INTRODUCTION

In Germany, high school starts with grade 5. In grades 5 and 6 about one hour per week is devoted to intuitive geometry. The aim is to develop the geometric intuition of the child and to familiarize him with many important geometrical concepts. The course appears somewhat unsystematic, since it consists of a great number of geometrical activities which are supposed to develop various intellectual and manual skills. In grade 7 there is a gradual transition to a more systematic development of geometry.

In this paper I shall present a selection of activities which I have used in grades 5 to 7 for the past 16 years. Well known topics will be mentioned only in passing; less familiar ones will be considered in greater detail. At this level I prefer topics which are not treated later, but which are still interesting, important and challenging. In fact, they are more interesting and instructive than many specialized curiosities which are proved in higher grades. These examples will show that, even at an early age, one can reach rather deep results in a short time and starting from scratch. It is in geometry that children are for the first time confronted with nontrivial mathematics.

COMBINATORIAL ACTIVITIES

For young children, activities with a combinatorial touch are best suited. They are easy to comprehend, and they often have a recreational twist which appeals to the natural curiosity of the child. Here are some examples:

(a) A square can be cut into 4, 6, 7, 8, 9, 10, 11,... squares. Show how!
Figure 1 shows the solution. It needs no explanation.
Problem 1. Solve the same problem for the equilateral triangle.

(b) Two rectangles are drawn in the plane. Into how many parts can they subdivide the plane? Think of all the possibilities!
Figure 2 shows subdivisions into 2, 3, 4, 5, 6, 7, 8, 9, 10 parts.
Problem 2. Study in a similar way subdivisions of the plane by
(a) a rectangle and a circle
(b) a rectangle and a triangle
(c) a triangle and a circle
(d) two triangles.
Problem 3. Study subdivisions of the plane by 1, 2, 3, 4, ... circles. Do you see a pattern? Can you explain the pattern? What happens if one circle is added?

Problem 4. Cut a cake by 1, 2, 3, 4, ... straight cuts. Do you see a pattern? Explain the pattern. What happens if an additional line is drawn?

\[ 4, 7, 10, 13, ..., 3n + 1 \text{ for all } n \geq 1 \]

\[ 6, 9, 12, 15, ..., 3n \text{ for all } n > 1 \]

\[ 8, 11, 14, 17, ..., 3n + 2 \text{ for all } n > 1. \]

Fig. 1.

Fig. 2.