Graphing Physics Data on the Graphing Calculator

1. Enter the original data into the calculator and plot it. Press the STAT button and then EDIT to enter the x values into $L_1$ and y values into $L_2$. Assume the x values are time and the y values are the distance traveled.

```
EDIT CALC TESTS    L1      L2      L3     2
1:Edit...           20      11      ------
2:SortA(            40      15.1
3:SortD(            60      19.3
4:ClrList           65      21.3
5:SetUpEditor       70      22.8
                    80      25.4
                    ------  ------
                    L2(1)=11
```

2. Make sure all "Y =" plots are off. (There should be no equations in the Y= window.) Press STAT PLOT and then 1. Turn on PLOT 1. Using the cursor, select the following

```
STAT PLOTS          Plot1  Plot2  Plot3
1:Plot1...Off       On  Off
    L1    L2        Type: ...
2:Plot2...Off
    L1    L2        Xlist:L1
3:Plot3...Off       Ylist:L2
    L1    L2        Mark: □  +  .
4↓PlotsOff
```
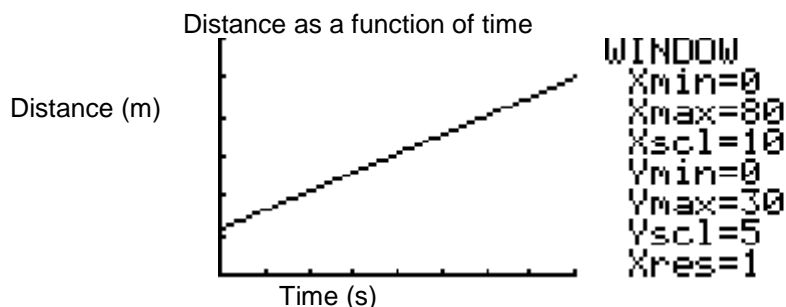
3. Press the GRAPH button. If the graph doesn't look suitable, you can adjust your WINDOW settings yourself or use the ZOOM command and select choice 9, ZOOM STAT.
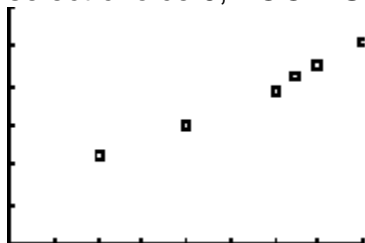
The graph here shows the data points plotted by the calculator.

**You must still properly communicate the physics** by:
- Sketching the graph accurately (you don't need to use graph paper) using a ruler to draw the line of best fit.
  - Title the graph
  - Label the x-axis with the variable including UNITS and powers of ten if any
  - Label the y-axis including UNITS and powers of ten if any.
  - A statement of the range of both axes, giving the minimum and maximum values. Press WINDOW to find these values.

Distance as a function of time

Distance (m)



Time (s)

WINDOW
Xmin=0
Xmax=80
Xscl=10
Ymin=0
Ymax=30
Yscl=5
Xres=1

The graph here shows the **sketch** of the line of best fit and the window settings used.

Or you can record the window settings in the following manner:
$X[X_{min}, X_{max}, X_{scl}]$ and $Y[Y_{min}, Y_{max}, Y_{scl}]$

4. Find the slope of the line. Press STAT and then CALC



EDIT CALC TESTS
1:1-Var Stats
2:2-Var Stats
3:Med-Med
4:LinReg(ax+b)
5:QuadReg
6:CubicReg
7↓QuartReg

5. Select 4 Linreg (linear regression). The list with the x values MUST be named first. The calculator display would look like this:
LinReg(ax+b) L₁,
L₂,Y₁

LinReg
y=ax+b
a=.2392771084
b=5.790361446

This will give the slope of the line and put the equation of the line in Y= editor. If you now press GRAPH, the line of best fit will be plotted.

6. **You must communicate** where the data are stored in the calculator **with the units**. On an exam or lab write-up you would communicate the solution this way:
$L_1$ = time (s)
$L_2$ = distance (m)
Use the linear regression on the calculator (ax + b) $L_1$, $L_2$
The slope is 0.24 m/s

**You have to report the slope in the proper number of significant digits and the correct units. Refer to the original data to determine the correct number of significant digits.**