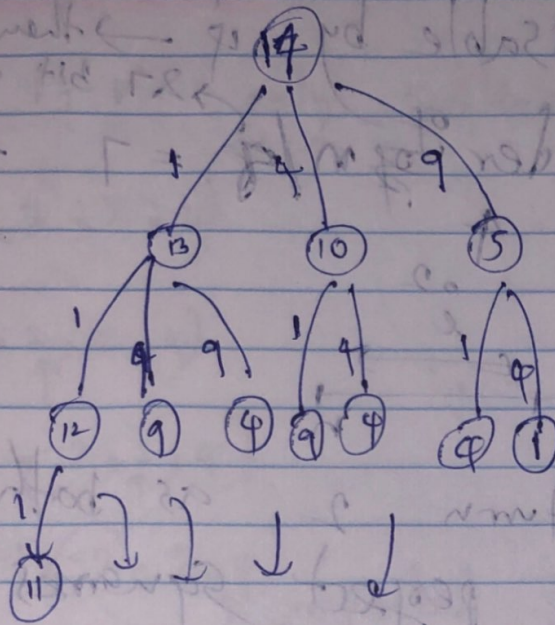
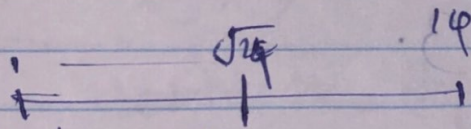


# \*Perfect Squares

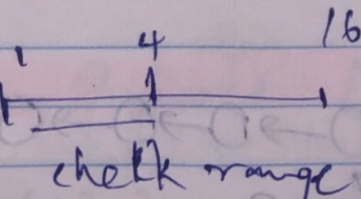
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19  
 1 2 3 1 2 3 4 2 1 2 3 3 2 3 4 2 2 3 2



to avoid recalculation  
we can use dp.



check in this range for min. val.



check range

when  $n = 0$  terminate  
if  $n < 0$  then we can't  
proceed in that way.

• can use Legendre's theorem

$$a^2 + b^2 + c^2 \text{ if and only if not } p^4 (8b+7)$$



No: \_\_\_\_\_

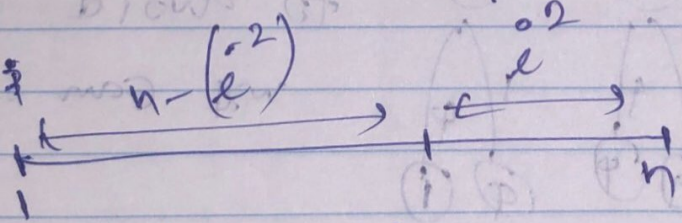
Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

$$a^2 + b^2 + c^2 \neq 4^q (8b+7)$$

first check if perfect square  
then return 1 → 23 bit operation

check if divisible by 4 → then do till not  
→ 27 bit operation

check remainder of  $n/4 = 7$  then  
return 4



then return 2 as both  
sides are perfect squares.

else return 3.