Name _____

METHODS AND MEANINGS

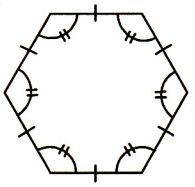
A #13

Convex and Non-Convex Polygons

MATH NOTES

A **polygon** is defined as a two-dimensional closed figure made up of straight line segments connected end-to-end. These segments may not cross (intersect) at any other points.

A polygon is referred to as a **regular polygon** if it is equilateral (all sides have the same length) and equiangular (all interior angles have equal measure). For example, the hexagon shown at right is a regular hexagon because all sides have the same length and each interior angle has the same measure.

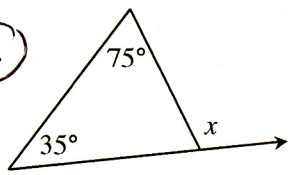


A polygon is called **convex** if each pair of interior points can be connected by a segment without leaving the interior of the polygon. See the example of convex and non-convex shapes in problem 8-4.

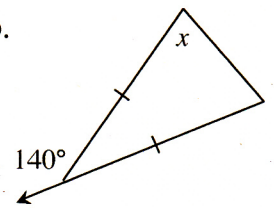
Review & Preview

8-6. Solve for x in each diagram below.

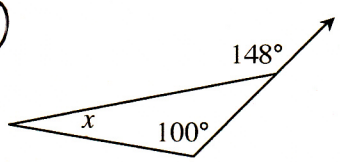
a.



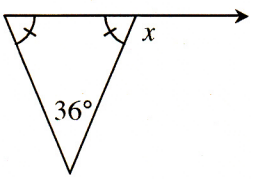
b.



c.



d.



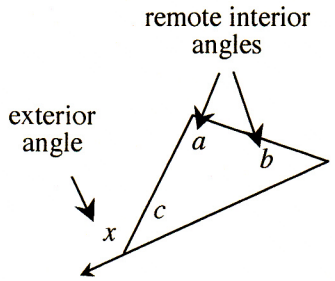
8-7. After solving for x in each of the diagrams in problem 8-6, Jerome thinks he sees a pattern. He notices that the measure of an exterior angle of a triangle is related to two of the angles of a triangle.

a. Do you see a pattern? To help find a pattern, study the results of problem 8-6.

Problem continues on next page →

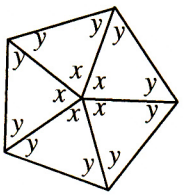
8-7. *Problem continued from previous page.*

b. In the example at right, angles a and b are called **remote interior angles** of the given exterior angle because they are not adjacent to the exterior angle. Write a conjecture about the relationships between the remote interior and exterior angles of a triangle.



c. Prove that the conjecture you wrote for part (b) is true for all triangles. Your proof can be written in any form, as long as it is convincing and provides **reasons** for all statements.

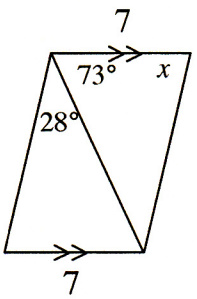
8-8. **Examine** the geometric relationships in the diagram at right. Show all of the steps in your solutions for x and y.



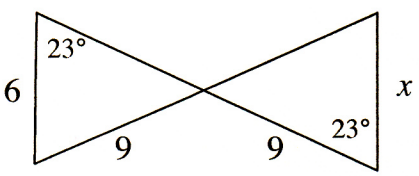
8-9. Steven has 100 congruent triangles that each has an angle measuring 15°. How many triangles would he need to use to make a pinwheel? Explain how you found your answer.

8-10. Find the value of x in each diagram below, if possible. If the triangles are congruent, state which triangle congruence property was used. If the triangles are not congruent or if there is not enough information, state, "Cannot be determined."

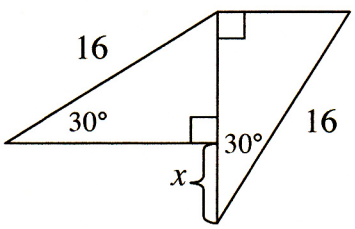
a.



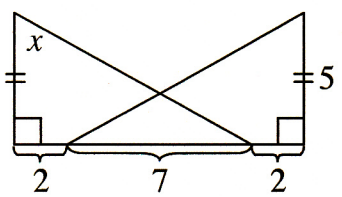
b.



c.



d.



8-11. Decide if the following statements are true or false. If a statement is false, provide a diagram of a counterexample.

a. All squares are rectangles.

b. All quadrilaterals are parallelograms.

c. All rhombi are parallelograms.

d. All squares are rhombi.

e. The diagonals of a parallelogram bisect the angles.