Authenticity:
The work I hand in is my own. The work is based on my own experiences, thought, research and reading; it changes in some significant way the words, forms and ideas of other people. I understand that if I am found to have submitted work that is not my own I will receive no grade for this assessment. I have read the statement above and understand that the work I hand in for my assessment must be my own.

Signature: (Student)
Date: Wednesday 19th June.

PLANNING

- **The investigation question.**

What is the relationship between shell length (in mm) and mussel mass (in grams)?

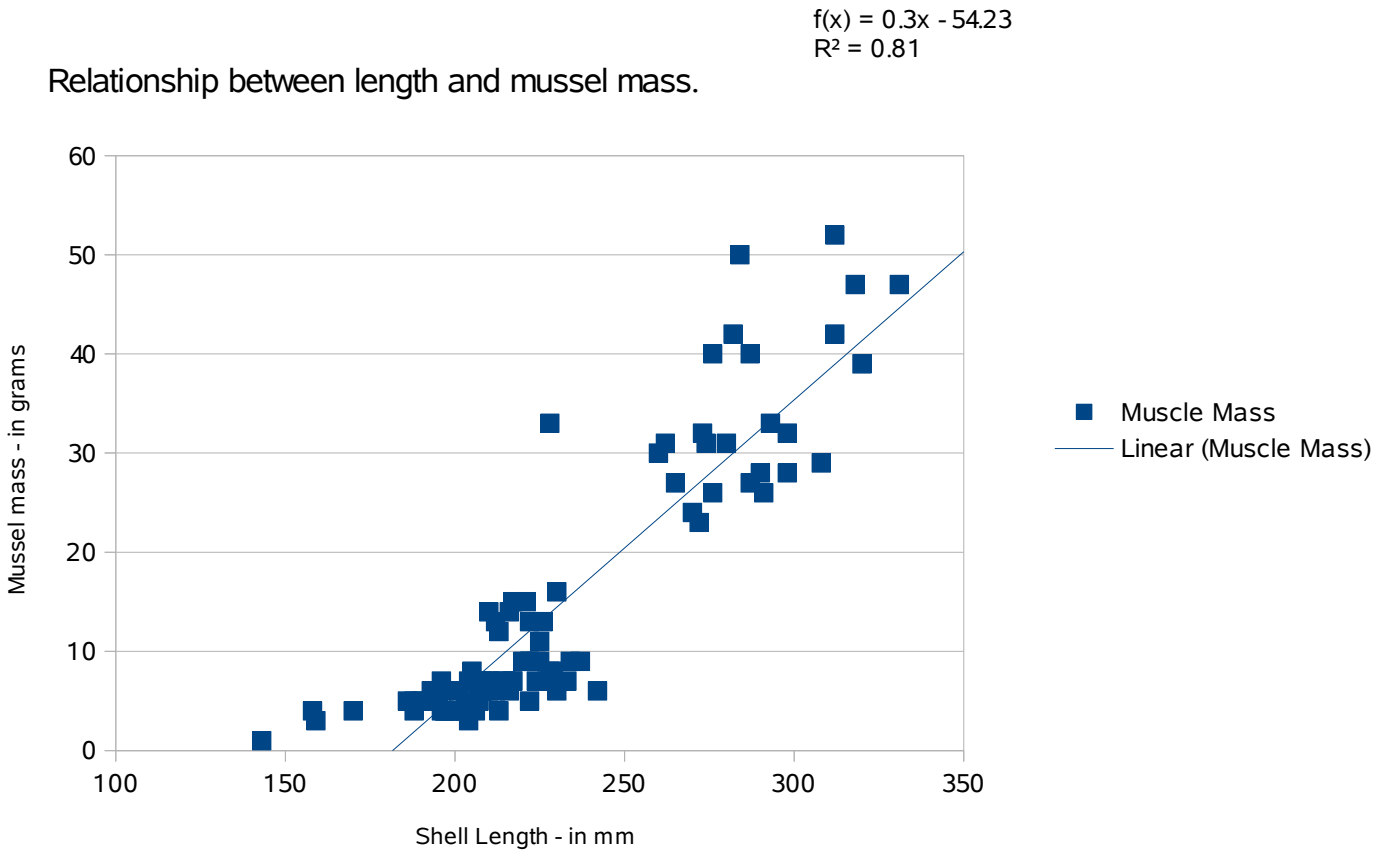
- **The variables you will be investigating.**

I will be investigating the correlation between the variables of shell length (in mm) and mussel mass (in grams).
Independent variable: The independent variable is the shell length.
Dependent variable: The dependent variable is the mussel mass (in grams), as it is dependent on the shell length of the mussel.

- **What things might affect the measures you take (i.e. possible sources of variation).**

As the data has be pre-collated for the investigation, there may be error or gaps in the data collection. Measurement error of the shell length or the mass of the mussel may have an effect on the analysis of the result. Also, miscalculations in the gradient or when using the equation given may affect final outcomes.

What is the relationship between shell length (in mm) and mussel mass (in grams)?



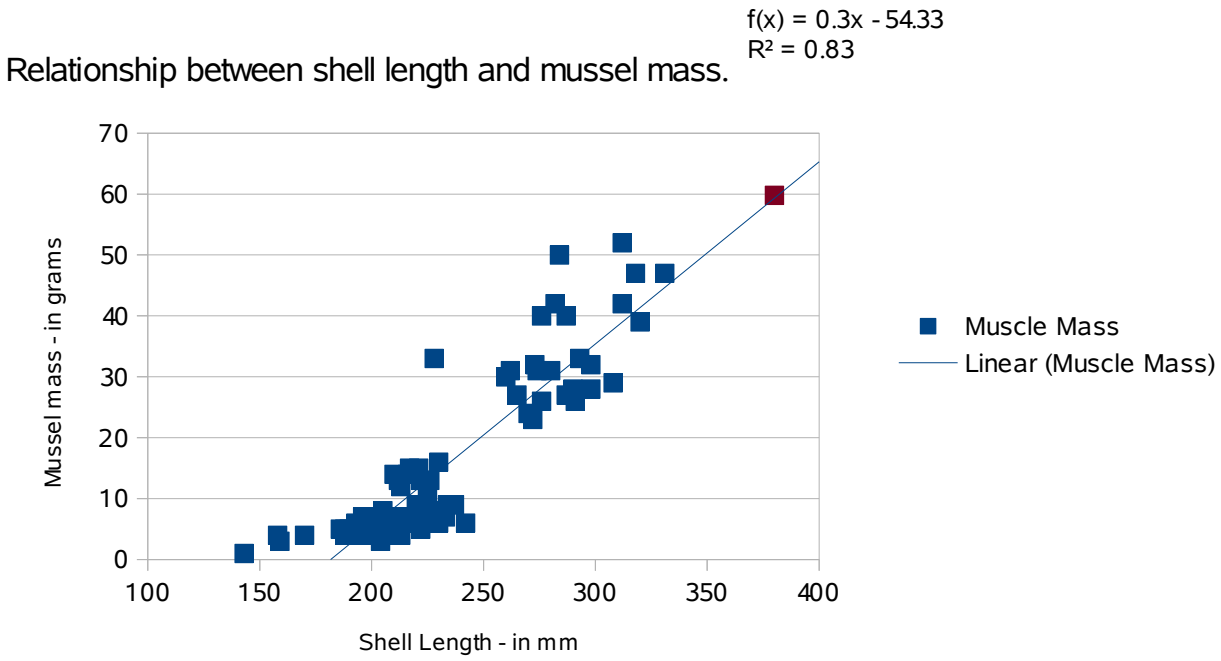
The correlation between shell length (in mm) and mussel mass (in grams) is that of a positive one, while being a strongly related. We are able to gather this, as the graph scatters are moving in a relative upward motion. This shows that as the shell length increases, the mussel mass increases similarly. By looking at the gradient for the trend line (line of best fit), we can see that for every increase of on millimeter in shell length, the mussel mass increases by approximately 0.3 grams.

We are able to draw the conclusion that the graph displays a strong relationship, as the scatter points are wrapped closely around the line of best fit. This indicates that the two variables that I have paired (shell length in mm and mussel mass in grams) can provide information that is accurate and entirely reliable. This can also be shown through the co-efficient of the r value ($\sqrt{0.81} = 0.9$). The stronger the relationship between variables, the more accurate and reliable the results. As the results shown plotted in the graph are easy to interpret and are of a strong relationship, we know that majority/all data points will correlate, thus allowing us to arrive at a precise and reliable conclusion when answering the relationship question.

With relation to this, seeing as we are given 98 samples of data perhaps if we given more data, we would be able to ensure further accuracy and reliability, aswell as being able to keep the relationship in a strong position. The larger the sample size, the less variation we can expect.

The graph shows a linear relationship, as we have used the straight line model to show the trend of results between the two variables (shell length and mussel mass), and it has shown a strong relationship. This means we are able to use the line equation to predict trends; for higher values, lower values or gaps in data. For example, we could find the mussel mass of a predicted shell length value. Predictions made can be relied because of the strong relationship between the two variables.

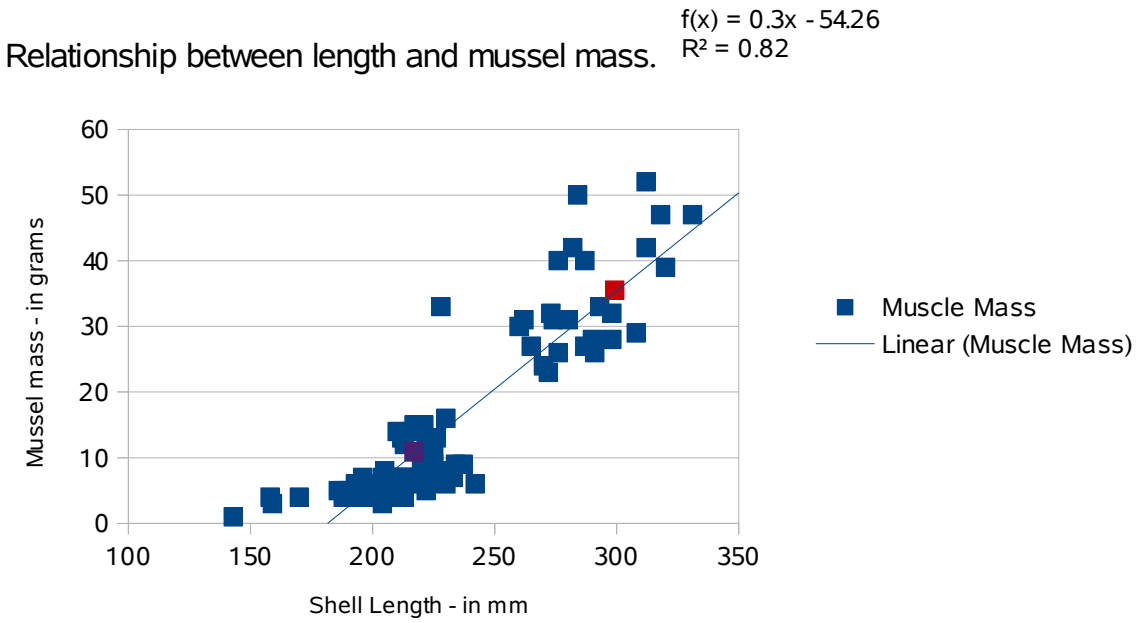
Based on the equation, we are able to predict a future result. If we wanted to find the mass of a mussel with the shell length of 380mm, we would use the equation and substitute 'x' with this value.
0.3x -54.23
0.3 * 380mm – 54.23 = 59.77 grams
Therefore 59.77 grams is the mass of a mussel with the shell length of 380mm.



Above is the graph with the inserted shell length value (380mm) and calculated mussel mass (59.77). We are able to clearly see that the trend line has not changed, and neither has the equation. Therefore the prediction follows the trend which is shown in the graph.

When calculated, the mean of shell length is 299.15mm and the median of shell length is 217mm. Using the equation we are also able to predict the mean and median mussel mass values.
<u>Mean:</u>
0.3x -54.23
0.3 * 299.15mm – 54.23 = 35.52 grams
Therefore 35.52 grams is the mean mass of a mussel with the shell length of 299.15mm.

Median:
0.3x -54.23
0.3 * 217mm – 54.23 = 10.87 grams
Therefore 10.87 grams is the mass of a mussel with the median shell length of 217mm.



The above graph shows the mean and median values plotted on the scatter graph. The red point shows the mean shell length and the calculated mean mussel mass. (shell length: 299.15mm, mussel mass: 35.52 grams)

The purple point shows the median shell length, and the calculated mussel mass for this value.
(shell length: 217mm, mussel mass: 10.87 grams)

For these values/predictions, both follow the trend which is shown in the graph using the trend line and equation. The gradient remains as 0.3 grams increase for every one mm increase in shell length which lets us know that the calculations are correct, and are reliable.

Conclusion:
This investigation has impacted the relationship question '**What is the relationship between shell length (in mm) and mussel mass (in grams)?**'. Through investigating the relationship between shell length and mussel mass, I can conclude that there is a relationship between the two variables and it is that of a positive correlation. From the line of best fit and gradient we can clearly see that for every increase of one millimeter in shell length, the mussel mass increases by approximately 0.3 grams, and we have confirmed this when using the trend line equation in predicting further values.