Finding the best linear or exponential model fitting some data.

1 Method for finding best linear model

1. Plot neatly the data points you have on a graph paper (choose the scale for both variables carefully so that your data points fit on the graph and are sufficiently spread).
2. With a ruler, draw the line which seems to stay closest to your data points. Some points should be under the line, and some others above it (unless they are all on the line !).
3. Compute the slope of your line. This is done by picking to points on the line (preferably far away to have more precision) and using the formula

   $$slope = \frac{\text{change of dependant variable}}{\text{change iof independant variable}}$$

   Compute the y-intercept of your line: if your horizontal graduation starts at 0, that's where the line intersects the vertical axis. Otherwise, you may have to solve for "initial value" in your model.
4. Substitute the initial value and the rate of change in your model.

2 Method for finding best exponential model

The method is based on the fact that if Q is a quantity which is exponentially growing following the law $Q = Q_0 \times (1+r)^t$ then the quantity $\log Q$ is linearly growing. This is because of a property of logarithm which transforms multiplication into an addition in the following sense: $\log(a \times b) = \log(a) + \log(b)$. Therefore $\log(Q) = \log(Q_0 \times (1+r)^t) = \log(Q_0) + \log((1+r)^t) = \log(Q_0) + t \times \log(1+r)$ thanks to the *bringing the exponent down rule.* Thus we get a formula

$$\log(Q) = \log(Q_0) + t \times \log(1+r)$$

which shows that $\log(Q)$ is linearly growing: its initial value is $\log(Q_0)$, and its rate of change is $\log(1+r)$. So the method is to find the best linear model for $\log(Q)$, and to translate the results obtained to get the quantities you need for your model, namely r and Q_0.
Here are more details.

1. Make a table where you compute $\log(Q)$ for each data point.
2. Plot neatly the data points corresponding to $\log(Q)$ on a graph paper (choose the scale carefully).
3. With a ruler, draw the line which seems to stay closest to the $\log(Q)$ data points.
4. Compute the slope m of your line and its y-intercept (that's $\log(Q_0)$) as above.
5. Use those values to recover r from m by solving the equation $m = \log(1+r)$, and to recover Q_0 (you know $\log(Q_0)$).
6. Plug the values of r and Q_0 in your model, and you're all set.