**Proportional Reasoning Project – Designing and 3D Printing a Scale Model**

Overview: Design and create a 3D model of something really cool. You have to do the math beforehand so that you can justify creating it and know that it will be awesome.

Process: (Please SHOW ALL YOUR WORK OR YOU WON’T GET ANY MARKS). Do this on a separate, but clearly labeled piece(s) of paper.

1. Choose an object (we’ll call this the original object) of which you would like a scale model (we’ll call this the scale object). It should be a practical object.
2. Calculate the necessary measurements of the original object.
3. Choose an appropriate scale factor and calculate the measurements for your scale object. It must fit on a platform that is 5 cm x 5 cm. It cannot exceed a height of 5 cm either.
4. Make a labeled sketch for your model.
5. Calculate the area of either the original object or the scale object (whichever is easier for you).
6. Use your scale factor to calculate the other area.
7. What is the volume of your original object? What unit best expresses the volume for your original object?
8. Using your scale factor, calculate the volume of your scale object. What unit best expresses the volume for your scale object?
9. How much filament do you need to create your object? The filament is 1.75mm wide and shaped like a cylinder. Provide your answer in linear centimetres. (Hint: you’ll have to use the volume of a cylinder to help you with this).
10. How much will your object weigh, if 400 meters of filament weighs 1 kg.
11. A roll of filament costs $35.99. How much will it cost to create your object?
12. Using a 3D-printing app, you are now going to create your design for printing. Once you get it OK’ed by me, you can submit it to Ms. Wilton and the MakerSpace to create it. This will happen after the February break and only if you have all of your calculations correct.
13. Fill out a group member self-assessment sheet. You will only receive marks if this sheet is completed.

Assessment: You will be assessed on the 5-point rubric below on each of the following outcomes/indicators.

FM 20.3 a, e, I, j, k, l, m, n, o, q

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 |
| No understanding evident. | Incorrect mathematical processes used. | Some understanding of concept. Some correct mathematical processes used. | Correct mathematical processes used. Minor error causes incorrect answer. | Correct mathematical processes used. Correct answer. |

**Group Member Self-Assessment**

Who thou art: Date:

1. What were three specific things you contributed to the success of your project?
2. What were two specific things you could have done differently to make your project more successful?
3. What is one thing you will work on for the future?
4. How did your group divide the work?
5. Did everyone equally contribute? If no, explain.
6. Did your group finish on time? If no, explain.