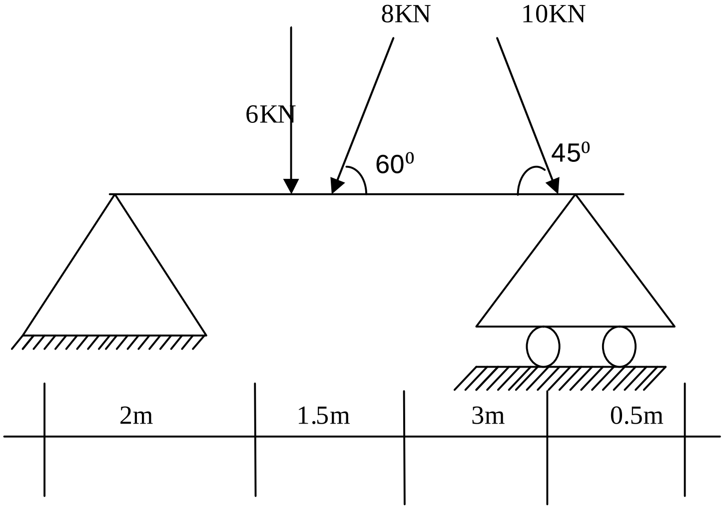
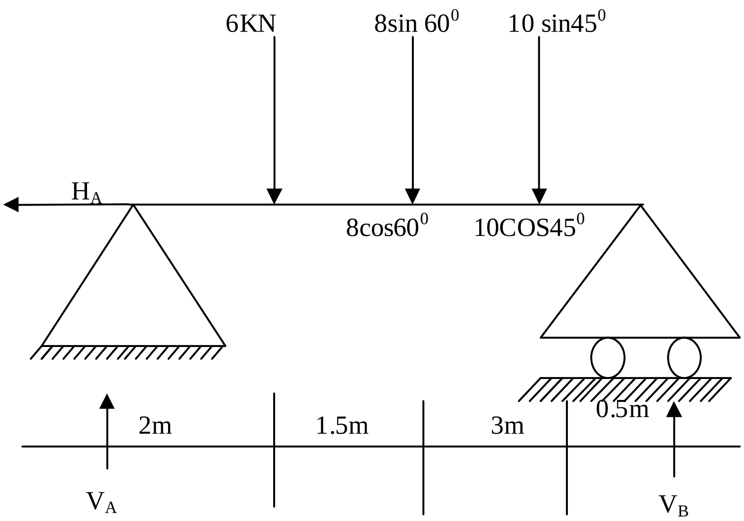
Problem 13: Determine the support reactions of the beam show in figure.



Solution:

First of all the inclined forces are to be resolved into two components.



Applying $\sum H = 0(\rightarrow +)$

$$10\cos 45° - 8\cos 60° - H_A = 0$$

$$H_A = 3.07\ KN$$

H_A is positive, hence direction of H_A assumed is correct $(\leftarrow)$

Applying $\sum V = 0(\uparrow +)$

$$V_A + V_B - 6 - 8\sin 60 - 10\sin 45 = 0$$

$$V_A + V_B = 20\,KN \longrightarrow (1)$$

Applying $\sum m_A = 0(\curvearrowright +)$

$$(H_A \times 0) + (V_A \times 0) + (6 \times 2) + (8\sin 60 \times 3.5) + (10\sin 45 \times 6.5) - (V_B \times 7) = 0$$

$$V_B \times 7 = 8.22$$

$$V_B = 11.74\,KN$$

Sub $V_B = 11.74\,KN\ in\ (1)$

$$V_A + V_B = 20$$

$$V_A + 11.74 = 20\,KN$$

$$V_A = 8.26\,KN$$

Both V_A and V_B are positive, Hence assumed directions are correct. Both are acting upwards.

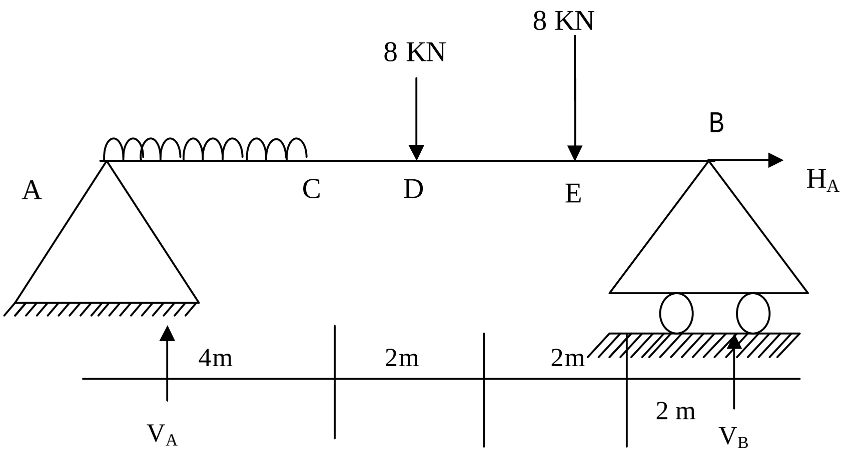
Results:

$H_A = 3.07\,KN(\leftarrow)$

$V_A = 8.26\,KN(\uparrow)$

$V_B = 11.74\,KN(\uparrow)$

Problem 14:A beam AB of spam 10m is loaded as shown in fig Determine the recations at A and B.



Solution:

For u.d.l total load is (3*4)=12 KN which acts at mid point of AC , i.e at $\frac{4}{2} = 2m$ from A

Applying $\sum H = 0(\rightarrow +)$

$H_B = 0$

Applying $\sum V = 0(\uparrow +)$

$$V_A + V_B - 8 - 8 - (3 \times 4) = 0$$

$$V_A + V_B = 28 \longrightarrow (1)$$

Applying $\sum m_A = 0(\curvearrowright +)$

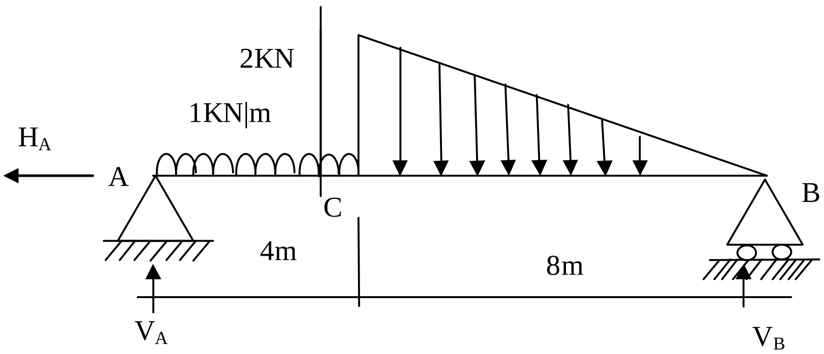
$$(8 \times 6) + (8 \times 6) + \left(3 \times 4 \times \frac{4}{2}\right) - (V_B \times 10) = 0$$

$$V_B = 13.6\ KN(\uparrow)$$

Substitute V_B in (1)

$V_A = 14.4\ KN(\uparrow)$

Problem 15: Calculated the support reaction of a simply supported beam shown in fig



Solution:

Total udl load is $1 \times 4 = 4KN$ which is located at mid point of AC.

Total load of triangular load is areaof the triangle i.e $\frac{1}{2} \times 8 \times 2 = 8KN$ acts at centroid of the triangle,at $\frac{2}{3} \times 8 = 5.33\ m$ from B.

Applying $\sum H = 0$; $H_A = 0$

Applying $\sum V = 0(\uparrow +)$

$$V_A + V_B - (1 \times 4) - (\tfrac{1}{2} \times 8 \times 2) = 0$$

$$V_A + V_B = 12 \longrightarrow (1)$$

Applying $\sum m_A = 0$ $(\curvearrowright +)$

$$\left(1 \times 4 \times \frac{4}{2}\right) - [8 \times (12 - 5.33)] - (V_B \times 12) = 0$$

$$12\,V_B = 8 + 53.36$$

$$V_B = 5.11\,KN\ (\uparrow)$$

Substitute $V_B\ in\ (1)$

$$V_A = 6.89\,KN$$