**Further Mathematics Practice SAT 2**

The seeds in the sunflower are arranged in spirals for a compact head. Counting the number of seeds in the successive circles starting from the centre and moving outwards, the following number of seeds were counted.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Circle** | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th |
| **Number of seeds** | 3 | 5 | 8 | 13 | 21 | 34 | 55 | 89 | 144 | 233 |

1. Plot the data and fit a least-squares regression line.
2. Find the correlation coefficient and interpret its value.
3. Using the equation of the regression line, predict the number of seeds in the 11th circle.
4. Find the residuals.
5. Construct the residual plot. Is the relation between the number of the circle and the number of seeds linear?
6. What type of transformation could be applied to:
   1. the x-values? Explain why.
   2. the y-values? Explain why.

Apply a log10(y) transformation to the data.

1. Fit a least-squares regression line to the transformed data and plot it with the data.
2. Find the correlation coefficient. Is there an improvement? Why?
3. Find the equation of the least-squares regression line for the transformed data.
4. Calculate the coefficient of determination and interpret its value.
5. Using the equation of the regression line for the transformed data, predict the number of seeds for the 11th circle.
6. How does this compare with the prediction?