

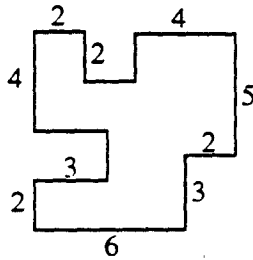
# AREAS BY DISSECTION

#19

**DISSECTION PRINCIPLE:** Every polygon can be dissected (or broken up) into triangles which have no interior points in common. This principle is an example of the problem solving strategy of **subproblems**. Finding simpler problems that you know how to solve will help you solve the larger problem.

## Example

Find the area of the figure below.



First fill in the missing lengths. The right vertical side of the figure is a total of 8 units tall. Since the left side is also 8 units tall,  $8 - 4 - 2 = 2$  units. The missing vertical length on the top middle cutout is also 2.

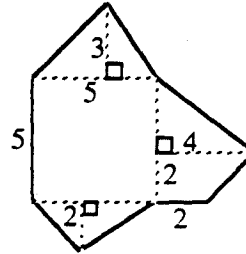
Horizontally, the bottom length is 8 units ( $6 + 2$ ). Therefore, the top is 2 units ( $8 - 4 - 2$ ). The horizontal length at the left middle is 3 units.

Enclose the entire figure in an 8 by 8 square and then remove the area of the three rectangles that are not part of the figure. The area is:

Enclosing square:	$8 \cdot 8 = 64$
Top cut out:	$2 \cdot 2 = 4$
Left cut out:	$3 \cdot 2 = 6$
Lower right cut out:	$2 \cdot 3 = 6$
Area of figure:	$64 - 4 - 6 - 6 = 48$

## Example

Find the area of the figure below.



This figure consists of five familiar figures: a central square, 5 units by 5 units; three triangles, one on top with  $b = 5$  and  $h = 3$ , one on the right with  $b = 4$  and  $h = 3$ , and one on the bottom with  $b = 5$  and  $h = 2$ ; and a trapezoid with an upper base of 4, a lower base of 2 and a height of 2.

The area is:		
square	$5 \cdot 5$	$= 25$
top triangle	$\frac{1}{2} \cdot 5 \cdot 3$	$= 7.5$
bottom triangle	$\frac{1}{2} \cdot 5 \cdot 2$	$= 5$
right triangle	$\frac{1}{2} \cdot 3 \cdot 4$	$= 6$
trapezoid	$\frac{(4+2) \cdot 2}{2}$	$= 6$
total area		$= 49.5 \text{ u}^2$

Find the area of each of the following figures. Assume that anything that looks like a right angle is a right angle.

