

### 3.2.6 Analyzing the third shadow

#### Reflect and Apply

The following data represents the data collected for the third shadow. Plug the given information in your graphing calculator to obtain an equation.

- Enter the data using the stat capabilities in your calculator.
- Find the vertex of the function and use it to write your equation.
- You will have to find the  $a$  value in order to complete your equation.

Remember, the calculator will only give you a quadratic regression in *general form*, which does not indicate the location of the vertex!

Time	Length
0	79.4
1	63.4
2	50.5
3	43.7
4	37.5
5	35.8
6	37.3
7	38.7
8	44.4

1. What is the coordinate of the vertex for the third shadow? \_\_\_\_\_

2. Why is the vertex different from the previous two vertices? Explain in detail. \_\_\_\_\_

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3. Find the  $a$  value of the equation. (Hint: Use the same approach to find  $a$  as you did in Over Da Watta!) Show your work or justify your answer.

4. Explain why the “ $a$ ” values of all three equations are very similar.

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5. Use the **equation** to find the point(s) in time when the shadow is **40 pixels** long using the data for the third shadow.

6. Using the equation in question 5 to find the length of shadow at **2 ½ seconds**.  
Show your work.

7. Compare the second and third graphs, how is the third graph different from the second graph? *Be specific.*

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8. What contributed to the change of the two graphs?

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9. What would happen to the graph if the light source were moved further down to the side closer and closer becoming horizontal?

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10. What would happen if the light were directed horizontally at the object?

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11. Are there any roots to any of the 3 equations? Explain your answer and give a possible explanation as to why it is so.

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12. What is contributing to the change in the location of the vertex? Justify your answer.

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