

Equilibrium achieved by book support

Kee Hong Soon

Models

Equilibrium is reached when the net forces and the net torque/ moment acting on an object equal to zero, and the objects is not moving. It is obvious that the books in figure 1 are unstable and it can easily collapse with some forces acting on it. The collapse situation is shown in figure 2.



Figure 1



Figure 2

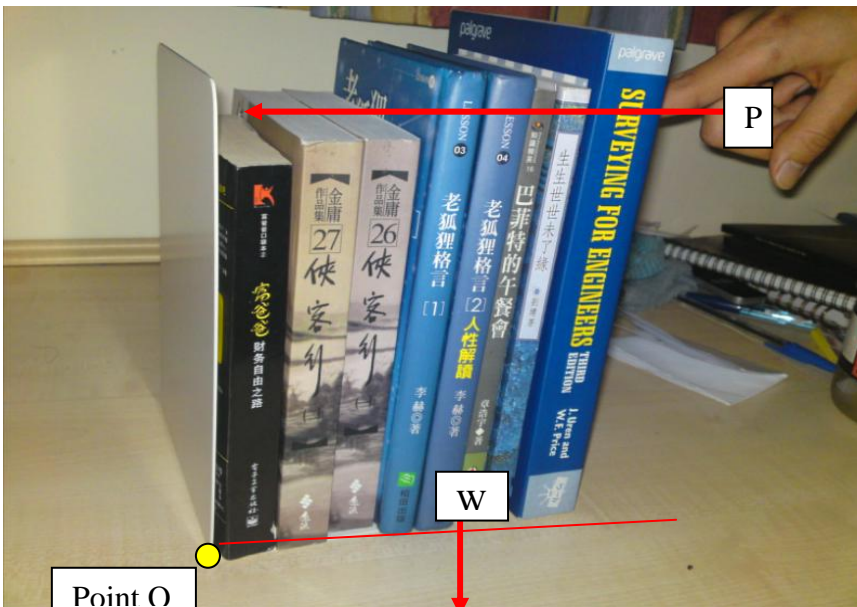


Figure 3

An equilibrium state can be achieved by putting a book support as in Figure 3. If take momentum at Point O, the force P is creating an anti-clockwise moment at point O but it is counter by another clockwise moments created by the weights of books. It is proved that the book support doesn't have to be thick but is the design of the book support to make the books in a stable equilibrium state.

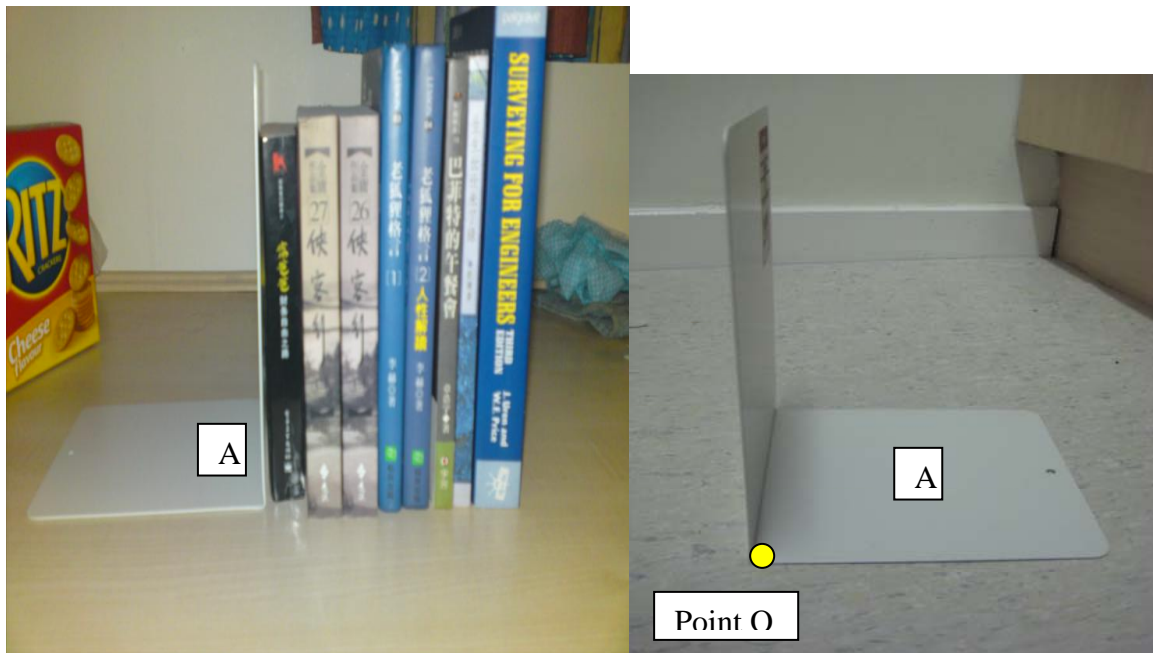


Figure 4

It can also explain in the way of use in figure 4. The plate is actually making the base larger and lower the centre of mass. It reduce the distribution of mass and decrease the chance of overturning cause by force applied because the centre of gravity is within the base.