Algorithm1        , Algorithm2  }
    ✓                   ∝
        ∝           ✓
    + ra              10 0

---

$T(n)$

**Time Complexity Analysis**

**Algorithm I   Traditional Tareeke se chai banati hai**

1. Heat water
2. Add tea leaves    } $t_1$
3. Add milk
4. Add sugar
5. Pour in cup

    b

1 cup = $t_1$
2 cup = $2t_1$
3 cup = $3t_1$
    ⋮
n cup = $nt_1$

$$T(n) = nt_1 + b$$

3 notations
{
  1) Big O
  2) Big θ
  3) Big Ω
}  Asymptotic notations.

{ km
  m
  s }

$n = 15$
{ $t_1 = 3$
  $b = 2$ }

⇒ 5×3 + 2  ✗
⇒ 15 + 2
⇒ 17 minutes  ✗
   $t_1 = 4$

⑮ ×3 + 2
   output T

$n = 4$
{ n ⇒ 4
  $n^2$ ⇒ 16   ⓝ² ⓝ t₁ }

$T(n) = \boxed{nt_1} + b$
⇒ $n$
⇒ $O(n)$

Big O (worst case)
   ice-cream ⇒ 2 min / 1 min   2 ✗
Big

---

**Time Complexity Analysis**

**Algorithm 2   Machine ka working process**

1. User input dena ————→ $k_1$
2. Button press karna ——→ $k_2$
3. Machine ka kaam (internal process) —→ $k_3$

{ n = 1
  n = 10
  n = 100 }

$T(n) = k_1 + k_2 + k_3 = ?$ ✗
$n = 1$
   $= n^0 k_1 + k_2 + k_3$
   ⇒ 1
   ⇒ $O(1)$ → Time is constant

Algo1 → kharaab → $O(n)$ ↑
Algo2 → Riga

Why?

$\equiv$   o/p ?

Algorithms:
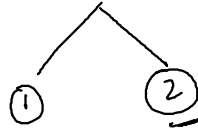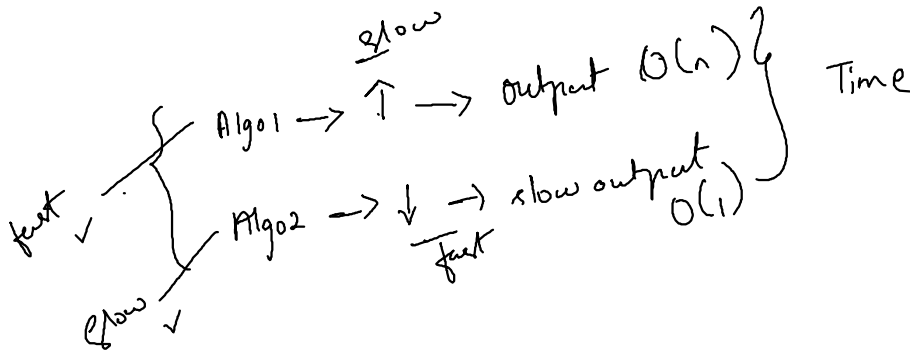
①        ②    ↓ ↑
                Program

slow
fast ✓  { Algo1 → ↑ → output O(n) }
        { Algo2 → ↓ → slow output }   Time
slow ✓       fast        O(1)

| no. of element | Student 1 (Rena) ✓ | Student 2 (Beena) |
|---|---|---|
| 5 | — 100 ms | 150 ms |
| 10 | ✓ 110 ms | ✓ 160 ms |
| { 100 | 200 ms | { 190 ms |
| 500 } ✓ | 5 s ✓ | 200 ms } ✓ |
| | refer | Al |

Graph
-

O(n)                    O(1)



time ↑   n →          time    n →

=)



time ↑   n →
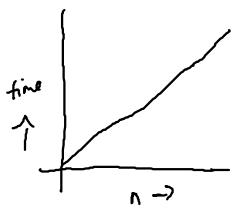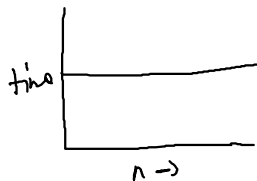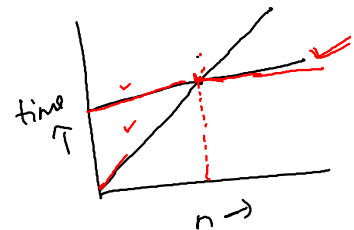
Solve Questions.

1) $6n^2 + 4n$

$\Rightarrow n^2 + n$

$n^2$

$\Rightarrow O(n^2)$

2) $n^4 + 6n^3 + 5n^2$

$O(n^4)$

4) $f(n) = 100$

$O(1)$

3) $n^3 + \log N$

$O(n^3)$

$\dfrac{1}{1^1}$

5) $f(n) = \dfrac{n}{2}$

$\Rightarrow n \times \dfrac{1}{2}$

$\Rightarrow n \qquad \Rightarrow O(n)$