Please No More Leaves!

Every fall I spend hours raking up the leaves in my yard. I have noticed that finishing the job each year takes me about 24 hours. I usually have to do it by myself. Of course I don't work 24 consecutive hours. I usually split the job up over a few days.

This year my friend helped me. We were pretty equally productive and efficient.

1. How many hours should it have taken the two of us to complete the job together? What math did you do to determine this?

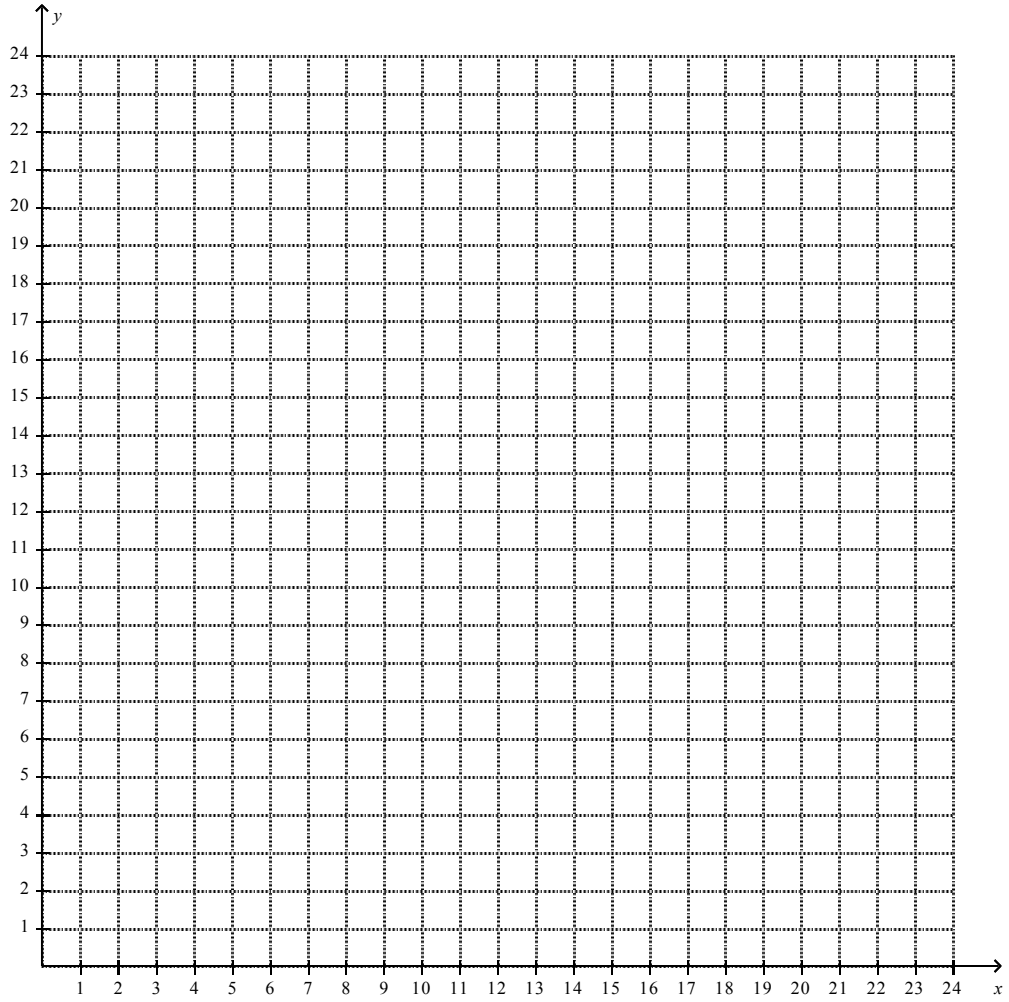
2. It was so much easier working with a friend than doing the job alone. Next year I plan to recruit even more friends to help. Fill in the chart below to help me see how long the job should take to complete with 1, 2, 3, or 4 people working together.

Number of Workers	Show the math that you did	Time in hours to complete
1		
2		
3		
4		

3. What math were you doing over and over again, regardless of the number of workers, to find the time it would take to complete the job?

4. You will notice there are blank rows in the table. Using the table, find out how long it should take to complete the job if I have even more workers. Are there numbers of workers that are easier to calculate than others? If so, give amounts that are easy to calculate with and some that are not as easy.

5. Now plot the points in your table to make an accurate graph. Number of workers should be on the x–axis and hours to finish the job should be on the y-axis. Do not connect the points with a line or curve yet. (You may not be able to plot all points from the table.)



6. Is it possible to take zero hours (as in zero seconds) to rake up all of my leaves?

7. Can the leaves be raked up with zero workers?

8. What do your answers to questions six and seven mean in terms of your graph?

9. In order to draw a smooth curve through the points you will need to find additional x and y values that work for this situation. Use a calculator to help you find how many hours it will take do the job with other numbers of workers. The number of workers should be between 0 and 24 workers and they should be values that you have not yet graphed. Plot the points on your previous plot and connect all points with a smooth curve. Use the table below to organize your new ordered pairs.

Number of workers (x)										
Hours to remove leaves (y)										

10. Will your graph ever touch the x–axis? The y–axes? Explain.

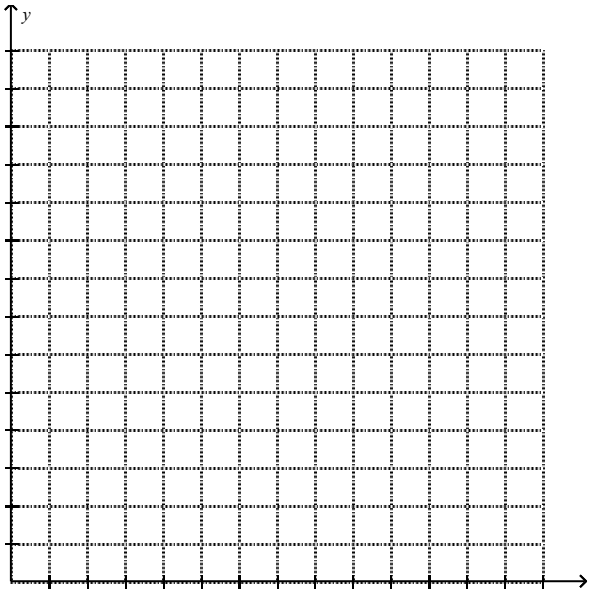
You should notice that your graph will not ever reach the x or y-axes. Your graph is called a hyperbola and this type of algebraic relationship is called an **inverse relationship**. In these inverse relationships the two variables always multiply to the same product. In this leaf raking situation our product was the 24 hours of work, split evenly among various numbers of workers.

Thank gosh raking leaves is done. Now we are heading into winter and I don't have to worry about leaves anymore…

Rats, I forgot it snows here and my driveway and sidewalks are long. When we get a foot of snow it takes me about 4 hours to clear the driveway and sidewalks!

11. Use what you learned in the leaf problem to create a table and graph for the time it takes to clear the snow for various numbers of workers.

Number of workers (x)									
Hours to remove snow (y)									



12. Can the snow be shoveled and removed in zero hours?

13. Can the snow be removed by zero people?

14. What x or y values will the graph of this relationship never touch?

15. Can you write an equation that will give the number of hours necessary to complete the snow removal for any number of workers?