

Trapezoids and other polygons

Geometry Research Honors

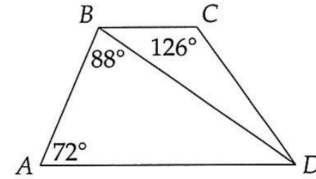
Trapezoids

8.2.1 In quadrilateral $PQRS$, $\overline{PQ} \parallel \overline{RS}$, \overline{PS} is not parallel to \overline{QR} , $QR = PS$, and $\angle P = 83^\circ$. Find the rest of the angles of the trapezoid.

8.2.2 Find the area of a trapezoid with bases 44 and 24 and with height 18.

8.2.3 The area of trapezoid $ABCD$ is 96. One base is 6 units longer than the other, and the height of the trapezoid is 8. Find the length of the shorter base.

8.2.4 $ABCD$ shown at right is a trapezoid with $\overline{BC} \parallel \overline{AD}$, $\angle ABD = 88^\circ$, $\angle A = 72^\circ$, and $\angle C = 126^\circ$. Find $\angle ADC$ and $\angle CBD$.



8.2.5 Prove that the diagonals of an isosceles trapezoid are congruent.

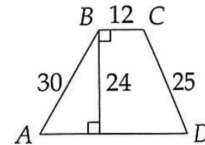
8.2.7★ The bases of a trapezoid have lengths 50 and 75. Its diagonals have lengths 35 and 120. Find the area of the trapezoid. **Hints:** 339, 420

Mixed Review

8.8.1 In rectangle $ABCD$, H is the midpoint of \overline{BC} , E lies on \overline{AD} , and F lies on \overline{AB} . In rectangle $CEFG$, H lies on \overline{FG} and $HG = 3$. Given $\angle DEC = 45^\circ$, what is the positive difference between the areas of these two rectangles?

8.8.2 Find the area of trapezoid $ABCD$ shown at right.

8.8.3 Quadrilateral $ABCD$ is a trapezoid with $\overline{AB} \parallel \overline{CD}$. We know $AB = 20$ and $CD = 12$. What is the ratio of the area of $\triangle ACB$ to the area of $ABCD$? (Source: MATHCOUNTS) **Hints:** 376



8.8.4 The diagonals of $EFGH$ are perpendicular. Prove that $EF^2 + GH^2 = FG^2 + EH^2$. (A quadrilateral with perpendicular diagonals is sometimes referred to as **orthodiagonal**.) **Hints:** 572

8.8.5★ In $\triangle ABC$, $AB = 6$, $BC = 7$, and $AC = 8$. Given that M is the midpoint of \overline{AB} , find CM . **Hints:** 240, 476, 117