

NAME: _____

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

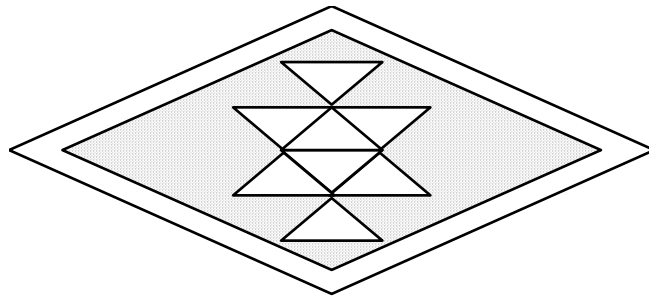
P.I. G.G.39: Investigate, justify, and apply theorems about special parallelograms (rectangles, rhombuses, squares) involving their angles, sides, and diagonals

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

1. (a) Define *square*. (b) Define *rectangle*.
2. Give examples of different quadrilaterals that you can find in your home, classroom, or environment.
3. Can the parallel sides of a trapezoid be congruent? Explain.
4. Explain how to find the measures of the sides of a parallelogram if you know the measure of one side and the perimeter.
5. Explain how to space four plants equally along a wall in a scale drawing if you know where the first and last plants are to go and have lined paper.
6. Use any problem solving strategy to solve the following problem. Mike is a surveyor. He surveys a four-sided lot and finds that the slopes of two opposite sides of the lot are the same. The slopes of the other two sides are opposites of one another. What is the shape of the lot?
7. Sara plans to make a toy by gluing two sticks of wood together to be diagonals and attaching a quadrilateral piece of nylon. Will her toy be a parallelogram? What could she do to guarantee a shape that is a parallelogram?

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8. Knowing that the side of a square is s , show that its area is equal to half the product of its diagonals without using the fact that a square is a special case of rhombus.
9. Do parallelograms have point symmetry? Explain.
10. Does a trapezoid have any symmetries? Does an isosceles trapezoid?
11. Look at the Navajo eye-dazzler design. Describe the quadrilaterals and other geometric figures you see in the design.



12. Sketch an equilateral quadrilateral that is not regular.
13. Sketch two parallelograms whose corresponding angles are congruent but whose corresponding sides are not.
14. Sketch and describe two rhombuses that have the same area but are not congruent.

(a) A square is a rhombus with four right angles.

[1] (b) A rectangle is a parallelogram with four right angles.

[2] Answers may vary. Samples: traffic signs, flags, kites, and desktops

[3] No, the figure would be a parallelogram.

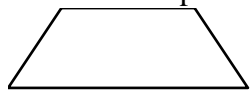
The given side and the side opposite it have the same length. Subtract twice the given side from the perimeter and divide the result by 2 to find the length of each of the remaining two sides.

[4] _____

Answers may vary. Sample: Position the first plant on the first line of the paper. Position the the last plant on the fourth line. Mark the points where the second and third lines intersect the 'wall'.

[5] _____

The lot is shaped like an isosceles trapezoid as shown below.



[6] _____

Not necessarily; she could glue the two sticks so that they bisected each other to form a parallelogram-shaped toy.

[7] _____

The diagonals are each $s\sqrt{2}$, so half the product is $\frac{1}{2}s\sqrt{2} \cdot s\sqrt{2} = \frac{1}{2}2s^2 = s^2$.

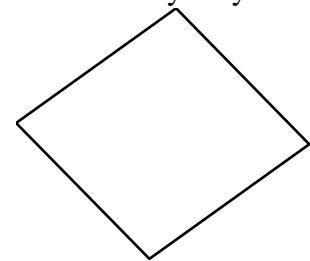
[8] _____

[9] Yes; they have symmetry about the intersection of the diagonals.

[10] no; reflectional symmetry

[11] Students should see triangles, rhombuses, trapezoids, and squares.

Answers may vary. Sample:



[12] _____

[13] Check students' work. There should be two similar parallelograms.

Check students' work. For example, rhombuses with area 20 square units might have diagonals of length 4 and 10 or 8 and 5.

[14] _____