

## **Can you create a new model for place value to show the power of 10?**

### **Background:**

Many high achieving students are very interested in large numbers and having a strong foundation in place value is key to being able to estimate sensibly and calculate mentally. Creating a model for place value provides the opportunity to demonstrate an understanding of the multiplicative “power of ten” and the impact of exponential increase/decrease in numbers.

Place value blocks are a powerful model but they are not the only one and engaging students in investigating alternatives requires creative and critical thinking about the strengths and weaknesses of models.

### **Curriculum Links**

Based on where the student is working within the curriculum, the task can be adapted to work with large whole numbers (Level 3) or decimal places (Level 4) or both.

The place value work is directly applicable to measurement and working with the metric system units.

### **Suggestions**

Students should explore existing models of place value first and analyse the strengths and weakness of each, focusing on how well they demonstrate the impact of multiplying (or dividing) by 10. This analysis can be recorded in a table or PMI chart.

Brainstorming ideas for several different models will then provide the opportunity to evaluate their own models and make a choice based on criteria.

Encourage students to think about and calculate the dimensions of their model for very large or very small numbers.

A further extension is to explore other place value systems. We use a base 10 (decimal) system, presumably because we have 10 fingers. Base 2 (binary) and base 16 (hexadecimal) are used in computing – why is this? What if we used base 5, because we have 5 fingers on each hand? What if we used base 12 because 12 has more factors? Consider how using a different base would impact on the models and the use of exponents.