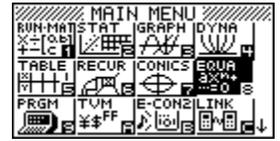


Arithmetic Sequences and Simultaneous Equations.

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Arithmetic sequences have a common difference between consecutive terms.

For example:

$\langle -3, 1, 5, 9, 13, 17, \dots \rangle$ and $\langle 7, 10, 13, 16, 19, 22, \dots \rangle$

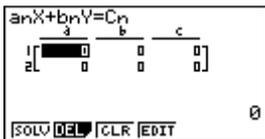
Activity 1

Write down six consecutive terms of an arithmetic sequence. Use these terms to form a pair of simultaneous equations by using them in order to fill the gaps in the equations shown below.

$$\underline{\quad}x + \underline{\quad}y = \underline{\quad}$$

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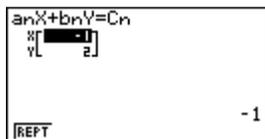
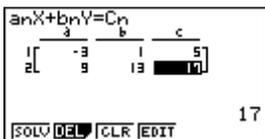
Enter the **EQUA** icon then **[F1]** for 'simultaneous' and select **[F1]** for 2 unknowns.



Using the sequence $\langle -3, 1, 5, 9, 13, 17, \dots \rangle$ you could form the following equations:

$$-3x + 1y = 5$$

$$9x + 13y = 17$$



Solve this pair of equations you have created.

Try another pair of simultaneous equations by using another set of six consecutive terms of an arithmetic sequence.

Press **[F1]** to return to the previous screen to enter the new coefficients of the two equations.

What do you notice?

Why?

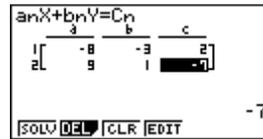
Activity 2

Repeat activity 1, but this time use three consecutive terms from one arithmetic sequence to create one of the equations, and three consecutive terms from a different arithmetic sequence to create the other equation.

For example:

$\langle -8, -3, 2, 7, 12, 17, \dots \rangle$ using $-8, -3$ and 2 .

$\langle 17, 9, 1, -7, -15, -23, \dots \rangle$ using $9, 1$ and -7 .



Try another set of simultaneous equations by using another set of 3 + 3 consecutive terms from the two arithmetic sequences.

What do you notice?

Why?

Activity 3

Repeat activity 1 but this time use 12 consecutive terms from an arithmetic sequence to create a set of three simultaneous equations in 3 unknowns.

For example: Using the arithmetic sequence

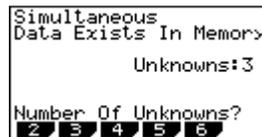
$\langle 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, \dots \rangle$ take the first 12 terms to get the equations:

$$3x + 5y + 7z = 9$$

$$11x + 13y + 15z = 17$$

$$19x + 21y + 23z = 25$$

Enter the **EQUA** icon then **[F1]** for 'simultaneous' and select **[F2]** for 3 unknowns.



Solve the set of three equations and three unknowns that you created from your arithmetic sequence terms.

Try another example from a different set of 12 terms from another arithmetic sequence.

What do you notice?

Why?

Activity 4

Repeat activity 3, but this time use terms from different arithmetic sequences to generate your pair of simultaneous equations.

What did you discover?

Why?

Activity 5

Repeat activity 1, but this time use consecutive terms of the Fibonacci sequence to generate your pair of simultaneous equations.

$\langle 1, 1, 2, 3, 5, 8, 13, 21, \dots \rangle$

What do you notice?

Why?