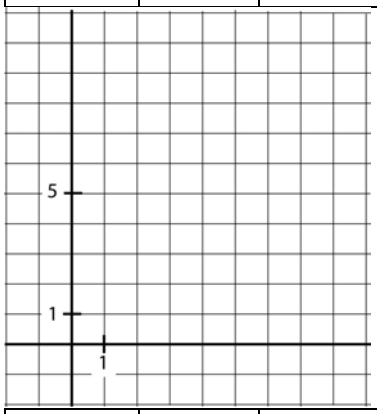
Understanding slope NAMES:

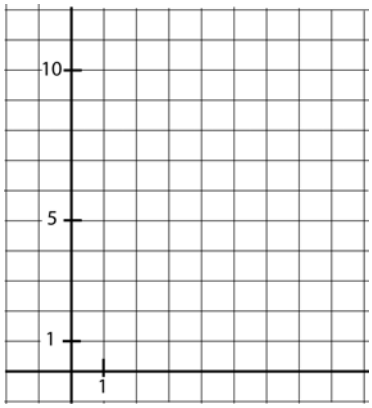
This worksheet will work on some preliminary information we need to understand linear functions.

1. For each table below, complete the third column of each table. The first one is done for you. Then use the graph paper directly below to plot the points.

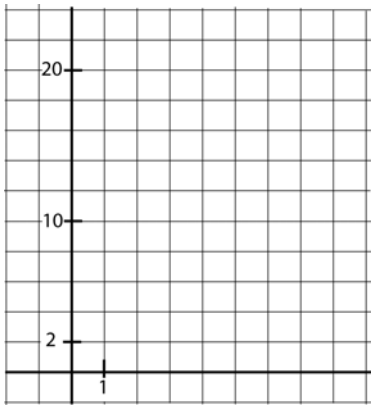
| *x* | *y* | *Difference in y value from last* |
|---|---|---|
| 1 | -2 | -- |
| 2 | 0 | +2 |
| 3 | 2 | +2 |
| 4 | 4 | +2 |



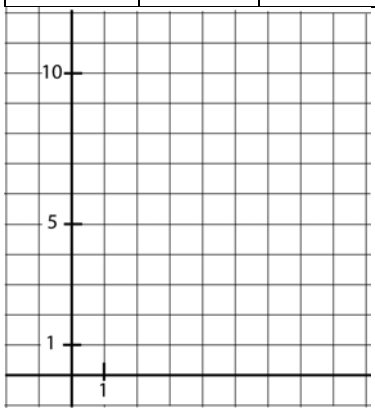

| *x* | *y* | *Difference in y value from last* |
|---|---|---|
| 1 | 3 | -- |
| 2 | 6 | |
| 3 | 9 | |
| 4 | 12 | |




| *x* | *y* | *Difference in y value from last* |
|---|---|---|
| 1 | 0 | -- |
| 2 | 8 | |
| 3 | 10 | |
| 4 | 22 | |




| *x* | *y* | *Difference in y value from last* |
|---|---|---|
| 1 | 8 | -- |
| 2 | 6 | |
| 3 | 4 | |
| 4 | 0 | |




Are these differences positive or negative?

2. Which graphs form a straight line? What about the numbers in the table could help you determine if the graph will be a straight line? In other words, what was true of the points that formed a straight line that was not true about the points that did not form a straight line?

We see that points whose $y$ values increase each time by a constant value (as $x$ increases by 1) will form a straight line. For every increase of one unit in $x$, there is some constant increase (or decrease) in $y$. Let's investigate the first relationship closely. I copied the table of values below.

| ***x*** | ***y*** | ***Difference in y value from last*** |
|---|---|---|
| 1 | -2 | -- |
| 2 | 0 | +2 |
| 3 | 2 | +2 |
| 4 | 4 | +2 |

*To get from -2 to 0, you add 2.*
*To get from 0 to 2, you add 2.*
*To get from 2 to 4, you add 2.*

*For every increase of 1 unit in the $x$ values, we see a constant increase of 2 units in the $y$ values.*

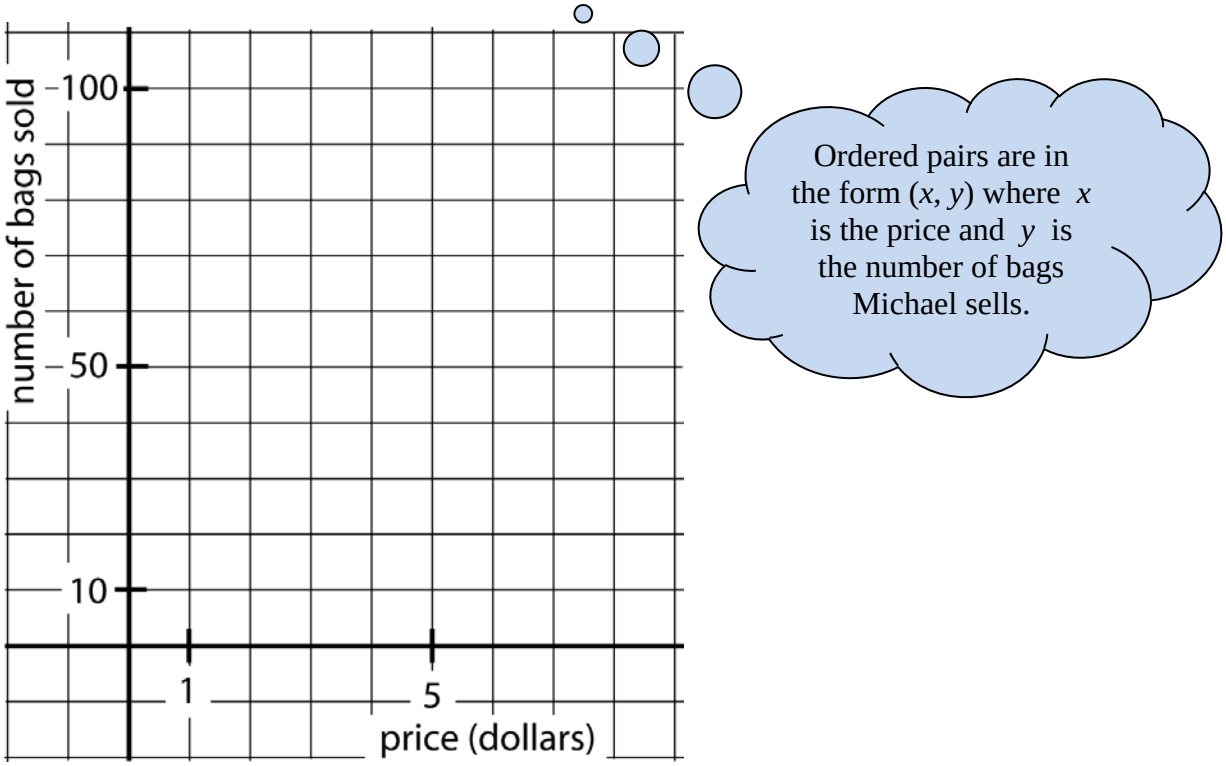
Again, notice how the points that formed straight lines (like the one investigated here) had consistently increasing $y$ values. This is not the case with the last two relationships, which were not straight lines.

**Slope is how we quantify this constant change we see in straight lines. The slope of a straight line tells us how slanted the line is, and if it falls or rises as it goes left to right.**

Slope can be found by comparing any two points on the line. We count how much we go up (or down; we call this rise) and how much we go right (or left; we call this run) to get from one point to the other.

**Form the ratio $\frac{rise}{run}$ and you have the slope of the line.**

3. Michael is selling bags of apples. If he sells the bags at $3 each, he can sell 100 bags. If he raises his price to $5 per bag, he will only sell 75 bags. Write this related information in ordered pair form (price, number of bags sold) and then plot the two points on the graph below. Draw the line (with a straight edge) through these points.




4. Now find the slope between these two points by finding $\frac{rise}{run}$. (Count the span as negative if you go left or down, and positive if you go right or up. Be careful to take note of the scale of the graph.) What meaning can we give to the slope? In other words, for every one dollar increase in price, how many less bags should he expect to sell?

5. Did you get a negative number for slope? Why?