Algebra 2 Worksheet
Hodge-Podge Sections 2.3-2.5

I. Determine whether or not each data set could represent a linear function. EXPLAIN your answer.

<table>
<thead>
<tr>
<th>x</th>
<th>1</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>+1</th>
<th>+1</th>
<th>+1</th>
</tr>
</thead>
<tbody>
<tr>
<td>f(x)</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>x</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
</tr>
</thead>
<tbody>
<tr>
<td>f(x)</td>
<td>7</td>
<td>10</td>
<td>15</td>
<td>22</td>
<td>31</td>
</tr>
</tbody>
</table>

Linear if/when constant rate of change, NOT linear if/when rate of change is NOT constant.

II. Graphing.

3. Graph the line with a slope of \(-\frac{2}{3}\) and that passes through the point \((-4,3)\).

\[-\frac{2}{3} \Rightarrow \frac{-2}{3}\]

\[\text{rise} \quad \frac{-2}{3}\]

\[\text{run} \quad -3\]

So, down 2, to the right 3.

4. Graph the line with a slope of 0 and that passes through the point \((4,-2)\).

\[y = \frac{0}{1} \text{mm}\]

So, up 0, to the right 1

5. Find the x and y intercepts of the line \(4x - 3y = 12\). Then graph the line.

\[4x - 3y = 12\]

\[4x = 12\]

\[x = 3\]

\[y = \frac{4(0) - 3y = 12}{-3y = 12}\]

\[y = -4\]

x-intercept: \((3,0)\)
y-intercept: \((0,-4)\)

6. Write the line \(3x - 2y = 4\) in slope-intercept form. Then graph the line.

\[3x - 2y = 4\]

\[y = \frac{3x}{2} - 2\]

Slope-intercept Form: \(y = \frac{3}{2}x - 2\)

III. Parallel/Perpendicular

7. Given a line that passes through the points \((-2,3)\) and \((-4,10)\), find...

(a) the slope of the line \(\frac{10 - 3}{-4 + 2} = \frac{7}{-2}\)

(b) the slope of the line PARALLEL to this line

(c) the slope of the line PERPENDICULAR to this line
IV. Write the equation of each line described in the form requested.

8. passing through \((2, -1)\) with a slope of \(-3\)
   - Slope-intercept form
   \[
   y - y_1 = m(x - x_1) \\
   y - (-1) = -3(x - 2) \\
   y + 1 = -3x + 6 \\
   y = -3x + 5
   \]
   - Equation of the Line: \(y = -3x + 5\)

9. passing through \((3, -2)\) and \((4, 0)\) in standard form
   - Pick a point \((4, 0)\)
   \[
   m = \frac{0 + 2}{4 - 3} = 2 \\
   y - y_1 = m(x - x_1) \\
   y - (-2) = 2(x - 4) \\
   y + 2 = 2x - 8 \\
   -2x + y = -8 \\
   2x - y = 8
   \]
   - Equation of the Line: \(2x - y = 8\)

10. parallel to the line \(y = \frac{2}{3}x + 4\) and passing through the point \((6, -1)\)
   - Same slope \(m_1 = \frac{2}{3}\)
   \[
   \frac{y - y_1}{x - x_1} = \frac{2}{3} \\
   \frac{y - (-1)}{x - 6} = \frac{2}{3} \\
   3(y + 1) = 2(x - 6) \\
   3y + 3 = 2x - 12 \\
   2x - 3y = 15
   \]
   - Equation of the Line: \(2x - 3y = 15\)

11. perpendicular to the line \(x + 2y = -6\) and passing through the point \((-4, 2)\)
   - Opposite reciprocal slopes \(m_1 = \frac{2}{3}\)
   \[
   \frac{y - y_1}{x - x_1} = -\frac{1}{3} \\
   \frac{y - 2}{x + 4} = -\frac{1}{3} \\
   3(y - 2) = -(x + 4) \\
   3y - 6 = -x - 4 \\
   x + 3y = 2
   \]
   - Equation of the Line: \(x + 3y = 2\)

V. Graph each inequality.

12. \(x > -1\)
   - Dashed line
   - Test \((0, 0)\)
   \(0 > -1\)
   - Shade on right

13. \(x \leq 3\)
   - Vertical line!
   - Test \((0, 0)\)
   \(0 \leq 3\)
   - Shade on left

14. \(x \leq -2x + 1\)
   - Solid line
   - Test \((0, 0)\)
   \(0 \leq -2(0) + 1\)
   - Shade on left

VI. Find the \(x\) and \(y\) intercepts and then graph.

15. \(x + 2y \geq -2\)
   - Dashed line
   - Test \((0, 0)\)
   \(0 + 2(0) \geq -2\)
   - Shade above

16. \(2x - 3y \leq 6\)
   - Solid line
   - Test \((0, 0)\)
   \(2(0) - 3(0) \leq 6\)
   - Shade above

\(x\)-intercept: \((-2, 0)\)
\(y\)-intercept: \((0, -2)\)