→ Fractional Knapsack problem:

Objects (O)	1	2	3	4	5	6	7
Profit (P)	5	10	15	7	8	9	4
weight (W)	1	3	5	4	1	3	2

W = 15
n = 7

→ Max Profit = ?

Approach 1 profit	47.25
Approach 2 profit	46
Approach 3 profit	51

Approach-1 To choose objects in random manner.

Approach-2 To choose objects in minimum weight first.

Approach-3 To choose $\frac{Pi}{Wi}$ based in decreasing order.

Objects (O)	1	2	3	4	5	6	7
profit (P)	5	10	15	7	8	9	4
weight (W)	1	3	5	4	1	3	2
$\frac{Pi}{Wi}$	5	3.3	3	1.75	8	3	2

Max $\frac{Pi}{Wi}$ Ratio

Objects	Profit	weight	Remaining weight
5	8	1	15-1 = 14
1	5	1	14-1 = 13
2	10	3	13-3 = 10
3	15	5	10-5 = 5
6	9	3	5-3 = 2
7	4	2	2-2 = 0
	51		

```
Greedy knapsack ( )
{
    for i = 1 to n
    Compute Pi/Wi  ⇒ O(n)
  Sort objects in non increasing order. ⇒ O(n logn)
  For i = 1 to n from sorted list.
    if (m>0 && wi ≤ m)
        m = m-wi
        P = P+Pi      } O(n)
    Else
          Break;
  if(m>0)
    P = P+Pi(m/wi)  ⇒ O(1)
}
```

$TC = O(n) + O(n \log n) + O(n) + O(1)$

$\Rightarrow O(n \log n)$

→ Applications

1. Portfolio optimization.
2. Power allocation management.
3. Resource management in S/w industry.
4. Home energy management.