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## EKO - Eko

#binary-search

Lumberjack Mirko needs to chop down  $M$  metres of wood. It is an easy job for him since he has a nifty new woodcutting machine that can take down forests like wildfire. However, Mirko is only allowed to cut a single row of trees.

Mirko's machine works as follows: Mirko sets a height parameter  $H$  (in metres), and the machine raises a giant sawblade to that height and cuts off all tree parts higher than  $H$  (of course, trees not higher than  $H$  meters remain intact). Mirko then takes the parts that were cut off. For example, if the tree row contains trees with heights of 20, 15, 10, and 17 metres, and Mirko raises his sawblade to 15 metres, the remaining tree heights after cutting will be 15, 15, 10, and 15 metres, respectively, while Mirko will take 5 metres off the first tree and 2 metres off the fourth tree (7 metres of wood in total).

Mirko is **ecologically** minded, so he doesn't want to cut off more wood than necessary. That's why he wants to set his sawblade as high as possible. Help Mirko find the **maximum integer height** of the sawblade that still allows him to cut off **at least  $M$**  metres of wood.

### Input

The first line of input contains two space-separated positive integers,  $N$  (the number of trees,  $1 \leq N \leq 1\,000\,000$ ) and  $M$  (Mirko's required wood amount,  $1 \leq M \leq 2\,000\,000\,000$ ).

The second line of input contains  $N$  space-separated positive integers less than  $1\,000\,000\,000$ , the heights of each tree (in metres). The sum of all heights will exceed  $M$ , thus Mirko will always be able to obtain the required amount of wood.

### Output

The first and only line of output must contain the required height setting.

### Example

<b>Input:</b> 4 7 20 15 10 17	<b>Output:</b> 15
-------------------------------------	----------------------

<b>Input:</b> 5 20 4 42 40 26 46	
--	--

Submit solution!

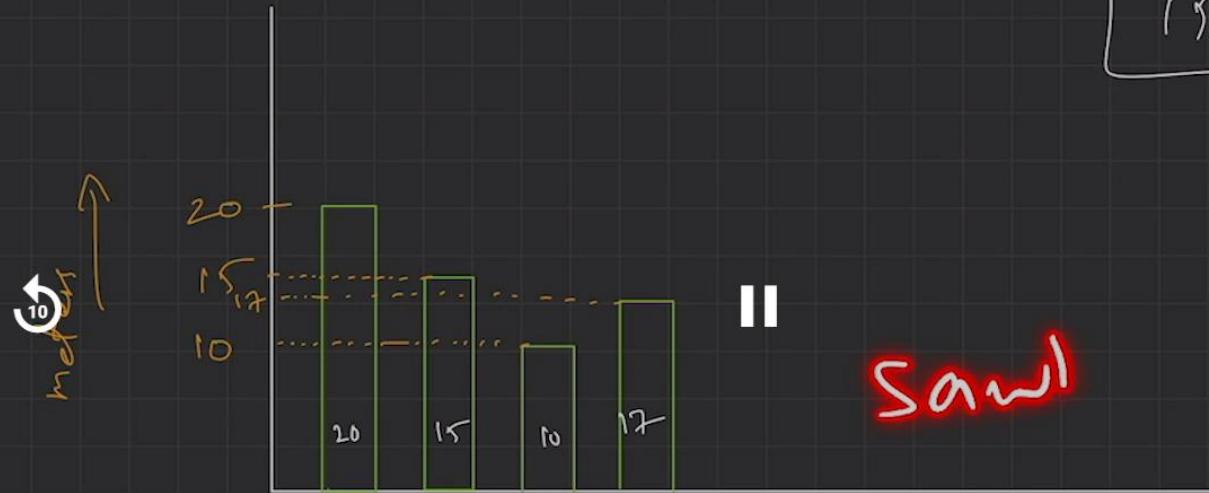
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Added by: ghorvat Date: 2012-07-02 Time limit: 1s Source limit: 50000B Memory limit: 1536MB Cluster: Cube (Intel G860) Languages: All Resource: COCI 2011/2012



# EKO-SPOJ

20 | 15 | 10 | 17 meter



$$M = \underline{\underline{10}} - \underline{\underline{7}} = \underline{\underline{3}}$$

Trees

$\rightarrow$  Sawblade  $\rightarrow$  15m

$$T_1 \rightarrow 20 - 15 = \underline{\underline{5m}}$$

$$\text{Total wood} = 5 + 2 = 7m,$$

$$T_2 = 0m,$$

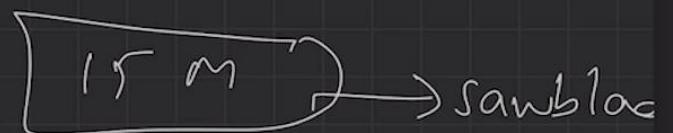
$$T_3 = 0m,$$

$$T_4 = 17 - 15 = \underline{\underline{2m}}$$



# EKO- SPOT

20 | 15 | 10 | 17 meter



$$M = \underline{\underline{7m}}$$

Trees

→ Sawblade  $\rightarrow 15m$

$$T_1 \rightarrow 20 - 15 = \underline{\underline{5m}}$$

$$\text{Total wood} = 5 + 2 = 7m,$$

$$T_2 = 0m,$$

$$T_3 = 0m,$$

$$T_4 = 17 - 15 = \underline{\underline{2m}}$$

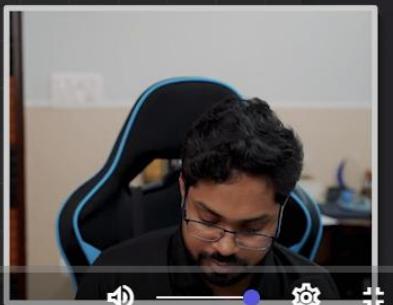


4  
↳ No. of trees

7 ↳ M → at least how much  
wood is  
removed,

20 15 10 7

Tree



↳  
No. of trees

↗  
 $M \rightarrow$  at least how much  
wood is  
removed,

20 15 10 17

Trees



II



Q →

20 | 15 | 10 | 17

M = 7



Brute force

To Find → sawblade's  
height

(Q) Sawblade height → 1m

$$\Rightarrow (20-1) + (15-1) + (10-1) + (17-1)$$

$$= 19 + 14 + 9 + 16$$

$$= 58 \text{ m.}$$



②

$$n = 2^m \Rightarrow (20-2) + (15-2) + (10-2) + (17-2)$$
$$= 18 + 13 + 8 + 15$$
$$= 54 \text{ m}$$



II



②

$$n = 2^m \Rightarrow (20-2) + (15-2) + (10-2) + (17-2)$$
$$= \cancel{18+13} + 8 + 15$$

$\approx 54 \text{ m}$

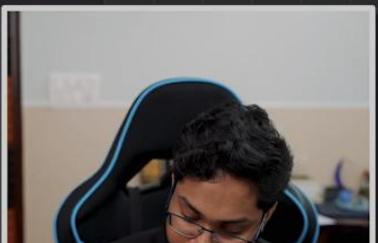
③

$$n = 3^m$$

II

④

$$n = 15^m \Rightarrow (20-15) + (15-15) + (10-\cancel{15}) + (17-15)$$
$$= 5 + 0 + 0 + 2 = 7^m$$



00:14:58 / 00:40:51

◀ ▶ ⏴ ⏵ ⏷ ⏹

⑤

$$n = 16$$

$$\begin{aligned} \Rightarrow & 20 - 16 + (15 - 16) + (10 - 16) + (17 - 16) \\ = & 4 + 0 + 0 + 1 \\ & = 5 \text{ m} \end{aligned}$$

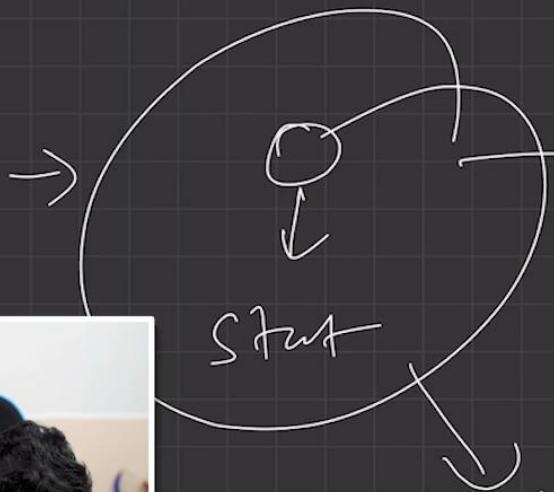
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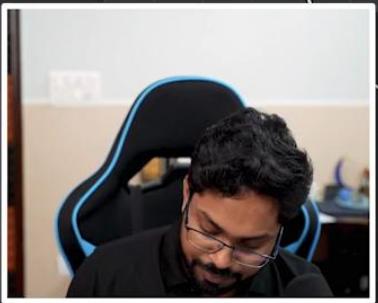
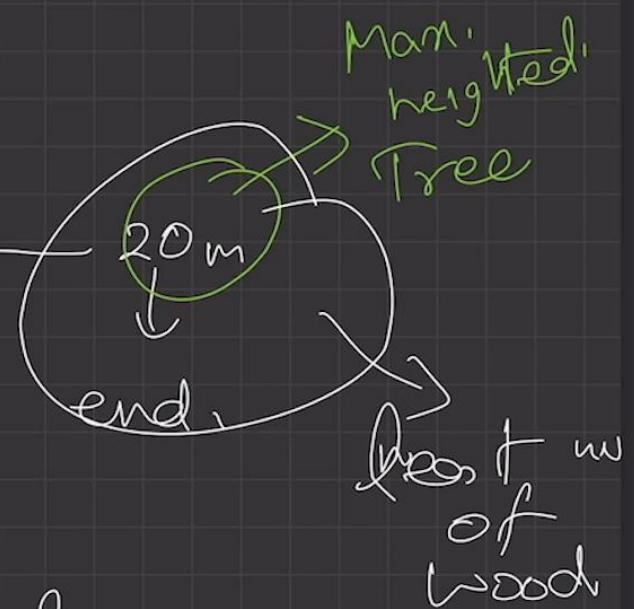
⑤

$$n = 16$$

$$\Rightarrow 20 - 16 + (15 - 10) + \cancel{(10 - 10)} + \cancel{(17 - 16)} \\ = 4 + 0 + 0 + 1 \\ = 5 \text{ m}$$



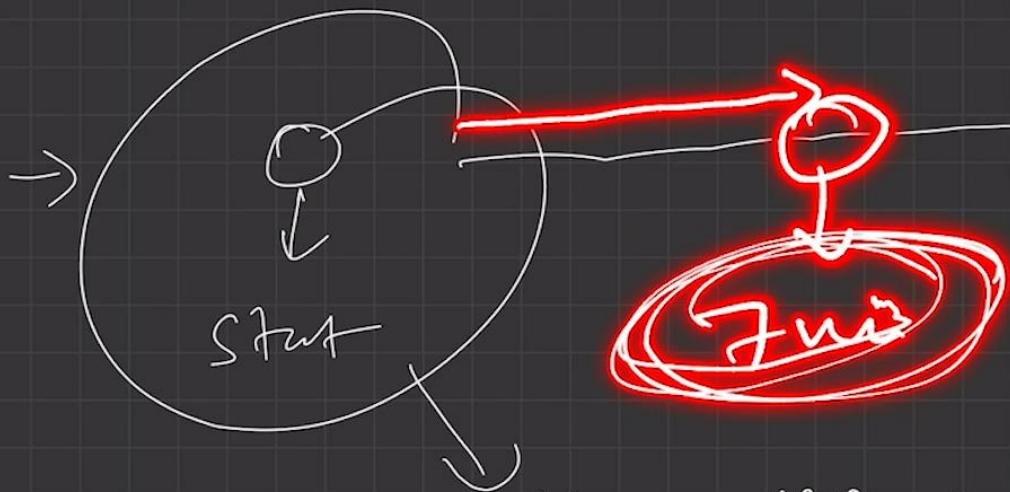
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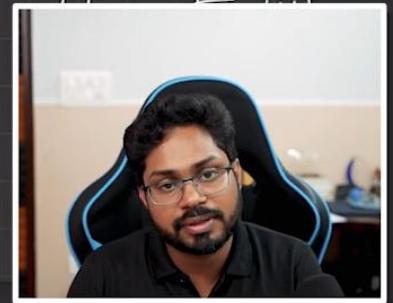
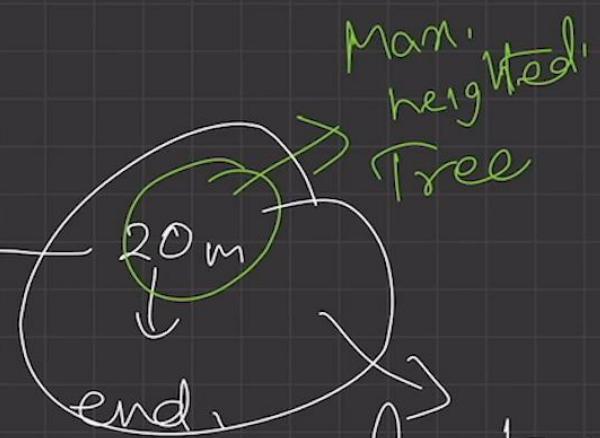
⑤

$$n = 16$$

$$\Rightarrow 20 - 16 + (15 - 10) + \cancel{(10 - 10)} + \cancel{(17 - 16)} \\ = 4 + 0 + 0 + 1 \\ = 5 \text{ m}$$



Max. no. of wood.

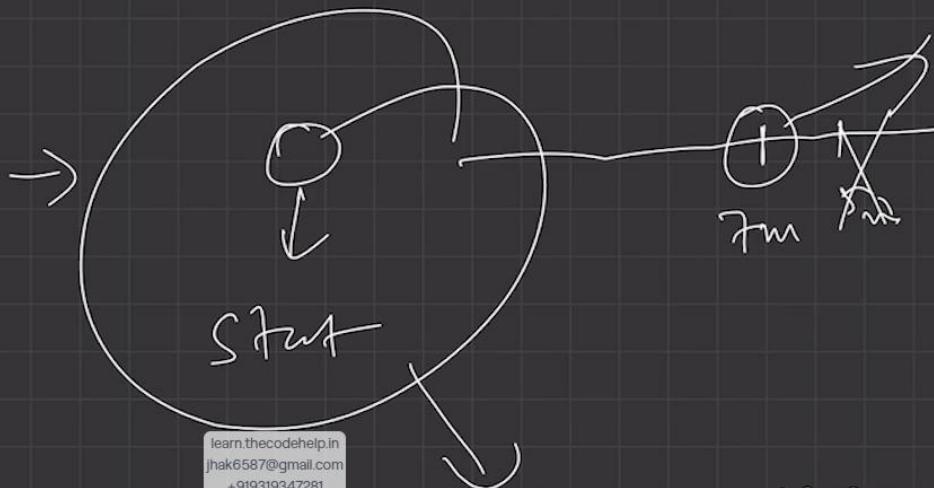


⑤

$$n = 16$$

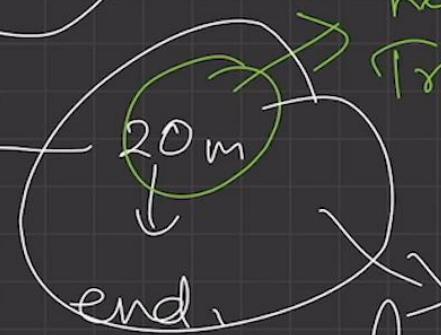
$$\Rightarrow 20 - 16 + (15 - 10) + \cancel{(10 - 10)} + (17 - 16) \\ = 4 + 0 + 0 + 1$$

= 5 m



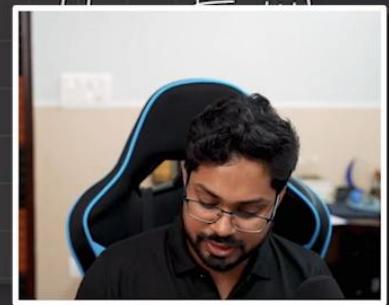
Saw blade  $\approx 10\text{m}$

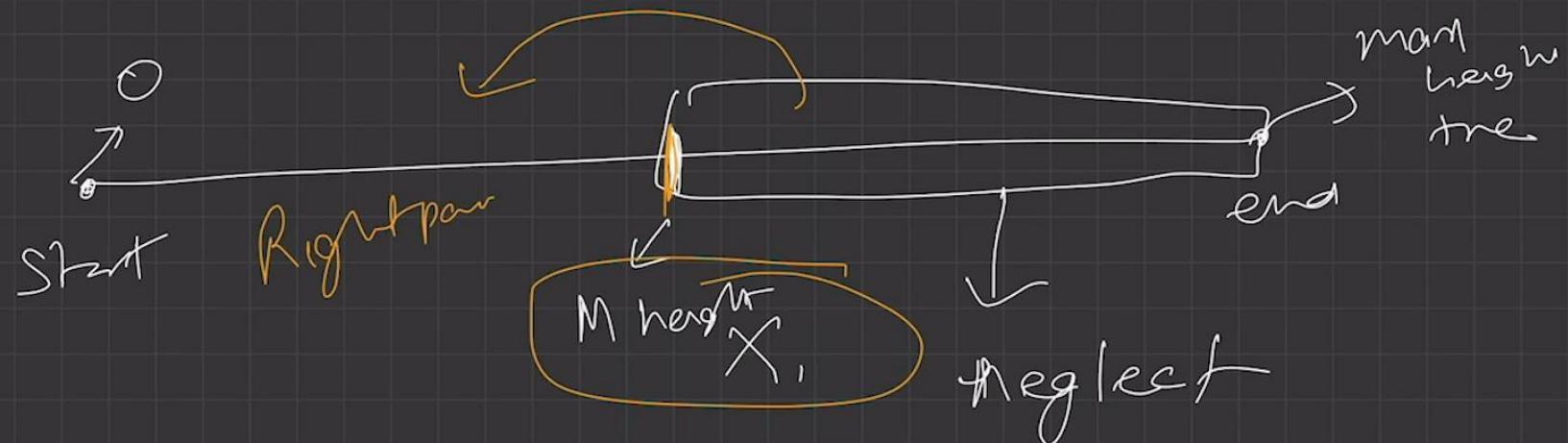
Max. height Tree



Max. no. of wood.

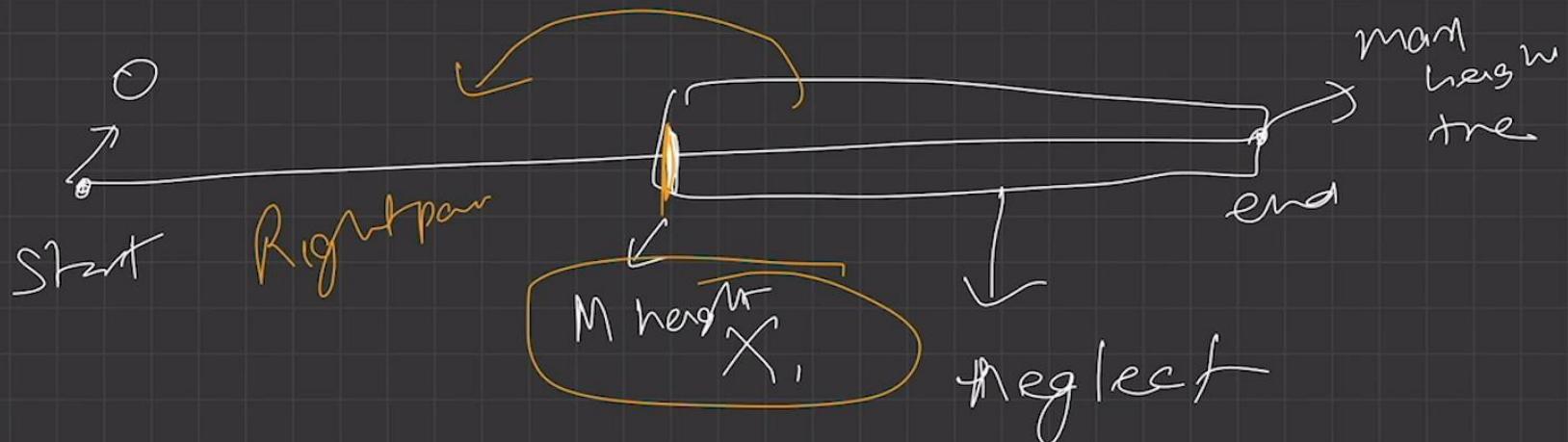
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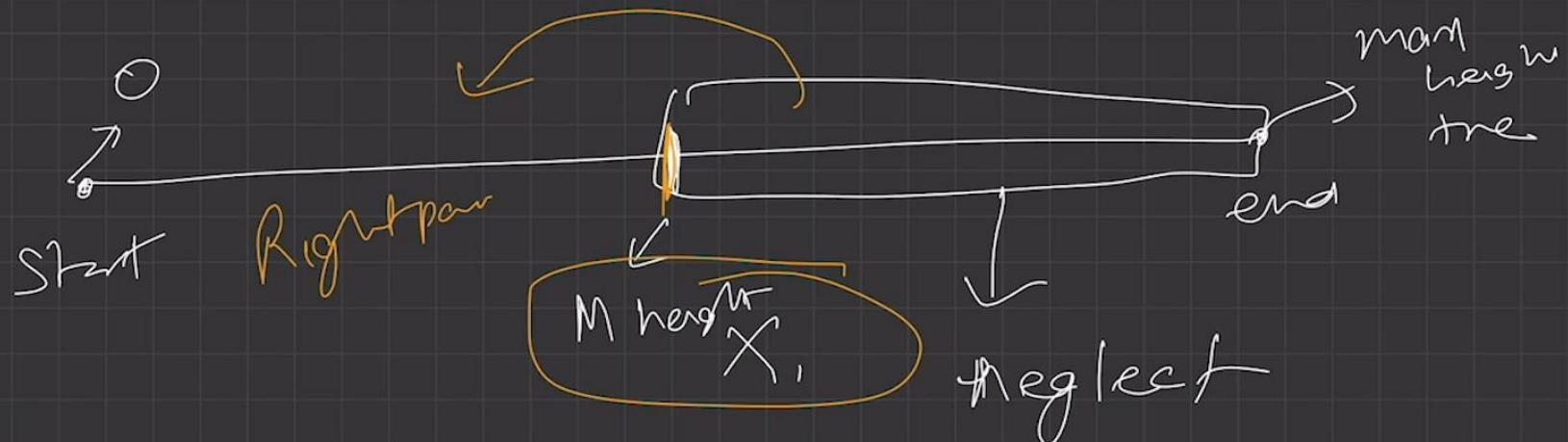


$\Rightarrow M = 7$  Trees array  $\rightarrow 20 | 15 | 10 | 17,$

① Start  $\Rightarrow 0$  end  $= 20,$

$$\text{Intmid} \Rightarrow \frac{20+0}{2} = 10m, 2? \geq \text{fond mood, mit payegi?}$$

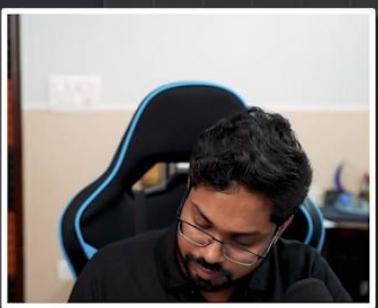




⇒  $M = 7$     Trees array → 20 | 15 | 10 | 17,

① Start ⇒ 0      end = 20.

Intmid ⇒  $\frac{20+0}{2} = 10m$ , ??  $\geq$  <sup>tom</sup> <sub>wood.</sub>  
mit payegi



-)

20 | 15 | 10 | 17



(17 - 10)

(20 - 10) (15 - 10) (10 - 10)

$$\Rightarrow 10 + 5 + 0 + 7 = 22 \text{ m}$$

$$(22 \text{ m} \geq 7) ? .2$$

Possible sol

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-)

20 | 15 | 10 | 17



(17 - 10)

(20 - 10) (15 - 10) (10 - 10)

$$\Rightarrow 10 + 5 + 0 + 7 = 22 \text{ m}$$

Possible sol<sup>n</sup>

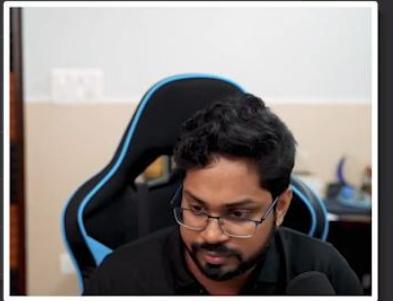
$$(22 \text{ m} \geq 7) ? .2$$

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if (possible < soln),

    ans = mid

    start = mid + 1



-)

20 | 15 | 10 | 17



(17 - 10)

(20 - 10) (15 - 10) (10 - 10)

$$\Rightarrow 10 + 5 + 0 + 7 = 22 \text{ m}$$

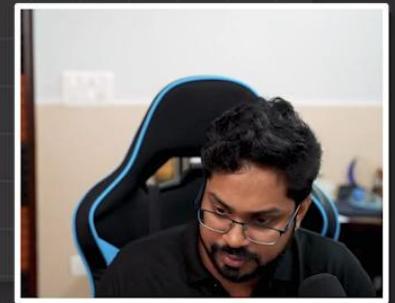
Possible sol

$$(22 \text{ m} \geq 7) ? .2$$

if (possible < soln),

    ans = mid

    start = mid + 1



②

20  
11  
15

⇒ mid =  $\frac{11+20}{2} = 15$

→ 15  
⇒

20 | 15 | 10 | 17  
↓      ↓      ↗  
~~(20 - 15)~~    15 - 15    ~~10 - 15~~  
→ (17 - 15)

→ fm

if ( possible )

↳ arr = mid  
↳ start = mid + 1



Q

16 18. 20,  
1 mid.

Saw blade  $\rightarrow$  18 m  $\rightarrow$

=

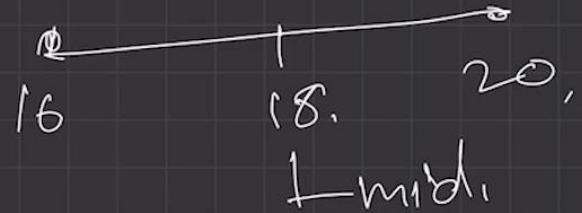
$$(20 - 18) + (15 - 18) + (10 - 18) + 17 - 1$$
$$= 2 \text{ m}$$

10

10



③



Saw blade  $\rightarrow 18\text{m}$   $\rightarrow$

$$= (20 - 18) + (15 \cancel{-} 18) + \cancel{10 \cancel{-} 18} + 1 \cancel{-} 1$$

$$= 2\text{m}$$

if( no + possiblereason.)

~~227~~

$$\hookrightarrow \text{end} = \text{mid} - 1$$

?



③

16      |      18.      20,  
        mid.

Saw blade  $\rightarrow 18\text{m}$   $\rightarrow$

=

$$(20-18) + (\cancel{15-18}) + \cancel{(10-18)} + \cancel{17-1} \\ = 2\text{m}$$

if( no + possible son )

?

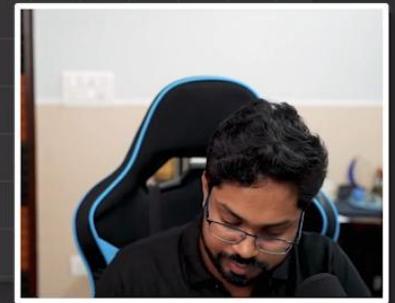
$$\text{end} = \text{mid} - 1$$

?

20 | 15 | 10 | 17

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~~227~~



5



$$\Rightarrow (20 - 16) + (17 - 16) + (13 - 16) + (17 - 16)$$
$$= 4 + 0 + 0 + 1$$

$\sum m$

~~$\sum m \geq f_m$~~

2)

$$end = mid - 1$$

$$end = 16 - 1$$

$$= 15.$$



5



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$$\Rightarrow (20 - 16) + (\cancel{17 - 16}) + \cancel{(18 - 16)} + (17 - 16)$$
$$= 4 + 0 + 0 + 1$$

$\sum m$

~~$\sum m \geq \sum m$~~

2)

$$\text{end} = \text{mid} - 1$$

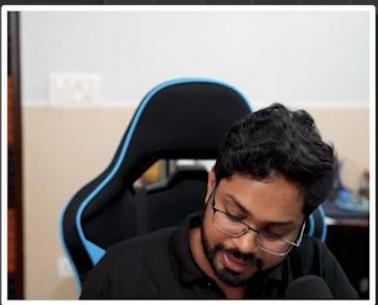
$$\text{end} = 16 - 1$$

$$= 15.$$

$$\text{start} = 16$$

$$\text{end} = 15$$

when ( $\text{start} > \text{end}$ )  
stop



16 > 15

STOP.

Trees  
=>

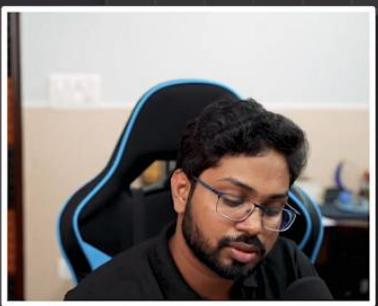
10<sup>9</sup> 10<sup>9</sup> 10<sup>9</sup>

↓  
10<sup>9</sup>-Subl of  
1m

+ (10<sup>9</sup>)  
→

+  
SINTex

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**RUN** C++ v File v Settings  **SAVE**  **SHARE** 

**SOURCE** - main.cpp

```
30     return ans;
31 }
32
33 int main() {
34     long long int n, m;
35     cin >> n >> m;
36     vector<long long int> trees;
37     while(n--){
38         long long int height;
39         cin >> height;
40         trees.push_back(height);
41     }
42
43     cout << maxSawBladeHeight(trees, m) << endl;
44
45     return 0;
46 }
```

**STDIN**

```
4 7
20 15 10 17
```

**STDOUT**

```
15
```



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**SOURCE** - main.cpp

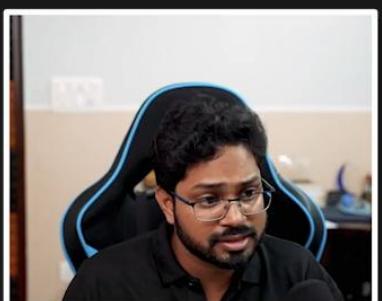
```
13     return woodCollected >= m;
14 }
15
16 long long int maxSawBladeHeight( vector<long long int> trees, long
17 long int m){
18     long long int start = 0, end, ans = -1;
19     end = *max_element(trees.begin(), trees.end());
20
21     while(start<=end){
22         long long int mid = start + (end - start) / 2;
23         if(isPossibleSolution(trees, m, mid)) {
24             ans = mid;
25             start = mid + 1;
26         }
27         else{
28             end = mid - 1;
29         }
30     }
31     return ans;
32 }
```

**STDIN**

```
4 7
20 15 10 17
```

**STDOUT**

```
15
```



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**RUN** C++ | File | Settings

**SOURCE** - main.cpp

```
6 bool isPossibleSolution(vector<long long int> trees, long long int
  m, long long int mid){
7     long long int woodCollected = 0;
8     for (long long int i = 0;i<trees.size();i++){
9         if (trees[i] > mid){
10            woodCollected += trees[i] - mid;
11        }
12    }
13    return woodCollected >= m;
14 }
15
16 long long int maxSawBladeHeight( vector<long long int> trees, long
  long int m){
17     long long int start = 0, end, ans = -1;      ||
18     end = *max_element(trees.begin(), trees.end());
19
20     while(start<=end){
21         long long int mid = start + (end - start) / 2;
22         if(isPossibleSolution(trees, m, mid)) {
23             ans = mid;
24             start = mid + 1;
25         }
26     }
27 }
```

**STDIN**

4 7  
20 15 10 17

**STDOUT**

15



00:39:50 / 00:40:51

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## PRATA - Roti Prata

no tags

IEEE is having its AGM next week and the president wants to serve cheese prata after the meeting. The subcommittee members are asked to go to food connection and get P ( $P \leq 1000$ ) pratas packed for the function. The stall has L cooks ( $L \leq 50$ ) and each cook has a rank R ( $1 \leq R \leq 8$ ). A cook with a rank R can cook 1 prata in the first R minutes 1 more prata in the next  $2R$  minutes, 1 more prata in  $3R$  minutes and so on (he can only cook a complete prata) ( For example if a cook is ranked 2.. he will cook one prata in 2 minutes one more prata in the next 4 mins an one more in the next 6 minutes hence in total 12 minutes he cooks 3 pratas in 13 minutes also he can cook only 3 pratas as he does not have enough time for the 4th prata). The webmaster wants to know the minimum time to get the order done. Please write a program to help him out.

**Input**

The first line tells the number of test cases. Each test case consist of 2 lines. In the first line of the test case we have P the number of prata ordered. In the next line the first integer denotes the number of cooks L and L integers follow in the same line each denoting the rank of a cook.

**Output**

Print an integer which tells the number of minutes needed to get the order done.

**Example**

**Input:**

```
3
10
4 1 2 3 4
8
1 1
8
8 1 1 1 1 1 1 1 1
```

**Output:**

```
12
36
1
```

**Submit solution!**

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**Vote requirements**

- ✓ be spoj user for at least 5 days
- ✗ solved 1 from 15 needed problems
- ✓ solve this problem

**Own tags**

Tag name Add

A man with glasses and a beard sitting in a chair, looking at a screen.

# PRATA SPOJ

$\Rightarrow P \rightarrow \text{Prata} \leq 1000$

$L_{cool} \leq 50 \Rightarrow \leq 50$

$R \rightarrow [1, 8]$

$C_1 \rightarrow$       1st      2nd      3rd      4th       $\overbrace{\quad \quad \quad \quad \quad}$  - - - - -  $1000$   
                   $R$        $2R$        $3R$        $4R_{\min}$        $\overbrace{\quad \quad \quad \quad \quad}$   $1000R$  =

$C_1 \rightarrow \underline{\underline{P}}$        $\downarrow$        $\downarrow$        $\downarrow$   
                   $1m$        $2m$        $3m$



① Brute force =  $n^P = 10$

$y_{cooks}$

$R \geq 1/2/3/y.$

⊕

$\text{for} ( i = 0m; i < (\text{max}) ; i++ )$

{

0m ✓

1m ✓

2m ✓

3m ✓

4m ✓

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$R \rightarrow | | 2 | 3 | 9$   
 $C_1 C_2 C_3 C_4$        $P = 10$

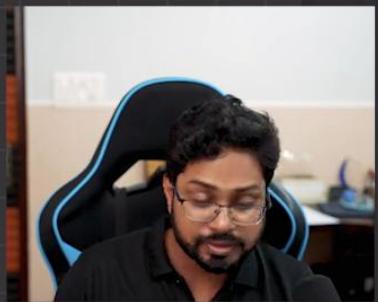
$C_4 \Rightarrow$  all 10 parts,

$$1 \times 4 + 2 \times 4 + 3 \times 4 + 4 \times 4 + 5 \times 4 + 6 \times 4 \\ + 7 \times 4 + 8 \times 4 + 9 \times 4 + 10 \times 4,$$



$R \rightarrow 1 | 2 | 3 | 9$   
 $C_1 C_2 C_3 C_4$

$P = 10$



$C_4 \Rightarrow$  all 10 parts,

$$1 \times 4 + 2 \times 4 + 3 \times 4 + 4 \times 4 + 5 \times 4 + 6 \times 4 \\ + 7 \times 4 + 8 \times 4 + 9 \times 4 + 10 \times 4,$$

$$\Rightarrow 4 \times [1 + 2 + 3 + \dots + 10]$$

$$4 \times \left[ \frac{10 \times (10+1)}{2} \right] = \frac{20 \times 11}{2}, \quad \begin{array}{l} [1+2+\dots+10] \\ \uparrow \text{sum,} \\ \frac{n \times (n+1)}{2} \end{array}$$

$R \rightarrow 1 | 2 | 3 | 9$   
 $C_1 C_2 C_3 C_4$        $P = 10$



$C_4 \Rightarrow$  all 10 parts,

$$1 \times 4 + 2 \times 4 + 3 \times 4 + 4 \times 4 + 5 \times 4 + 6 \times 4 \\ + 7 \times 4 + 8 \times 4 + 9 \times 4 + 10 \times 4,$$

$$\Rightarrow 4 \times [1 + 2 + 3 + \dots + 10]$$

$$4 \times \left[ \frac{10 \times (10+1)}{2} \right] = \frac{20 \times 11}{2}, \quad \begin{array}{l} [1+2+\dots+10] \\ \text{Sum,} \\ \hline \frac{n \times (n+1)}{2} \end{array}$$

min  
↓  
O

man

↓

220, (Time taken by  
Cook with highest  
rank when all  
the Prata are  
given to him)

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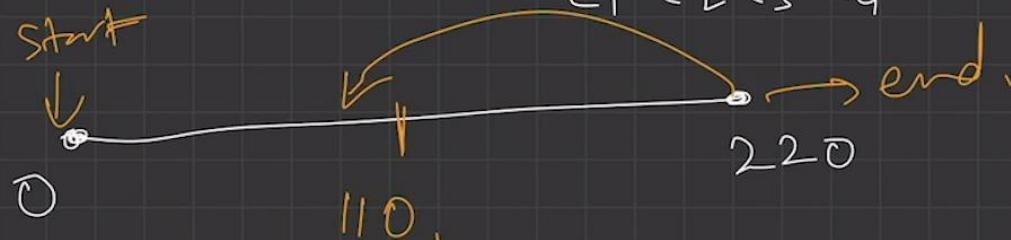
Q

①

10 - P

| | 2 / 3 / 4  
C<sub>1</sub> C<sub>2</sub> C<sub>3</sub> C<sub>4</sub>

Ranks.



Can cook order of 10 Parata in  $\text{mid} = 110$  min?

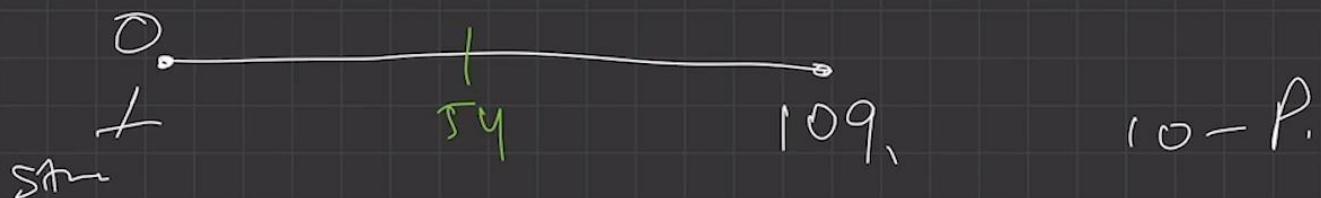
$$\begin{aligned}C_1 \Rightarrow & 1 + 2 \times 1 + 3 \times 1 + 4 \times 1 - \dots \\= & 1 + 2 + 3 + 4 + \dots + 10 \\ \Leftarrow & 55 \text{ min}\end{aligned}$$

$\Rightarrow$  if (Possible so)  
? ans = mid,  
? end = mid - 1;

$$55 \leq 110$$



2



$$\text{mid} = 54,$$

1 | 2 | 3 | 4

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$$C \rightarrow 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 \\ = 45 \text{ min.}$$



$C_2 \Rightarrow$

$$1 \times 2 = 2 \text{ min}$$



2



$$\text{mid} = 54,$$

1|2|3|4

$$C \rightarrow 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 \\ = 45 \text{ min.}$$



$$1 \times 2 = 2 \text{ min}$$

if (possible  
{  
    am = mid;  
    end = mid - 1



B



26.

26 min? Order =

6 proto.

C<sub>1</sub> ⇒

$$\underbrace{1 + 2 + 3 + 4 + 5 + 6}_{21 \text{ min.}}$$

$$C_2 \Rightarrow \underbrace{2 + 2 \times 2 + 2 \times 3}_{}$$

$$\hookrightarrow 2 + 4 + 6 + 8 \Rightarrow 20 \text{ min}$$

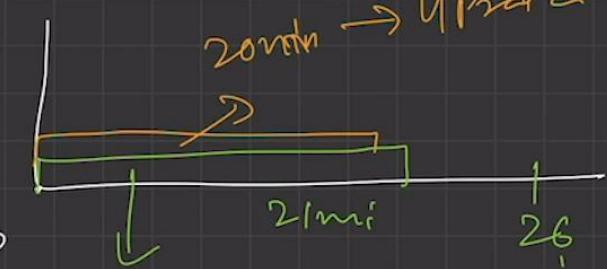
14 proto

10 /

10 - P

1 | 2 | 3 | 4

C<sub>1</sub> C<sub>2</sub> C<sub>3</sub> C<sub>4</sub>



6 proto (



B

26 min? Order =

6 prota.

C<sub>1</sub> ⇒

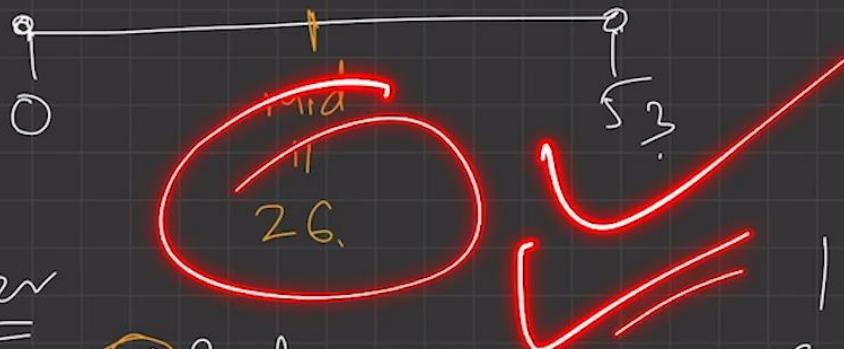
$$\frac{1+2+3+4+5+6}{21 \text{ min.}}$$

$$C_2 \Rightarrow 2 + 2 \times 2 + 2 \times 3$$

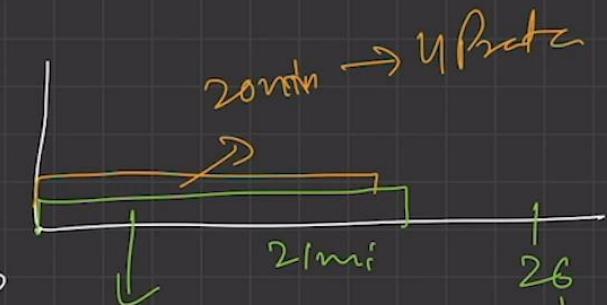
$$\hookrightarrow 2 + 4 + 6 + 8 \Rightarrow 20 \text{ min}$$

M prota

10 Protat.



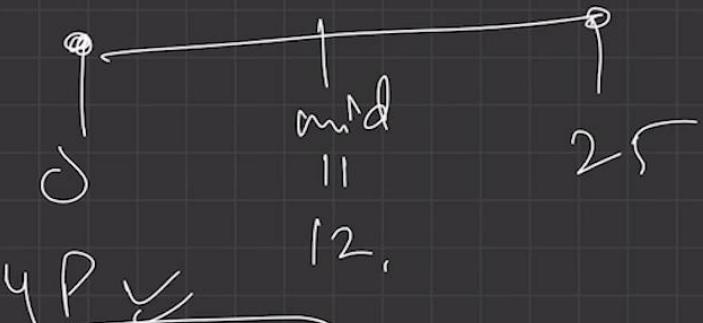
10-P  
| | 2 | 3 | 4.  
C<sub>1</sub> C<sub>2</sub> C<sub>3</sub> C<sub>4</sub>



6 prota



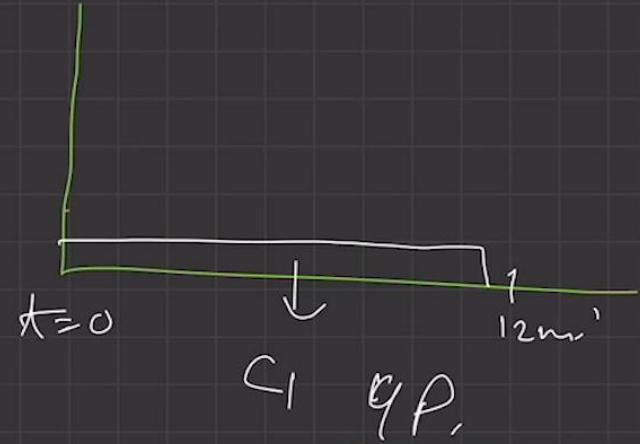
4



1/2/3/4.

$$C_1 \rightarrow \underbrace{1 + 2 + 3 + 4}_{10 \text{ min.}} + 5$$

$$C_2 \rightarrow \underbrace{2 + 4 + 6}_{12 \text{ min.}} = 3 \text{ Pwd}$$



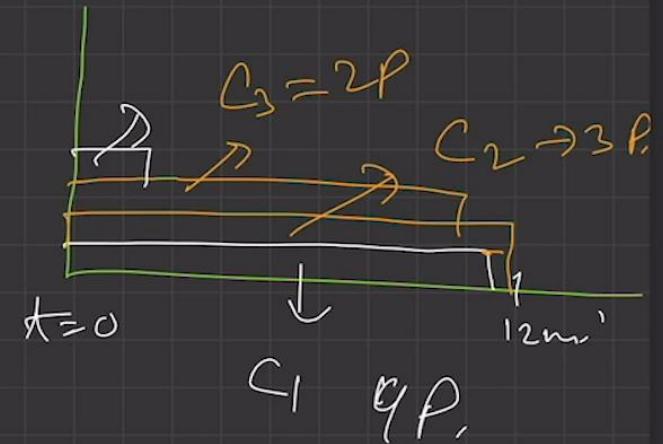
4



$$C_1 \rightarrow \underbrace{1 + 2 + 3 + 4}_{10 \text{ min.}} + 5$$

$$C_2 \rightarrow \underbrace{2 + 4 + 6}_{12 \text{ min.}} = 3 \text{ Pwd}$$

$$\underbrace{3 + 6}_{9 \text{ min.}} \cancel{+ 5} \rightarrow 2 \text{ P.} \quad C_4 \rightarrow 4 \leftarrow \textcircled{P.}$$



4

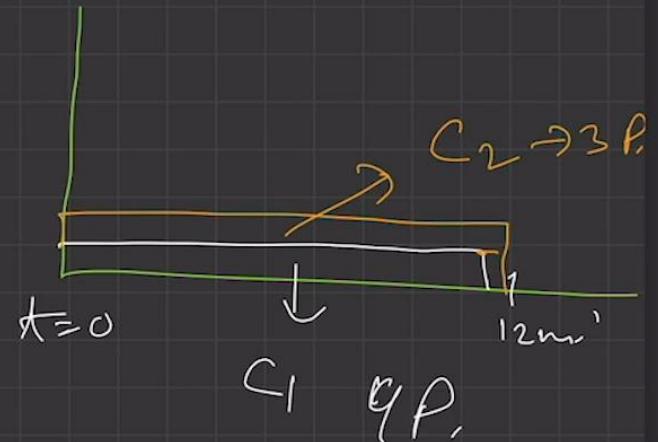


$$C_1 \rightarrow \underbrace{1 + 2 + 3 + 4}_{10 \text{ min.}} + 5$$

$$C_2 \rightarrow \underbrace{2 + 4 + 6}_{12 \text{ min.}} = 3 \text{ Pmt}$$

$$C_3 \Rightarrow \underbrace{3 + 6}_{9 \text{ min}} \cancel{+ 5} \rightarrow 2P. \quad C_4 \rightarrow$$

1/2/3/4.



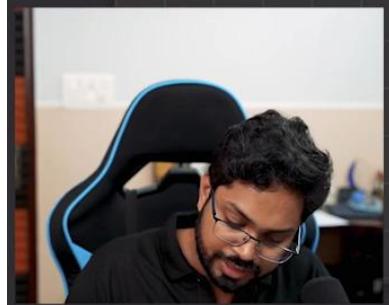
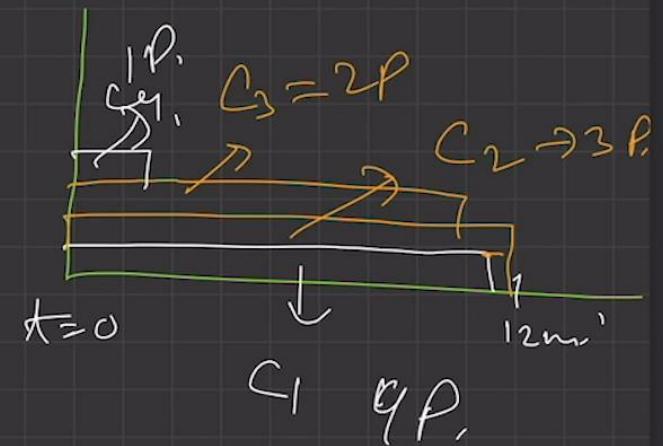
4



$$C_1 \rightarrow \underbrace{1 + 2 + 3 + 4}_{10\text{min.}} + 5$$

$$C_2 \rightarrow \underbrace{2 + 4 + 6}_{12\text{min.}} = 3\text{ Pwd}$$

$$\underbrace{3 + 6}_{9\text{ min}} \cancel{+ 5} \rightarrow 2\text{ P.} \quad C_4 \rightarrow 4 \leftarrow \textcircled{P.}$$



6



1 | 2 | 3 | 4.

$r_{\min}$  ✓

$C_1 \Rightarrow$

$$1 + 2 + \cancel{X}, \quad 2P.$$

$\downarrow$   
 $3^{\min}$

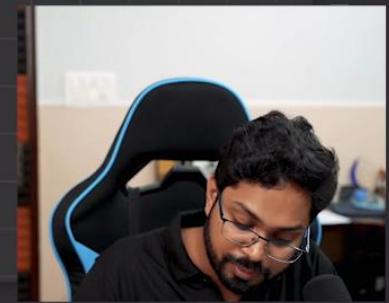
if (not Possible)

{ start = mid / 11 }

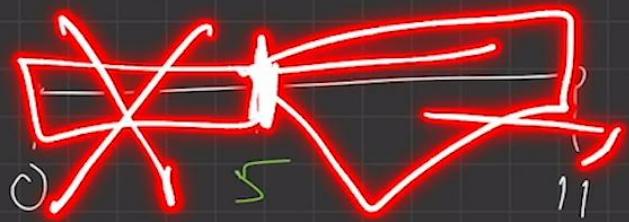
$$C_2 \Rightarrow 2 + \cancel{X} \quad 1P.$$

$$C_3 \Rightarrow 3 + \cancel{X} = 1P,$$

$$C_4 \Rightarrow 4 + \cancel{X} = 1P,$$



6



1 | 2 | 3 | 4.

$\tau_{\min}$  ✓

$C_1 \Rightarrow$

$$1 + 2 + \cancel{X}, \quad 2P. \\ \downarrow \\ 3 \min$$

if (not Possible)

start = mid / 11

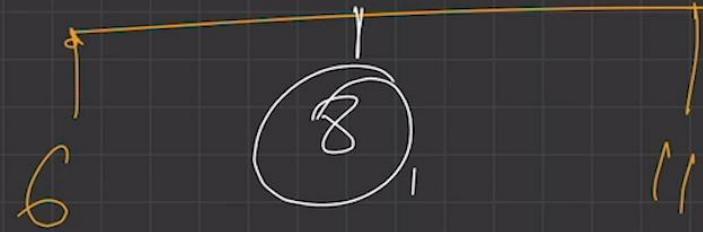
$$C_2 \Rightarrow 2 + \cancel{X} \quad 1P.$$

$$C_3 \Rightarrow 3 + \cancel{X} = 1P.$$

$$C_4 \Rightarrow 4 + \cancel{X} = 1P.$$



(Q)



8 min ??

1 | 2 | 3 | 4,

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C<sub>1</sub> →

$$\underbrace{1 + 2 + 3 + \cancel{4}}_{6 \text{ min.}} \rightarrow 3P$$

C<sub>2</sub> →

$$\underbrace{2 + 4 + \cancel{3}}_{6 \text{ min.}} \Rightarrow 2P.$$

3P

C<sub>3</sub> →

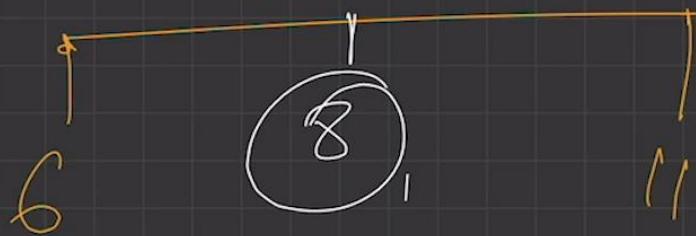
$$3 + \cancel{2} \rightarrow 1P.$$

C<sub>4</sub> →

$$4 + \cancel{1} \rightarrow 1P.$$



(Q)



10P

8 min ??.

1 | 2 | 3 | 4.

C<sub>1</sub> →

$$1 + 2 + 3 + \cancel{4} \xrightarrow{6 \text{ min.}} 3P$$

C<sub>2</sub> →

$$2 + 4 + \cancel{3} \Rightarrow 2P.$$

CP

$$3 + \cancel{2}$$

→ 1P.

$$4 + \cancel{1}$$

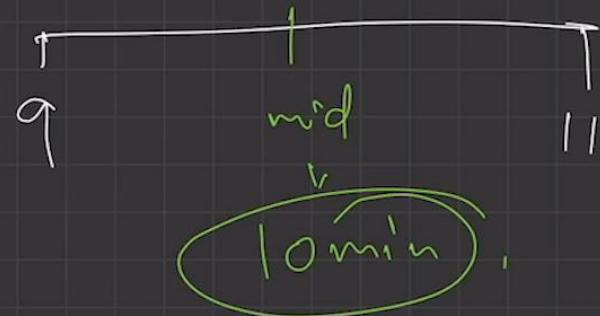
→ 1P.

if (not soln)  
start = mid + 1  
start = 9,



7

10 min?



10 P.

1 | 2 | 3 | 4

C<sub>1</sub> →

$$\underbrace{1 + 2 + 3}_{9 \text{ min}} + \cancel{4} = 4 \text{ P. v.}$$

C<sub>2</sub> ⇒

$$\underbrace{2 + 4}_{6 \text{ m}} + \cancel{5} \Rightarrow 2 \text{ P.}$$

if not X

start = 1077

$$\underbrace{2 + 4 + 6 + 7}_{9 \text{ min}} + \cancel{8} = 2 \text{ P.}$$

start = 11

$$4 + \cancel{8} \rightarrow 1 \text{ P.}$$



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8



11 min.

$\Rightarrow C_1 \rightarrow \underbrace{1 + 2 + 3 + 7} \rightarrow 7P$

$C_2 \rightarrow \underbrace{2 + 4 + \cancel{6}} = 2P$

$C_3 \rightarrow \underbrace{3 + 5 + \cancel{9}} = 2P$

$C_4 \rightarrow \underbrace{4 + \cancel{6}} = 1P$

9P



⑧



z) 11 min.

$$C_1 \rightarrow \underbrace{1 + 2 + 3 + 7} \rightarrow 4P$$

$$C_2 \rightarrow \underbrace{2 + 4 + \cancel{6}} = 2P$$

$$C_3 \rightarrow \underbrace{3 + 5 + \cancel{9}} = 2P$$

$$C_4 \rightarrow \underbrace{4 + \cancel{6}} = 1P$$

z) Note as 1M

$$\begin{aligned} S^{\text{start}} &= \text{mid} + 1 \\ S^{\text{start}} &= 12 \end{aligned}$$



①

o p  
12 11

(start > end)

STOP



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**RUN** C++ | File | Settings

**SOURCE** - main.cpp

```
1 #include <iostream>
2 using namespace std;
3
4
5
6 int main() {
7     int T; cin >> T;
8     while(T--){
9         int nP, nC;
10        cin >> nP >> nC;
11        vector<int> cooksRanks;
12        while(nC--){
13            int R; cin >> R;
14            cooksRanks.push_back(R);
15        }
16
17        cout << minTimeToCompleteOrder(cooksRanks, nP) << endl;
18    }
19    return 0;
20 }
```

**STDIN**

Your Input Goes Here ...

**STDOUT**

Your Output Will Be Displayed Here ...



end ↩

1 | 2 | 3 | 4  
C<sub>1</sub> C<sub>2</sub> C<sub>3</sub> C<sub>4</sub>

- ① Max ranker cook = 4 (C<sub>4</sub>)

② nP = 10 ↩  
1R + 2R + 3R - - -

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1R + 2R + 3R + --- + nPR

⇒ R [  $\frac{n P \times (n P + 1)}{2}$  ] ⇒ R C<sub>4</sub> [  $\frac{n P \times (n P + 1)}{2}$  ]



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**SOURCE** - main.cpp

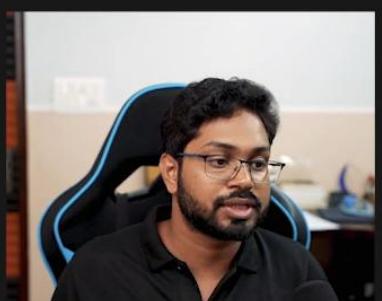
```
1 #include <iostream>
2 using namespace std;
3
4 int minTimeToCompleteOrder(vector<int> cooksRanks, int nP){
5     int start = 0;
6     int highestRank = *max_element(cooksRanks.begin(), cooksRanks.end());
7     int end = highestRank * (nP * (nP + 1) / 2);
8     int ans = -1;
9
10    while(start <= end){
11        int mid = (start + end) >> 1;
12        if(isPossibleSolution(cooksRanks, nP, mid)) {
13            ans = mid;
14            end = mid - 1;
15        }
16        else {
17            start = mid + 1;
18        }
19    }
20    return ans;
21 }
22
23 int main() {
24     int T; cin >> T;
25     while(T--){
```

**STDIN**

Your Input Goes Here ...

**STDOUT**

Your Output Will Be Displayed Here ...



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**SOURCE** - main.cpp

```
4  bool isPossibleSolution(vector<int> cooksRanks, int mid) {
5      int currP = 0; // initial cooked Prata Count
6      for (int i=0;i<cooksRanks.size();i++){
7          int R = cooksRanks[i], j = 1;
8          int timeTaken=0;
9
10         while(true){
11             if(timeTaken + 10 * R <= mid) {
12                 ++currP;
13                 timeTaken += j*R;
14                 ++j;
15             }
16             else {
17                 break;
18             }
19         }
20         if (currP >= nP){
21             return true;
22         }
23     }
24     return false;
25 }
```

**STDIN**

Your Input Goes Here ...

**STDOUT**

Your Output Will Be Displayed Here ...

00:41:36 / 00:43:20    

