# Accelerated Algebra I/ Geometry A
## SYSTEMS OF LINEAR EQUATIONS & INEQUALITIES
### *THE BUS PROBLEM – AN APPLICATION*

Fulton County Schools (FCS) is replacing their busses.  It can purchase a large bus that can hold 120 students or a small bus that can hold 80 students.   The large bus has accommodations for only two handicapped students with wheelchairs. Of the 80 students that the small bus holds, 10 of those are handicapped students with wheelchairs.  FCS needs the capacity to carry at least 86,000 non-wheelchair students and 2,000 wheelchair students.  It costs $160 each month for maintenance of the large bus and $98 each month for maintenance of the small bus.  Each month, FCS can spend $125,000 on maintenance of the bus fleet.  The purchase price of each large bus is $118,000 and each small bus costs $142,000 due to the handicap equipment.  FCS has $98,000,000 in funds with which to buy busses.  Each large bus carries an insurance premium of $482.32 per month, while each small bus is $561.57 per month.  How many of each bus should FCS buy in order to minimize the insurance costs?

1. Create a table from the information given in the problem. After you have completely filled it in, re-read each sentence and place the appropriate inequality sign into the "*SIGN*" column.

| *ITEM* | LARGE BUS (x) | SMALL BUS (y) | *SIGN* | *TOTAL* |
|---|---|---|---|---|
| Students | (120) | (80) | | |
| Wheelchair | 2 | 10 | | |
| Non-wheelchair | | | | |
| Maintenance | | | | |
| Price | | | | |

2. Write the system of inequalities for this problem from the completed table.  Remember that you cannot have negative busses.

3. Write the equation that is to be minimized for the total insurance cost on the busses.

4. Graph this system on a piece of paper.
   a. Graph the line for each inequality by finding and labeling the *x*- and *y*-intercepts.
   b. Lightly shade the correct side for the inequality associated with each line drawn.
   c. Find all of the intersection points of the (boundary) lines that you have drawn.
      i.   Place a dot on the sketch and label each point on the graph with a letter.
      ii.  Round all intersection points correctly to integer values.

5. Calculate the insurance cost for each labeled point from the previous step.

6. How many of each bus should FCS buy in order to minimize the insurance costs?

| | POINT | | |
|---|---|---|---|
| *LABEL* | *x* | *y* | *INSURANCE* |
| A | | | |
| B | | | |
| C | | | |

To help organize the results, create a table for the labeled intersection points found.  The table should have the label of each point, the *x* and *y* values of each point, and the total insurance cost calculated from number (3).