**Quadratic Models**

**Graphing calculator work**

1. The formula d = ½at² gives the distance travelled by a car as it accelerates from a stopped position; d metres is the distance travelled, a metres per second squared is the acceleration, and t seconds is the time elapsed.
2. Investigate the relationship between d and a when t = 2 s.
3. Investigate the relation ship between d and t when a = 2 m/s²
4. What types of relationships were obtained in parts a and b? Why does it make sense that these relationships were obtained?
5. A fountain of sparks from a Canada Day rocket follows an arc in the air. This table shows the height of the sparks at various horizontal distances from the launching point.

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| --- | --- | --- | --- | --- | --- | --- |
| Distance (m) | 5 | 10 | 15 | 20 | 25 | 30 |
| Height (m) | 43 | 75 | 97 | 108 | 109 | 100 |

1. Determine the equation of the parabola of best fit.
2. Determine the maximum of the regression curve. What does it represent? (\*Hint – to find the maximum use the instructions on the bottom of page 302 in your textbook).
3. The volume V of a pyramid with height h and square base of side length s is given by the formula: v = 1/3s²h
4. Which variable would you set constant to generate a linear relationship?
5. Which variable should you set constant to generate a quadratic relationship?
6. How can you check that your answers in parts a and b are correct? Explain.
7. The management of a hockey arena plans to increase ticket prices to obtain more revenue. A survey was conducted to estimate the revenue generated for different ticket prices. These data were obtained.

|  |  |
| --- | --- |
| Ticket Price ($) | Projected Revenue($) |
| 10 | 16 000 |
| 15 | 19 500 |
| 20 | 20 300 |
| 25 | 14 750 |

1. Why might a quadratic model be a good fit for the data?
2. Perform a quadratic regression on the data.
3. Determine the maximum value of the regression equation.
4. Predict the revenue that would be obtained if the tickets cost $30.

**Homework: p. 303 #1,2,3,4,5,7**