Algebra II
How To Get The Equation Given Two Points

Assume you have two Points (5,-5) and (-3,11).
To get the name of the line that passes through these two points you can:

I.   Determine the Slope by using the formula: $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

         so we have $m = \dfrac{{}^-5 - 11}{5 - {}^-3} = {}^-2$

         Now use this to determine the value of b in y=mx+b.
         Starting with y=mx+b we plug in values we know [x,y,m] and then
         solve for b.
         -5=-2*5+b
         -5=-10+b
         -5+10= ⁻10+10+b
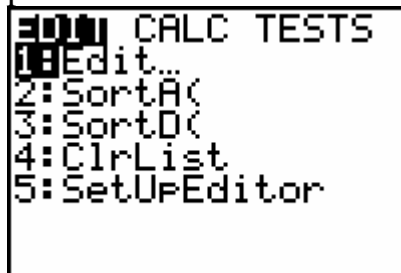   5=b
         So we have y = -2x + 5

II.   You can plot the points, by running SETMEUP and choosing
         option 4: X and Y.

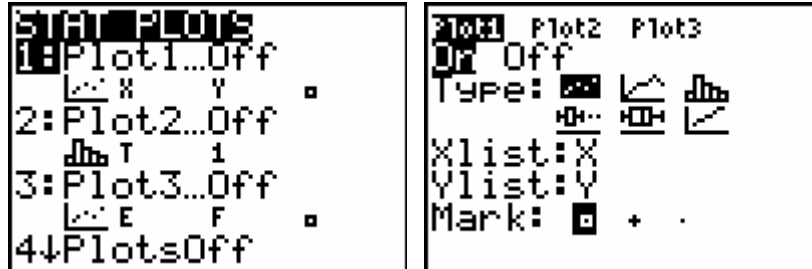   Then press …   ĺ   to get to the List Editor and enter the two
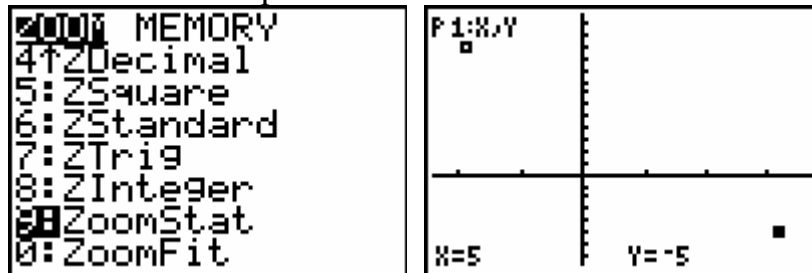   points.

Algebra II
How To Get The Equation Given Two Points

Then set up the plot by pressing y   [STAT PLOT] and pressing
Í   to set up Plot 1 as shown below.

```
STAT PLOTS            Plot1 Plot2 Plot3
1 Plot1…Off          On Off
  ∟ X    Y           Type: ▨  ⬚  ⬚
2:Plot2…Off               ⬚  ⬚  ⬚
  ∟ T    1           Xlist:X
3:Plot3…Off          Ylist:Y
  ∟ E    F           Mark: □  +  ·
4↓PlotsOff
```

Now press q   and do either ¸   for Dolciani or ® for Zoom
STAT to see the plot.

```
ZOOM MEMORY          P1:X,Y
4↑ZDecimal            □
5:ZSquare
6:ZStandard
7:ZTrig
8:ZInteger          ─────────┼────────
9 ZoomStat
0:ZoomFit            X=5        Y=-5        ■
```

Determine the Slope by looking at Rise over Run by drawing in the
steps as shown below:

```
 ■
  RISE
  -16

─────────┼──────
         │
         RUN=8          ■
```
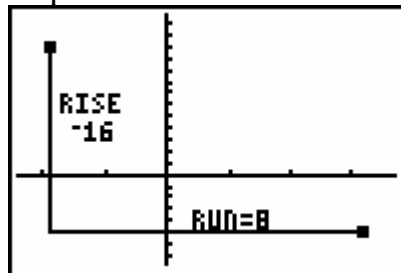
so we get –16/8 = -2 as the slope.

Using the Solver [Press   } Í   ] and keying in the 0=
version of the Slope-Intercept form of the line, we have:

```
MATH NUM CPX PRB     EQUATION SOLVER
4↑³√(               eqn:0=MX+B-Y
5: ×√
6:fMin(
7:fMax(
8:nDeriv(
9:fnInt(
0 Solver…
```
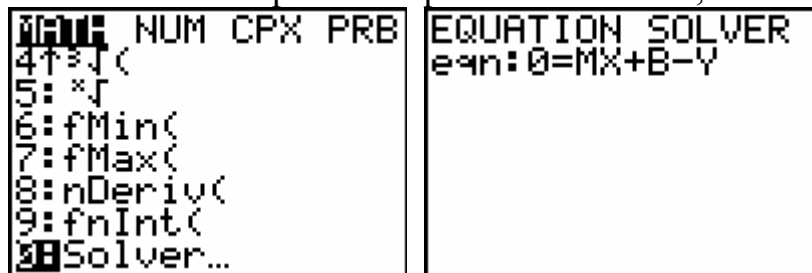
Key in the values you have for the slope (m) and one of the points
(x,y). Then guess a value for B and press ƒ   Í   for
SOLVE. The bullet next to the B tells the answer, in this case 5.

Algebra II
How To Get The Equation Given Two Points

```
MX+B-Y=0        MX+B-Y=0
 M=-2            M=-2
 X=5             X=5
 B=55           ▪B=4.9999999999…
 Y=-5            Y=-5
 bound={-1ε99,1…  bound={-1ε99,1…
                ▪left-rt=0
```
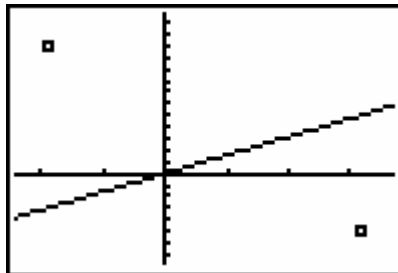
You have the equation. Y = -2X + 5

III.   Guess and Test: You could just plot the points as above and then guess the equation starting with the y = 1X + 0 form with the Bubble Baby.

```
Plot1 Plot2 Plot3
•\Y₁⊟1X+0
 \Y₂=
 \Y₃=
 \Y₄=
 \Y₅=
 \Y₆=
 \Y₇=
```

Then fiddle with the numbers to get the answer.
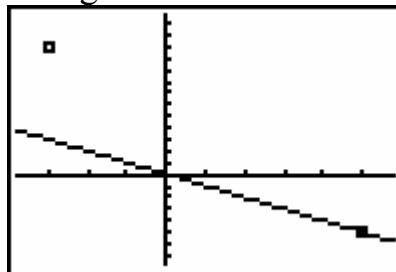
```
Plot1 Plot2 Plot3
•\Y₁⊟-1X+0
 \Y₂=
 \Y₃=
 \Y₄=
 \Y₅=
 \Y₆=
 \Y₇=
```

```
Plot1 Plot2 Plot3
•\Y₁⊟-2X+0
 \Y₂=
 \Y₃=
 \Y₄=
 \Y₅=
 \Y₆=
 \Y₇=
```
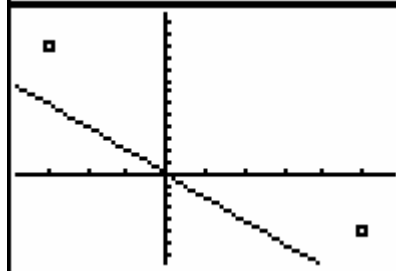
```
Plot1 Plot2 Plot3
•\Y₁⊟-2X+5
 \Y₂=
 \Y₃=
 \Y₄=
 \Y₅=
 \Y₆=
 \Y₇=
```
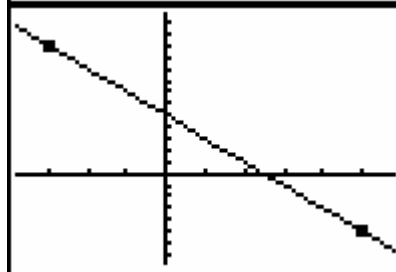
Now test it with the Table. Set the Table with the ASK by pressing

Algebra II
How To Get The Equation Given Two Points

y   [WINDOW] and setting up as shown, and then y   [TABLE] to see the table and key in the two x values, obtaining the two y values.

```
TABLE SETUP
 TblStart=-10
 ΔTbl=1
Indpnt: Auto ASK
Depend: Auto Ask
```

```
 X  │ Y₁ │
 5  │ -5 │
 -3 │ 11 │
────┴────┴
X=
```

So the equation is $y = -2x + 5$.

IV.   Using Science Tools won't work since we only have two points. If we want the automatic regression, we go HOME by pressing y [QUIT] and then '   . Then key in …   ~   to get the CALC Menu. Select option 4:LinReg.
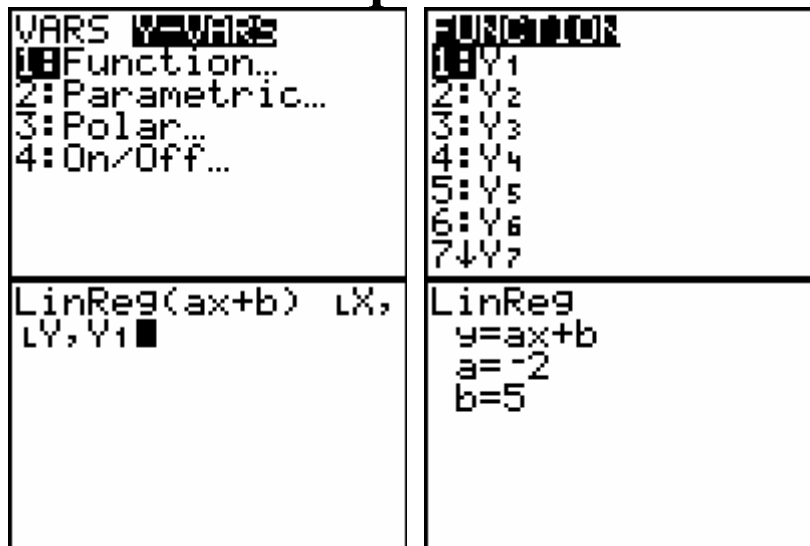
```
■
```

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

Select the names of the list – press y [LIST] to see them, and access the Y-variables by pressing   ~ ĺ   and pick the number wanted.

```
LinReg(ax+b) ■
```

```
NAMES OPS MATH
1:X
2:Y
```

```
LinReg(ax+b) ∟X,
∟Y,■
```

```
VARS Y-VARS
1:Window…
2:Zoom…
3:GDB…
4:Picture…
5:Statistics…
6:Table…
7:String…
```

Algebra II
How To Get The Equation Given Two Points

```
VARS  Y-VARS
1:Function…
2:Parametric…
3:Polar…
4:On/Off…
```

```
FUNCTION
1:Y1
2:Y2
3:Y3
4:Y4
5:Y5
6:Y6
7↓Y7
```

```
LinReg(ax+b)  LX,
LY,Y1█
```

```
LinReg
  y=ax+b
  a=-2
  b=5
```

So we have again the equation is y = -2x + 5.

```
Plot1  Plot2  Plot3
\Y1█-2X+5
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```