch2 = scn.next().charAt(0);  
  
    System.out.println(str.indexOf(ch2) - str.indexOf(ch1) - 1);  
}
```

$$\text{ch1} = 4$$

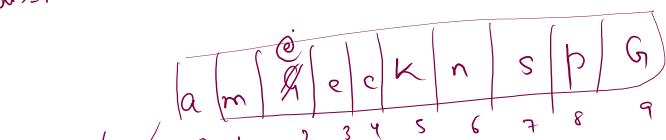
$$\text{ch2} = 5$$



$$7 - 2 - 1$$

$$= 4$$

$$\text{ans} = 1$$



$\min = \infty$

1

$$d = |2 - 7| - 1 = 4$$
$$d = |9 - 7| - 1 = 1$$

$$c1 = G \rightarrow ②$$
$$c2 = S - ① \quad ②$$