

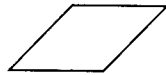
Take Another Look 9.1

Use a geometry computer program to construct a parallelogram whose perimeter can vary but whose area stays constant.

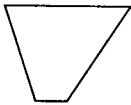


Exercise Set 9.1

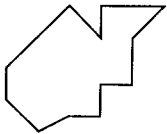
In Exercises 1-4, estimate the area of each figure. The area of each square is one square unit.



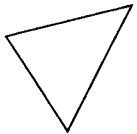
1.



2.

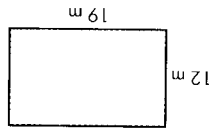


3.

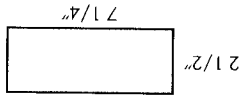


4.

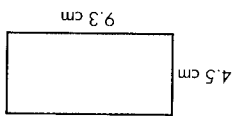
In Exercises 5-12, each quadrilateral is a rectangle. In Exercises 13-20, each quadrilateral is a parallelogram. Use the appropriate unit in each answer. Area is represented by A and P stands for perimeter.



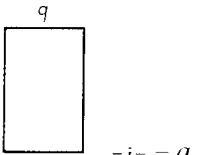
5. $A = ?$



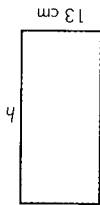
6. $A = ?$



7. $A = ?$



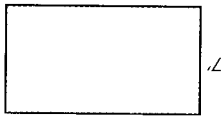
8. $A = 96$ sq yd



9. $A = 273$ cm²



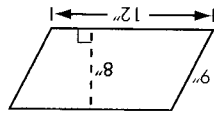
10. $A = 375$ sq ft



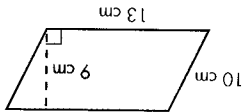
11. $P = 40$ ft



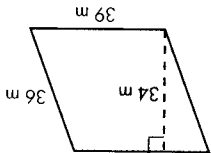
12. $A = 264$ sq ft



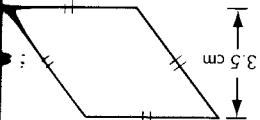
13. $A = ?$



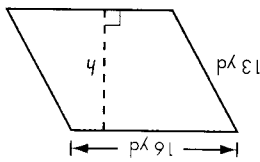
14. $A = ?$



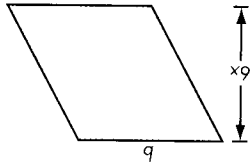
15. $A = ?$



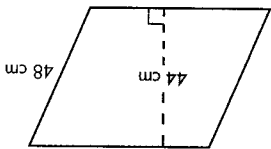
16. $A = ?$



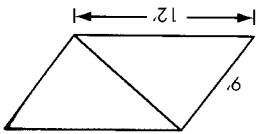
17. $A = 176$ sq yd
 $h = ?$



18. $A = 48x^2$ sq in.
 $b = ?$



19. $A = 2508$ cm²
 $P = ?$



20. Find the shaded area.

Investigation 9.2.3



Now you are going to create and carry out your own investigation to discover a formula for the area of a kite. Do you recall some of the properties of a kite? These kite properties may be helpful: The diagonal connecting the vertex angles of a kite divides the kite into two congruent triangles; the diagonal connecting the nonvertex angles of a kite divides the kite into two isosceles triangles; and the diagonals of a kite are perpendicular to each other and thus divide the kite into four right triangles. You're on your own. Investigate.

Compare your results with the results of others near you. State a conjecture.



C-85 The area of a kite is given by the formula $A = \frac{1}{2}d_1d_2$ (Kite Area Conjecture).

Take Another Look 9.2

Try one or more of these follow-up activities.



1. Use a geometry computer program to construct a triangle or a trapezoid whose perimeter you can change without changing the area.
2. Provide a logical argument demonstrating that when you put two copies of the same trapezoid together, as you did in Investigation 9.2.2, the figure is a parallelogram.
3. True or false? The area of a triangle is equal to half the perimeter times the radius of the inscribed circle. Support your conclusion with a convincing argument.
- 4.* Find four more methods for arriving at the formula for the area of a trapezoid. Consider ways of dividing the trapezoid into pieces (triangles, rectangles, parallelograms) and then rearranging the pieces into shapes for which you already know the area. See Exercises 27 and 28 for two methods.

Exercise Set 9.2

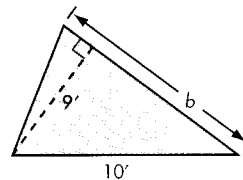
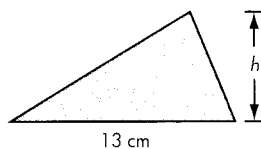
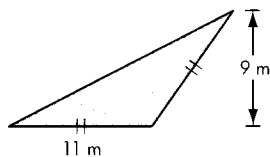
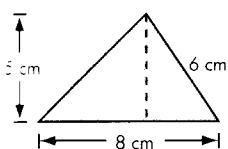
Use your new area conjectures to solve Exercises 1–16. In Exercises 9 and 10, the quadrilaterals are kites. In Exercises 11–16, the quadrilaterals are trapezoids.

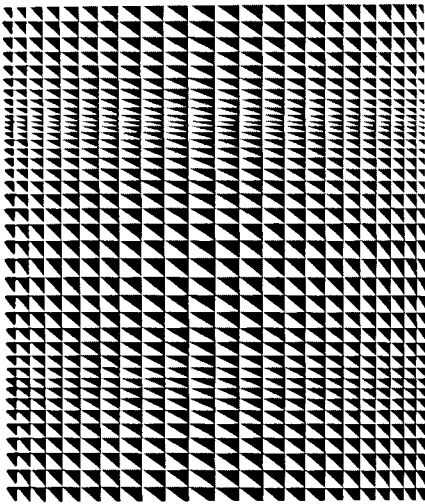
1. $A = \frac{1}{2}bh$

2.* $A = \frac{1}{2}d_1d_2$

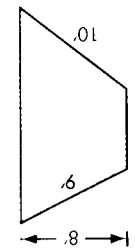
3. $A = 39 \text{ cm}^2$
 $h = \frac{1}{2}d_1d_2$

4.* $A = 31.5 \text{ sq ft}$
 $b = \frac{1}{2}d_1d_2$

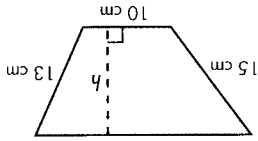




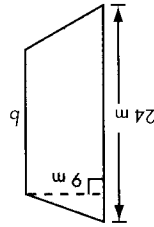
- 17.* Sketch and label two different triangles, each with an area of 54 cm^2 .
- 18.* Sketch and label two different trapezoids, each with an area of 56 cm^2 .
19. Sketch and label two different kites, each with an area of 1092 cm^2 .
20. Sketch and label a triangle and a trapezoid with equal areas and equal heights. How does the base of the triangle compare with the two bases of the trapezoid?
21. Bridget Riley's painting *Straight Curve* consists of columns and rows of triangles with varying heights and bases. What's the optical effect of this variation? What do you think the title of the painting means? What fraction of the total area do the dark triangles occupy?



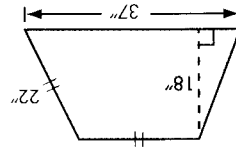
16.* $A = 84 \text{ sq ft}$
 $P = -?$
 $h = -?$



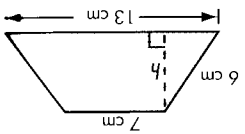
15. If $A = 204 \text{ cm}^2$
 and $P = 62 \text{ cm}$,
 then $h = -?$.



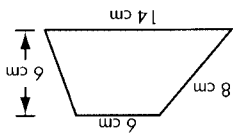
14. $A = 180 \text{ m}^2$
 $b = -?$



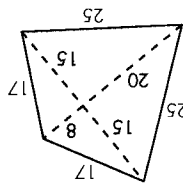
13. $A = -?$



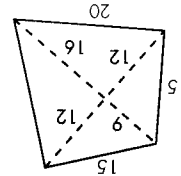
12. $A = 50 \text{ cm}^2$
 $h = -?$



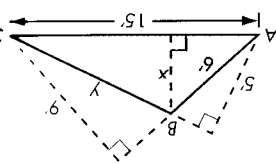
11. $A = -?$



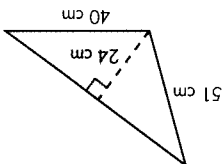
10. $A = -?$



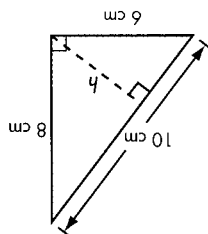
9. $A = -?$



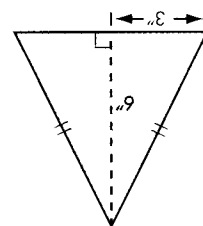
8.* $x = -?$
 $y = -?$



7. If the area is 924 cm^2 , what is the perimeter?



6. $h = -?$



5. $A = -?$