

Notes 7.5 part 2

x
Water
10 people
20 lb
1 ft³

y
med
6 people
10 lb
1 ft³

plane $\leq 80,000$ lb
 ≤ 6000 ft³

The following problem is in your textbook Section 7.5 Pg. 417-420 Examples 1-4. Use the textbook to help you through this problem.

Bottled water and medical supplies are to be shipped to victims of an earthquake by plane. Each container of bottled water will serve 10 people and each medical kit will aid 6 people. Each plane can carry no more than 80,000 pounds. The bottled water weighs 20 pounds per container and each medical kit weighs 10 pounds. Each plane can carry a total volume of supplies that does not exceed 6000 cubic feet. Each water bottle is 1 cubic foot and each medical kit also has a volume of 1 cubic foot. Determine how many bottles of water and how many medical kits should be sent on each plane to maximize the number of earthquake victims who can be helped.

A) Identify your variables: HINT: "What is it that you want to make, produce, sell, deliver...?"

x = # bottles water
y = # medical kits

B) Objective Function: HINT: "What is it that you want to Maximize or Minimize?" # people helped

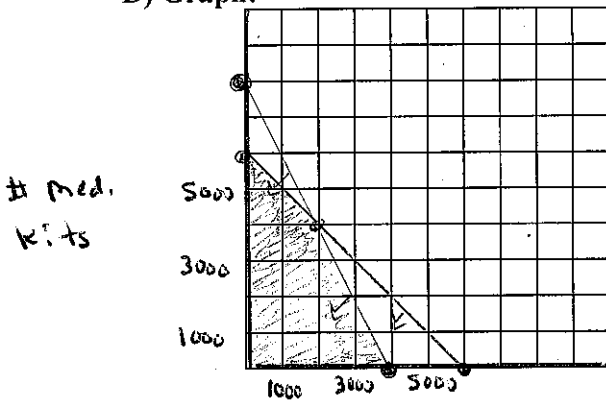
$$Z = 10x + 6y$$

C) Constraints: HINT: "What are your limitations?"

$$\begin{aligned} x &\geq 0 \\ y &\geq 0 \\ 20x + 10y &\leq 80,000 \\ 1x + 1y &\leq 6000 \end{aligned}$$

$$\begin{array}{r|l} x & y \\ \hline 0 & 8000 \\ 4000 & 0 \end{array}$$

D) Graph:



$$\begin{array}{r|l} x & y \\ \hline 0 & 6000 \\ 6000 & 0 \end{array}$$

E) Corners: # bottles water Objective Function Value: $10x + 6y$

Intersection between Weight and Volume

(0,0)	0
(4000,0)	40,000
(2000,4000)	$20,000 + 24,000 = 44,000$
(0,6000)	$0 + 36,000$

$$\begin{aligned} -20(1x + 1y &\leq 6000) \\ 20x + 10y &\leq 80,000 \\ -20x - 20y &\leq -120,000 \\ \hline -10y &= -40,000 \end{aligned}$$

$$-10y = -40,000$$

$$y = 4000$$

$$x + 4000 = 6000$$

$$x = 2000$$

Send 2000 water bottles and 4000 medical kits.