Generating calibration curve in MS Excel

1) Graphical display will allow to check visually that all your data points are on the curve
2) Simple calculation of slope and intercept
3) Using function LINEST allows us to get also standard deviations and R²
4) Calculate unknown

Initial data consist of response (signal) of different concentrations of standard and response of unknown sample

1) Graphical display

Use chart wizard to generate calibration curve, select “(XY) scatter”
Select data (left click) and right click to get menu and select add trendline.

Select linear (trendline) and in options (top menu) select "Display equation and $R^2$"
The result is the calibration curve, and equation.
2) Simple calculation of slope and intercept

To get slope, type “=slope” and in parenthesis select range for ys and xs ranges.

To get intercept type the same formula as for slope, but replace slope by intercept.

Note, the slope and intercept calculated are and should be the same as on the chart.
3) Using function LINEST allows us to get also standard deviations and $R^2$. Select the area 2 x 3 cells and point at menu at insert function (above B column) and select category and function.
select data ranges, and type in “true” for const and stats

\[
\text{Function Arguments}
\]

- **Known_y’s**: C9:C12 = \{2;8;16;32\}
- **Known_x’s**: B9:B12 = \{1;10;20;40\}
- **Const**: true = TRUE
- **Stats**: true = TRUE

Returns statistics that describe a linear trend matching known data points, by fitting a straight line using the least squares method.

**Stats** is a logical value: return additional regression statistics = TRUE; return m-coefficients and the constant b = FALSE or omitted.

Formula result = 0.776

HIT ctrl+shift+enter

The values obtained in cells F9 – G11 are

<table>
<thead>
<tr>
<th>m (slope)</th>
<th>b (y-intercept)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Std. Dev. for m</td>
<td>Std. Dev for b</td>
</tr>
<tr>
<td>( r^2 ) (see below)</td>
<td>Std. Dev for ( y )</td>
</tr>
</tbody>
</table>
4) calculate concentration of unknown
rearrange equation for calibration curve to express x (concentration)

Based on the calibration we know slope (m) and intercept (b) and we measured response y.
The results would be 7. You should be able to get the same estimate from a graphical display of the calibration curve.