

Fractional Knapsack

	1	2	3	4	5	6	7
<u>Profit</u>	25	75	100	50	45	90	30
<u>Weight</u>	5	10	12	4	7	9	3

$$M = 37$$

$$n = 7$$

Profit maximum \leftarrow (Objects profit)

constraint

$> M$ — cannot pick

Step 1

	1	2	3	4	5	6	7	
n	1	2	3	4	5	6	7	
Profit/Weight	5	7.5	8.3	12.5	6.4	10	10	$O(n)$

Step 2

sort Profit/Weight

	4	6	7	3	2	5	1	
n	4	6	7	3	2	5	1	
Profit/Weight	12.5	10	10	8.3	7.5	6.4	5	$O(n \log n)$
Weight	4	6	7	3	2	5	1	

Step-3

α $\circledast 1$ $\circledast 1$ $\circledast 1$ $\circledast 1$ $\circledast \frac{9}{10}$ \circ \circ

(fraction)

$$M = 37$$

$$O(n)$$

<u>Net weight</u>	<u>Net Profit</u>
$37 - 4 = 33$	50
$33 - 9 = 24$	$50 + 90 = 140$
$24 - 3 = 21$	$140 + 30 = 170$
$21 - 12 = 9$	$170 + 100 = 270$
$9 - \frac{9}{10} \times 9 = 0$	$270 + \frac{9}{10} \times 75$

$$= 337.5 \rightarrow \text{Net Profit}$$

Reducing weight & increasing Profit

Time complexity

$$n + n \log n + n \approx \underline{\underline{O(n \log n)}}$$