Answer on Question #48058, Physics, Mechanics | Kinematics | Dynamics
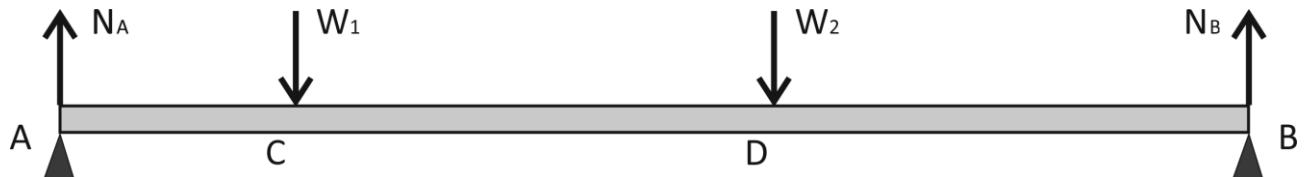
A beam 5m long is supported at it's ends A and B point load W1&W2 were placed at C and D, 1m and 3m respectively from A. If the reaction at A is twice the reaction at B, find the ration of the loadss W1&W2...

Solution:

Let N_A and N_B be the reaction forces at the left and right supports.

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

$$W_1 * AC + W_2 * AD - N_B * AB = 0$$
$$W_1 + 3W_2 - 5N_B = 0$$

Thus,

$$N_B = \frac{W_1 + 3W_2}{5}$$

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

$$N_A * AB - W_1 * CB - W_2 * DB = 0$$
$$5N_A - 4W_1 - 2W_2 = 0$$

Thus,

$$N_A = \frac{4W_1 + 2W_2}{5}$$

From given

$$\frac{N_A}{N_B} = 2$$

$$\frac{N_A}{N_B} = \frac{4W_1 + 2W_2}{W_1 + 3W_2} = 2$$

$$4W_1 + 2W_2 = 2(W_1 + 3W_2)$$

$$4W_1 + 2W_2 = 2W_1 + 6W_2$$

$$2W_1 = 4W_2$$

Thus,

$$\frac{W_1}{W_2} = 2$$

Answer: $\frac{W_1}{W_2} = 2$