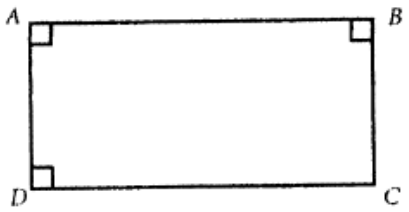
OTHER POLYGONS

86. SPECIAL QUADRILATERALS

• ***Rectangle***

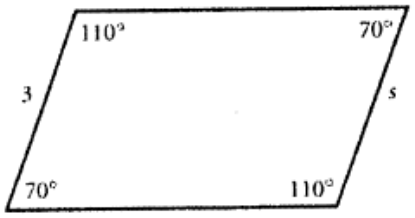
A rectangle is a **four-sided figure with four right angles.** Opposite sides are equal. Diagonals are equal.



Quadrilateral *ABCD* above is shown to have three right angles. The fourth angle therefore also measures 90°, and *ABCD* is a rectangle. The perimeter of a rectangle is equal to the sum of the lengths of the four sides, which is equivalent to 2(length + width).

• ***Parallelogram***

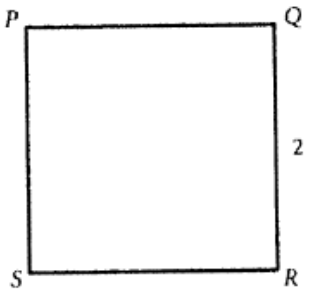
A parallelogram has **two pairs of parallel sides.** Opposite sides are equal. Opposite angles are equal. Consecutive angles add up to 180°.



In the figure above, s is the length of the side opposite the 3, so $s = 3$.

• ***Square***

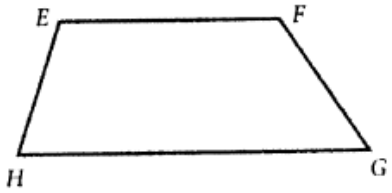
A square is a **rectangle with 4 equal sides.**



If *PQRS* is a square, all sides are the same length as *QR*. The perimeter of a square is equal to four times the length of one side.

• **Trapezoid**

A **trapezoid** is a quadrilateral with one pair of parallel sides and one pair of nonparallel sides.

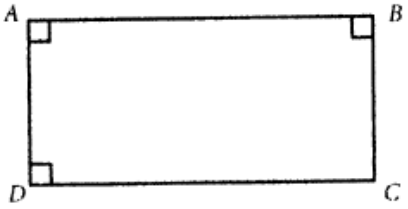


In the quadrilateral above, sides $\overline{EF}$ and $\overline{GF}$ are parallel, while sides $\overline{EH}$ and $\overline{FG}$ are not parallel. *EFGH* is therefore a trapezoid.

7. AREAS OF SPECIAL QUADRILATERALS

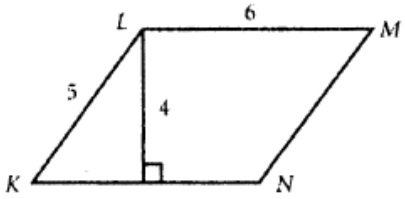
Area of Rectangle = Length × Width

The area of a 7-by-3 rectangle is $7 \times 3 = 21$.



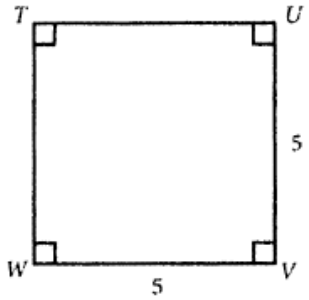
Area of Parallelogram = Base × Height

The area of a parallelogram with a height of 4 and a base of 6 is $4 \times 6 = 24$.



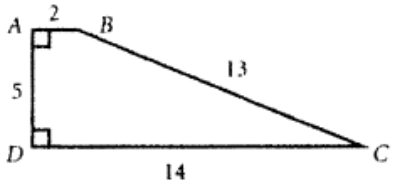
Area of Square = $(\text{Side})^2$

The area of a square with sides of length 5 is $5^2 = 25$.



Area of Trapezoid = $\left(\frac{\text{base}_1 + \text{base}_2}{2}\right) \times$ height

Think of it as the average of the bases (the two parallel sides) times the height (the length of the perpendicular altitude).



In the trapezoid $ABCD$ above, you can use side $\overline{AD}$ for the height. The average of the bases is $\frac{2 + 14}{2} = 8$, so the area is 5×8, or 40.

88. INTERIOR ANGLES OF A POLYGON

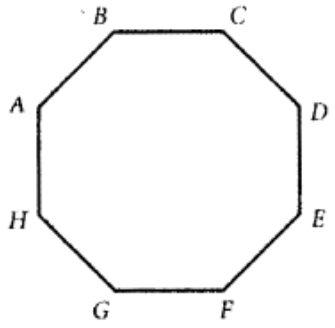
The sum of the measures of the interior angles of a polygon is $(n - 2) \times 180$, where n is the number of sides.

$$\textbf{Sum of the Angles} = (n - 2) \times 180 \text{ degrees}$$

The eight angles of an octagon, for example, add up to $(8 - 2) \times 180 = 1{,}080$.

To find **one angle of a regular polygon,** divide the sum of the angles by the number of angles (which is the same as the number of sides). The formula, therefore, is:

$$\textbf{Interior Angle} = \frac{(n - 2) \times 180}{n}$$



Angle A of the regular octagon above measures $\frac{1{,}080}{8} = 135$ degrees.