**Subject area/course**: Mathematics/Pre-Calculus

**Grade level/band**: 10-12

**Task source**: Summit Public Schools

**Cube It - Patterns, Polynomials, and Modeling**

**STUDENT INSTRUCTIONS**

1. **Task context**:

Patterns, scale, and proportion are all major crosscutting concepts of how our world functions, from the maximum size of a cell, to the design limitations of a building, to the rate of flow within a system of liquid. Understanding these concepts allows humans to maximize efficiency in buildings, energy use, transportation, or any other situation where size is an important part of the design choice.

1. **Final product**:

You will design and analyze an object of your choice by decomposing it into regular shapes. You will specifically analyze how changing the object's dimensions affects the properties of that object. You will choose specific functions that govern the growth of the object’s components in each direction. At the end of the project, you will produce a poster to display your model and an explanation of your object’s growth.

Your **poster** will display your model and the justification of the object’s growth. It must include the following:

* Title and objective
* At least 4 drawings: One for each of the different stages of growth with all important parts labeled
* Tables: Tables to organize the data for both dimensions and properties
* Written descriptions: Written explanations to describe the growth of your object
* Analysis of the object’s properties: Review of discoveries made during reflection

See *Cube It: Student Directions* (Item A) for detailed instructions.

**Additional Information**

1. **Knowledge and skills you will need to demonstrate on this task:**

* Ability to identify and write equations describing patterns
* Ability to model a real-world object geometrically
* Ability to model properties of a real-world object algebraically

1. **Materials needed:**

* Item A. Cube It: Student Directions
* Item B. Intro: Design Worksheet
* Item C. Intro: Painted Shape Worksheet
* Item D. Phase 1 Design Worksheet
* Item E. Phase 2 Analyze Worksheet
* Item F. Phase 3 Reflection Worksheet

1. **Time requirements:**

This task will take approximately 2 weeks to complete. Your teacher will provide additional details regarding deadlines and due dates.

1. **Scoring:**

Your work will be scored using the Summit Public Schools Cube It rubric. You should make sure you are familiar with the language that describes the expectations for proficient performance.