Two cities use incinerators to reduce waste before placing it in landfills.

- **City 1** produces **500** tons of waste per day, and
- **City 2** produces **400** tons of waste per day.
- Waste must be burned at **incinerator 1** or **incinerator 2.**
- Each incinerator can process up to **500** tons of waste per day.
- The cost to incinerate waste is $**40**/ton at incinerator 1 and $**30**/ton at incinerator 2.
- Incineration reduces each ton of waste to **0.2** tons of debris, which must be dumped at one of **two landfills**.
- Each landfill can receive at most **150** tons of debris per day.
- It costs $3 per mile to transport a ton of material (either debris or waste).
- Distances (in miles) between locations are:
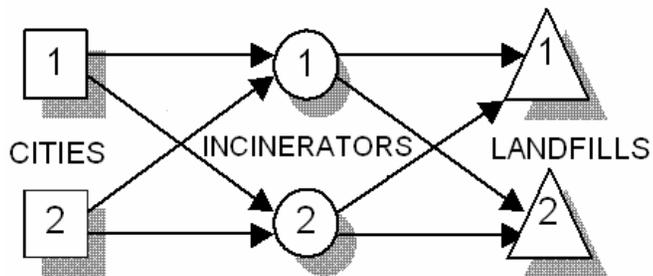
	Incinerator #1	Incinerator #2
City# 1	**30**	**5**
City #2	**36**	**42**

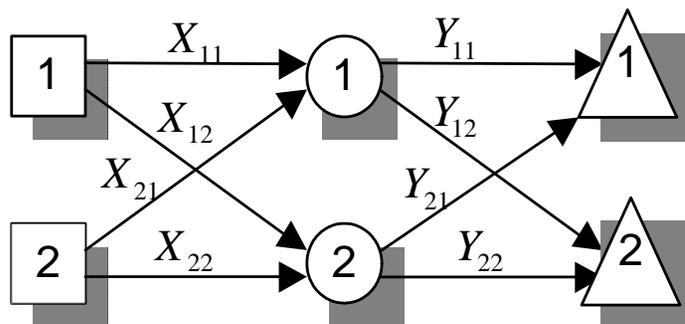|	Landfill #1	Landfill #2
Incin #1	**5**	**8**
Incin #2	**9**	**6**

Formulate an LP that can be used to minimize the total cost of disposing of the waste of both cities.

Definition of variables

X_{ij} = tons/day of City #i waste that is sent to Incinerator #j, i=1,2; j=1,2

Y_{jk} = tons/day of debris sent from Incinerator #j to Landfill #k, j=1,2; k=1,2

(There are a total of 8 variables.)

 Complete the table entries which would make this a feasible *(not necessarily optimal!)* solution:

Variable	Value		Variable	Value
X_{11}	100		Y_{11}	70
X_{12}			Y_{12}	
X_{21}	400		Y_{21}	80
X_{22}	0		Y_{22}	

Match the written restriction with the mathematical constraint below.

___ 1. City #1 must dispose of 500 tons of waste each day.

___ 2. Landfill #1 can receive at most 200 tons/day of waste.

___ 3. Incinerator #2 reduces one ton of trash to 0.2 tons of debris, e.g., ashes & other waste.

___ 4. Incinerator #2 can process at most 500 tons of waste per day.

a. $Y_{11} + Y_{21} - X_{11} - X_{12} \leq 500$ **b.** $Y_{11} + Y_{21} \leq 200$ **c.** $X_{12} + X_{22} \leq 500$

d. $X_{12} + X_{22} = 0.2(Y_{21} + Y_{22})$ **e.** $Y_{11} + Y_{22} = 0.2(X_{11} + X_{22})$ **f.** $X_{11} + X_{12} \geq 500$

g. $Y_{21} + Y_{22} = 0.2(X_{12} + X_{22})$ **h.** $(X_{11} + Y_{11}) = 0.2(X_{12} + Y_{12})$ **i.** $X_{12} + X_{22} \geq 500$

j. $X_{12} - X_{22} = 0.2(Y_{12} - Y_{22})$ **k.** $Y_{11} + Y_{21} \geq 200$ **l.** $Y_{11} + Y_{12} \geq 500$

m. *None of the above*