

$$(n)^y = \underbrace{n \times n \times n \times \dots}_{y \text{ times}}$$

$$(2)^y = \underbrace{2 \times 2 \times 2 \times \dots}_{y \text{ times}}$$

$$\underline{\underline{(1)^0}} \quad \underline{\underline{(2)^0)}$$

(let res = 1
 for (let i = 0; i < y; i++) {
 res = res * n;
 }
 console.log(res);

$$(3)^5$$

$$res = 1 \times 3$$

$$res = (1 \times 3) \times 3$$

$$res = ((1 \times 3) \times 3) \times 3$$

$$\underline{\underline{n \times n \times n}}$$

$$(a)^b = \underbrace{a \times a \times a \times \dots}_{b \text{ times}}$$

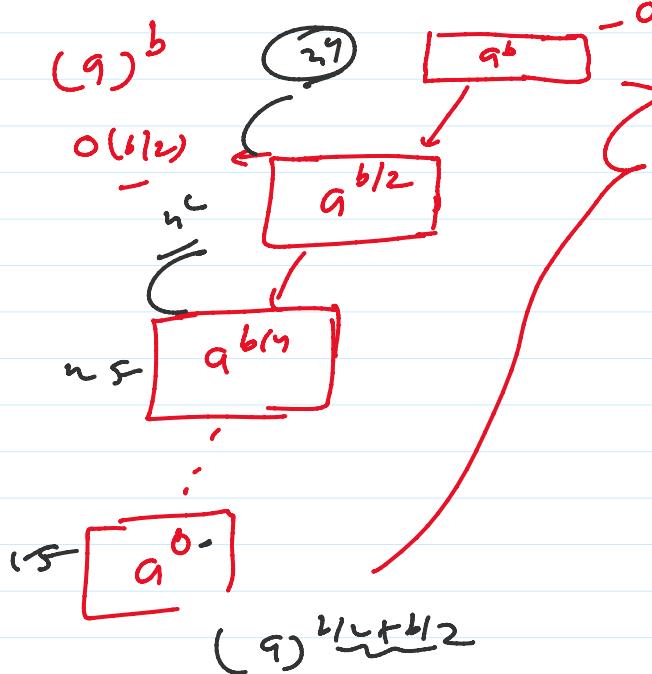
$$\underline{\underline{a^{b/2}}} \times a^{b/2}$$

$$\underline{\underline{a^{b/2}}} \times a^{b/2} \times a^{b/2}$$

$$(a)^b = a^{b/2} \times a^{b/2} \times \dots \times a^{b/2}$$

$$\begin{matrix} b/2^0 & , & b/2^1 & , & b/2^2 \\ b \rightarrow b/2 \rightarrow b/4 \rightarrow b/8 \rightarrow \dots \rightarrow b/2^k \end{matrix}$$

$$\Rightarrow \lceil \log_2 b \rceil$$



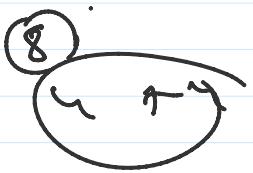
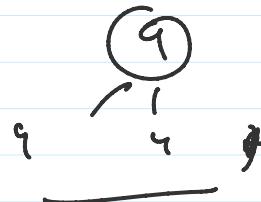
$$b/2^k = 1$$

$$2^k = b$$

$$\log_2 b = \log_2 \left(2^k \right)$$

$$(a)^b = \begin{cases} (a)^{b/2} \cdot (a)^{b/2} & \{ b \text{ is even} \} \\ (a)^{b/2} \cdot (a)^{b/2} \cdot (a)^{b/2} & \{ b \text{ is odd} \} \end{cases}$$

$$t \frac{(a)^{1/2} \cdot (a)^{1/2} \cdot (a)^{1/2}}{(a)} \leftarrow \frac{b/2 + b/2 + 1}{1}$$



$$\underline{\underline{a^b}} = \underline{\underline{a^{b/2} \cdot a^{b/2}}} \rightarrow q^2$$

$$a^{b/2} = \underline{\underline{a^{b/2} \cdot a^{b/2} \cdot a}} \rightarrow q^2 \cdot q$$

$$(a)^b = \underline{\underline{a \cdot a \cdot a}}$$

$$a^{b/2} = \underline{\underline{a^{b/2} \cdot a^{b/2}}} \rightarrow q^2$$

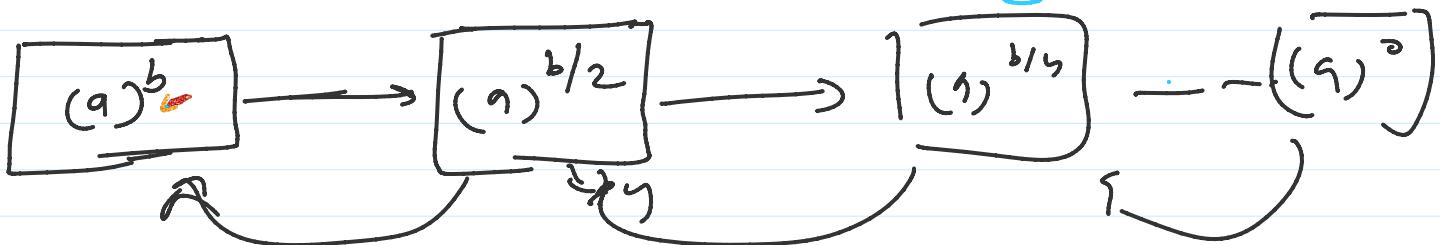
$$a^{b/2} = \underline{\underline{a^{b/2} \cdot a^{b/2} \cdot a}} \rightarrow q^2 \cdot q$$

$\lfloor \frac{9}{2} \rfloor$

$9 \rightarrow 4 \rightarrow 2 \rightarrow 1 \rightarrow 0$

$\underline{\underline{2 \cdot 5}}$

$\lfloor \frac{1}{2} \rfloor = \lfloor \underline{\underline{0.5}} \rfloor = 0$



$$\frac{y \times y \times q}{y \times y}$$

function some(a, b)

if ($b == 0$)

return 1;

let $sq = \text{some}(a, b/2)$;

$\frac{y \times y}{y \times y \times q}$ } if ($b/2 == 0$)

if ($b/2 == 0$)
return $y \times y$;

$\Rightarrow q:$

3	5	8	10	11	15	12	6
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21 ← 6

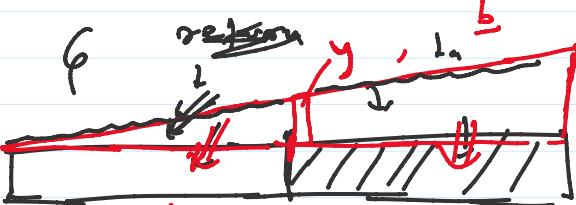
\Rightarrow 2:

3	5	8	10	11	15	12	6
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(21) \Leftarrow (6)

for arr. for each ($i \Rightarrow i$) $\Rightarrow O(n)$

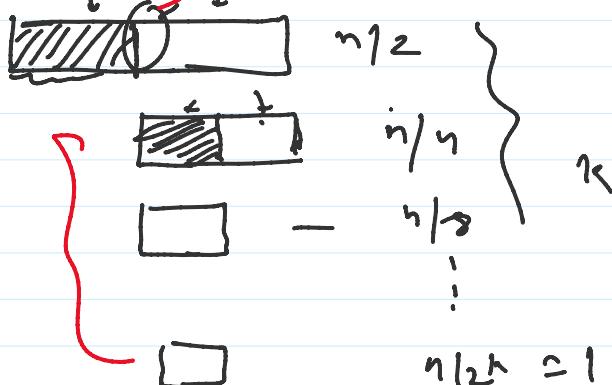
If $a \leq b$



(1)

$y > b$

$y < b$



$n \rightarrow n/2 \rightarrow n/4 \rightarrow \dots$

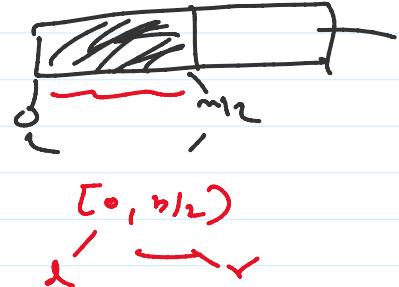
$$n/2^k = 1 \Rightarrow k = \log_2^n$$

function solve(q, b) {

let $n = q.length$;

let $y = q[n/2]$ $\xrightarrow{\text{floor}}$

if ($y > b$) {

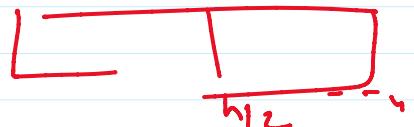


$solve(q, b; l, r)$

{ else {

$solve(q, b, n/2, n)$

}



function solve(q, b, l, r) {

let $n = r - l + 1$;

let $u = q[n/2]$.



$$\frac{2}{2, 3, 4, 5} \quad \frac{5}{}$$

let $\eta = \gamma - x + 1$;

13.4.5

let $y = a[n/2]$;

if ($a[y] == b$) {
 return true;

{

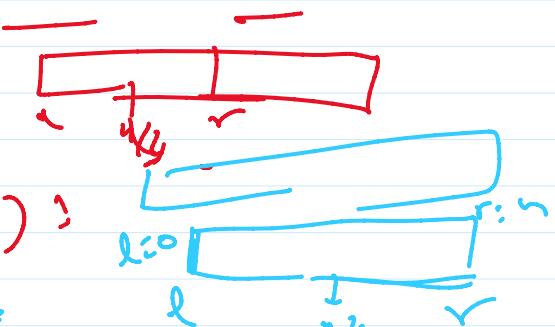
else if ($a[y] > b$) {

Solve($a, b, l, n/2$);

{ else <

Solve($a, b, n/2, r$);

{



{ $[l, n/2]$ }
{ $[n/2, r]$ }

Solve($a, b, l, n/2$);

Solve($a, b, n/2, r$);