



Review

Author(s): Allan Cunningham

Review by: Allan Cunningham

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In the case of the top, with the usual notation

$$\begin{aligned} I_1 &= A & I_2 &= I_3 = B, \\ l_1 &= \cos \theta & l_2 &= \cos \left(\frac{\pi}{2} + \theta \right) & l_3 &= 0, \\ \Omega_1 &= \omega & \Omega_2 &= \sin \theta \dot{\phi} & \Omega_3 &= -\dot{\theta}. \end{aligned}$$

The great value of the book is not however affected by such comparatively small matters as these, and the work will take its place as one of the most useful to which a teacher of elementary rigid dynamics can refer for aid in presenting this difficult subject. C. S. JACKSON.

Tablettes des Cotes relatives à la base 20580 des facteurs premier d'un nombre inférieur à N et non divisible par 2, 3, 5, ou 7. Par GASTON TARRY. 2 pp. Text, 6 pp. Tables. 1. Svo. Paris, Gauthier-Villars, 1906.

These tables form a very ingenious and highly compact apparatus for detecting the divisors $\nless 313$ of any number N . Taking as "base" $b = 2 \cdot 3 \cdot 5 \cdot 7^3 = 20580$, the "character" (cote) of a number k relative to a prime modulus p (> 7) is defined as the *least* residue (\pm) of ka to mod. p , where $ab = +1 \pmod{p}$. Two tables of "characters" are provided. The main table is that of the characters of r to mod. p , where $r < 2 \cdot 3 \cdot 5 \cdot 7 = 210$, and covers two large 8vo pages. The second table gives the characters of $210q$ to mod. p , where $q \nless 49$, covers four such pages, and is pierced with long narrow slits of the width of a column. Each prime modulus p has a line to itself; thus each table has 60 lines on a page, i.e. one line for each of the 60 primes from 11 to 313.

The number N to be factorised is to be expressed in the form $N = mb \pm (210q + r)$, in such a way that the residue $(210q + r)$ shall be $< \frac{1}{2}b$; here r is $+$ and < 210 . Taking q, r as arguments (these are the numbers at the heads of the columns in the q - and r -tables), the q -table is to be placed over the r -table with the q -column alongside the r -column, the figures in which will be visible through the slits. Denoting the "characters" of $210q$ and r by the letters Q, R , (these are the entries in the q - and r -columns) the adjacent entries Q, R are to be compared throughout the whole length of the q - and r -columns. The points to be examined are (under certain rules as to signs of Q, R, m).

1. If $Q \sim R = \pm m$; 2. If $Q + R = m$; 3. If $Q + R + m = p$.

In any of these cases p must be a divisor of N , and not otherwise. This arrangement is certainly very ingenious: the actual trial division by a divisor (p) is here replaced by an examination of the three simple conditions above. The original expression of the number N in the form $N = mb \pm (210q + r)$ is the *only* computation required, when $m \nless 5$, i.e. when $N \nless 113030$. With larger numbers (N), some of the prime moduli (p) will be $< 2m$: in such cases m is to be replaced by its least residue to mod. p , in the three conditions above.

As at present prepared the tables extend only to 60 lines (for 60 primes), i.e. up to $p = 313$: to be of any great practical use they would require to be greatly extended. Their chief merit would appear to be in their great compactness, as they are of course not so easy to use as the ordinary tables. Their extension will evidently involve great labour, and will therefore be costly: also, there will be great risk of error as the "characters" are quite artificial numbers. The sheets of the q -tables being pierced with five long slits, running the whole length of the printed matter, are somewhat delicate, and will need care in handling: this is a decided practical drawback.

ALLAN CUNNINGHAM, Lt.-Col., R.E.

Geodasie. PROF. DR. A. GALLE. Leipzig. G. J. Goschen. 1907. Pp. vii, 284. Price, 8 marks.

The mathematical principles of topographical surveying as distinguished from the details of the construction and use of topographical instruments are carefully set forth by Professor Galle. Special attention is given to the "three point problem" to the application of photography to surveying, and to the effect on final results of errors in observed quantities. A teacher desirous of making trigonometry "practical" would find much to interest him in this volume of the "Sammlung Schubert."

C. S. J.