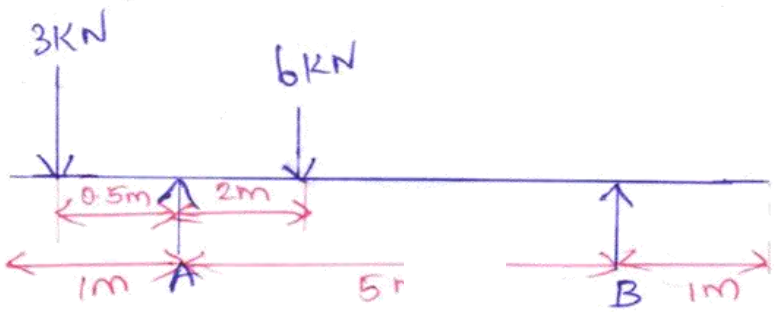
2) A vertical chassis can be considered as a simply supported beam of 5m long and is supported at A & B - Each being 1.0 m from its front and rear ends. Loads of 3KN and 6KN are carried 0.5 m in front of A and 2m behind A respectively.

(i) find the magnitude of the reactions at A and B

(ii) If an extra load of 5KN is to be added to the beam in such a position that the reaction at A and B are to be equal, What will this reaction can be and at what distance from A must the 5KN load to be situated

Given data:



To find:

(i) R_A & R_B

(ii) x

Solution:

(i) Taking moment about A

$$(R_B \times 5) - (6 \times 2) + (3 \times 0.5) = 0$$

$$\boxed{R_B = 2.1\,kN}$$

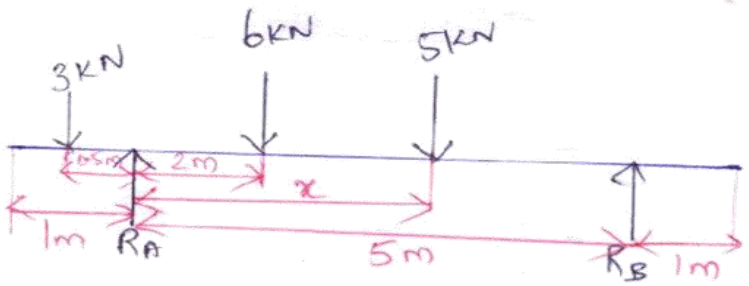
$$\Sigma V = 0$$

$$R_A + R_B = 3 + 6$$

$$R_A + 2.1 = 9$$

$$\boxed{R_A = 6.9\,kN}$$

(ii)



$$\Sigma V = 0$$

$$R_A + R_B = 3 + 6 + 5$$

$$R_A + R_B = 14$$

$$R_B + R_B = 14 \qquad [R_A = R_B]$$

$$\boxed{R_B = 7\,kN} = \boxed{R_A = 7\,kN}$$

Taking moment about A

$$(R_B \times 5) + (3 \times 0.5) - (6 \times 2) - (5 \times x) = 0$$

$$(7 \times 5) + (3 \times 0.5) - (6 \times 2) - (5 \times x) = 0$$

$$35 + 1.5 - 12 - 5x = 0$$

$$5x = 24.5$$

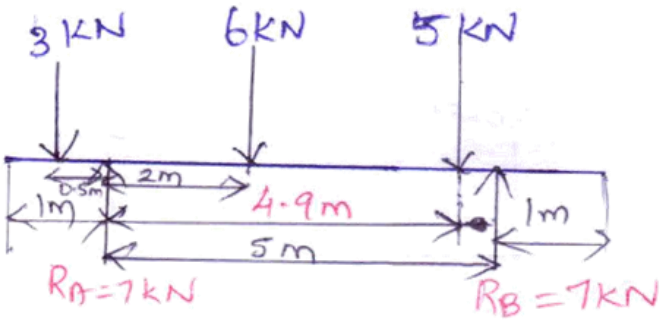
$$\boxed{x = 4.9\text{m}}$$

Result:

(i) $R_A = 6.9$ kN

$R_B = 2.1$ kN

(ii)

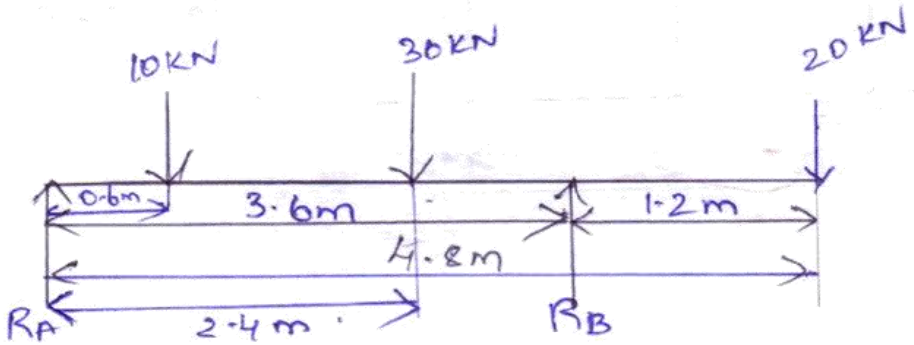


$R_A = R_B = 7$kN

$x = 4.9$ m

3. A chassis side member is 4.8 m long measured from the position of the front axle, the wheel base is 3.6 m and the rear over hang is 1.2 m. The member can be considered as a beam simply supported at the positions of the front and rear axle. It carries point loads of 10 KN and 30 KN at 0.6 m and 2.4 m respectively from the front axle and another point load of 20 KN at the rear end. Calculate the value of the reactions at front and rear axle

Given



To find

(i) R_A.
(ii) R_B

Solution

Taking moment about A

$(R_B \times 3.6) - (10 \times 0.6) - (30 \times 2.4) - (20 \times 4.8)$

$= 0$

$3.6\, R_B = 6 + 72 + 96$

$$\boxed{R_B = 48.33\ kN}$$

$\Sigma v = 0$

$R_A + R_B = 10 + 30 + 20$

$R_A + 48.33 = 60$

$$\boxed{R_A = 11.67\ kN}$$

Result:

$R_A = 11.67\ kN$

$R_B = 48.33\ kN$