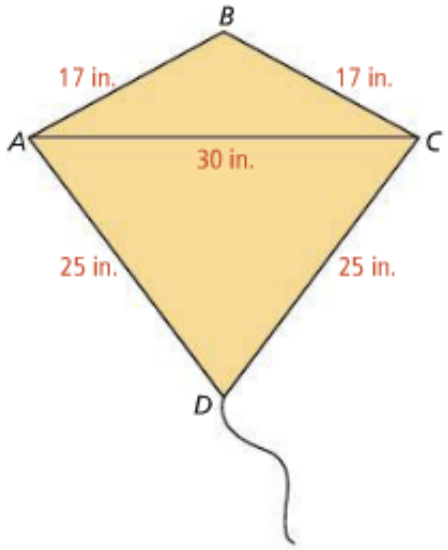
Name:_____ Date:_____ Band:_____

Geometry Ms. Lozada

Unit 8: Polygons and Quadrilaterals Project

Building a Kite

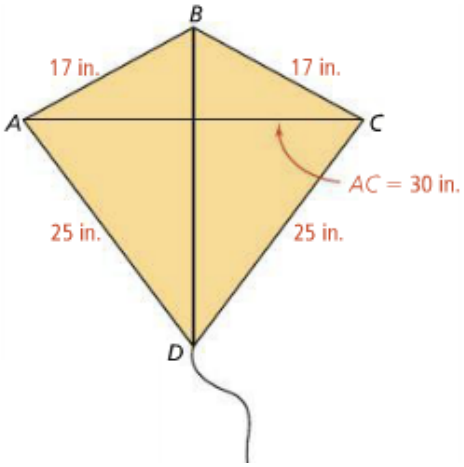
Alejandro plans to make a paper kite. In his sketch, shown below, he included the lengths of the wooden dowels that will form the frame and the horizontal support. He forgot to show the kite's vertical support in his sketch.



Task: Find the length of the vertical support for Alejandro's kite and the area of the paper used to make the kite.

Part 1: Applying What You Learned

Look at Alejandro's kite with the missing vertical support drawn in.



Choose from the following words to complete the sentences below.

diagonals	sides	opposite
consecutive	congruent	perpendicular
parallel	bisects	right

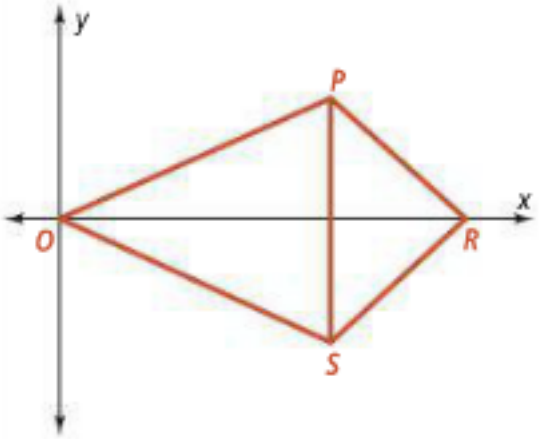
Alejandro's kite fits the geometric definition of a kite because it has two pairs of congruent **a.**_____ sides and no pairs of congruent **b.**_____ sides. The vertical and horizontal supports of the kite are its **c.**_____**.** Vertices B and D are each equidistant from vertices A and C, so the vertical support **d.**_____ the horizontal support.

Because the diagonals of a kite are **e.**_____ to each other, they divide the kite into four **f.**_____ triangles. The kite's vertical support divides it into two **g.**_____ triangles.

Part 2: Applying What You Learned

Look back at the information about Alejandro's kite. In Part 1, you showed that the shape of Alejandro's kite fits the geometric definition of a kite.

You can use coordinate geometry to find a formula for the area of a kite. Use the diagram below, in which $PRSO$ is a kite with one vertex at the origin and diagonal $\overline{OR}$ on the x-axis. In the diagram, $OP = OS$ and $PR = SR$.



A. If $OR = a$, what are the coordinates of R?

B. If the coordinates of P are (b, c), what are the coordinates of S? Explain how you know.

C. Explain why the area of $PRSO = ac$.

D. a is the length of one diagonal of the kite $PRSO$. What is c with respect to the kite?

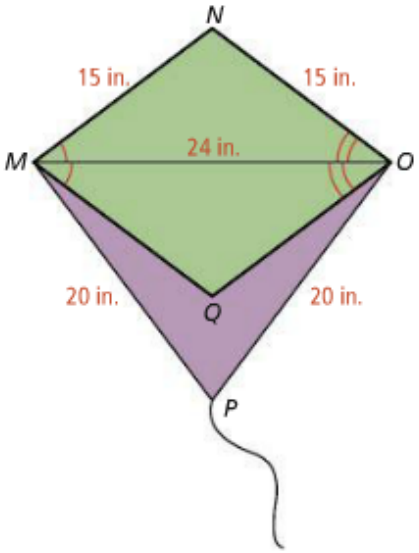
E. In words, an area formula for a triangle is "half the product of the base and height." How can you express an area formula for a kite in words?

Part 3: Completing the Task

Look back at your results from Parts 1 and 2. Use the work you did to complete the following. Solve the problem in the Task by finding the length of the vertical support for the kite and the area of the paper used to make the kite. Show all your work and explain in step in your solution.

Part 5: On Your Own

Alejandro's friend Amy also draws a sketch for a paper kite. In her sketch shown below, she colored the green region so that the horizontal support $\overline{MO}$ bisects two angles of the quadrilateral $MNOQ$. Like Alejandro, Amy forgets to show the vertical support for the kite.



Find the length of the missing vertical support for Amy's kite and the areas of the green and purple papers used in the kite.