Name: _____ Group Members: _____

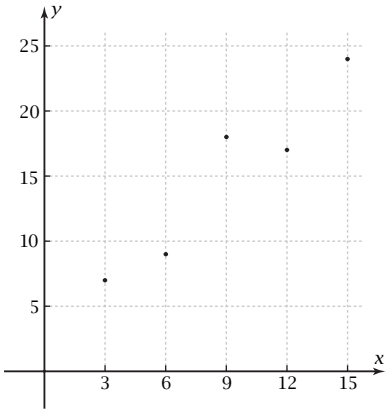
Exploration 8-2b: The Correlation Coefficient

Date: _____

Objective: Learn the formula by which your grapher calculates the regression equation from a set of data.

x	y
3	7
6	9
9	18
12	17
15	24

The table shows the weight, y, of a turkey at times x months after it was hatched. The graph shows a scatter plot of these data.



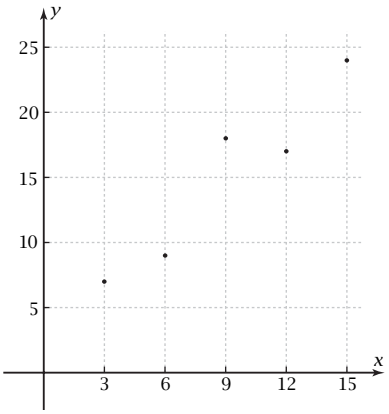
1. Find the average of the y-values, $\overline{y}$. Plot a horizontal line on the graph at $y = \overline{y}$.

2. The **deviation** of each point is its directed distance from the line $y = \overline{y}$ to the point. Show that you understand the meaning of *deviation* by drawing the deviation of each point on the graph.

3. Calculate the deviation and the square of the deviation for each data point. Record these in the table at the top of this column. Then calculate the **sum of the squares of the deviations,** SS_{dev}.

4. Run linear regression on the data. Write the regression equation and record the value of r^2 and the value of the correlation coefficient r.

5. On this scatter plot, plot the graph of the regression equation.



6. You recall that the **residual** of each data point is the directed vertical distance from the regression line to the point. Draw on the graph the residual for each point.

7. On this copy of the data table, calculate $\hat{y}$ for each point. Then calculate the square of each residual. Use the result to calculate SS_{res}.

x	y	$\hat{y}$	$(y - \hat{y})^2$
3	7		
6	9		
9	18		
12	17		
15	24		

8. SS_{res} is the amount of SS_{dev} that remains after regression has taken out as much of it as possible. The fraction of SS_{dev} that is removed by the linear regression is called the coefficient of determination. Calculate

$$\frac{SS_{\text{dev}} - SS_{\text{res}}}{SS_{\text{dev}}}$$

9. On the back of this sheet, write a paragraph stating where the coefficient of determination shows up in the linear regression by grapher. Explain how the correlation coefficient r is calculated from the coefficient of determination.