

and also the equivalent expressions—

$$R^2 = P^2 + Q^2 + 2 P Q \cos (P, Q)$$

$$P^2 = Q^2 + R^2 + 2 Q R \cos (Q, R)$$

$$Q^2 = R^2 + P^2 + 2 R P \cos (R, P)$$

Polygon of
Forces.

30. Polygon of Forces.

If Forces acting on a point be represented in magnitude and direction by the sides of a polygon, taken in order, they will keep the point at rest.

For if $ABCDEF$ be the polygon, the forces AB, BC , have for their resultant AC ; and the resultant of this and CD is AD ; and so on till we come to the last side which is equal and opposite to the resultant of all the previous ones.

Hence the proposition, as well as its converse, is established.

31. In this way, the Resultant of any number of Forces at a point can be constructed geometrically; for, having drawn consecutive lines, so that, taken in order, they are parallel to, in the same direction with, and proportional in magnitude to, the forces; the line drawn to complete the polygon will represent in magnitude and in reversed direction the Resultant required.

It may be noticed that the Polygon referred to need not be a *plane* one, neither are re-entering angles or crossed sides excluded.
