26th August

1. It is suggested that the value of X decreases with time according to the relationship:

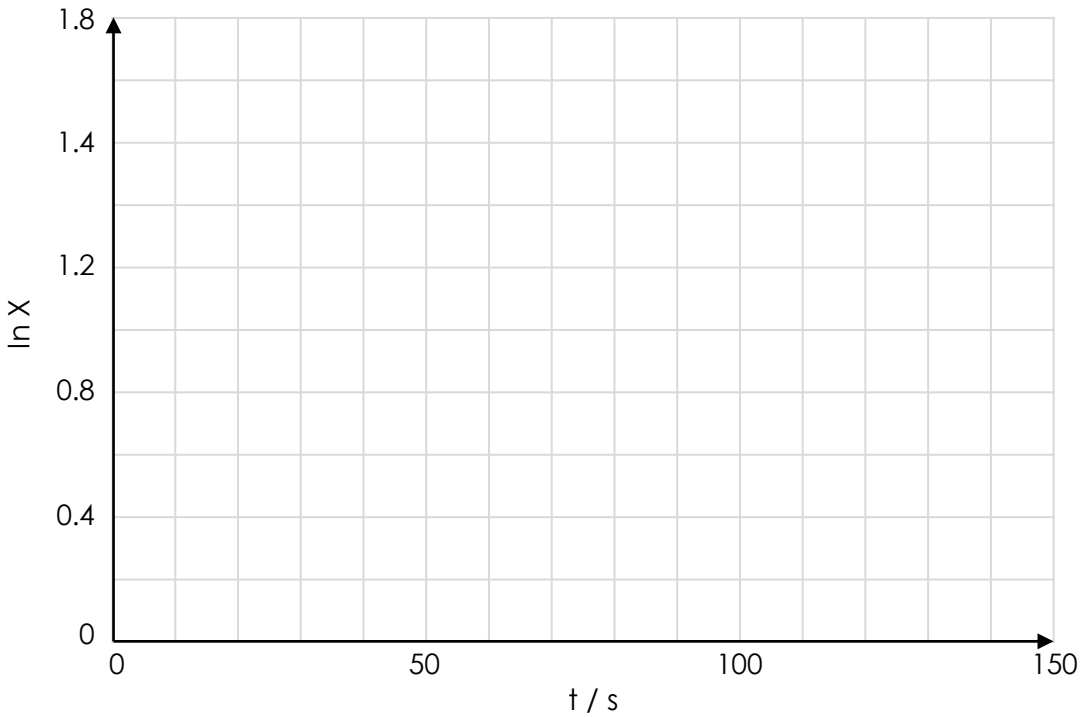
$$X = X_0 e^{-Bt}$$

In an experiment to investigate this relationship, the following data was recorded:

t / s	0	30	60	90	120	150
X	6.0	4.1	2.8	2.1	1.4	1.0
ln X						

a. Complete the table with the **natural log** values for *X*

b. Plot the data on the graph below and draw a straight **line of best fit**



c. Use the value for your **gradient** to determine a value for the **constant B** with appropriate units

27th August

1. The equation for the magnitude of force due to gravity can be written as:

   (1) $F = GmM / r^2$

   The size of the centripetal force acting on an orbiting body is:

   (2) $F = mv^2 / r$

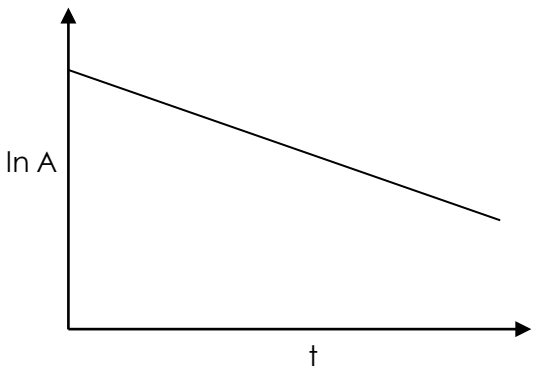
   a. **Equate** equations (1) and (2)

   b. **Rearrange** the equation to make v^2 the subject

2. For a radioactive sample:

   $A = A_0 e^{-\lambda t}$

   In an experiment, some data is recorded and plotted, giving a straight line of best fit.

   a. Take **ln** of both sides of the equation

   b. **Rewrite** your equation in the form $y = mx + c$

   c. **Complete** the table:

y-axis	gradient	x-axis	y-intercept

   d. Describe how the value of the **constant λ** (the decay constant) would be calculated from the graph