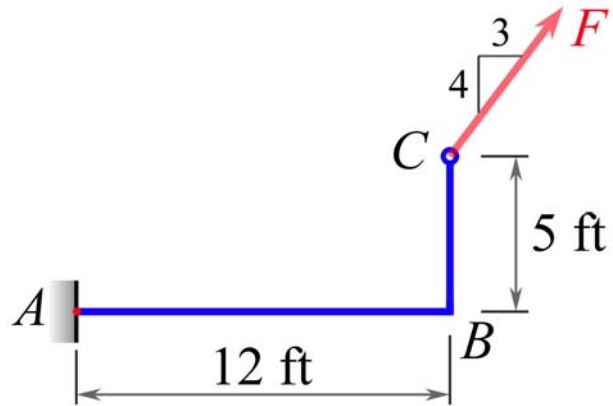


MEEG 2003 Quiz #4.m08

1. (4 points) For computing moments of forces, define (a) moment center, (b) moment arm, (c) right-hand rule.

2. (6 points) A 60-lb force \mathbf{F} acts at the free end C of a bent rod shown. Determine the moment \mathbf{M}_A of \mathbf{F} about the fixed end A by using (a) *Varignon's theorem* and the *right-hand rule*, (b) $\mathbf{M}_A = \mathbf{r} \times \mathbf{F}$.



1. (a) The *moment center* is a point about which moment of a force is computed. ① (b) The *moment arm* is the shortest distance from the moment center (*or* moment axis) to the line of action of the force. ① (c) The *right-hand rule* states that when the fingers of the right hand point along the line of action of the force and the palm of the right hand faces the moment center (*or* moment axis), the extended thumb of the right hand will point in the direction of the moment of the force. ②

2.

$$(a) M_A = -5 \left[\frac{3}{5} (60) \right] + 12 \left[\frac{4}{5} (60) \right] = 396$$

$$\mathbf{M}_A = 396 \text{ lb}\cdot\text{ft} \curvearrowright \quad \textcircled{3}$$

$$(b) \mathbf{M}_A = \mathbf{r} \times \mathbf{F} = (12\mathbf{i} + 5\mathbf{j}) \times (36\mathbf{i} + 48\mathbf{j}) = (576 - 180)\mathbf{k} = 396\mathbf{k}$$

$$\mathbf{M}_A = 396\mathbf{k} \text{ lb}\cdot\text{ft} \quad \textcircled{3}$$