HADAMARD'S GEOMETRY.

Leçons de Géométrie élémentaire. Par JACQUES HADAMARD. Paris, Colin et Cie. 8vo, xvi+308 pp.

THE writing of good books for school use is, one can readily imagine, not an easy matter in so old a science as mathematics. On the one hand is a vigorous tradition, on the other the desire to effectively prepare the way for a real knowledge of the modern science. It is, then, good for us to be able to obtain an authoritative indication of the French point of view, from the series of elementary text-books now being published under the direction of M. Darboux.

M. Hadamard contributes a book on plane geometry which is intended for such beginners as expect to pursue serious studies in mathematics. While retaining the accepted view that the training in reasoning is especially to be kept in mind, he contrives, by selection and arrangement of matter, and by style, to let appear the intrinsic fascination of geometry. The rules of the game do not spoil the game itself; and these rules are explained, not dogmatically stated.

The work begins with a short introduction. Then follow books on the straight line, on the circle, on similitude, and on areas. The third book is followed by an important section headed Compléments du Livre III, which contains the bulk of the post-Euclidian part such as the theories of anharmonic ratios, pole and polar, and inversion. It would seem more convenient to call this section Book IV. Other modern ideas, for instance the displacement of a figure or the radical axis, are worked into the books themselves.

The whole, so far, is divided into chapters of proper length. Then come four valuable notes on methods in geometry, on Euclid's postulate, on the circles touching three given circles, and on the notion of area. Of exercises and problems there are 422.

What appears of the body of Euclid's doctrine is freely scattered; it reminds us (if we may say so) of a royal mummy used for fertilization.

One feature which is especially admirable is that when the author passes from the strict geometrical reasoning on the figures themselves to arithmetical reasoning he emphasizes the transition; thus the beginner realizes the difference.

We may make one small objection. The circle is said to be a *region*; the circumference being the boundary line, as in Euclid. This usage is not retained in later life and might well be given up. It is not used consistently throughout the book, the circle being spoken of where the curve is intended.

Enough has been said, we hope, to show, without insisting on details, the value of the work to the teacher. Even the rigid Euclidian would find side-lights on the meaning of the old classic; perhaps more than in many school editions.

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FURTHER NOTE ON EULER'S USE OF *i* TO REPRESENT AN IMAGINARY.

IN a communication recently received from M. Eneström he gave it as his impression that attention was called to Euler's use of i for $\sqrt{-1}$ some years ago in the *Zeitschrift für mathematischen und naturwissenschaftlichen Unterricht.*

On investigation I find that one of the principal passages quoted by me in the March number of the BULLETIN was referred to by Heymann and Ackermann in this *Zeitschrift*, vol. 17 (1886), pp. 509, 580.

A careful examination of such of Euler's memoirs as are found in the library of the United States Naval Observatory, undertaken at my request by Mr. George K. Lawton, has revealed no other papers, either before or after 1777, in which Euler uses i for $\sqrt{-1}$.

Further information would be gladly welcomed.

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