Example 3.3.3 What is the perpendicular force produced at the end of a 45.0 cm lever if the moment of force acting on the lever is 250 N.m?

$$F = \frac{M}{d} = \frac{250}{0.450} = 556$$

The perpendicular force applied to the lever will be 556 N.

Example 3.3.4 What perpendicular force is necessary to produce a 55.0 N.m moment of force on a torque wrench that has a 25.0 cm handle?

$$F = \frac{M}{d} = \frac{55.0}{0.250} = 220$$

The necessary force on the torque wrench is 220 N.

Example 3.3.5 Compute the moments of force about axes at A produced by the forces depicted in figure 3.14.

(a) Since the box is a rigid body we can slide the force vector to D and compute the moment as,

$$M_A = F\,d$$
$$= 220 \times 35.0 = 7700$$

Therefore, the moment of force is 7700 N.cm or 77.0 N.m in the positive direction.

(b) Note that the moment caused by the load at B is negative and the moment caused by the fulcrum at A must be zero. Thus,

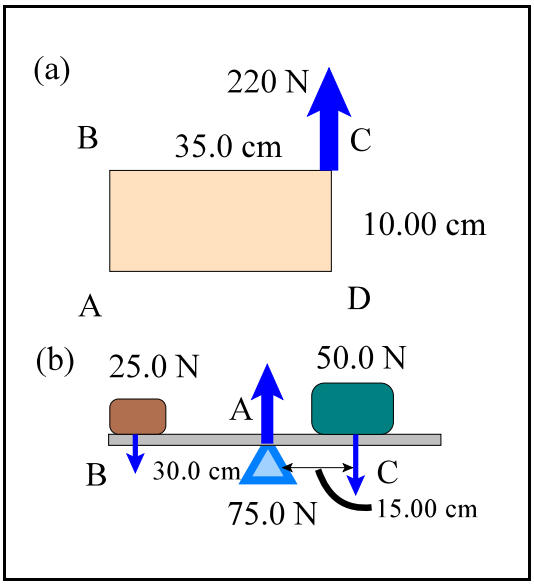

Figure 3.14 Example 3.3.5

$$M_A = F_A d_A + F_B d_B - F_C d_C$$
$$= (75.0 \times 0.0) + (25.0 \times 30.0) - (50.0 \times 15.00)$$
$$= 0.00 + 750 - 750 = 0.00$$

The moment is therefore equal to zero. Since the forces sum to zero as well the lever is in static equilibrium.