Knapsack Problem :- Greedy method

Objects	0	1	2	3	4	5	6	7
Profits	P	10	5	15	7	6	18	3
Weights	w	2	3	5	7	1	4	1

Fill objects in container of weight 15kg

↳ transfer it.

$n = 7$

$m = 15$

→ Container / bag / Knapsack

constraint:

The total weight of objects to be put in knapsack should be less than or equal to 15 here.

Object selection based on ratio = $\frac{\text{profit}}{\text{ratio}}$

Step 1: Determin Ratio

Object	1	2	3	4	5	6	7
Profit	10	5	15	7	6	18	3
Weight	2	3	5	7	1	4	1
Ratio (P/w)	5	1.3	3	1	6	4.5	3

Step 2: Sort according to ratio in descending order

Objects	5	1	6	7	3	2	4
Profit	6	10	18	3	15	5	7
Weight	1	2	4	1	5	3	7
Ratio (P/w)	6	5	4.5	3	3	1.6	1

Total weight: $\sum x_i w_i$ $= 1 + 2 + 4 + 1 + 5 + 3 \times \frac{2}{3}$ $= 15$

(constraint: Total weight ≤ 15)

$\sum x_i w_i \leq m$

(From object 2 we are only taking 2kg weight to reach maximum of 15kg to be placed in bag)

Objective:

max $\sum x_i p_i$

[Profit should be max]

Total profit: $6 + 10 + 18 + 3 + 15 + 5 \times \frac{2}{3}$

$= 55.33$

(2/3 kg profit)

objects :	0	1	2	3	4	5	6	7
Profits : P	10	5	15	7	6	18	3	
weight : w	2	3	5	7	1	4	1	
Ratio (P/w)	5	1.5	3	1	6	4.5	3	

$x \quad (x_1, x_2, x_3, x_4, x_5, x_6, x_7)$

constraint :

$\sum x_i w_i \leq m$

objective :

max $\sum x_i p_i$

Ratio : Profit / weight