Linear function applications NAMES:

These problems involve variables that are linearly related, meaning their graphs will be straight lines. Draw the graphs using a straight edge.

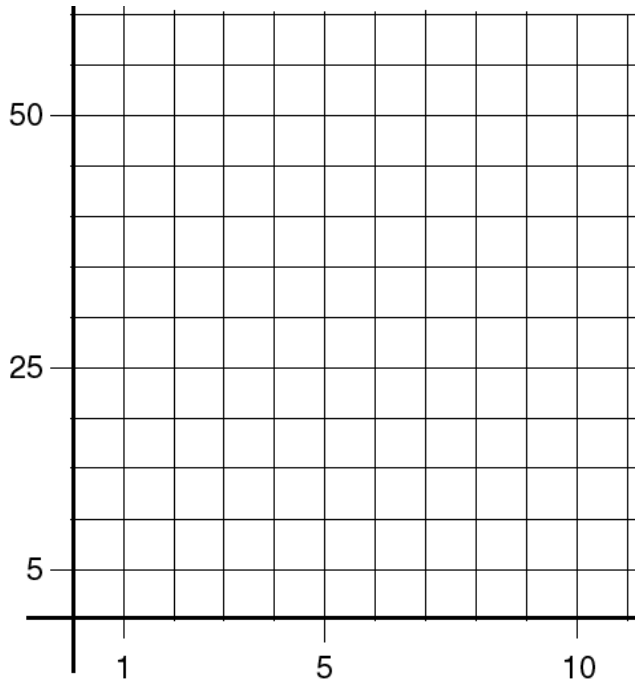
1. You produce exotic candles. You have up-front costs of $25 (perhaps the rent of your studio or one-time equipment costs) and a cost of $5 per candle (perhaps the wax and supplies needed for each candle). You sell your candles for $10 each.

Let x represent the number of candles you produce and sell. Determine algebraic equations for cost and revenue. Use the tables to help you develop the patterns needed.

x	***y, cost***
0	
1	
2	
3	
x	

x	***y, revenue***
0	
1	
2	
3	
x	

On the graph paper below, accurately graph cost and revenue. Label which is which. Use a straight edge.



2. Find the cost and revenue generated if you make and sell 2 candles. (Label which is which.) Where, on the graph, is this information? Do you make or lose money?

3. Find the cost and revenue generated if you make and sell 6 candles. (Label which is which.) Where, on the graph, is this information? Do you make or lose money?

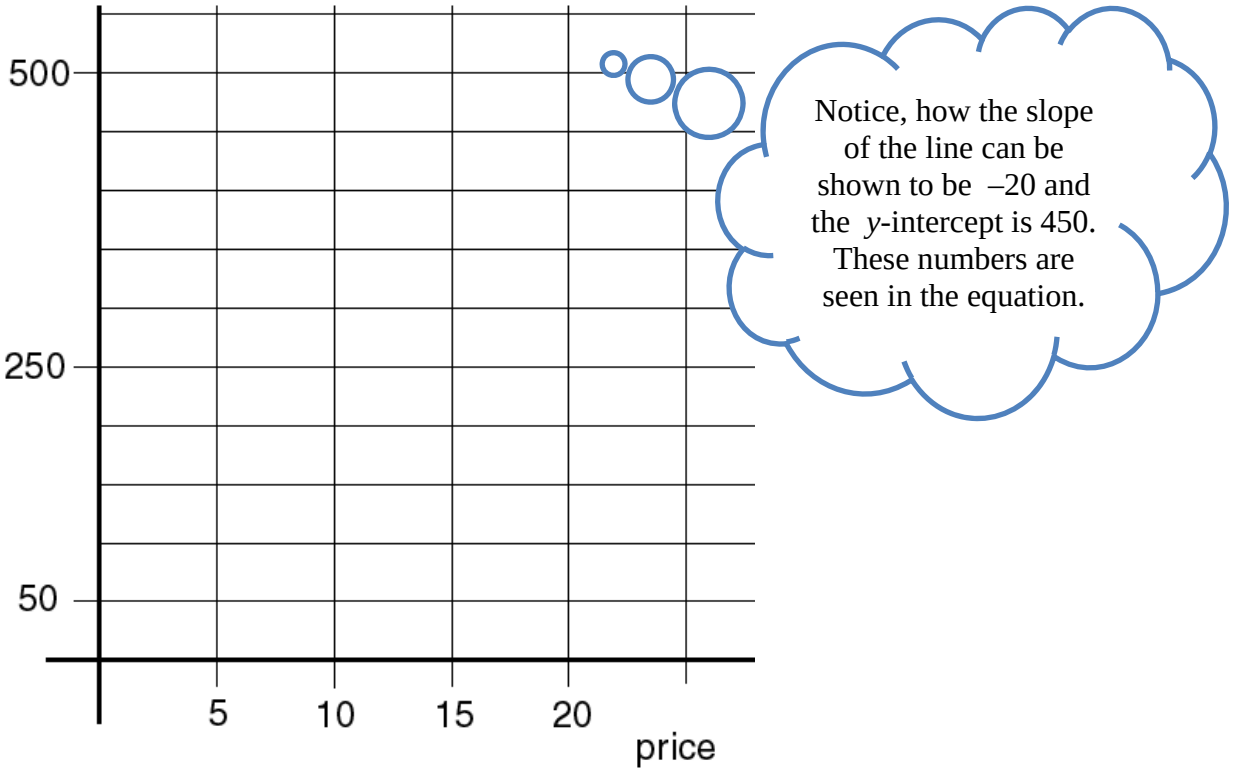
4. Algebraically, find the number of candles you would have to make and sell to break even, meaning you would not make or lose any money. (Set up an equation where cost equals revenue and solve for x.) Where, on the graph, is this information?

5. You are in the business of selling novelty t-shirts. You know that you can sell 150 if you sell them at a price of $15. But if you lower your price to $10, you can sell 250. Assume the relationship between price and quantity sold is linear.

The equation that tells us how price and number of shirts sold are related is $y = -20x + 450$. Here y is the number of shirts you will sell when you sell them for x dollars each.

Graph this relationship by plotting the two points (15, 150) and (10, 250) below and connecting them. [Notice these points are in the form (x, y) or (price, number sold).] You will use the equation and graph in the questions that follow.

Notice price is the independent or x variable.



6a. Using the graph, estimate the price of each t-shirt if you sell 300 of them. Explain your method.

6b. Algebraically, find the price of each t-shirt if you sell 300 of them. Show work. (The equation is $y = -20x + 450$ where y is the number of shirts you will sell when you sell them for x dollars each. Put in the information you know to find what you want to know.)

7a. Using the graph, estimate the quantity you would expect to sell if your price was $6. Explain your method.

7b. Algebraically, determine the quantity you would expect to sell if your price was $6. Show work. (The equation is $y = -20x + 450$ where y is the number of shirts you will sell when you sell them for x dollars each. Put in the information you know to find what you want to know.)

The idea of questions 6 and 7 is to see the connection between algebraic and graphical means. Keep this in mind when you're solving more complicated equations.