To draw a parabola, given its vertex, axis and one point; thence to draw it, given the axis and two points at different distances from the axis.

Intersections of Conics, straight lines and othe[illegible]

Contact. Circle of curvature; $2\rho$ as limit of $\frac{y^2}{x}$ or $\frac{y^2}{x \sin \theta}$

$\therefore \rho = \frac{2a}{\sin^3 \theta} = \frac{N}{\sin^2\theta} = \frac{N^3}{SL^2}$; thence construction of radius of curvature, and evolute.

Intersection of circle and conic, equal inclinations of opposite chords; thence construction of radius of curvature, § 208.

Ellipse.—Chapter IX, X, omitting § 205.

Equation found from the definitions of an ellipse as the projection of a circle, as described by the trammel, and as $r + r' = 2a$, instead of that given in Todhunter. Geometric properties proved from the definition $r + r^1 = 2a$, as follows: Construction of a tangent; its equal inclinations to the focal distances; locus of the foot of the perpendicular from the focus. $pp' = b^2$; $\frac{p}{p'} = \frac{r}{r'}$; $p^2 = \frac{b^2 r}{r'}$.

Equations to tangent and normal. Points where the tangent cuts the axes.

Locus of intersection of tangent with the perpendicular at the focus to the radius vector; locus of intersection of tangents at the extremities of a focal chord; proof of Todhunter's definition of an ellipse; the straight lines $ae$, $a$, $\frac{a}{e}$; $r = a \pm ex$. Polar equation referred to both focus and centre: The length $e^2x'$ both analytically and geometrically.

Equation at the vertex becomes a parabola if $e = 1$ or $a = \infty$. Latus rectum $= 2\frac{b^2}{a} = 2e\left(\frac{a}{e} - ae\right)$, compared with parabola. $e$ is the tangent of the inclination of the tangent from the foot of the directrix. Other properties compared with the parabola. Relation $p^2 = a^2 \cos^2 \alpha + b^2 \sin^2 \alpha$ for perpendicular from centre on tangent; thence locus of intersection of perpendicular tangents.

The eccentric angle; $x = a \cos \theta$; $y = b \sin \theta$. Locus of a point obtained by measuring $\frac{a+b}{2}$ at an inclination $\theta$ and then $\pm \frac{a-b}{2}$ at $-\theta$

Diameters investigated analytically as for parabola (alternative with § 187.) Conjugate diameters as the projections of two perpendicular diameters of the auxiliary circle; hence the