

47. Also, if the centre of gravity of a system be supported or fixed, the system will balance about this point in all positions under the sole action of the weights of the parts of the system, these being rigidly connected with each other and the centre of gravity, and this is sometimes made the definition of the *centre of gravity*.

System
balances
about in all
positions:

48. The position of the centre of gravity relative to a given system will be determined from the consideration, that, placing the system so that any given line in it shall be horizontal, and equating the moment of the whole weight collected at the centre of gravity with the moments of the several weights of the particles about this line, the distance of the centre of gravity from the vertical plane passing through this line will be found. Taking thus three planes in succession intersecting in a point, the distances of the centre of gravity from each of these planes can be found, and its position therefore determined.

How found.

49. Since the position of the centre of gravity in the system depends on the relative and not the absolute weights of its parts, this position will not be affected by increasing or diminishing proportionally these weights.

50. If a rigid body be of uniform density: that is, if the weight of a given volume of its substance be the same in every part of the body; then, if there be a line about which the form of the body is symmetrical, the centre of gravity will be in that line; and if there be two such lines, the centre of gravity will be their intersection. Thus the centre of gravity of a circle or sphere is the centre; of a parallelogram or parallelepiped, the intersection of its diagonals; of a regular prism or cylinder, the middle point of its axis.

Of a uniform
body.

51. If a uniform body balance in every position about a line, the centre of gravity lies in that line; and if about two such lines separately, it will be their intersection. Thus a triangular area will balance about a line drawn from one angle to bisect the opposite side, for the triangle can be generated by a line moving parallel to one side, and the small area generated at any stage of its motion will balance about the line