the straight line law, and drawing to scale. One, however, is rather staggered to find, when only half-way through an Arithmetic, that one is expected to be able to follow the proof of the formula for the volume of a frustum of a cone or of the area of a zone on a sphere.

Part IV starts with contracted methods. This is the only serious fault I can find with the book. *This should have been in the first book.* Mr. Abbott had the chance of a generation to show England how Arithmetic should be taught. He starts with measurement, *essentially approximate*, and—the inference is obvious—left to right multiplication, upper and lower limits,* and his last chapter examples on practical and squared-paper work on gradients and rates of increase. Had this been done, I am confident that in ten years time you would enter few schools in England without seeing an Abbott on the desks ; and mathematical teachers would owe him a debt hard to repay.

J. M. CHILD.

CORRESPONDENCE.

THE EDITOR OF THE *Mathematical Gazette.*

DEAR SIR,—I have read with much interest Mr. Lodge's article in No. 116 of the *Gazette*, pp. 39-41. In an article published in 1907, in the *Annaes da Academia Polytechnica do Porto*, vol. 2, I proposed the following method for calculating the radius of curvature ρ at any point Ω of any curve C. Let ΩA, ΩB, the tangent and normal respectively at the point Ω, be taken as coordinate axes, and let ξ, η be the coordinates with respect to these lines of a point close to Ω (on one of the branches meeting at Ω) ; we then have

$$\rho = \underset{\xi=0}{\mathrm{L}} \frac{\xi^2}{2\eta}.$$

I showed how easily the method may be applied, giving as examples the folium of Descartes, the strophoid, the conchoid of Sluse, Maclaurin's trisectrix, the conchoid of Nicomedes, Pascal's limaçon, and all the Rhodoneae. My results were also published in the second edition of my *Specielle algebraische und transcendente ebene Kurven.*

This letter is not written for the purpose of claiming priority, but with the object of drawing the attention of the readers of the *Gazette* to a simple and general method which, if I am not mistaken, may often be found useful. —Yours sincerely,

GINO LORIA.

Genoa, April 14, 1915.

DEAR SIR,—Dr. T. J I'a Bromwich has kindly pointed out to me that my note on "Singular solutions of differential equations of the second order," in the December number of the *Mathematical Gazette*, is seriously in error.

Firstly, the condition $$\frac{\partial F}{\partial x}\,\frac{\partial^2 F}{\partial y\,\partial t} = \frac{\partial F}{\partial y}\,\frac{\partial^2 F}{\partial x\,\partial t}$$

is the condition for super-osculation (not osculation) as a rule. The proof of this statement is given in the *Quarterly Journal*, 34 (1902), p. 98, by Bromwich and Hudson. The process I suggested gives singular solutions, but the proof needs modification.

Secondly, the statement that curves "1 and 2 meet at P, which is consecutive to Q and R," is not necessarily true ; and is, for example, not true in Ex. 2 of my paper, as Dr. Bromwich points out. In fact, the use of the word "consecutive" is always fraught with danger !—Yours faithfully,

HAROLD HILTON.

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* See Carson, *Mathematical Education*, page 53 *et seq.*