Join **OT** cutting **AB** in **M.** Then **BM** is perpendicular to **OT.** Hence, **OBT** being a right-angled triangle, and **BM** being the perpendicular on the hypotenuse, **OM . OT** = **OB**². (Bk. III., 12, Cor. 1.)

Again, the angles at **M** and **N** being right angles, a circle may be described to pass through the points **P, M, T, N.** Therefore

$$OP \cdot ON = OM \cdot OT = OB^2 = (\text{radius})^2.$$

But the radius is constant, and **OP** is constant; therefore **ON** is constant.

Hence as **AB,** the chord through **P,** takes different positions, and in consequence the position of **T** varies, **N,** the foot of the perpendicular from **T** on **OP,** remains fixed. Therefore the locus of **T,** *i.e.*, the polar of **P,** is a straight line **TN** perpendicular to **OP** and passing through the fixed point **N,** which is determined by the relation $OP \cdot ON = (\text{radius})^2$.

Hence having given the pole **P,** to construct the polar,—(1) if **P** be within the circle, draw a chord through **P,** perpendicular to **OP,** and at its end draw a tangent meeting **OP** in **N**: the line through **N,** perpendicular to **OP** is the polar; (2) if **P** be without the circle, draw a tangent from **P**: the line through the point of contact, perpendicular to **OP,** is the polar. These constructions suggest the method of constructing for the pole, when the polar is given.

It will be noted that when the pole is within the circle, the polar does not cut the circle; and when the pole is without the circle, the polar cuts the circle.

The polar of **P** may conveniently be denoted by enclosing **P** in brackets,—**(P).**

Since the polar is at right angles to the line joining the centre to the pole, therefore the angle sub-