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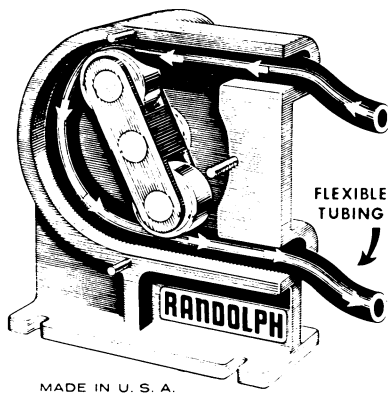
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LETTERS

to the editor

Hijacking prevention

Sir:

Your article describing the new Lockheed device which promises to detect metal objects carried by passengers boarding planes (SN: 8/31, p. 204) was very well done.

If this can be perfected so that only objects the size of guns will trigger the alarm system, then we will have gone another step toward better control of the situation.

Certainly the casual and business passenger, as well as the crew of each plane, deserve such protection if it can be provided.

I am glad that you are following developments in this matter through the pages of SCIENCE NEWS.

(Senator) Warren G. Magnuson
Washington, D.C.

No four-color solution

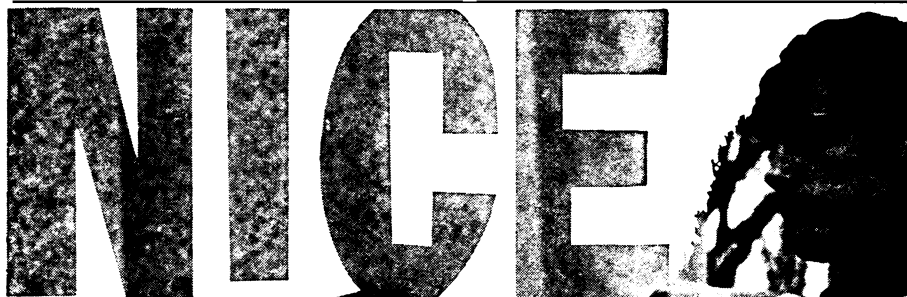
Sir:

The brief account concerning the four color problem (SN: 7/27, p. 89) may leave your readers with the impression that this famous problem has been solved. This is not the case. The paper by Gerhard Ringel and J. W. T. Youngs: Solution of the Heawood Map-coloring Problem, PROC. NAT. ACAD. SCI., vol. 60 (1968) pp. 438-445, concerns the Heawood conjecture, not the four color problem.

Heawood proved in 1890 that any map on an orientable surface of genus p , $p > 0$, (that is, a sphere with p handles) can be colored using at most $H_p = \lceil \frac{1}{2}(7 + \sqrt{1 + 48p}) \rceil$ colors, where the square brackets represent the greatest integer function. In particular, seven colors are sufficient for any map on the torus ($p=1$). Heawood described a map on the torus consisting of seven countries, each having a portion of its boundary in common with every other country. This map therefore required seven colors. The possibility was still open that for some particular $p > 1$, every map on a surface of genus p could be colored with fewer than H_p colors.

That this was not a trivial problem was shown by the fact that a similar formula for non-orientable surfaces gave the number seven for the Klein bottle, while in fact it can be proved that every map on the Klein bottle can be colored with six colors.

Ringel and Youngs have proved that for every $p > 0$, there exists a map on the orientable surface of genus p having



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NOTES

Cliff's Notes

H_p countries each adjacent to all the others. Therefore no number smaller than H_p is sufficient to color every map on such a surface. Their announcement of this is the paper mentioned above. The similar question concerning non-orientable surfaces with $p > 1$ was settled a number of years ago by Gerhard Ringel.

The case $p=0$ (the sphere) is still not solved. The four color problem itself remains open.

*James A. Hummel
Professor of Mathematics
University of Maryland
College Park*

By referring to PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, June 1968, p. 438, please note that in the very first sentence of our paper we stated that we have "nothing new to add" to the matter. Moreover, at the conclusion of the fourth paragraph, we stated the classical question, "Does $m=4$?" and added that "no one knows the answer."

We did announce that the "Heawood conjecture is settled in the affirmative"; the Heawood conjecture is not the four-color conjecture.

Finally, our "History of the Solution," starting on p. 440, makes it clear that many mathematicians were involved in the solution. Ringel and I completed the problem by solving cases 2, 8 and 11.

If you wish to report the true state of affairs in popular parlance, you may state that the map-coloring problem has been solved for all surfaces except the sphere.

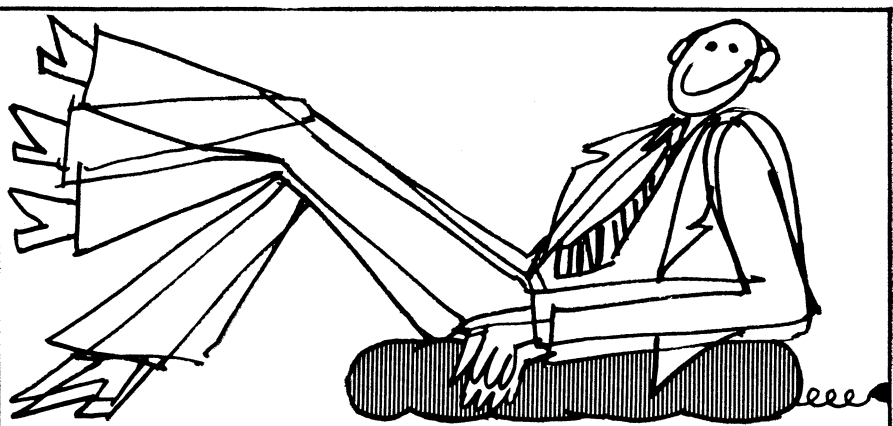
*J. W. T. Youngs
Division of Natural Sciences
University of California
Santa Cruz*

No guarantee

Sir:

Being intelligent is no guarantee against being stupid. My apologies to Miss Stephanie Rifkinson and any other SN reader who may have wondered where in the world MENSA information can be obtained. Having neglected to include this vital information in my letter of 7/13, I hasten to rectify my oversight herein. For information and details on application for membership in

(see Letters, p. 336)



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