Student Activity: To investigate the solution of two simultaneous equations with two unknowns

Use in connection with the interactive file, ‘Simultaneous Equations of 2 Unknowns’, on the Student’s CD.

1. a. Complete the following table:

<table>
<thead>
<tr>
<th>x</th>
<th>y=2x+1</th>
<th>y=x+3</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. Draw a graph to represent each of the equations in the above table.
c. Where do the lines representing \( y = 2x + 1 \) and \( y = x + 3 \) meet?

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d. Hence, what are the co-ordinates of the point which satisfies both 

\( y = 2x + 1 \) and \( y = x + 3 \) ?

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e. Hence, solve \( y = 2x + 1 \) and \( y = x + 3 \).

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2. Given \( 2x + y = 6 \), write \( y \) in terms of \( x \).

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3. What is the minimum number of points required to draw a line?

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4. Using the same axes and scale, draw the lines \( x + y = 3 \) and \( 3x + y = 7 \). Where do these lines intersect? Hence, solve this set of equations.

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5. Using the same axes and scale, draw the lines $2x + 3y = 5$ and $1x + 3y = 2.5$. Where do these lines intersect? Hence, solve this set of equations.

6. From looking at the diagram below, is it possible to determine if $x + 2y = 5$ and $0.6x + y = 5$ form a set of simultaneous equations.

7. Given that the lines $g$ and $h$ have each slope of 1, as represented on the diagram below, are there any points that satisfy both the equations $x + y = 5$ and $-2x - 2y = 5$? Explain your answer.
The following equations can be done graphically or algebraically

8. In the school canteen, 1 roll and 2 pieces of fruit cost €4.20 and 3 rolls and 1 piece of fruit cost €9.60. Write two equations in terms of $x$ and $y$ to represent this information. Solve these equations to find the cost of a roll and the cost of a piece of fruit.

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9. John is the owner of a shop. If he hires 4 sales assistants and 1 security guard, his daily payroll is €480, while 2 sales assistants and 1 security guard require a daily payroll of €300. Write two equations in terms of $x$ and $y$ to represent this information. Solve these equations. What are the daily wage of a sales assistant and the daily wage of a security guard?

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10. The sum of two numbers, $a$ and $b$, is 45 and their difference is 3. Write two equations in terms of $a$ and $b$ to represent this information. Solve these equations to find the two numbers.

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11. 5 oranges and 3 apples cost €2.10 and 3 oranges and 1 apple cost €1.10. Write two equations in terms of x and y to represent this information. Solve these equations to find the cost of an orange and the cost of an apple.

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12. There are a number of rabbits and budgies in a cage. Altogether there are 29 heads and 98 legs. Represent this problem as two equations and solve the equations. How many of each type of animal are in the cage?

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13. Write a story that the following set of simultaneous equation could represent:

\[ 2x + y = 11 \]
\[ x - 2y = 3 \]

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Challenge

14. A car park charges €a to enter and €b per hour after that. John pays €14 for 4 hours parking and Sara pays €20 for 6 hours parking. Write two equations in terms of a and b to represent this information. Solve these equations to find the cost to enter the car park and the cost per hour of parking.

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