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W. J. C. MILLER

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WITH THEIR

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$\cos a \cos A,\quad \cos b \cos B,\quad \cos c \cos C,\quad \cos a \cos b \cos c,\quad -\cos A \cos B \cos C,$

one is negative, the other four being positive. In the solution of such triangles, what parts must be given that the affections of the remaining three can be determined by this theorem? 89

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they will intersect on $\frac{U}{(b-c)^2} + \frac{V}{(c-a)^2} + \frac{W}{(a-b)^2} = 0,$

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$$\frac{1}{n}\cdot\frac{1}{2m+n}-2m\cdot\frac{1}{n+1}\cdot\frac{1}{2m+n-1}+\frac{2m(2m-1)}{1\,.\,2}\cdot\frac{1}{n+2}\cdot\frac{1}{2m+n-2}-\&c.,$$

where m is a positive integer, and the $(r+1)^{\text{th}}$ term is

$$(-)^r\frac{2m(2m-1)\ldots(2m-r+1)}{1\,.\,2\,.\,3\ldots r}\cdot\frac{1}{n+r}\cdot\frac{1}{2m+n-r}.$$ 32

5787. (W. J. C. Sharp, M.A.) — From an ordinary point on a quartic five straight lines can be drawn so as to be cut harmonically by two curves. How far is this modified when the point is a node? 31

5945. (W. J. C. Sharp, M.A.)—From a double point on a quintic, a triple point on a sextic, or a p^{ic} point on a $(p+3)^{\text{ic}}$, prove that a limited number of lines can be drawn so as to be harmonically cut by the curve. (This is an extension of Question 5787, which may be extended to surfaces as follows):—Through an ordinary point on a quartic surface lines may be drawn so as to be cut harmonically by the surface; the points of section will trace out a quintic curve on the surface............. 31

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7040. (Rev. T. R. Terry, F.R.A.S.)—If p and q be two positive integers such that $p > q$, and if r be any positive integer, or any negative integer numerically greater than p, show that

$$1-\frac{q}{p-q+1}\cdot\frac{r}{p+r-1}+\frac{q(q-1)}{(p-q+1)(p-q+2)}\cdot\frac{r(r-1)}{(p+r-1)(p+r-2)}-\&c.$$
$$=\frac{p-q}{p}\cdot\frac{p+r}{p-q+r}.$$ 98

7155. (T. Woodcock, B.A.)—If P, Q be the points in which the plane through the optic and ray axes intersects the circle of contact PQ of a tangent plane perpendicular to an optic axis of the wave surface of a biaxal crystal, and if a, c, the greatest and least axes of elasticity, be given; prove that, O being the centre of the wave surface, (1) the triangle POQ, (2) the circle of contact PQ, (3) the angle POQ will have their greatest values respectively, when the square of the mean axis b is (i.) the arithmetic, (ii.) the geometric, (iii.) the harmonic mean of a^2 and c^2; and the cone whose vertex is O and base the circle PQ will have its maximum volume when $b^2 = \frac{1}{6}\left[a^2+c^2+(a^4+14a^2c^2+c^4)^{\frac{1}{2}}\right]$. 46

7159. (R. Knowles, B.A., L.C.P.) — In a parabola whose latus rectum is $4a$, if θ be the angle subtended at the focus S by a normal chord PQ, prove that the area of the triangle SPQ $= a^2 \cot \frac{1}{2}\theta\,(\tan \frac{1}{2}\theta + 4 \cot \frac{1}{2}\theta)^2$. 64

7194. (Professor Wolstenholme, M.A., Sc.D.)—In the examination for the Mathematical Tripos, January 2, 1868, Question (6) is as follows:—"If there be n straight lines lying in one plane so that no three meet in one point, the number of groups of n of their points of intersection, in each of which no three points lie in one of the n straight lines, is $\frac{1}{2}(n-1)$." Prove that this is not true; but that, if "n-sided polygons" be written for "groups of n points, &c.," the result will be true: and calculate the correct answer to the question enunciated. ... 57

7230. (The Editor.)—On a square (A) of a chess-board, a knight is placed at random: find the probability that it can march (1) from that square (A) to a given square (B), as, for example, to one of the corner-squares, within a moves; and (2) over b squares in less than c moves, for instance, over the four corner-squares of the board. 70

7236. (The Rev. T. W. Openshaw, M.A.)—On AB, a chord of an ellipse, as diameter, a circle is drawn intersecting the ellipse again in C, D; if AB, CD are parallel to a pair of conjugate diameters: show that the locus of their intersection is $b^2x + a^2y = 0$................................ 44

7247. (Dr. Curtis.) — Two magnets, whose intensities are I_1, I_2, and lengths a_1, a_2, are rigidly connected so as to be capable of moving only in a horizontal plane round a vertical line, which passes through the middle point of the line connecting the two poles of each magnet; if $2a$ denote the angle between the lines of poles of the two magnets in the