CORRESPONDENCE.

To the Editor of the "MATHEMATICAL GAZETTE."

SIR,—Many thanks for your courtesy in sending me the draft report of the Committe on Geometry. I venture to say that it seems to me to be, on the whole, on sound lines. It would be presumptuous on my part to pass judgment on the details of any such scheme; as, for the last twenty-five years, I have had no direct connection with scholastic work; I have been employed only in cases where school methods had failed to convey any comprehension of mathematical procedure. My chief work, however, has consisted in investigating the causes of such failures with the help of medical practitioners, who are studying the laws of normal mental action by the aid of the formula known as "Boole's Equation," and the mathematical analysis of normal thought-sequence. It is gratifying to find that educational authorities are inviting the attention of the public to methods of teaching which store mental power and nerve-stamina, instead of scattering them at random for the mere purpose of producing a showy and false appearance of precocious knowledge.—Yours respectfully, MARY EVEREST BOOLE.

SOLUTION.

391. [K. 20. e.] *In any triangle prove that*

$$(a+b-2c)^2\sec^2\frac{C}{2}+(a-b)^2\operatorname{cosec}^2\frac{C}{2}=(b+c-2a)^2\sec^2\frac{A}{2}+(b-c)^2\operatorname{cosec}^2\frac{A}{2}$$

$$=(c+a-2b)^2\sec^2\frac{B}{2}+(c-a)^2\operatorname{cosec}^2\frac{B}{2},$$

and interpret geometrically. E. N. BARISIEN.

Solution by C. E. YOUNGMAN.

Suppose $a<b<c$. On BC, CA, AB, take $BD=c$, $CE=a$, $AF=b$: and again on CB, BA, AC, take $CD'=b$, $BF'=a$, $AE'=c$. This makes $CD=c-a$, $CE'=c-b$, and so on. Project DE' on the bisectors of the angle C; one projection is $(CD-CE')\cos\frac{1}{2}C$, and the other $(CD+CE')\sin\frac{1}{2}C$;

$$\therefore\ DE'^2=(a+b-2c)\sin^2\tfrac{1}{2}C+(a-b)^2\cos^2\tfrac{1}{2}C;$$

$$\therefore \text{ the first of the given expressions}=DE'^2\sec^2\tfrac{1}{2}C\operatorname{cosec}^2\tfrac{1}{2}C$$

$$=4DE'^2\operatorname{cosec}^2 C=\text{sq. on twice the diameter of the circle } CDE'.$$

Hence the assertion is that the circles CDE', AEF', BFD' are equal; or that

$$DE':EF':FD'=\sin C:\sin A:\sin B=AB:BC:CA.$$

To prove this, let $E'F$ meet BC at L. We have $BE'\parallel CF$;

$$\therefore\ E'L:LF=BL:LC=BE':CF=AB:AF=c:b$$

$$=BD:CD'=BD-BL:CD'-CL$$

$$=DL:LD';$$

$$\therefore\ DE'\parallel FD';\quad \text{and}\quad DE':FD'=c:b.$$

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