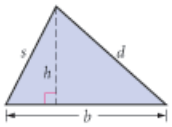
Lesson 8.2: Areas of Triangles, Trapezoids, and Kites

In this lesson you will:

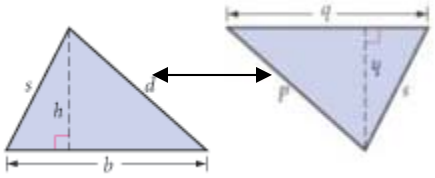
- discover area formulas for triangles, trapezoids, and kites

In Lesson 8.1, you reviewed the area formula for rectangles, and you used it to rediscover the area formula for parallelograms. In this lesson, you will use those formulas to discover or demonstrate the formulas for the areas of triangles, trapezoids, and kites.

Investigation 8.2.1: "Area Formula for Triangles"



A.) If you were to make a copy of the triangle that is given above and slide the copy together with the original so that the sides *d* were lined up (like shown below), what new figure would you make? _____



B.) What would be the formula you would use to find the total area of the new figure you have made? A = _____

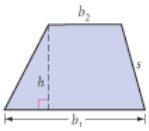
C.) The formula you gave in part B found the area of 2 congruent triangles. How could you find the area of just one of the triangles?
A = _____

D.) Use your findings to complete the conjecture below.

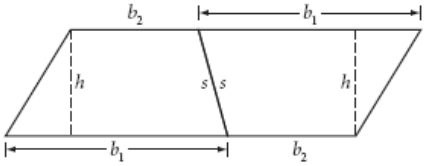
Triangle Area Conjecture (C-76)

The area of a triangle is given by the formula A = _____, where A is the area, b is the length of the base, and h is the height of the triangle.

Investigation 8.2.2: "Area Formula for Trapezoids"



A.) If you were to make a copy of the trapezoid that is given above and slide the copy together with the original so that the sides *s* were lined up (like shown below), what new figure would you make? _____



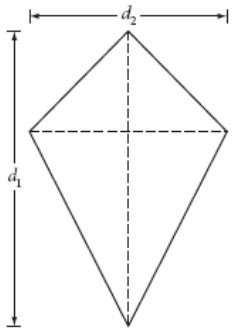
B.) How would you find the total area of the new figure you have made? Write a formula based on the way the figures are labeled. A = _____

C.) The formula you gave in part B found the area of 2 congruent trapezoids. How could you find the area of just one of the trapezoids?
A = _____

D.) Use your findings to complete the conjecture below.

Trapezoid Area Conjecture (C-77)

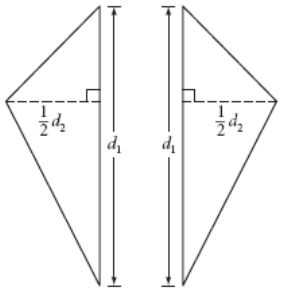
The area of a trapezoid is given by the formula A = _____, where A is the area, b_1 and b_2 are the lengths of the two bases, and h is the height of the trapezoid.



Investigation 8.2.3: "Area Formula for Kites"

In the kite at right, let d_1 be the length of the diagonal connecting the vertex angles, and let d_2 be the length of the other diagonal.

A.) Which diagonal divides the kite into two congruent triangles?
(check one) □ diagonal connecting the vertex angles
□ diagonal connecting the non-vertex angles



B.) In the picture below, the kite has been divided into two congruent parts. Consider the diagonal labeled d_1 to be the base of one of the triangles. Therefore, $b = d_1$. Because d_1 is the perpendicular bisector of the other diagonal, the height of each triangle is _____. Therefore, h = _____.

C.) What would be the formula you would use to find the area of one of the triangles? A = $\frac{1}{2}bh$ = _____ So to find the area of the whole kite, you would multiply the area of one of the triangles by ____.

D.) Based on your observations, complete the conjecture below.

Kite Area Conjecture (C-78)

The area of a kite is given by the formula A = _____, where A is the area and d_1 and d_2 are the lengths of the diagonals.

⇒**ASSIGNMENT**: _____