Instructions and Tips:

- You have 60 minutes to complete this worksheet
- This worksheet consists of 7 questions
- Write answers in the spaces provided
- All working must be clearly shown
- Label Graphs properly

Student Name: _______________________________
Student ID: __________________________________
Date: _ _ / _ _ / _ _ _ _

Total Score:

Highest Score:

Tutor's Comments:

Access more free worksheets at www.868tutors.com
**Question 1**

**Solve the simultaneous equations:**

\[ 2x + 5y = 16 \]
\[ x + 4y = -1 \]

**Rearrange equation (ii)**

\[ x + 4y = -1 \]
\[ x = -1 - 4y \quad (iii) \]

**Substitute equation (iii) into equation (i)**

\[ 2(-1 - 4y) + 5y = 16 \]
\[ -2 - 8y + 5y = 16 \]
\[ -2 - 3y = 16 \]
\[ -3y = 16 + 2 \]
\[ -3y = 18 \]
\[ y = \frac{18}{-3} \]
\[ y = -6 \]

**Substitute y = -6 into equation (iii)**

\[ x = -1 - 4(-6) \]
\[ x = -1 + 24 \]
\[ x = 23 \]

\[ x = 23 \]
\[ y = -6 \]

(4 marks)
**Question 2**

Solve the simultaneous equations:

\[ x + y = 11 \]  
\[ 2x - 5y = -13 \]

\( x + y = 11 \) (i)  
\( 2x - 5y = -13 \) (ii)

Rearrange equation (i)

\[ x + y = 11 \]
\[ y = 11 - x \] (iii)

Substitute equation (iii) into equation (ii)

\[ 2x - 5(11 - x) = -13 \]
\[ 2x - 55 + 5x = -13 \]
\[ 2x + 5x = -13 + 55 \]
\[ 7x = 42 \]
\[ x = \frac{42}{7} = 6 \]

Substitute \( x = 6 \) into equation (iii)

\[ y = 11 - 6 \]
\[ y = 5 \]

\[ x = \underline{6} \]
\[ y = \underline{5} \]  

(4 marks)
**Question 3**

Solve the simultaneous equations:

\[ 2x + y = 12 \]  
\[ x - y = -6 \]  

2. **Rearrange equation (i)**  
   \[ 2x + y = 12 \]  
   \[ y = 12 - 2x (iii) \]  

3. **Substitute equation (iii) into equation (ii)**  
   \[ x - (12 - 2x) = -6 \]  
   \[ x - 12 + 2x = -6 \]  
   \[ x + 2x - 12 = -6 \]  
   \[ 3x - 12 = -6 \]  
   \[ 3x = -6 + 12 \]  
   \[ 3x = 6 \]  
   \[ x = \frac{6}{3} = 2 \]  

4. **Substitute \( x = 2 \) into equation (iii)**  
   \[ y = 12 - 2(2) \] (iii)  
   \[ y = 12 - 4 \]  
   \[ y = 8 \]  

\[ x = \text{2} \quad y = \text{8} \]  

(4 marks)
**Question 4**

**Solve the simultaneous equations:**

\[ 3x^2 + y^2 = 6 \]

\[ 3x - y = -3 \]

1. \[ 3x^2 + y^2 = 6 \] (i)
2. \[ 3x - y = -3 \] (ii)

Rearrange equation (ii)

\[ 3x - y = -3 \]

\[ -y = -3 - 3x \quad \text{(divide throughout by -1)} \]

\[ y = 3 + 3x \] (iii)

Substitute equation (iii) into equation (i)

\[ 3x^2 + (3 + 3x)^2 = 6 \]

\[ 3x^2 + (3 + 3x)(3 + 3x) = 6 \]

\[ 3x^2 + 9 + 9x + 9x + 9x^2 = 6 \]

\[ 12x^2 + 18x + 3 = 0 \]

\[ x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} \]

\[ a = 4 \quad b = 6 \quad c = 1 \]

Applying the quadratic formula

\[ x = \frac{-6 \pm \sqrt{36 - 16}}{2(4)} \]

\[ x = \frac{-6 \pm \sqrt{20}}{8} \]

\[ x = -0.190983005 \quad \text{or} \quad -1.309016994 \]

Substitute x value into equation (iii)

\[ y = 3 + 3(-0.190983005) = -2.427050983 \]

\[ y = 3 + 3(-1.309016994) = -0.927050983 \]

\[ x = -0.19 \text{ or } -1.31 \] (to 2 decimal places)

\[ y = 2.43 \text{ or } -0.93 \] (to 2 decimal places)

(6 marks)
**Question 5**

Solve the simultaneous equations:

\[2x - 3y = -14\]
\[x + 2y = 7\]

**Equations:**

(i) \[2x - 3y = -14\]
(ii) \[x + 2y = 7\]

**Step 1:** Rearrange equation (ii)

\[x = 7 - 2y\] (iii)

**Step 2:** Substitute equation (iii) into equation (i)

\[2(7 - 2y) - 3y = -14\]
\[14 - 4y - 3y = -14\]
\[14 - 7y = -14\]
\[-7y = -14 - 14\]
\[-7y = -28\]

\[y = \frac{-28}{-7}\]
\[y = 4\]

**Step 3:** Substitute \(y = 4\) into equation (iii)

\[x = 7 - 2(4)\]
\[x = 7 - 8\]
\[x = -1\]

\[x = \boxed{-1}\]
\[y = \boxed{4}\]

(4 marks)
**Question 6**

Solve the simultaneous equations:

\[ x + y = 4 \]  
\[ 3x + y = 5 \]

\( x + y = 4 \) (i)  
\( 3x + y = 5 \) (ii)

Rearrange equation (i)

\[ y = 4 - x \] (iii)

Substitute equation (iii) into equation (ii)

\[ 3x + 4 - x = 5 \]
\[ 2x + 4 = 5 \]
\[ 2x = 1 \]
\[ x = \frac{1}{2} \]

Substitute \( x = \frac{1}{2} \) into equation (iii)

\[ y = 4 - \frac{1}{2} \]
\[ y = 3\frac{1}{2} \]

\[ x = \frac{1}{2} \]

\[ y = 3\frac{1}{2} \]  

(4 marks)
**Question 7**

Consider the simultaneous equations:

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

(a) Complete the table below for the equation: \( y = 2x + 2 \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>-4</td>
<td>-2</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

when \( x = -3 \), \( y = 2 (-3) + 2 = -4 \)  
when \( x = -2 \), \( y = 2 (-2) + 2 = -2 \)  
when \( x = -1 \), \( y = 2 (-1) + 2 = 0 \)

when \( x = 0 \), \( y = 2 (0) + 2 = 2 \)  
when \( x = 1 \), \( y = 2 (1) + 2 = 4 \)  
when \( x = 2 \), \( y = 2 (2) + 2 = 6 \)

(b) Complete the table below for the equation: \( y = -2x + 3 \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>9</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>-1</td>
</tr>
</tbody>
</table>

when \( x = -3 \), \( y = -2 (-3) + 3 = 9 \)  
when \( x = -2 \), \( y = -2 (-2) + 3 = 7 \)  
when \( x = -1 \), \( y = -2 (-1) + 3 = 5 \)

when \( x = 0 \), \( y = -2 (0) + 3 = 3 \)  
when \( x = 1 \), \( y = -2 (1) + 3 = 1 \)  
when \( x = 2 \), \( y = -2 (2) + 3 = -1 \)

(c) Draw the graphs of both equations on the same graph paper

(d) Use your graphs to solve the simultaneous equation

\[ x = \frac{1}{4} \]
\[ y = 2 \frac{1}{2} \]  

(10 marks)
The point of intersection of the two graphs is the solution to the simultaneous equations.