** Mathematics Assignment 10**

**Building Structures**

**Date:** Due

**Overview:**

Many structures consist of interconnected geometric shapes. The mathematical relationships between these shapes allow builders and engineers to construct scale models of structures in order to test structural strength and estimate costs. In this project, you will use your knowledge of angles and triangles to analyze, draw, model, and make estimates about actual structures.

**Preparation Work and Tasks:**

1. Choose a picture of a building structure or design your own. Sketch part of one flat surface of the structure. Mark the line segments that look parallel or perpendicular.
2. Use the same mark to show angles that look congruent, and line segments that look congruent. Are there some angles that you know are congruent?
3. Assume that the lines that appear to be parallel are parallel. Mark the transversals. Are there other angles that you can now assume are congruent?
4. Draw a diagram of the triangles in one flat surface in the picture. Try to draw the triangles as accurately as possible so that your diagram looks similar to the picture. What measurements did you need to make?
5. What types of triangles are contained in the structure? Find and label examples of each.
6. What triangles are probably similar? How do you know?
7. What symmetry is found in the structure?
8. Can any of the quadrilaterals in the structure be created by the reflection or rotation of triangles?
9. Assign a reasonable height and width of the structure. Explain how you arrived at your estimates.
10. Make a scale model of the 3-D structure.
11. Estimate the total amount of materials required to make an actual reproduction of your model.
12. How does the Pythagorean theorem help you determine lengths in the model?

(Hint: You may need to construct imaginary lines to make your estimates.)

**Evaluation:**

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| **Category** | **Level 4** | **Level 3** | **Level 2** | **Level 1** | **%** |
| Depth of Understanding | Demonstrates thorough understanding of concepts. | Demonstrates considerable understanding of concepts. |  |  | 20 |
| Problem Solving / Thinking | Use of procedure includes almost no errors or omissions. | Use of procedures is mostly correct, but there may be a few minor errors and / or omissions. |  |  | 20 |
| Application of Learning | Demonstrates sophisticated ability to make connections between mathematics learning and the real world. | Demonstrates considerable ability to make connections between mathematics learning and the real world. |  |  | 20 |
| Explanation and Justification of Concepts, Procedures, and Problem Solving | Provides thorough, clear and insightful explanations / justifications, using a range of words, pictures, symbols, and / or numbers. | Provides complete, clear and logical explanations / justifications, using appropriate words, pictures, symbols, and / or numbers. |  |  | 20 |
| Use of Mathematical Vocabulary | Uses a broad range of mathematical vocabulary to communicate clearly and precisely. | Uses mathematical vocabulary with considerable clarity and precision. |  |  | 20 |