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On the Foundations of Dynamics.

By Dr PEDDIE.

Note on a Theorem in connection with the Hessian of a Binary Quantic.

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Extension of the "Medial Section" problem (Euclid II:11, VI:30, etc.) and derivation of a Hyperbolic Graph.

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To divide the straight line AB (containing a units) at C so that AB.BC=p.AC².

§Ι.

By algebra, taking the positive root,

$$AC = \frac{AB}{2p}(\sqrt{4p+1}-1),$$
 . . . (1.)

The number p may therefore have any positive value, integral or fractional, and when negative cannot exceed $\frac{1}{4}$. Secondly, AC and AB are incommensurable except when 4p+1 is a square :-e.g., if 4p = (q-1)(q+1) or if p = q(q+1), q being any positive integer or fraction.

To find the surd-line $\sqrt{4p+1}$ geometrically is the heart of the problem. *Euclid* solves it (II:11) when p=1 by I:47, which is also used in Ex. i., ii., iii. following; but II:14 will sometimes be easier. Since equation (1.) becomes $AC = \sqrt{4p+1} - 1$, if AB = 2p, *i.e.*, if the unit line is $\frac{AB}{2p}$ or $\frac{AM}{p}^*$, we construct thus:—