EXPLORING FIBONACCI POLYGONS

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We shall define a Fibonacci polygon as any closed plane figure bounded by straight lines all of whose lengths correspond to Fibonacci numbers of the series: $1, 1, 2, 3, 5, 8, 13, \cdots$. Specifically, we shall investigate one subset of this group of figures, namely, those for which all sides are unequal.

The question for study is: Under what circumstances may a polygon be formed from line segments all of whose lengths correspond to Fibonacci numbers? Three situations may be envisaged:

(1) The greatest length is greater than the sum of all the other lengths in which case no polygon can be formed;

(2) The greatest length is equal to the sum of all the other lengths. Again, no polygon can be formed, but this case is interesting as it represents the division point between polygons and non-polygons.

(3) The greatest length is less than the sum of all the other lengths in which case a polygon can be formed.

Research could begin by studying specific polygons beginning with the triangle and working upward. We might ask such questions as the following:

(1) Is it possible to have a Fibonacci triangle with all sides unequal?

(2) Is a Fibonacci quadrilateral possible? Under what circumstances?

(3) What is the limiting situation between polygons and non-polygons for the pentagon?

(4) Is there some situation in which we can be sure that a polygon can always be formed if the number of sides is greater than a given quantity?

(5) Is there some situation in which we can be certain that a Fibonacci polygon can never be formed?

This study leads to some interesting results. It is not difficult but it is rewarding in mathematical insights into the properties of Fibonacci numbers.

Readers are encouraged to send their discoveries to the editor of this section by December 15, 1963, so that it may be possible to give due recognition to all contributors in the issue of February, 1964.