Linear Regression Activity

The table below shows the number of small specimen-BMD scanners in the United States from 1998 to 2004.

<table>
<thead>
<tr>
<th>Year</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Specimen BMD Scanners</td>
<td>5</td>
<td>8</td>
<td>13</td>
<td>21</td>
<td>33</td>
<td>52</td>
<td>80</td>
</tr>
</tbody>
</table>

a. Linearize the data. That is, make a table with $x$- and $y$-values, where $x$ is the number of years since 1998 and $y$ is the number of BMD scanners. Then make a scatter plot of the linearized data.

Subtract 1998 from each year (your $x$) and find the natural logarithm of each BMD scanner quantity.

<table>
<thead>
<tr>
<th>$x$</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ln $y$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The scatter plot suggests that there may be a linear relationship between $x$ and ln $y$. Plot your points here and be sure to label and scale your axis.

b. Find a regression equation for the linearized data.

Use $\text{LinReg}(ax+b)$ on the STAT CALC screen to find the linear regression equation. $\text{LinReg}$

$y =$

$a =$

$b =$

$r^2 =$

$r =$

Write out linear equation:
c. Use the linear regression equation to find an exponential model for the original data.

To find a model solve the regression equation in part b for $y$.

d. Use the exponential model to predict the number of BMD scanners there will be in 2015. Does this prediction make sense?