Graphs of Equations in Two Variables

Section 4.2

In this section we will continue to work with equations in two variables.

Consider the linear equation $y = -\frac{1}{2}x - 3$

- Is this a linear equation? Explain why.

From Section 4.1, we found that a solution to linear equation in two variables are TWO values that make a TRUE statement when we make the appropriate substitutions.

A solution to a linear equation in TWO VARIABLES is in _______________ form.

**Task 1**

a) For the equation $y = -\frac{1}{2}x - 3$ Determine if the following ordered pairs are solutions. Please show your work.

- $(0, -3)$
- $(-2, -2)$
- $(2,)$

b) Do you think these are the only solutions? Explain why

c) Find other solutions by completing the table below.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y = -\frac{1}{2}x - 3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td></td>
</tr>
<tr>
<td>-2</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
DEFINITION!!!
A graph is

d) Graph the linear equation \( y = -\frac{1}{2}x - 3 \) using the solutions you found on previous page.
Please LABEL... LABEL... LABEL

Task 2
a) Complete the table below for the equation \( x + 2y = 4 \)

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

b) Graph the equation using the points you found above. LABEL, LABEL, LABEL
Task 3
Graph the equation \( y = 2x \) using 5 points. Please be neat and show your work.

Task 4
Graph the equation \( y = x^2 - 1 \) using 5 points. Please be neat and show your work.
Task 5
Graph the equation \( y = (x - 1)^2 \) using 5 points. Please be neat and show your work.

Task 6
Graph the equation \( y = -x^2 - 1 \) using 5 points. Please be neat and show your work.
Task 7

a) Where does the graph cross the $x$ axis? What is the ordered pair?____________

b) Where does the graph cross the $y$ axis? What is the ordered pair?____________

c) Where does the graph cross the $x$ axis? What is the ordered pair?____________

d) Where does the graph cross the $y$ axis? What is the ordered pair?____________

e) Where does the graph cross the $x$ axis? What is the ordered pair?____________

f) Where does the graph cross the $y$ axis? What is the ordered pair?____________

DEFINITION
The $x$ intercept is the point where your graph crosses the $x$ axis
The $y$ intercept is the point where your graph crosses the $y$ axis
What do you notice about the $x$ intercepts? What do they all have in common?

What do you notice about the $y$ intercepts? What do they all have in common?

To find $x$ intercepts for any equation, I will
To find $y$ intercepts for any equation, I will

**Task 8**

With out graphing, find the $x$ and $y$ intercepts for the equation $2x - 5y + 50 = 0$

**Task 9**

A hot-air balloon at 1120 feet descends at a rate of 80 feet per minute. Let $y$ represent the height of the balloon and let $x$ represent the number of minutes the balloon descends.
Write an equation that relates the height of the hot-air balloon and the number of minutes it descends.

- What is the $y$ intercept of the graph, and what does it represent in the context of the problem?