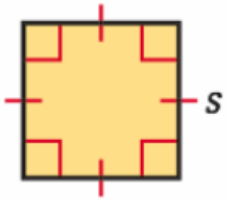
11.1 Areas of Triangles and Parallelograms

POSTULATES

For Your Notebook

POSTULATE 24 Area of a Square Postulate

The area of a square is the square of the length of its side.



$A = s^2$

POSTULATE 25 Area Congruence Postulate

If two polygons are congruent, then they have the same area.

POSTULATE 26 Area Addition Postulate

The area of a region is the sum of the areas of its nonoverlapping parts.

THEOREM

For Your Notebook

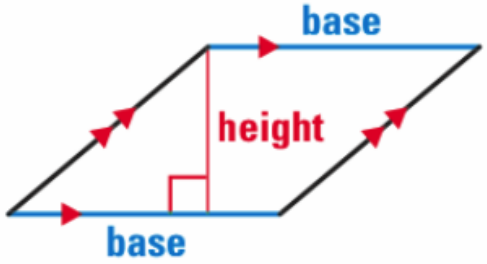
THEOREM 11.1 Area of a Rectangle

The area of a rectangle is the product of its base and height.

Justification: Ex. 46, p. 726

$A = bh$

PARALLELOGRAMS Either pair of parallel sides can be used as the **bases** of a parallelogram. The **height** is the perpendicular distance between these bases.



If you transform a rectangle to form other parallelograms with the same base and height, the area stays the same.

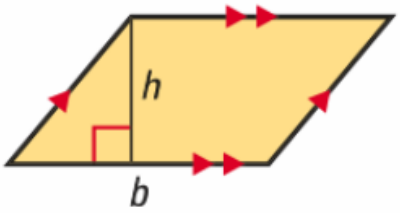
THEOREMS

For Your Notebook

THEOREM 11.2 Area of a Parallelogram

The area of a parallelogram is the product of a base and its corresponding height.

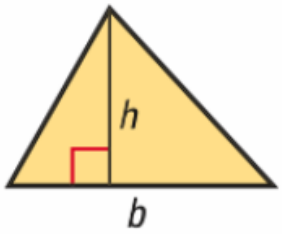
Justification: Ex. 42, p. 725



$A = bh$

THEOREM 11.3 Area of a Triangle

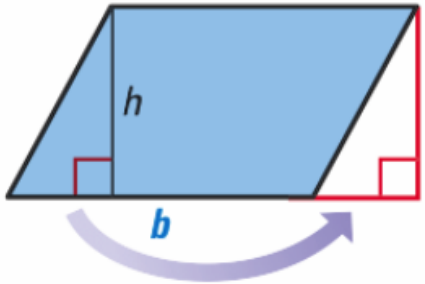
The area of a triangle is one half the product of a base and its corresponding height.



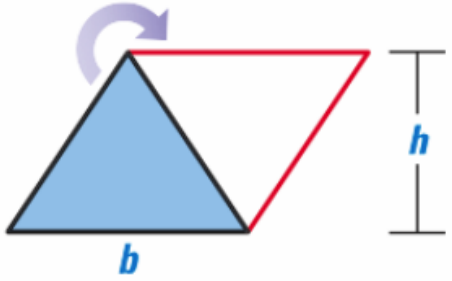
$$A = \frac{1}{2}bh$$

Justification: Ex. 43, p. 726

RELATING AREA FORMULAS As illustrated below, the area formula for a parallelogram is related to the formula for a rectangle, and the area formula for a triangle is related to the formula for a parallelogram. You will write a justification of these relationships in Exercises 42 and 43 on pages 725–726.



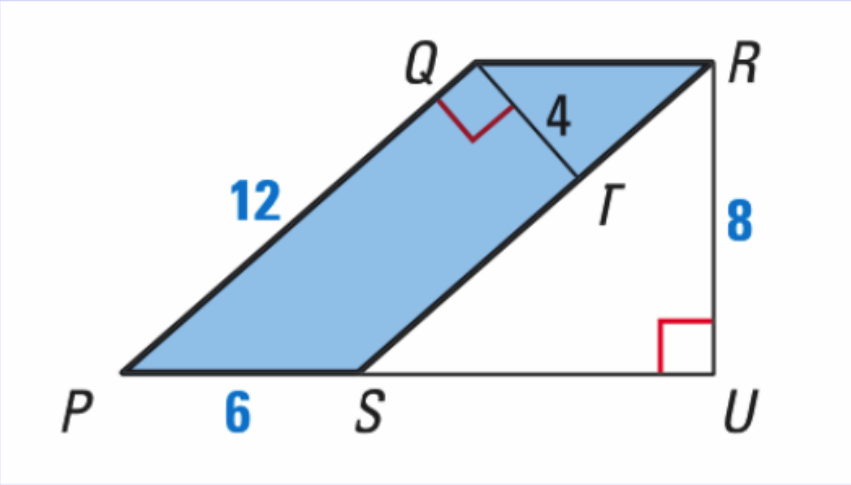
Area of ▱ = Area of Rectangle



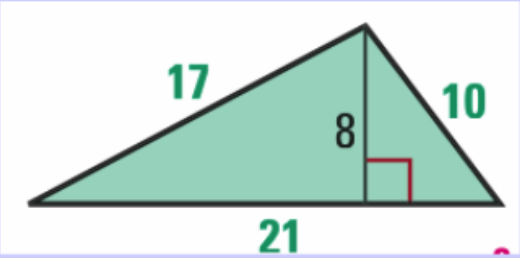
Area of △ = $\frac{1}{2}$ • Area of ▱

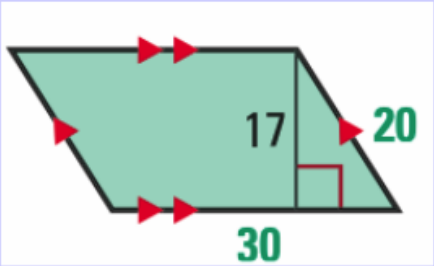
EXAMPLE 1 Use a formula to find area

Find the area of ▱*PQRS*.

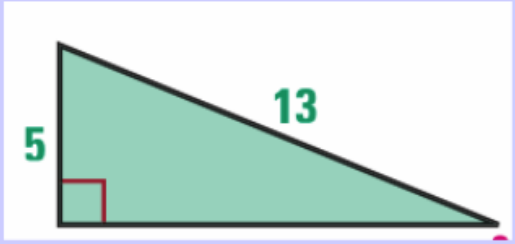


Find the perimeter and area of the polygon.



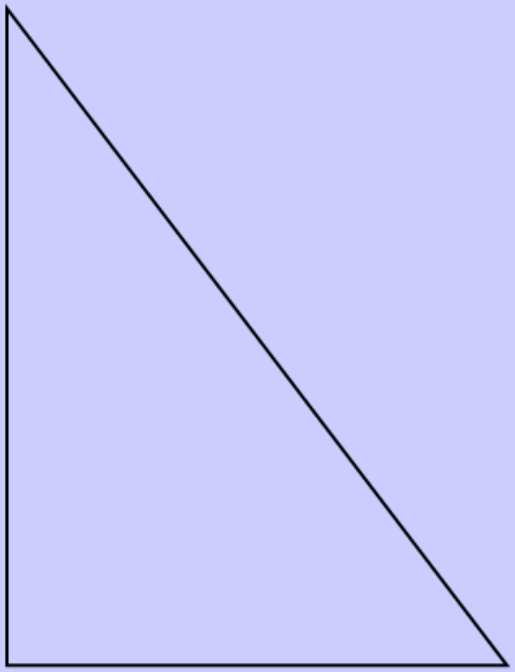


Find the perimeter and area of the polygon.



EXAMPLE 2 Solve for unknown measures

xy ALGEBRA The base of a triangle is twice its height. The area of the triangle is 36 square inches. Find the base and height.



Assignment:

p. 723 (3-8, 13, 16-18, 22-27)