

But if BAC be not parallel to bac , let them meet in O . Then, O being a point in the plane of the forces, the moment of R round O is equal to the sum of those of P and Q round it, and therefore

$$R. OA = P. OB + Q. OC.$$

But by similar triangles

$$\frac{Aa}{OA} = \frac{Bb}{OB} = \frac{Cc}{OC}$$

and therefore

$$R. Aa = P. Bb + Q. Cc,$$

moments of
the Forces.

which proves the proposition for this case, and the proof holds good also for the cases where the forces or their moments are in opposite directions, having due regard to algebraic sign.

Any number
of parallel
Forces have
in general a
single Resultant.

42. *Any parallel Forces, acting on a rigid system, are either reducible to a couple or else to a single Resultant Force which acts in a parallel direction, its magnitude being the algebraic sum of the magnitudes of all the Forces, and its moment about any assumed line perpendicular to their direction, being equal to the algebraic sum of the moments of all the Forces about this line.*

Taking any two of the forces (which do not form a couple), we find their Resultant, which acts in a parallel direction, its magnitude being the algebraic sum of their magnitudes, and its moment, about any assumed line perpendicular to the direction of the forces, being equal to the algebraic sum of their moments about this line: combining this Resultant with any third force to form a new Resultant, and this again with a fourth, and so on as in § 37, we arrive at last either at a couple or a single Resultant Force acting in a parallel direction, its magnitude being equal to the algebraic sum of the magnitudes of all the Forces, and its moment about the assumed line being equal to the algebraic sum of all their moments about this line.