Name_____

# Systems of Linear Equations

Dear Family,

Some people have a side business to supplement their income: delivering papers, selling crafts, or running a website, to name a few. The goal is to make a *profit*—to have more income than expenses.

The *break-even point* is where the income equals the expenses. Making a graph is a good way to keep track of income and expenses and will show at a glance when the business will break even. On a graph, the break-even point is where the income line crosses the expense line.

**My Woodworking Business**

| Selling Stools at Craft Fair | | Units | Expense | Income |
|---|---|---|---|---|
| | | 0 | $370.00 | $0.00 |
| Craft Fair Booth: | $160.00 | 10 | $475.00 | $149.50 |
| Business Cards: | $85.00 | 20 | $580.00 | $299.00 |
| New Tools: | $125.00 | 30 | $685.00 | $448.50 |
| **Initial Investment:** | **$370.00** | 40 | $790.00 | $598.00 |
| | | 50 | $895.00 | $747.50 |
| Electricity: | $0.50 | 60 | $1,000.00 | $897.00 |
| Rough Lumber: | $3.00 | 70 | $1,105.00 | $1,046.50 |
| Fasteners & Glue: | $0.75 | 80 | $1,210.00 | $1,196.00 |
| Stain & Sandpaper: | $1.25 | 90 | $1,315.00 | $1,345.50 |
| My Time: | $5.00 | 100 | $1,420.00 | $1,495.00 |
| **Unit Cost:** | **$10.50** | 110 | $1,525.00 | $1,644.50 |
| | | 120 | $1,630.00 | $1,794.00 |
| **Unit Price:** | **$14.95** | 130 | $1,735.00 | $1,943.50 |



Selling Stools at Craft Fair

Have your student help you make a plan for a small business. A few basic steps will get your business plan started.

- How much money will you need for supplies to get started? This represents your *initial investment*. Plot this point on your graph.
- How much does it cost you to produce each item? This is the *unit cost*. Use this to plot more points on the graph to make an expense line.
- What price will you charge for each item? Starting at the origin of the graph, use this unit price to make an income line.
- Do the two lines cross? This is your break-even point—the number of items you must sell to pay for your expenses.

If the two lines do not cross, you will have to make some changes. Can you increase your unit price? You may not be able to charge more than your competitors. In that case, you will have to find a way to cut expenses.
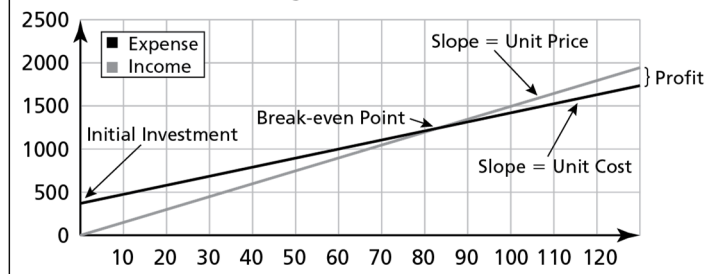
What effect do changes to your initial investment have on the break-even point? What effect do changes to the unit cost have on the break-even point? Ask your student which one has a greater impact over time.

May your collaboration be a profitable one!

| Lesson | Learning Target | Success Criteria |
|---|---|---|
| 5.1 Solving Systems of Linear Equations by Graphing | Understand how to solve systems of linear equations by graphing. | • I can graph a linear equation.<br>• I can find the point where two lines intersect.<br>• I can solve a system of linear equations by graphing. |
| 5.2 Solving Systems of Linear Equations by Substitution | Understand how to solve systems of linear equations by substitution. | • I can solve a linear equation in two variables for either variable.<br>• I can solve a system of linear equations by substitution. |
| 5.3 Solving Systems of Linear Equations by Elimination | Understand how to solve systems of linear equations by elimination. | • I can add or subtract equations in a system.<br>• I can use the Multiplication Property of Equality to produce equivalent equations.<br>• I can solve a system of linear equations by elimination. |
| 5.4 Solving Special Systems of Linear Equations | Solve systems with different numbers of solutions. | • I can determine the number of solutions of a system.<br>• I can solve a system of linear equations with any number of solutions. |