

Teachers Teaching with Technology

T³ Scotland



T³ EUROPE

Simultaneous Equations

SIMULTANEOUS EQUATIONS: Two Linear Equations

Aim

To demonstrate how the TI-83 can be used to facilitate a fuller understanding of systems of equations and provide a method for accurate solution of problems involving two linear simultaneous equations.

Objectives

Mathematical objectives

By the end of this session you should be able to

- clearly understand the concept of a linear equation, and have an improved understanding of the relationship between a line and its equation.
- understand that in solving a pair of linear simultaneous equations you are finding the unique point where these lines intersect
- understand that simultaneous equations are encountered whenever two lines intersect
- fully understand why linear simultaneous equations can have a maximum of one solution
- recognise when linear simultaneous equations have no solution and be able to predict this without need for solution.

Calculator objectives

By the end of this session you should be able to

- draw graphs using [Y=]
- clear graphs
- alter the display of a graph using [WINDOW] and [ZOOM].
- find a point of intersection by using [2nd][CALC] 5:intersect
- move a cursor on the screen using the cursor keys

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Calculator Skills Sheet

EXAMPLE: Find the point of intersection of these two lines. $3x - 2y = 8$(1)
 $5x + 8y = 70$(2)

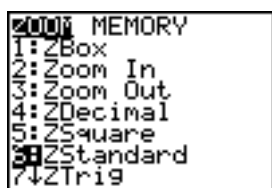
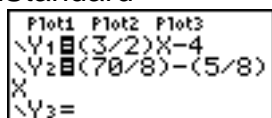
1. To enter an equation on the TI the equation must be in the form $Y=$.

First step is to rearrange these equations to make y the subject of the equation.

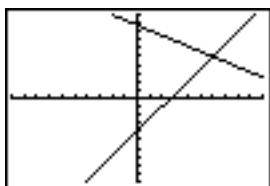
(1) $3x - 2y = 8$
 $2y = 3x - 8$
 $y = \frac{3x-8}{2} = \left(\frac{3}{2}\right)x - \frac{8}{2}$
 $y = \left(\frac{3}{2}\right)x - 4$

(2) $5x + 8y = 70$
 $8y = 70 - 5x$
 $y = \frac{70-5x}{8} = \frac{70}{8} - \left(\frac{5}{8}\right)x$
 $y = \left(\frac{70}{8}\right) - \left(\frac{5}{8}\right)x$

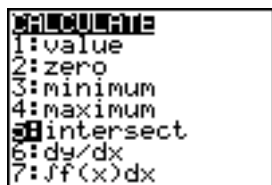
2. On the [Y=] screen enter the equations. Notice the use of the brackets. Now press [ZOOM] and choose 6:ZStandard



3. The TI draws the two lines

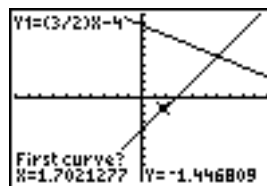


4. We want to find the coordinates of the intersection point of these two lines. Press [2nd][CALC]

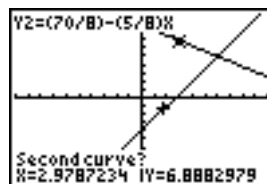


Choose 5:intersect

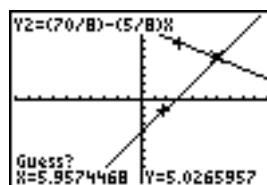
5. The TI asks for the “First curve?”. Notice the flashing cursor, and confirm that the expression shown top left is the first of the two lines. Press [ENTER] to confirm.



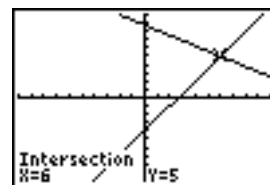
6. The TI asks for the “Second curve?”. Once again check and [ENTER].



7. The TI now asks for a “Guess?”. Using the cursor keys move the flashing cursor close to the intersection point and [ENTER].



8. The TI returns the coordinates of the intersection (6,5)



SIMULTANEOUS EQUATIONS: Two Linear Equations

Solve these pair of simultaneous equations:

Exercise 1

1. $y = 2x + 3$
 $y = 3x + 1$

2. $y - 4x = 5$
 $2x + y = -7$

3. $y - 2x = 8$
 $x + y = -1$

4. $y - 2x = 3$
 $y - x = -1$

5. $y + x = -1$
 $y - x = 5$

6. $-x + y = -6$
 $y + 2x = 6$

7. $y - 2x = -1$
 $y - x = 5$

8. $x + y = 3$
 $x - y = 6$

9. $2x + y = 6$
 $-4x + y = -9$

Exercise 2

1. $x - y = 3$
 $2x + 3y = 11$

2. $5x - 2y = 12$
 $7x - 3y = 17$

3. $2x + 5y + 2 = 0$
 $3x - 4y + 3 = 0$

4. $3x + y = 4$
 $3x + y = 2$

5. $y = -x + 7$
 $x + y = -4$

6. $8x + 4y = -19$
 $3y = -6x - 7$

7. $\frac{9}{2}y - 2x = 9$
 $-4x + 9y = -\frac{5}{18}$

8. In questions 4 - 7 comment upon what you notice.