# Problem of the Week
Problem A and Solution
School Clean Up

Problem

Every year the students at Spotless Elementary do an outdoor cleanup. First, the school yard is divided into three sections: A, B, and C.

A map of the school yard is shown, with all given lengths in metres. Note that the school yard is a square, the school is a rectangular U-shape, and the diagram is not drawn to scale.
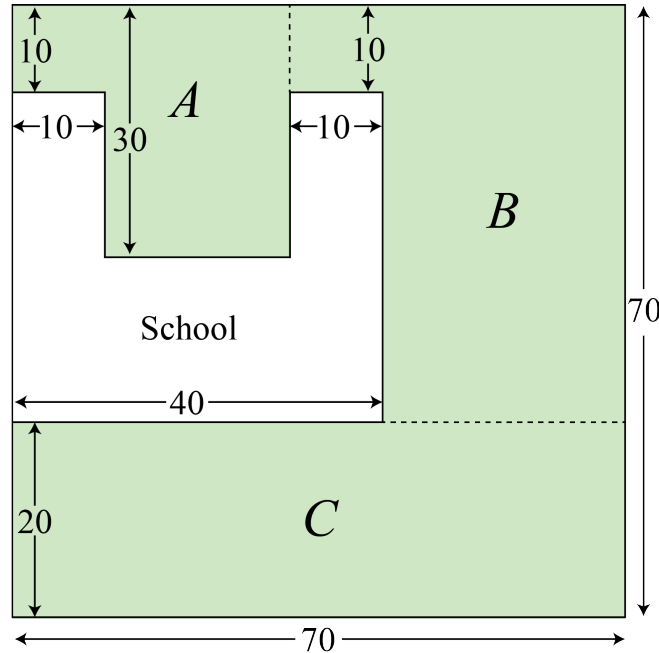
The Grade 1 & 2 students are assigned the section with the smallest area, the Grade 5 & 6 students are assigned the section with the largest area, and the Grade 3 & 4 students are assigned the remaining section. Determine which section is assigned to each grade. Justify your answer.

Solution
Solution 1

One way to solve this problem is to calculate the area of each section. Since Section C is a rectangle with length 70 m and width 20 m, its area is $70 \times 20 = 1400$ m^2.

We are missing some dimensions needed to calculate the areas of the other two sections. However, we can determine these missing dimensions from the information in the diagram.

Since the bottom side of the school is 40 m and the widths of the ends of the U-shape are each 10 m, then the length in between the ends of the U-shape is $40 - 10 - 10 = 20$ m.

Since the bottom side of the yard is 70 m and the bottom side of the school is 40 m, then the distance from the right side of the school to the right side of the yard must be $70 - 40 = 30$ m.

Since the right side of the yard is 70 m and the right side of Section C is 20 m, then the right side of Section B is $70 - 20 = 50$ m. The following diagram shows all the dimensions.
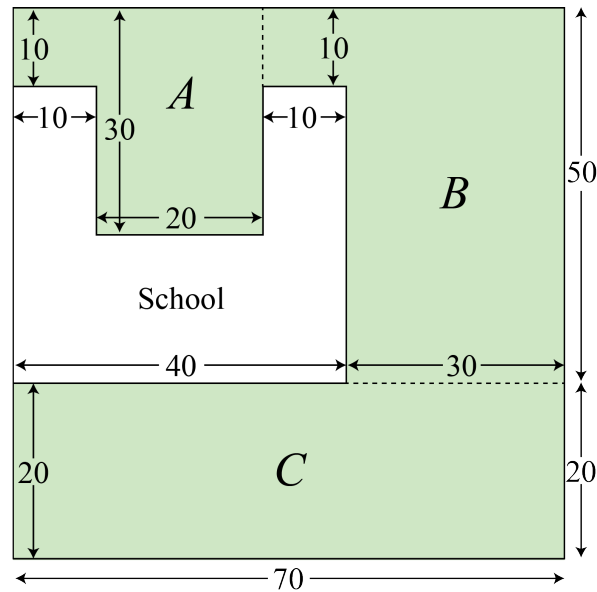
Section A is formed by a square with side length 10 m, and a rectangle with length 30 m and width 20 m. The area of the square is $10 \times 10 = 100$ m^2, and the area of the rectangle is $30 \times 20 = 600$ m^2. The total area of Section A is then $100 + 600 = 700$ m^2.

Similarly, Section B is formed by a square with side length 10 m, and a rectangle with length 50 m and width 30 m. The area of the square is $10 \times 10 = 100$ m^2, and the area of the rectangle is $50 \times 30 = 1500$ m^2. The total area of Section B is then $100 + 1500 = 1600$ m^2.

Thus, the area of Section A is 700 m^2, the area of Section B is 1600 m^2, and the area of Section C is 1400 m^2. Therefore Grades 1 & 2 are assigned to Section A, Grades 5 & 6 are assigned to Section B, and Grades 3 & 4 are assigned to Section C.

Solution 2

Another way to solve this problem is to build each section using 10 m $\times$ 10 m squares, as shown.

Section A Section B Section C
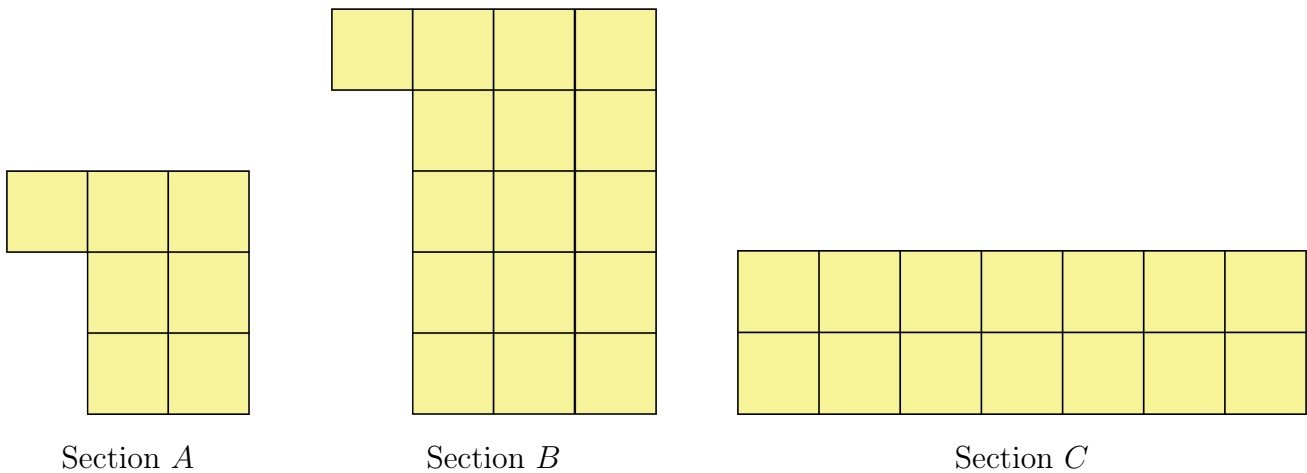
Using this approach, we can count the number of 10×10 squares that form each section. Section A is formed with 7 squares, Section B is formed with 16 squares, and Section C is formed with 14 squares. Therefore, Grades 1 & 2 are assigned to Section A, Grades 5 & 6 are assigned to Section B, and Grades 3 & 4 are assigned to Section C.