



# Problem of the Week

## Grade 7 and 8

### Irregular Area Solution

### Problem

The dots on the diagram are one unit apart, horizontally and vertically. Determine the area of the figure.

### Solution

On the diagram, draw two horizontal lines and two vertical lines to form a rectangle such that the vertices of the irregular area are on the sides of the rectangle. Label the four vertices of the rectangle and the four vertices of the irregular area as shown on the diagram.

To find the area of the irregular shape, determine the area of the rectangle and subtract the area of the four triangles that are not part of the area of the irregular shape.

Since the dots are one unit apart horizontally and vertically we can determine the various lengths:

$$\begin{array}{ll}
 AB = 5, BC = 4, AC = 9 & CD = 4, DE = 3, CE = 7 \\
 EF = 7, FG = 2, EG = 9 & GH = 2, HA = 5, GA = 7
 \end{array}$$

To find the area of the rectangle, multiply the length  $AC$  by the width  $CE$  obtaining  $9 \times 7 = 63 \text{ units}^2$ .

Each of the corners of the rectangles has a right angle. So each of the four triangles is right angled and we can use the lengths of the two sides that meet at the right angle in the calculation of the area of the triangle. Using  $\text{Area} = \text{base} \times \text{height} \div 2$ , we calculate the areas:

$$\begin{array}{l}
 \text{Area } \triangle ABH = \frac{AB \times HA}{2} = \frac{5 \times 5}{2} = \frac{25}{2} = 12.5 \text{ units}^2 \\
 \text{Area } \triangle BCD = \frac{BC \times CD}{2} = \frac{4 \times 4}{2} = \frac{16}{2} = 8 \text{ units}^2 \\
 \text{Area } \triangle DEF = \frac{DE \times EF}{2} = \frac{3 \times 7}{2} = \frac{21}{2} = 10.5 \text{ units}^2 \\
 \text{Area } \triangle FGH = \frac{FG \times GH}{2} = \frac{2 \times 2}{2} = \frac{4}{2} = 2 \text{ units}^2
 \end{array}$$

Therefore the area of the irregular shape is  $63 - 12.5 - 8 - 10.5 - 2 = 63 - 33 = 30 \text{ units}^2$ .

