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| Name: | | \_\_\_\_**SOLUTIONS**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | Date:*\_\_\_\_\_\_\_\_\_\_* | |
| pact jpg1 | | **Subject: METHODS MAT**  **Investigation 3, 2015**  **Topic – Applications of Differentiation**  **Take home component** | | | |  | |
| **Important Information:**  *Although the take-home component is not worth any marks, it is essential in preparation for the in-class component. Knowledge and skills gained will be extended in the in-class validation component. This in-class validation will be completed under test conditions on the day in which this take-home component is due. The take-home component may be used when completing the in-class component. Contact may be made to parent(s) if the take-home component is not available for submission (at the start of the lesson).* | | | | | | | |
| **Date out:** | | | *Week \_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_* | **Date Due:** | *Week \_\_\_\_ Date \_\_\_\_\_\_\_\_\_* | | |
| **Take home component weighting:** | | | *0% of the year* | **In-class component weighting:** | *5% of the year.* | | |
| **AIM:** The concepts and skills covered in this investigation consists of activities which allow students to calculate derivatives of polynomials and to solve optimisation problems arising in a variety of contexts involving polynomials on finite interval domains | | | | | | | |
| **Problem 1**  A: Square  Length = 2 m, Area = 4 m2  B: Equilateral triangle  Length =  m, Area =  C: Regular hexagon  Length of side = *a* =  m    D: Circle  Radius =  Area =  In order of increasing magnitude the shapes are triangle, quadrilateral, hexagon, circle. The greater the number of sides the greater the area (assuming the circle has infinite number of sides)  A pentagon with a perimeter of 8 m would have an area between 4 and 4.619 m2 | | | | | |

**Problem 2**

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| Solution  A: Rectangular prism  (a)  (b)  (c)  metres  (d)  metres  (e)  m3    B: Triangular prism  (b)  (c)  (d)  metres  (e)  metres  (f)  m3  C: Cylindrical garden bed  (a)  (b)  (c)  (d) Maximum volume = |

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| |  |  |  |  | | --- | --- | --- | --- | | Shape | Restriction | Dimensions for maximum volume (m) | Maximum volume  (m3) | | Rectangular prism |  |  | 2.31 | | Triangular prism |  |  | 2.31 | | Cylinder |  |  | 14.544 |   Comment   * There is no clear indication from these results that a particular shape will produce the maximum volume as two shapes have the same volume. There is not a consistent restriction (variables not controlled) for a conclusion to be valid. * Another method to locate a maximum value for volume is to plot the volume function (when reduced to one variable) and find the local maximum on the graph. Calculus offers a more accurate and quicker way to locate the maximum value. |