**Transformations with Fred – Packet 3**

.

The graph of **Dipper, D(x),** is shown.

List the characteristic points of Dipper.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is different about Dipper from the functions we have

used so far?

Since Dipper is our original function, we will refer to him as

the **parent function**. Using our knowledge of transformational

functions, let’s practice finding children of this parent.

**Note:** In transformational graphing where there are multiple steps, it is important to perform the translations last.

1. **Example:** Let’s explore the steps to graph **Dipper Jr, 2D(x + 3) +** **5**, without using tables.
2. The transformations represented in this new function are listed below in the order they will be performed. (See note above.)
* Vertical stretch by 2 (Each point moves twice as far from the x-axis.)
* Translate left 3.
* Translate up 5.
1. On the graph, put your pencil on the left-most characteristic point, (– 5, –1) .
* Vertical stretch by 2 takes it to (– 5, –2). (Note that the originally, the point was 1 unit away from the x-axis. Now, the new point is 2 units away from the x-axis.)
* Starting with your pencil at (– 5, –2), translate this point 3 units to the left. Your pencil should now be on (– 8, –2).
* Starting with your pencil at (– 8, –2), translate this point up 5 units. Your pencil should now be on (– 8, 3).
* Plot the point (– 8, 3). It is recommended that you do this using a different colored pencil.
1. Follow the process used in Step 2 above to perform all the transformations on the other 3 characteristic points.
2. After completing Step 3, you will have all four characteristic points for Dipper Jr. Use these to complete the graph of Dipper Jr. Be sure you use a curve in the appropriate place. Dipper is not made of segments only.
3. Dipper has another child named **Little Dip, – D(x) – 4**

.

Using the process in the previous example as a guide,

graph Little Dip (without using tables).

1. List the transformations needed to graph Little Dip.

 (Remember, to be careful with order.)

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Apply the transformations listed above to each of the four characteristic points.

3. Complete the graph of Little Dip using your new characteristic points from #2.

1. Dipper has another child named **Dipsy, 3 D(– x)**

.

Using the process in the previous example as a guide,

graph Dipsy (without using tables).

1. List the transformations needed to graph Dipsy.

 (Remember, to be careful with order.)

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Apply the transformations listed above to each of the four characteristic points.

3. Complete the graph of Dipsy using your new characteristic points from #2.

1. Now that we have practiced transformational graphing with Dipper and his children, you and your partner should use the process learned from the previous three problems to complete the following.
2. Given Cardio, C(x), graph: **y =** **3C(x) + 5**
3. Given Garfield, G(x), graph: **y =** **– G(x – 3) – 6**

1. Given Horizon, H(x), graph **y = – 3H(x)**
2. Given Batman, B(x), graph: **y = B(–x) + 8**
3. Given Mickey, M(x), graph:  **y =** $-\frac{1}{3}$ **M(x)**
4. **Finally, let’s examine a reflection of Harry in the line y = x.**
5. Graph this line (y = x) on the grid.
6. Using Harry’s characteristic points and the MIRA,

graph Harry’s reflection.

1. Complete the charts below with the characteristic points:

 **Harry, y = H(x) Harry’s reflection in y = x:**

|  |  |
| --- | --- |
| **x** | **y** |
|  |  |
|   |  |
|  |  |
|  |  |

|  |  |
| --- | --- |
| **x** | **y** |
|  |  |
|  |  |
|  |  |
|  |  |

1. Compare the points in the two charts. Describe what happens when we reflect in the line y = x.

(This should match what we learned in our earlier study of reflections in the line y = x.)

1. A reflection in the line y = x, shows a graph’s **inverse**. We will study this in more depth in a future unit. Look at the graph of Harry’s inverse. Is the inverse a function? Explain how you know.