

NAME: _____

P.I. G.G.38: Investigate, justify, and apply theorems about parallelograms involving their angles, sides, and diagonals

P.I. G.G.39: Investigate, justify, and apply theorems about special parallelograms (rectangles, rhombuses, squares) involving their angles, sides, and diagonals

P.I. G.G.40: Investigate, justify, and apply theorems about trapezoids (including isosceles trapezoids) involving their angles, sides, medians, and diagonals

1. Think of at least three different instances in which you might need to find the area or perimeter of a square or rectangle. Write a paragraph to describe these situations.
2. Write a problem that involves finding the area of a regular polygon.
3. Find something in your environment that is shaped like a trapezoid. Describe how the shape is used and estimate its area.
4. Here is another way to find the area of a trapezoid: Cut the trapezoid into two pieces along a line parallel to the parallel sides so that the height of each new trapezoid is $\frac{1}{2}$ that of the original trapezoid. Use the pieces to form a parallelogram. Write an argument to justify the formula for the area of a trapezoid using this method.

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- Write an explanation that justifies the following: The area of a regular polygon is half the product of the apothem and the perimeter.
- Measure the length of a side of a stop sign and determine an approximate length of the apothem. Use these measurements to estimate the area of a stop sign.

[1] Check students' work.

[2] Check students' work.

[3] Check students' work.

[4] The parallelogram formed has height $\frac{h}{2}$ and base $(b_1 + b_2)$. Hence, its area is $(b_1 + b_2) \cdot \frac{h}{2}$ or $\frac{1}{2} \cdot (b_1 + b_2)$.

The apothem of a regular polygon is the height of one of n equal triangles into which the figure is divided. So, each triangle's area is $\frac{1}{2}(a)(s)$, where s is the length of a side. So, the total area is

[5] $\frac{1}{2}(a)(s)(n)$. But sn is the perimeter, so the total area is $\frac{1}{2}(a)(p)$.

[6] Check students' work.