# Solving Linear Systems Graphically

There are 3 ways to graph lines:
1. table of values – takes too long
2. x and y intercepts – great if you divide numbers evenly (get whole number intercepts)
3. y- intercept , slope form – change to y = mx + b

To solve a system of equations we are looking for the values of x and y that would satisfy all equations – graphically, this means that we are looking for the point of intersection (POI) of the two lines on the graph.

**Example 1:** Solve the linear system graphically and then check your results.

$$3x + y = 5$$
$$-x + 3y = -15$$
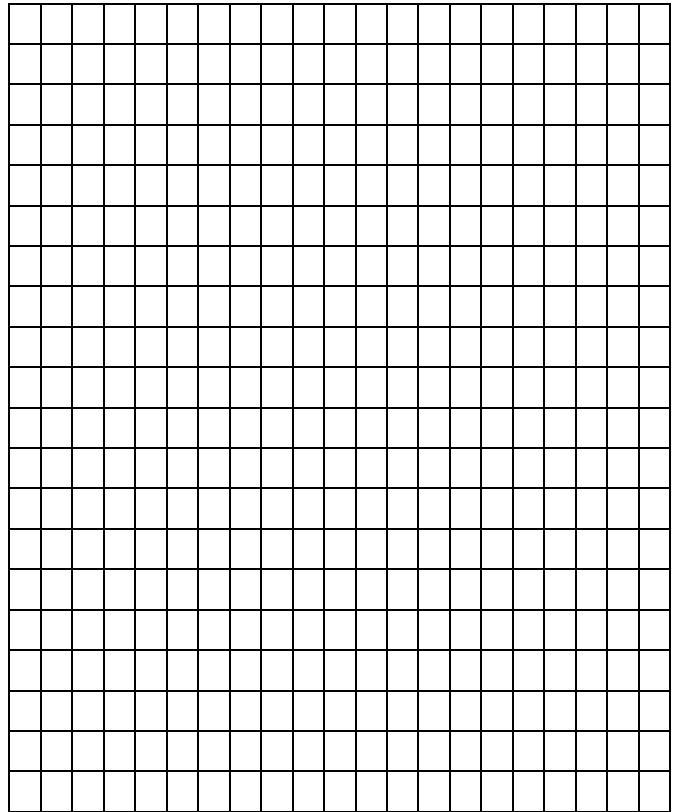
Example 2: A yearbook committee must choose a printing company to print the yearbooks. Blue Heron Yearbooks charges $8000 for set up and $4 per copy. Miles Ahead Yearbooks charges $8400 for set-up and $3 per copy. Suppose it costs C dollars to print n copies of the yearbook. Equations that represent the cost for each company are;

$$C = 4n + 8000 \qquad C = 3n + 8400$$

a) Graph the linear system

b) Determine the POI. Explain what this means.

c) How many yearbooks must be printed for the cost to be the same for both companies? What is the cost?

d) The committee wants to print 300 yearbooks this year. Which company has the better price? Suppose the committee at another school wants to print 800 yearbooks. Which company should they choose?

e) Yearbooks are sold at cost. Calculate the price of a yearbook in each school in part d.
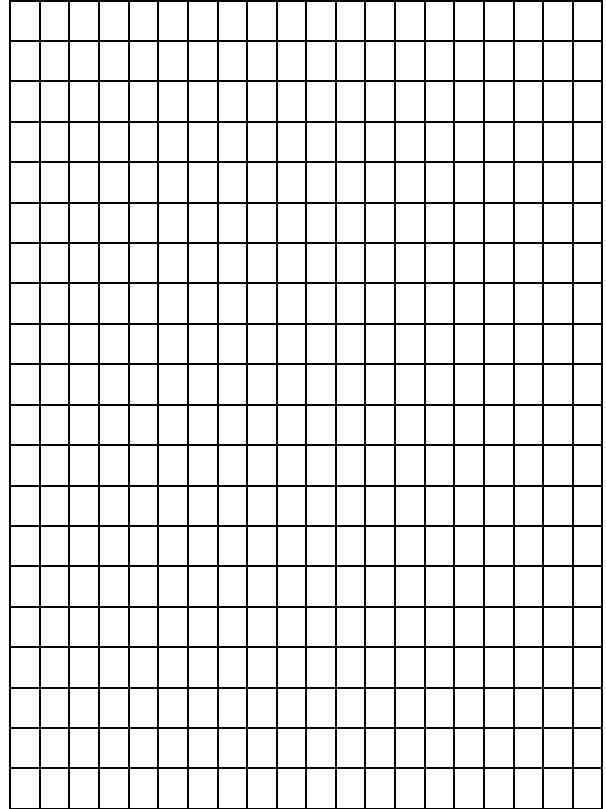
Disclaimer: It is not always possible to obtain the exact solution of a linear system by graphing. If the lines do not intersect on the grid lines, we estimate the solution. Even if the lines appear to intersect on the grid lines, we cannot be certain that they do. Exact solutions can be found *algebraically*. This will be taught in the very near future. ☺

Practice: P.26 # 1a, 2c, 4, 7, 10, 14, 16