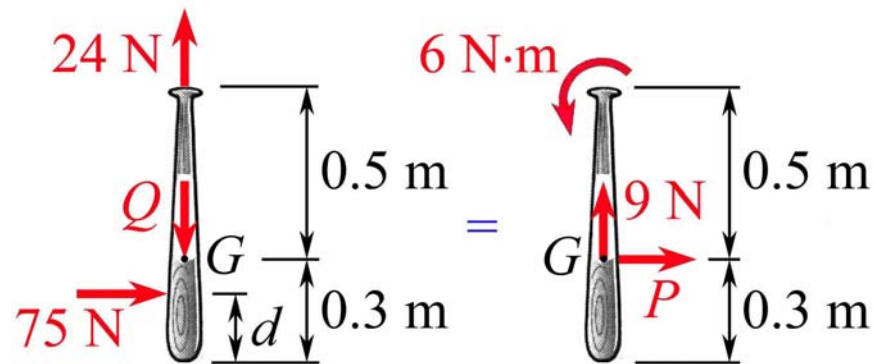The two force systems acting on identical baseball bats, as shown, are to be equivalent. Determine (*a*) the magnitudes *P* and *Q* of the unknown forces acting at point *G* of the bat, (*b*) the distance *d*.

$\mathbf{R} = \mathbf{R}'$:

$$75\mathbf{i} + (24 - Q)\mathbf{j} = P\mathbf{i} + 9\mathbf{j}$$

i: $75 = P$ $\qquad\qquad\qquad \therefore$ $P = 75 \text{ N}$ ③

j: $24 - Q = 9$ $\qquad\qquad \therefore$ $Q = 15 \text{ N}$ ③

$\mathbf{M}_G^R = \left(\mathbf{M}_G^R\right)'$:

$$75(0.3 - d)\mathbf{k} = 6\mathbf{k}$$

k: $75(0.3 - d) = 6$ $\qquad \therefore$ $d = 0.22 \text{ m}$ ④