**Student Activity:** To investigate equations of the form $ax + b = cx + d$

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

1. a. Complete the following table and on the same axes draw the graphs of the following functions $f(x) = 3x + 1$ and $g(x) = 2x + 1$.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x) = 3x + 1$</th>
<th>$g(x) = 2x + 1$</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>
</tbody>
</table>
b. Show on the graph and name the point(s) where \( f(x) = 3x + 1 \) and \( g(x) = 2x + 1 \) intersect. What information does this give us?

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c. How many points of intersection do the graphs of \( f(x) \) and \( g(x) \) have? Could they intersect at other points not visible on your graph? Explain your answer.

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2.

a. Complete the following table and on the same axes draw the graphs of the following functions \( f(x) = 1x + 4 \) and \( g(x) = 2x + 3 \).

<table>
<thead>
<tr>
<th>( x )</th>
<th>( f(x) = 1x + 4 )</th>
<th>( g(x) = 2x + 3 )</th>
</tr>
</thead>
<tbody>
<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>
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<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. Show on the graph and name the point(s) where \( f(x) = 1x + 4 \) and \( g(x) = 2x + 3 \) intersect. What information does this give us? Could they intersect at other points not visible on your graph? Explain your answer.

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3. Graphically find the solution to the equation $f(x) = g(x)$, where $f(x) = 2x + 2$ and $g(x) = x + 3$.

4. Where do the following functions intersect? Give a reason for your answer.

5. List two other functions that will never intersect with the function $f(x) = 4x + 2$.  

6. Will the function \( f(x) = 2x + 1 \) ever intersect with the function \( g(x) = 2x + 8 \)? Explain.

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7. If you know two functions never intersect and the equation of one of the equations is \( f(x) = 5x + 2 \) and the other function cuts the x axis at 3, find its equation.

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8. Will the functions \( f(x) = 2x + 4 \) and the function \( g(x) = -2x + 1 \) ever intersect each other? Explain your answer.

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9. Solve the following either by algebra or graphically and then check using the interactive file:
   a. \( 2x + 5 = 4x + 1 \)
       
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   b. \( 3x + 2 = 5x \)
       
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       ________________________________________________________________
       ________________________________________________________________

   c. \( -4x + 4 = 5x - 5 \)
       
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       ________________________________________________________________
       ________________________________________________________________

   d. \( 3x + 2 = 8 \)
       
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