

8. From the definitions laid down, it will be observed that three elements enter into every Force: (1), its point of application, or the particle on which it acts; (2), its direction; (3), its magnitude. When these are known, the force is fully determined.

9. The following is the fundamental law, deduced from experiment, on which the Science of Statics is based: Experimental Law.

*If two equal forces act respectively on two particles, which are rigidly connected, in the line joining them but in opposite directions, they will counterbalance.*

Hence, either of these forces may be transferred to the other particle, preserving the same direction, without alteration of its statical effect; or:

*"A force may be supposed to act at ANY point in its own line of action, the new point of application being rigidly connected with the former one; and in this latter form the law is frequently stated.*

10. The following consequences may be noted:

When a pressure is communicated by means of a straight rigid rod in direction of its length, the pressure is wholly effective in this direction and may be supposed to act at any point of the rod.

When an inextensible string is stretched straight by a force at each end, these two forces must be equal, and their magnitude is independent of the length of the string. Also at every point of the string there are acting along it, in opposite directions, two forces equal to the former, and either of these is called the *tension* of the string, which is thus uniform throughout its whole length. The same is true when the string (if it be perfectly flexible) is stretched over a *smooth* surface. Tension of a String.

A *smooth* surface is one which can exert a pressure at any point of it, only in direction of the normal at that point.