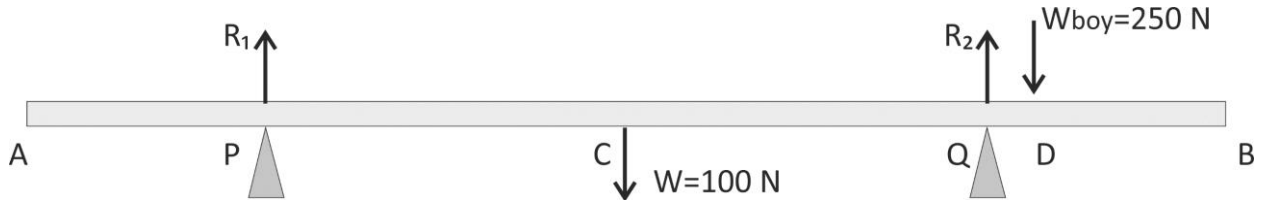


Answer on Question #53039, Physics / Other

A uniform plank AB 30m long weighing 100N is pivoted at points P, Q which are 5m from the ends A and B respectively. A boy of weight 250N stands at a point D 1m away from Q and the arrangement is in equilibrium. Determine the reaction R_1 R_2 at the supports

Solution:



$$AP = BQ = 5 \text{ m}$$

$$QD = 1 \text{ m}$$

$$PC = 15 - 5 = 10 \text{ m}$$

Let R_1 and R_2 be the reaction forces at the left and right supports.

Taking moments of all forces about the point of contact of the left support,

$$W * PC + W_{boy} * PD - R_2 * PQ = 0$$

$$100 * 10 + 250 * 21 - 20R_2 = 0$$

Thus,

$$R_2 = \frac{100 * 10 + 250 * 21}{20} = 312.5 \text{ N}$$

Taking moments of forces about the point of contact of the right support,

$$R_1 * PQ - W * CQ + W_{boy} * QD = 0$$

$$20R_1 - 100 * 10 + 250 * 1 = 0$$

Thus,

$$R_1 = \frac{100 * 10 - 250 * 1}{20} = 37.5 \text{ N}$$

Answer: $R_1 = 37.5 \text{ N}$; $R_2 = 312.5 \text{ N}$.