STUDENT PROBLEM CORNER

Students are encouraged to examine the problems presented below. Send your explanation or solution to:

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Delta-K will publish the names of students who successfully solve the problems.

Make a Star

A Problem Solving Lesson for Secondary Geometry

Oscar Schaaf
University of Oregon

Comments and Suggestions

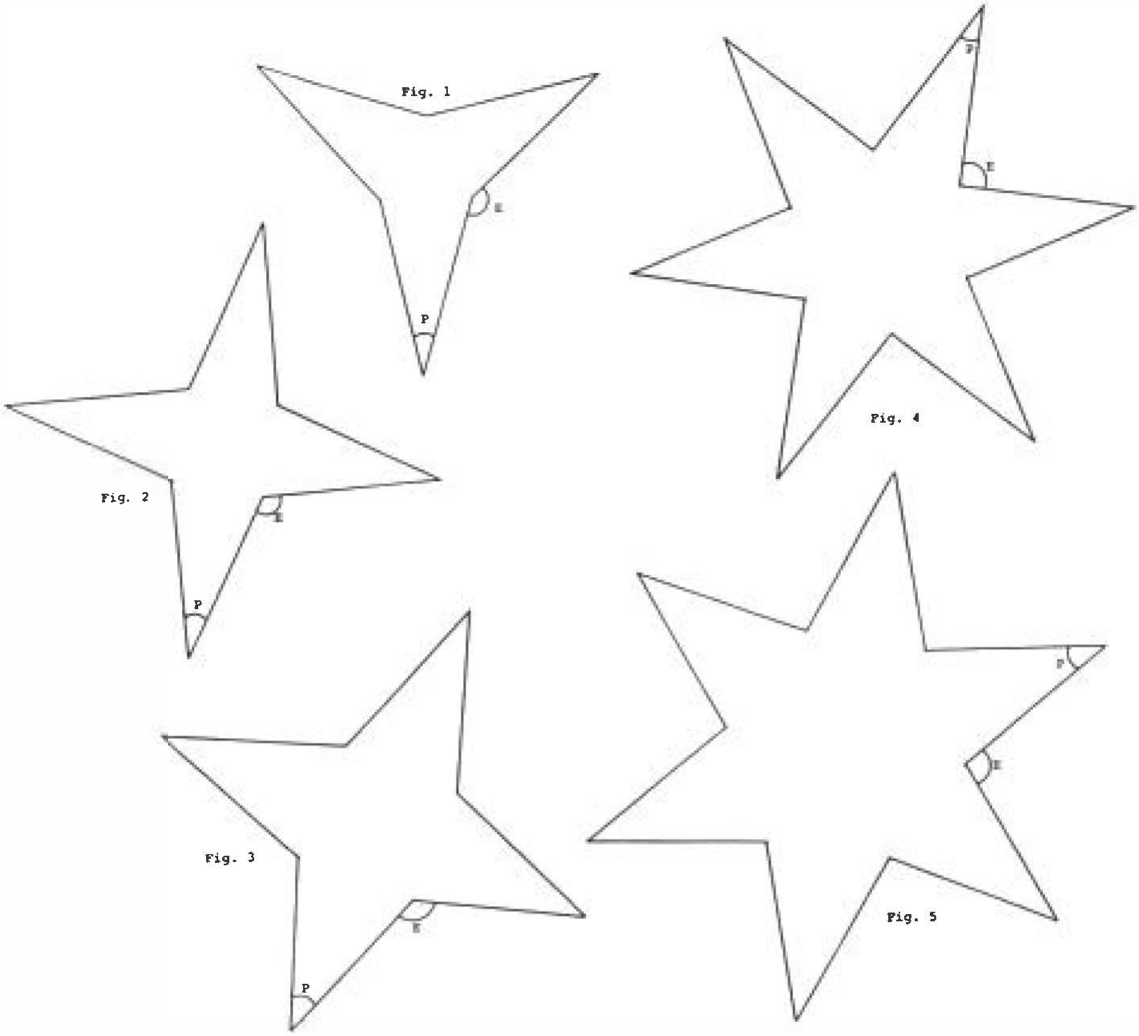
Geometry students should understand before starting this "Make a Star" lesson that the goal of the lesson is to become familiar with a process frequently used in discovering a relationship. This lesson, with the exception of problem 6, could be used in pre-high school geometry classes. The lesson does require a certain degree of skill in using a protractor. Models of stars are provided.

To the Student

A method was used to make the three-, four-, and six-pointed stars shown on page 42. The procedure depends upon the measures (m) for angles E and P, and the number (n) of points in the star. Your task is to discover the method by collecting data from the stars, recording the data in the table below, searching for a relationship (conjecture) between E, P, and n, and then testing the conjecture by drawing stars.

1. Collect the data from the stars and record in the table.

	n	mE	mP
Fig. 1			
Fig. 2			
Fig. 3			
Fig. 4			
Fig. 5			



2. Study the table for patterns. Predict the measure of E if n = 4 and P = 20°. Check your prediction by trying to draw the star.

3. Predict the measure of E if n = 6 and P = 20°. Check your prediction by making a drawing.

4. Draw a five-pointed star using the same procedure.

5. Describe the procedure you used in making the stars or write the formula with the variables n, E, and P.

6. Prove that the relationship is true for any star drawn in this way.

Oscar Schaaf is Professor Emeritus at the College of Education, University of Oregon. He has been a speaker at many NCTM meetings including those held in Alberta. Dr. Schaaf was director of the Lane County Mathematics Project which focused on problem solving.

The Road to Four Villages

L.G. Hoye

University of Lethbridge

Four villages are situated at the vertices of a square of sides which are one mile long. The inhabitants wish to connect the villages with a system of roads, but have only enough material to make $3 + 1$ mile(s) of road. How do they proceed?

Reference

Coxeter, H.S.M. Introduction to Geometry, 2nd Edition. (Toronto: J. Wiley & Sons, Inc., 1969), p. 392.

Professor Hoye is an Associate Professor of Mathematics and Associate Dean of the Faculty of Arts and Science, University of Lethbridge. The problem can be solved by using algebra or calculus, or by developing a computer program.

The Altar Window

Arthur Jorgensen

Jamaica Ministry of Education

Painters are at work painting and decorating the inner walls of a church. Somewhat above the altar there is a circular window. For decoration, the painters have been asked to draw two vertical lines tangent to the circle and of the same height as the circular window. They were then to add half circles above and below, closing the figure. This area between the lines and the window is to be covered with gold. For every square inch, x amount of gold is needed. How much gold will be needed to cover this space (give the diameter of the circle); or what is the area between the circle and the lines?

Dr. Jorgensen, former editor of the MCATA Newsletter and a member of the MCATA executive, forwarded this problem from Jamaica where he is currently on an 18 month position developing elementary mathematics curricula.