

Solving simultaneous equations using a graph

When you have two equations and two variables. eg:	$2x + 7y = 23$ $5x - y = -2$	$2x = 5y - 4$ $y + x = 5$	$y = 200 + 10x$ $y = 200 \times 1.045^x$
Rearrange both the equations so they are of the form "y="	$y = \frac{1}{7}(23 - 2x)$ $y = 5x + 2$	$y = \frac{1}{5}(2x + 4)$ $y = 5 - x$	Note: This example is actually a comparison (after X years) of investing £200 at 5% simple interest compared to 4.5% compound interest.
Enter the LHS into the calculator: [Y=]	<pre> Plot1 Plot2 Plot3 Y1 (23-2X)/7 Y2 5X+2 Y3 = Y4 = Y5 = Y6 = Y7 = </pre>	<pre> Plot1 Plot2 Plot3 Y1 (2X+4)/5 Y2 5-X Y3 = Y4 = Y5 = Y6 = Y7 = </pre>	<pre> Plot1 Plot2 Plot3 Y1 200+10X Y2 200*1.045^X Y3 = Y4 = Y5 = Y6 = Y7 = </pre>
View the graph: [GRAPH]			
Then select [CALC] (via [2nd] [TRACE]) and select option 5, "intersect"	<pre> CALCULATE 1:value 2:zero 3:minimum 4:maximum 5:intersect 6:dy/dx 7:∫f(x)dx </pre>	<pre> CALCULATE 1:value 2:zero 3:minimum 4:maximum 5:intersect 6:dy/dx 7:∫f(x)dx </pre>	<pre> WINDOW Xmin=0 Xmax=10 Xscl=1 Ymin=200 Ymax=300 Yscl=1 Xres=1 </pre> <p>...we must press [WINDOW] and select more appropriate values)</p>
Pick the two curves/lines and then move the cursor to your estimate of where the intersection is.			
Note: The "guess" is only really important when there is more than one intersection. In the third example the curves also cross at X = 0, Y = 200 ie when the investment starts, so we must be sure to guess near the other intersection.			
Top tip: You could solve "normal" equations like this too: write $2x + 7y = 15$ as $Y = 2X + 7$ $Y = 15$.. and solve!	The answer is: $X = 0.243, Y = 3.22$ (3sf)	The answer is: $X = 3, Y = 2$	The answer is: $X = 5.67, Y = 257$ (3sf) ie if you are investing for less than 6 years then 5% simple interest is best, any longer and you should choose 4.5% compound interest.