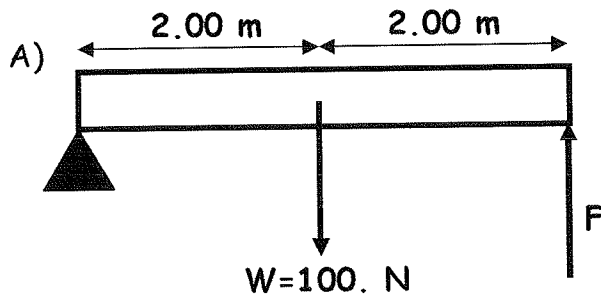


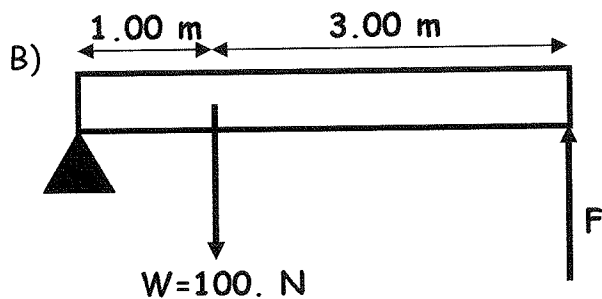
Name: Key

torque Practice

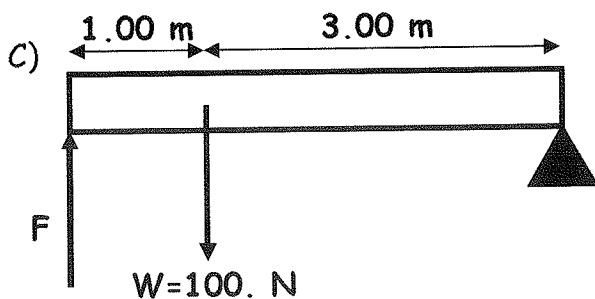
I. Find the force, F , needed to keep the bar level. The bar has a weight of 100. N. The location of the center of mass is designated by the downward arrow and the W .



$$\tau_{cw} = \tau_{ccw}$$
$$(2.00\text{ m})(100\text{ N}) = (4.0\text{ m})F$$
$$F = 50.0\text{ N}$$

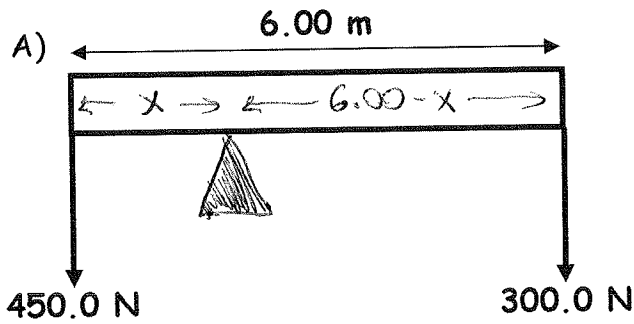


$$(1.00\text{ m})(100\text{ N}) = (4.0\text{ m})F$$
$$F = 25.0\text{ N}$$



$$(4.00\text{ m})F = (3.00\text{ m})(100\text{ N})$$
$$F = 75.0\text{ N}$$

II. Find the location of the fulcrum so that the bar balances. In case A), assume the bar has negligible mass. In cases B) and C), the location of the center of mass is again designated by the downward arrow and the W.



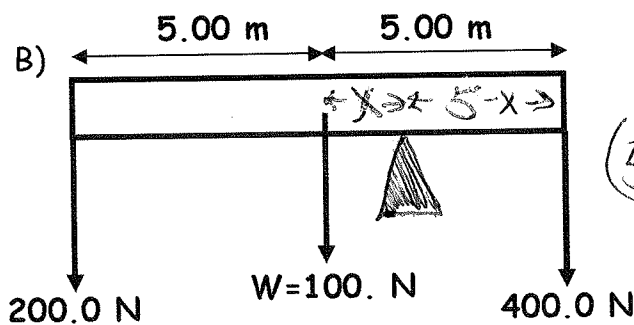
$$\sum \tau_{cw} = \sum \tau_{ccw}$$

$$(6.00 - x)(300\text{N}) = x(450\text{N})$$

$$(6.00)(300\text{N}) = x(450 + 300\text{N})$$

$$x = 2.40\text{m}$$

from left edge

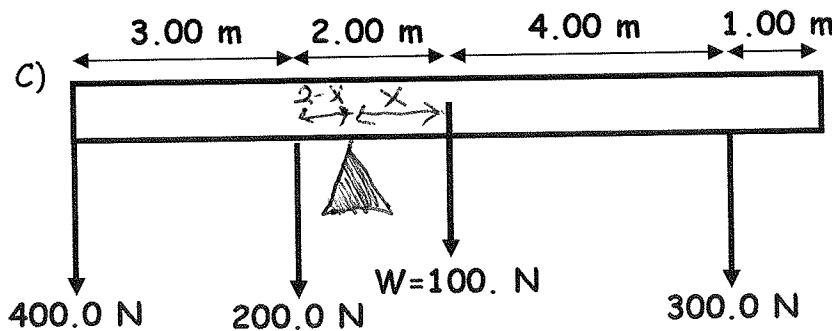


$$(5 - x)(400\text{N}) = x(100\text{N}) + (x + 5)(200\text{N})$$

$$(5)(400) - 5(200) = x(100 + 200 + 400\text{N})$$

$$x = 1.43\text{m}$$

right of center



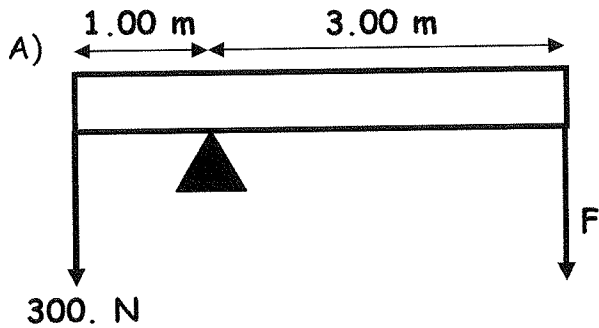
$$x(100\text{N}) + (x + 4)(300\text{N}) = (2 - x)(200\text{N}) + (3 + 2 - x)(400\text{N})$$

$$x(100 + 300 + 200 + 400) = (2)(200) + 5(400) - 4(300)$$

$$x = 1.20\text{m}$$

left of center

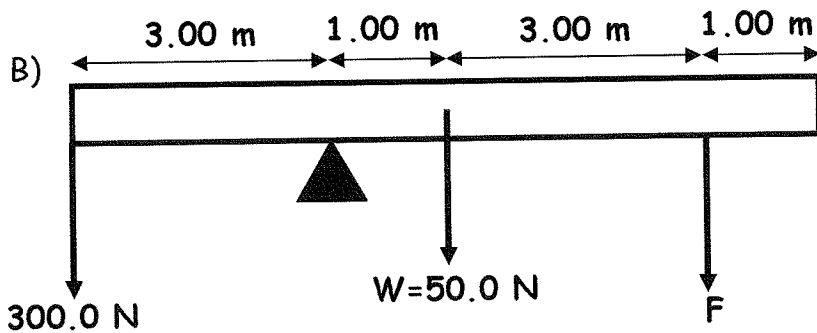
III. Find the force, F , needed to balance the bar. In cases A) and C), assume the bars have negligible mass. In case B), the location of the center of mass is again designated by the downward arrow and the W .



$$\tau_{ccw} = \tau_{cw}$$

$$(3.00)F = (1.00)(300\text{N})$$

$$F = 100\text{N}$$

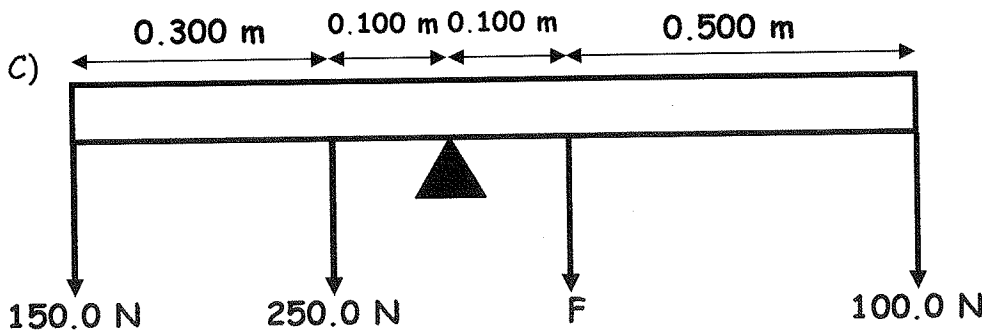


$$(1.00)(50\text{N}) + (4.00)F =$$

$$(3.00)(300\text{N})$$

$$F = 213\text{N}$$

212.5 N



$$(0.100)F + (0.600)(100) = (0.100)(250\text{N}) + (0.400)(150\text{N})$$

$$F = 250\text{N}$$