Mathematician \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**That’s the Way the Ball Bounces Record Sheet**

**DATA TABLES**

|  |
| --- |
| Vertex |
| x-coordinate (h) | y-coordinate (k) |
|  |  |

|  |
| --- |
| Vertex Formula |
| $$f1\left(x\right)≔a\left(x-h\right)^{2}+k$$ |  |

|  |  |  |
| --- | --- | --- |
|  | Values calculated from expanded vertex form | Values calculated from regression |
| $$a$$ |  |  |
| $$b$$ |  |  |
| $$c$$ |  |  |

**ANALYSIS QUESTIONS**

1. In this activity, the ball bounced straight up and down beneath the detector, yet the plot you see might seem to depict a ball that is moving sideways as it bounces up and down. Explain why the graph looks the way it does.

1. Show work from Analysis Step #3, expand the vertex form of the equation to standard form.
2. Are the values of $a$, $b$, & $c$ in the quadratic regression equation consistent with the values you determined in Analysis Step #3?
3. Describe how the parameter affects the graph of $y=a\left(x-h\right)^{2}+k$. Specifically, how the magnitude (size) of $a$ and the sign of $a$ change the graph?
4. Suppose you had chosen the parabolic section for the bounce just to the right of the one you actually used in this activity. Describe how the parameters $h$ and $k$ would change, if at all, if the different parabolic section were to be fit with the equation $y=a\left(x-h\right)^{2}+k$.

**EXTENSION**

1. Compare your value of $a$ to another student. Explain why the values of $a $are in close agreement for both bounces. What does $a$ measure?