

the parts of the system. Converse of this principle. Applications of the principle of Virtual Velocities. If any system of particles be in equilibrium under the action of gravity, their centre of gravity is (generally) in a highest or lowest position; in the former position the equilibrium is unstable, in the latter stable. Condition for stability of a heavy curved body resting on a horizontal plane; also of a flat body on a rough surface. Elementary proof that the ends of a chain over a smooth pulley must rest in a horizontal plane, but in unstable equilibrium. Pressure on a curve produced by a string of given tension, wrapped round it. Relation between the tensions at the extremities of a string passing round an arc of a rough curve; application to obtain the advantage of passing the fall three times round the windlass of a gyn. Parabolic curve of the suspension bridge with vertical rods. The common catenary; its equation, length of arc, tension at any point, similarity to a parabola near the vertex; position of equilibrium of a heavy chain resting over two smooth pegs. Suspension rods of equal strength, equation to bounding curve. Catenary of equal strength. The problem of the traction of a carriage; the point of contact between the axle and the pipe-box; the angle of draught. The forces acting on a field gun carriage at the moment of discharge.

SECTION Q.

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Dynamics (Todhunter's Mechanics for beginners).—Harder questions on the obligatory course. Loss of Vis Viva after impact, § 108. Motion in a circle or conic section to be read over only, more advanced proofs being furnished. Chapters XIV, XV. Kepler's laws, § 178.

Notes.—The differential equations of motion. Application to rectilinear motion under the action of a force, (1) constant; (2) varying as the distance; (3) varying inversely as the square of the distance. Law of attraction outside and inside the attracting body. Simple harmonic motion. Motion of a heavy chain, (1) hanging over a smooth pulley, (2) placed with part hanging over a smooth table. Body moving vertically on a resisting medium, the law being as the square of the velocity; rectilinear motion, neglecting gravity, the law of resistance being as the cube of the velocity. Curvilinear motion, the parabola of projection. Given the general equations of motion in two perpendicular directions, to find the tangential and normal accelerations, also the equation of Vis Viva. Equal areas are described in equal times, under the influence of a central force. If the force varies as the inverse