SYNOPSIS

449 The Academy Corner: No. 37 Bruce Shawyer
Featuring the Memorial University Undergraduate Mathematics Competition, written in September 2000; and the 2000 Atlantic Provinces Council on the Sciences Mathematics Competition.

452 The Olympiad Corner: No. 210 R.E. Woodrow
Featuring the questions of the 1996-1997 Estonian Mathematical Olympiads, Final Round of the National Olympiad; the “exercises” of the Composition de Mathématiques (Classe terminale S) from France; readers’ solutions to problems of the Turkish Team Selection Examination for the 37th IMO; and readers’ solutions to problems of the Australian Mathematical Olympiad 1996.

465 Book Reviews Alan Law
Twenty Years Before the Blackboard
by Michael Steuben with Diane Sandford
Reviewed by Nicholas Buck, College of New Caledonia, Prince George, BC.

Archimedes — What Did He Do Besides Cry Eureka
by Sherman Stein
Reviewed by C.L. Kaller, Kelowna, BC.

467 Letter to the Editor Walther Janous

468 A Spatial Problem Solved with Stereographic Projection
by Shay Gueron and Oran Lang

Stereographic projection is a transformation in space, used frequently in complex analysis. It can also be interpreted as the spatial analog of inversion. In this paper, we demonstrate how the elementary properties of the stereographic projection can be used for solving a geometric problem.

The following problem was proposed to the 1999 International Mathematical Olympiad (IMO) Jury:
Problem: A finite set $F$ of $n \geq 3$ points in space (the plane) is called completely symmetric if it satisfies the following condition: for every two distinct points $A, B$ from $F$, the perpendicular bisector plane (the perpendicular bisector) of the segment $AB$ is a plane (an axis) of symmetry for $F$. Find all completely symmetric sets.

The IMO Jury looked for a relatively simple geometric question for the IMO paper, and decided to use only the planar version of the problem. The answer in the planar variant is not surprising: any completely symmetric set consists of the vertices of a regular polygon. The straightforward generalization to space would read: a completely symmetric set consists either of the vertices of a regular polygon, or the vertices of a regular polyhedron. Surprisingly however, this is not the correct answer for the 3D-version: a completely symmetric non-planar set consists of the vertices of a regular tetrahedron or a regular octahedron. The other regular polyhedrons, namely the cube, the regular dodecahedron and the regular icosahedron, are ruled out. This counterintuitive result is not easy to see, particularly when looking at the problem strictly as one of space geometry. We show here how stereographic projection helps to reduce the problem to a planar one, and thus, makes it easier to understand.

For more, read on!

475 The Skoliad Corner: No. 50 R.E. Woodrow

Featuring the rest of the "official" solutions to the problems of the Preliminary Round of the British Columbia Colleges Senior High School Contest for 2000.

479 Mathematical Mayhem

479 Editorial

480 Shreds and Slices — Another Proof of the Ellipse Theorem

482 Mayhem Problems

482 High School Solutions H261–H264

485 Advanced Solutions A237–A240

489 Challenge Board Solutions C89–C90

491 Problem of the Month Jimmy Chui

492 Constructive Geometry — Part II

Cyrus Hsia

In part I of this series [2000 : 231] we laid the foundations of building basic geometric objects. We started with two simple tools: a straightedge and a collapsible compass. Though deceptively simple, their usefulness is demonstrated over and over again. Using only these objects we were able to construct all the tasks given in part I. We continue here with a selection of problems from various sources that require only these two
tools. We also noted in part I that many geometric construction problems can be readily done by using results from other constructions that we have done. Here, we will discuss one result named Apollonius' Theorem that is useful in many geometric constructions.

497 Problems: 2589—2600

This month's “free sample” is:

2598. Proposed by D.J. Smeenk, Zaltbommel, the Netherlands.

Suppose that $AD$, $BE$ and $CF$ are the internal angle bisectors of $\triangle ABC$, with $D$ on $BC$, $E$ on $CA$ and $F$ on $AB$. Write $a = BC$, $b = CA$, $c = AB$, $x = AE$ and $y = AF$. We are given that $x + y = a$. Prove that:

(a) $a^2 = bc$;
(b) $\frac{1}{x} - \frac{1}{y} = \frac{1}{b} - \frac{1}{c}$;
(c) $\frac{1}{x} + \frac{1}{y} = \left(\frac{1}{\sqrt{b}} + \frac{1}{\sqrt{c}}\right)^2$;
(d) $AD < c$.

500 Solutions: 2468, 2477, 2480—2500

531 Problems from 100 years ago
Preliminary Examination for the Army, 1888

532 YEAR END FINALE
532 Thanks
533 A Maze in Three Dimensions  Izador Hafner
534 F.G.-M. Mystery solved?  Paul Yiu
535 Forum Geometricorum
535 Dr. Herta Freitag

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