with similar expressions for the projections upon the other two planes. The area of the original triangle ABC is therefore

$$\frac{1}{2}\left\{\begin{vmatrix} y_1 & z_1 & 1 \\ y_2 & z_2 & 1 \\ y_3 & z_3 & 1 \end{vmatrix}^2 + \begin{vmatrix} z_1 & x_1 & 1 \\ z_2 & x_2 & 1 \\ z_3 & x_3 & 1 \end{vmatrix}^2 + \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}^2\right\}^{\frac{1}{2}}$$

as given, for example, by Maxwell ([3] p.46).

If **a**, **b** and **c** be the position vectors of the points A, B and C respectively relative to any origin, then the area of the triangle ABC is equal to half the magnitude of the vector $(\mathbf{b}-\mathbf{a})\times(\mathbf{c}-\mathbf{a}) = \mathbf{b}\times\mathbf{c}+\mathbf{c}\times\mathbf{a}+\mathbf{a}\times\mathbf{b}$ as noted, for example, by Maxwell ([3] p.76) and Weatherburn ([4] p.66). This may appear a more elegant expression, but it reduces to the former when used to evaluate a practical example.

References

1. Robert J. T. Bell, *An elementary treatise on coordinate geometry of three dimensions* (2nd edition). Macmillan (1912).
2. George Salmon, *A treatise on the analytic geometry of three dimensions*, Volume I (6th edition). Longman, Green (1914).
3. E. A. Maxwell, *Coordinate geometry with vectors and tensors*. Oxford University Press (1958).
4. C. E. Weatherburn, *Elementary vector analysis*. Bell (1939).

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The first geoboard

DEAR MR QUADLING,

In his article "Diderot and the geoboard" (*Mathl Gaz.* **62**, 116–118), John Glenn ascribes to Diderot the invention of the geoboard, as an extension of Saunderson's pinboard described in a *Memoir* prefaced to his *Elements of algebra* (1740). The relevant passages from the article are the following:

(a) "How about the geoboard? It is nowhere mentioned in the *Elements*, and appears to have been thought of by Diderot himself as an extension of the tactile code described in the *Memoir* . . ."

(b) "Diderot repeats this description of the pinboard from the *Memoir* and adds that the same apparatus served to demonstrate geometrical figures by arranging pins in lines. He then takes the decisive step and writes: 'Similarly instead of forming entire lines with his pins, he is content with putting them at vertices and points of intersection. Round these he passes silk threads to form the outlines of the figures.'"

(c) "Diderot's invention and description of the geoboard seems to be part of his plan to plant the famous blind mathematician on to the reader as one who had been known to the writer as a holder of the heretical views expounded, . . ."

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Unfortunately these statements are all incorrect: Diderot seems to have read the *Elements* with greater care than the author of the article. On p. xii, in the section devoted to *Memoirs of the Life and Character of Dr Nicholas Saunderson*, we read as follows:

"I wish I were capable of entertaining the Curious with the many Contrivances he had, to supply his Defect of Sight. He had a Board made with Holes bored the equal Distance of half an Inch from each other: Pins were fixed in them, and by drawing a Piece of Twine round their Heads, he could more readily delineate all rectilinear Figures used in Geometry, than any Man could with a Pen."

Further, on p. xxiv, in the section devoted to *Dr Saunderson's Palpable Arithmetic Decypher'd*, we read as follows:

"But besides this Arithmetical Use of his Table, which was indeed its principal and primary Use, he could describe upon it very neat and perfect Geometrical Figures, consisting of right Lines, any how intersecting one another, of which I have seen some Instances. This he did in two ways, either by Pins set in Rows, which exhibited the appearance of pricked Lines; or by Pins placed only at the Intersections. Then by winding a Piece of fine Thread or Silk about their Heads, he could very well exhibit any continued strait Lines at pleasure, or any System of such Lines."

Yours sincerely,

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Reviews

International Mathematical Olympiads 1959–1977, compiled with solutions by Samuel L. Greitzer. Pp xi, 204, £4. 1978. SBN 0 88385 627 1 (Mathematical Association of America/Wiley)

This book is No. 27 of the American Mathematical Association's *New Mathematical Library*. Already in this library are three books of problems from the Annual High School Examinations and two based on the Hungarian Eötvös competitions. The enthusiasm and drive of the author were responsible for the USA's first entry of a team to the International Mathematical Olympiad in 1974, and "as ingenious problem-solver and devoted coach" he saw his team of eight high-school competitors win the competition in 1977.

The book contains the IMO papers from the first year, 1959, to 1977†. A previous collection of IMO problems was issued in German at the 1974 IMO in the GDR. The US publication is more robust. The matter is excellently set out. It starts with an Editor's Note commending the author and the value of problem-solving. An Author's Preface then gives some account of the IMO and acknowledges the generous support of sponsors—the National Science Foundation, US Army and Navy and various large private-enterprise concerns. This support provides not only for travelling expenses to IMOs but also for 3-week training sessions conducted by the author and Professor Murray Klamkin, who sets the US national Olympiad.

The problems then follow. In some places the original English wording has been improved. The marks per question and the countries which originated the problems are not given as they were in the German collection. Neither are the participating countries, marks or prizes.

The solutions occupy the major part of the book. A great deal of value can be got by studying these solutions and the comments accompanying them. References to textbooks are

† The 1978 IMO papers and brief solutions can be had from the Leicester office of the Mathematical Association.