**Mathematics Methods Unit 4 2019**

**Investigation 3: Pressure and Balloons**

**Validation Exercise**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**



**Marks:\_\_\_\_ / 40 Time allowed 55 minutes.**

**Mobile phones must be switched off and stored in bags. The mark for this section will constitute 100% of the total investigation mark. Notes will not be allowed in this section, however calculators will be allowed.**

**Answer the questions in the spaces provided.**

In a deep-sea diving experiment, a balloon is inflated while submerged at 30 metres depth below the surface of the water. The Volume of the balloon (in cm3) was found to increase as the depth (in metres) got less. The table below gives information on how the volume of a balloon changes at various depths.

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| ***d (m)*** | 25 | 15 | 8 | 50 | 20 | 30 |
| ***V (cm3)*** | 5 213.2 | 10 498.1 | 17 136.3 | 905.9 | 7 397.9 | 3 673.7 |

**1. [ 5 marks]**

On the graph grid below, choosing the scale of your axes carefully, plot the points above.

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**2. [ 9,2 = 11 marks]**

**a)** Verify the nature & exact relationship between depth and the volume of the balloon. You should show and compare the results you have found to verify that you have found the best option.

**b)** Were the other options considered like or very different from the preferred option? Why should this be?

**3. [ 8,7,5,1,2,1 = 24 marks]**

A perfect match or correlationship between two variables can be verified by a straight line graph. Show how this can be made to be the case.

**a)** Complete the table below and **b)** redraw your graph accordingly.

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**c)** Use your graph to verify the original function (to two decimal places) of the relationship between the depth and the volume of the underwater balloon.

**d)** Comment on any possible reason you may not have the same exact answer as in Question 2.

**e)** Comment on the Volume of the balloon at the surface. Why might this not be theoretically possible?

**f)** When would the volume of the balloon be zero?

**4. [ 2 marks]**

How might this information be important for any diver?

**END OF PAPER**