Shear Forces and Bending Moments in Beams

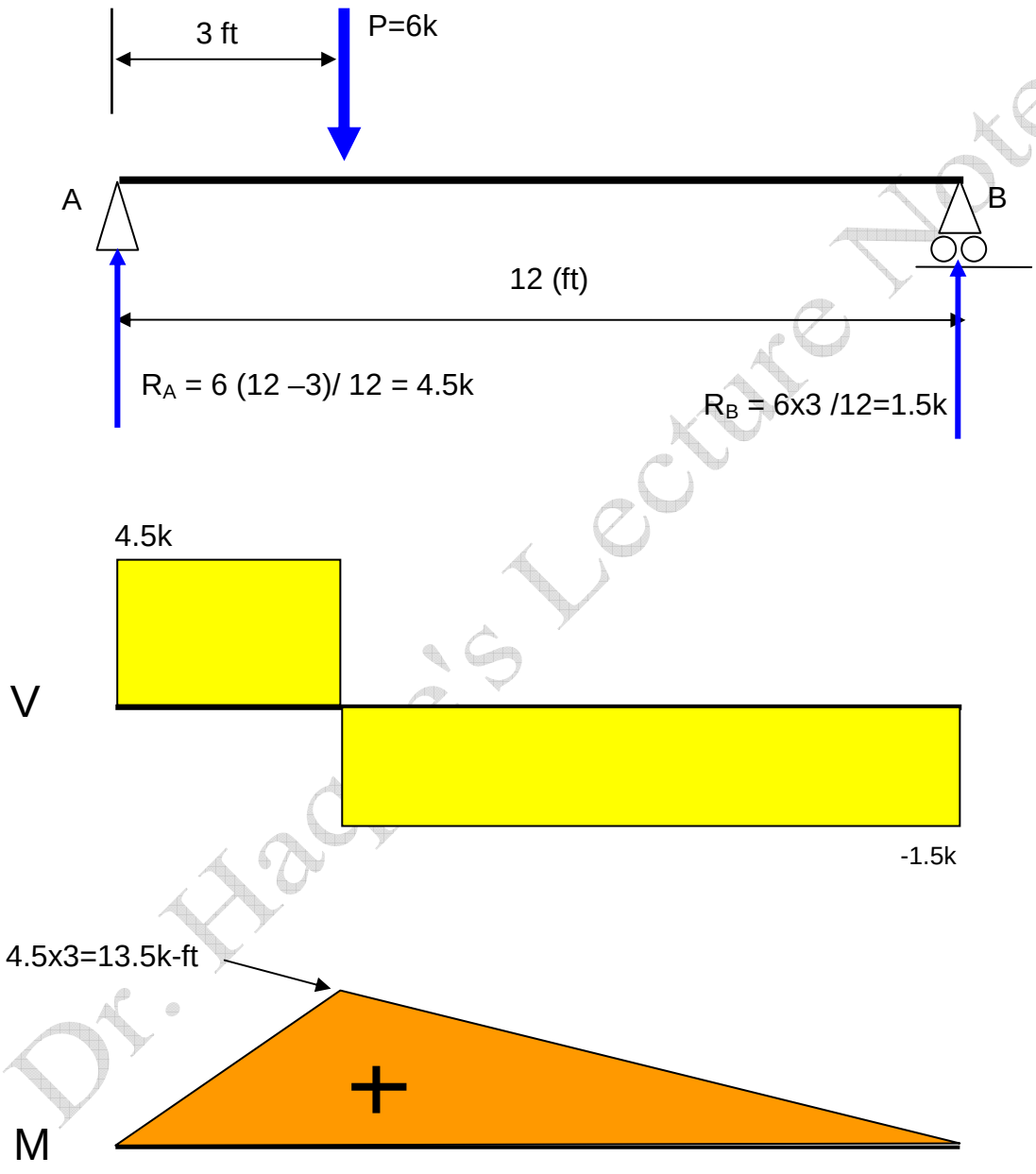
REACTIONS
SHEAR FORCE DIAGRAMS
MOMENT DIAGRAMS

[EXAMPLES]

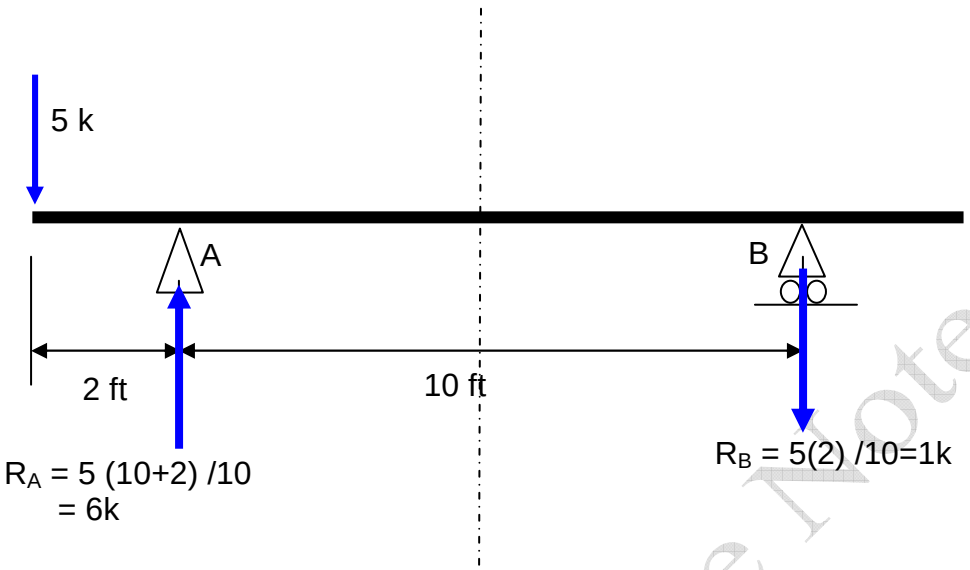
- Equilibrium Method for V and M Diagrams
- Semi-graphical Method for V and M Diagrams

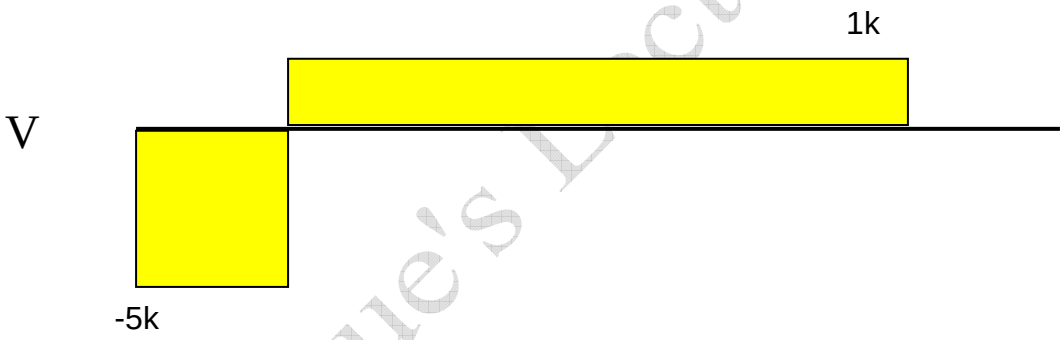
Equilibrium Method for V and M Diagrams

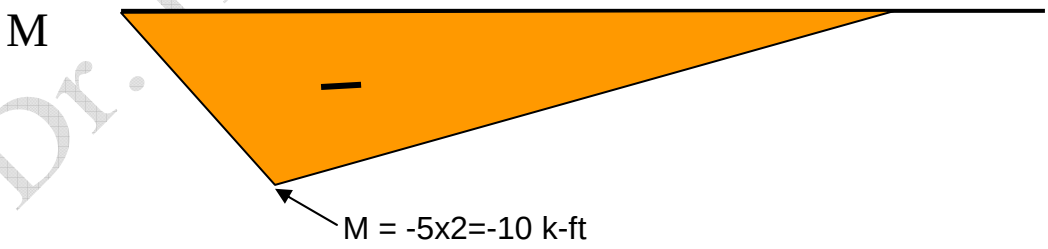
Q1:



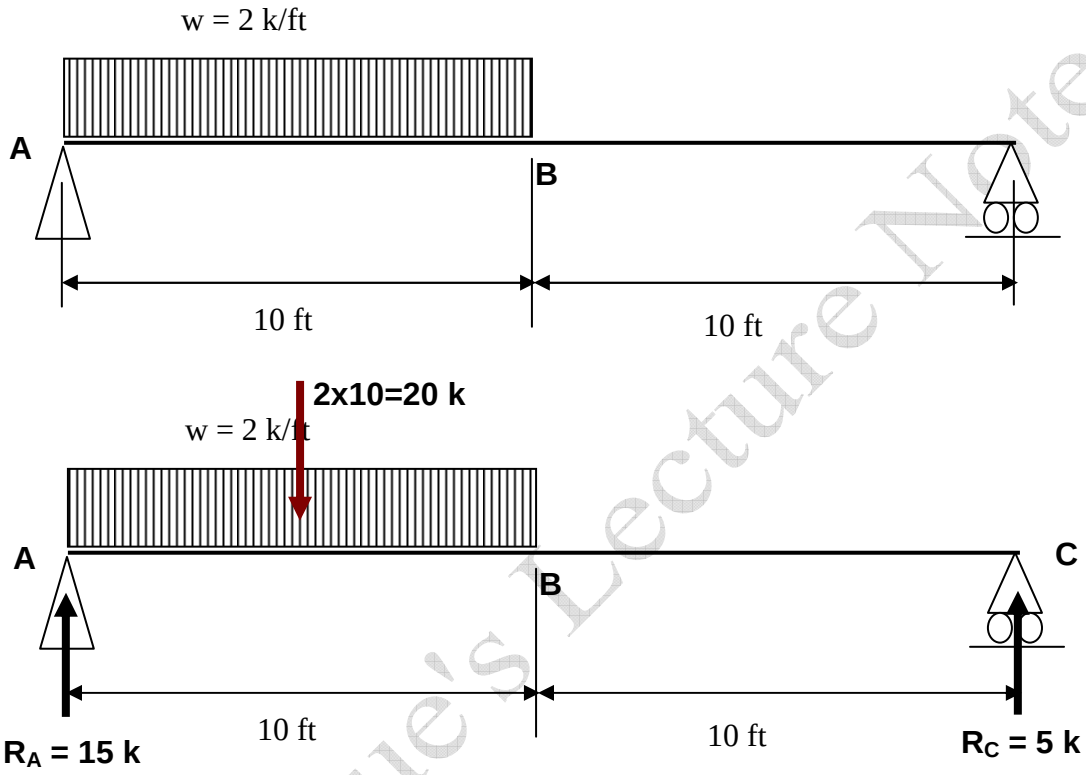
Q2:







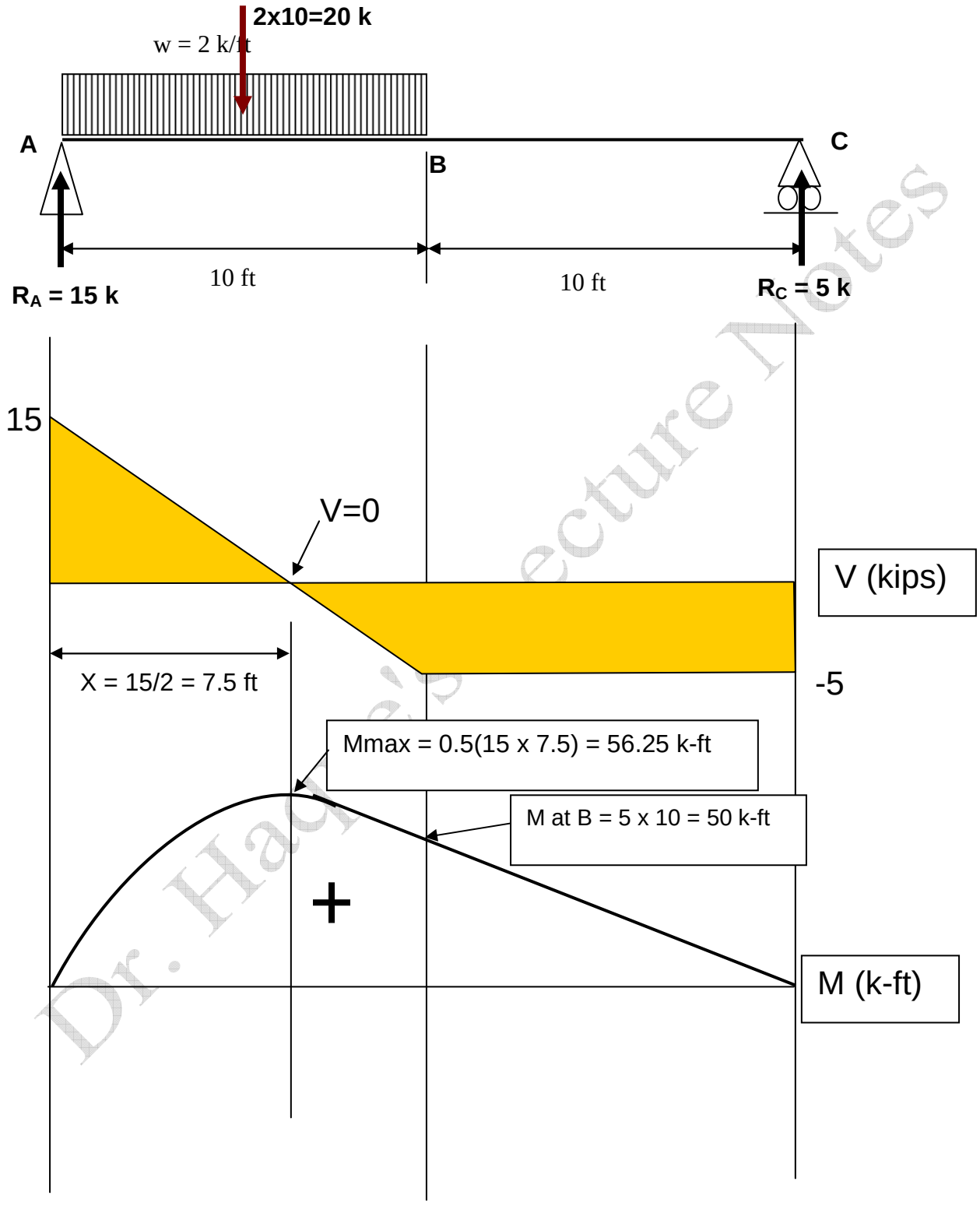
Q3: Find reactions, Shear Force, Location of zero shear forced, Maximum Moment, Mid-span moment.



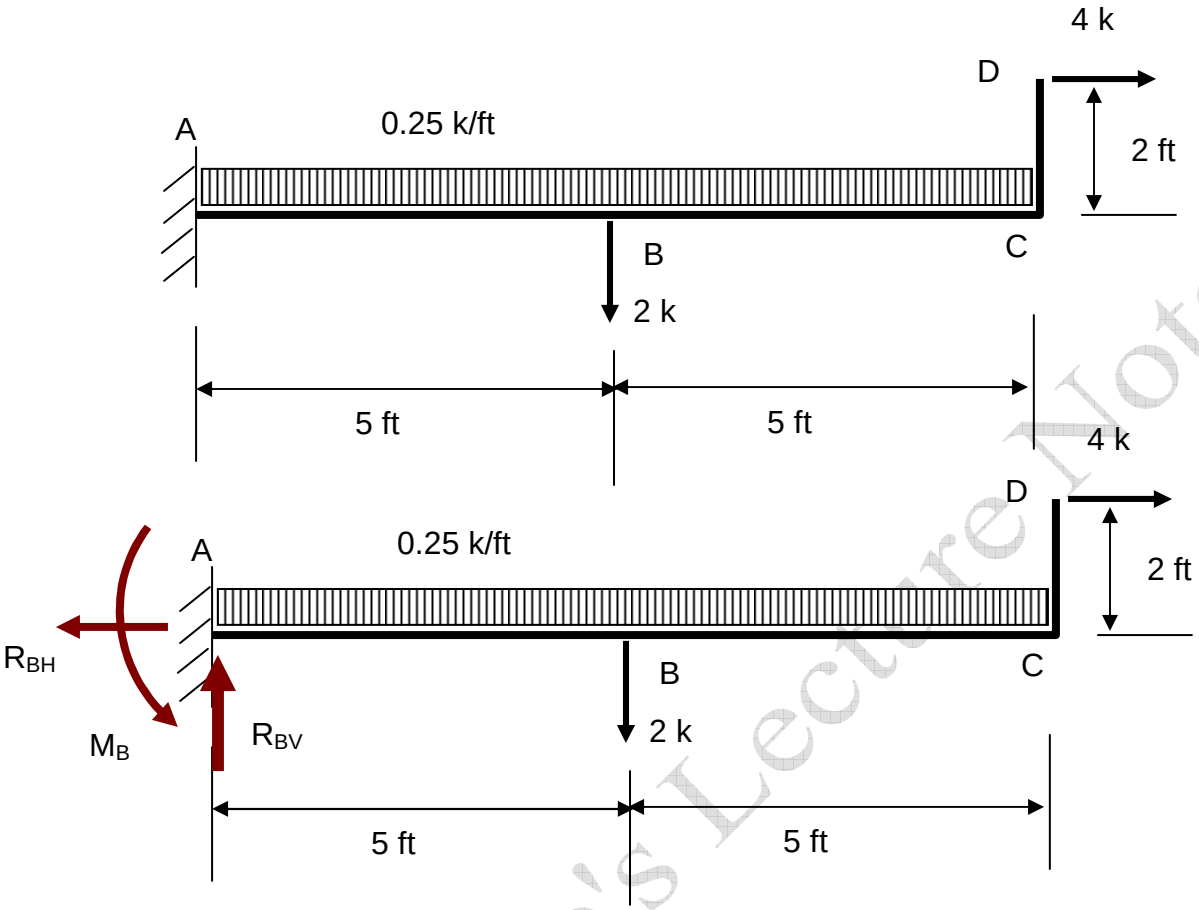
Take a moment about C and Find Reaction at A
R_A = (20x15)/20 = 15 kips

Take a moment about A and Find Reaction at C
R_c = (20x5)/20 = 5 kips

[CHECK: Sum of all the forces Upward = sum of the all the forces downward
15 + 5 = 20 OK]



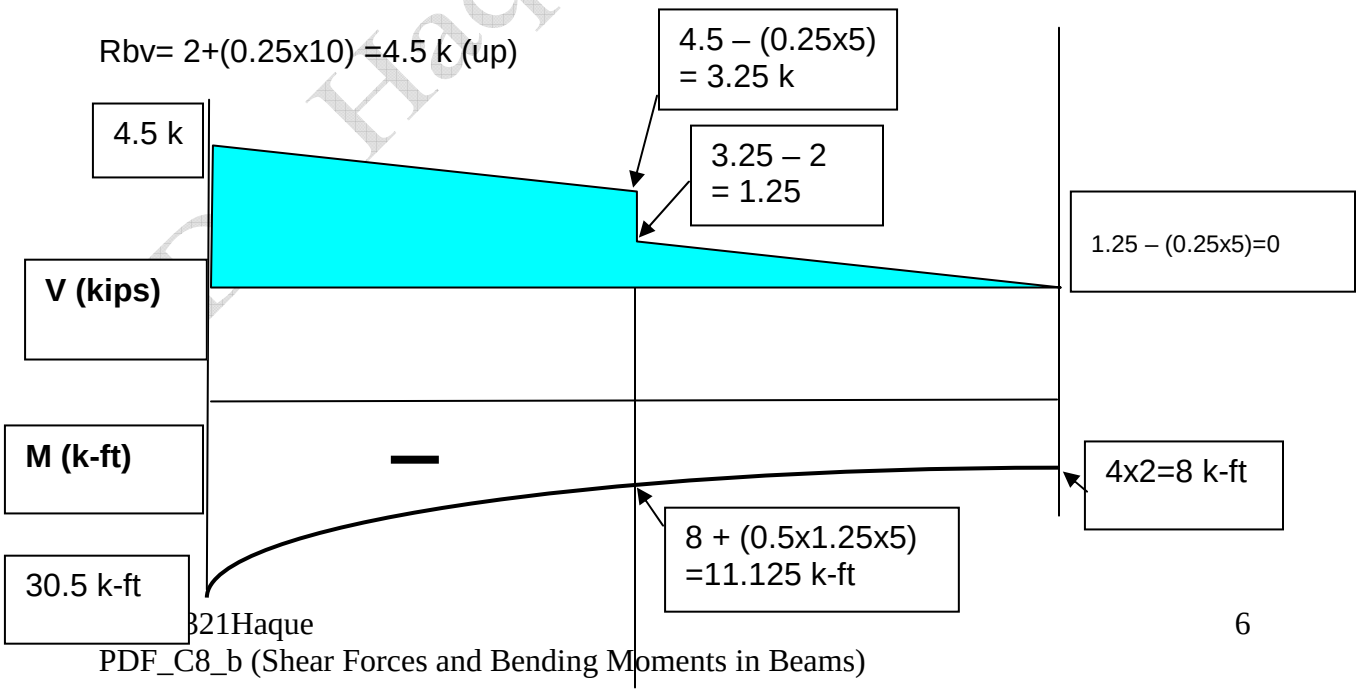
Q4: Find reactions, Support Moment; Draw Sear Force and Moment diagrams.



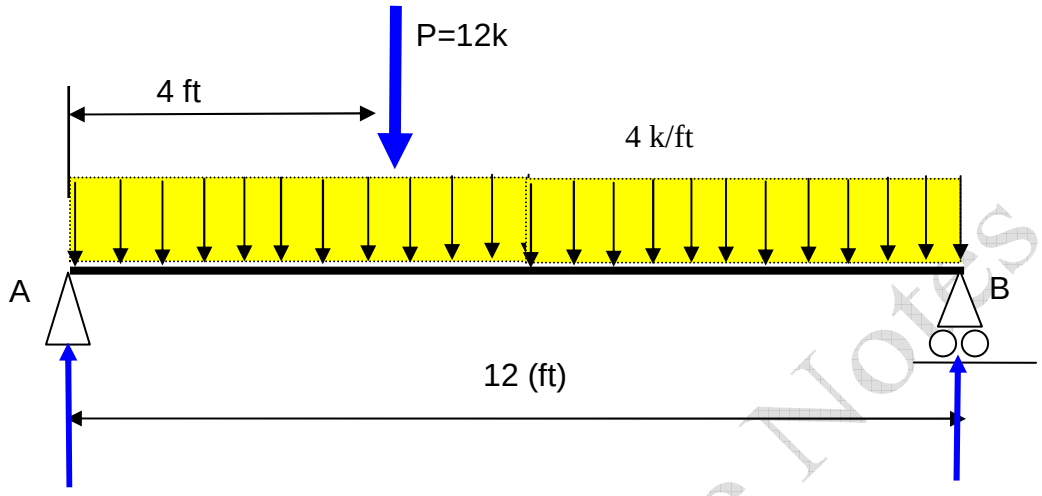
Mb = (4x2) +(2X5) + (0.25x10x5) = 30.5 k-ft (Anti-clockwise)

Rbh = 4 k (towards left)

Rbv= 2+(0.25x10) =4.5 k (up)

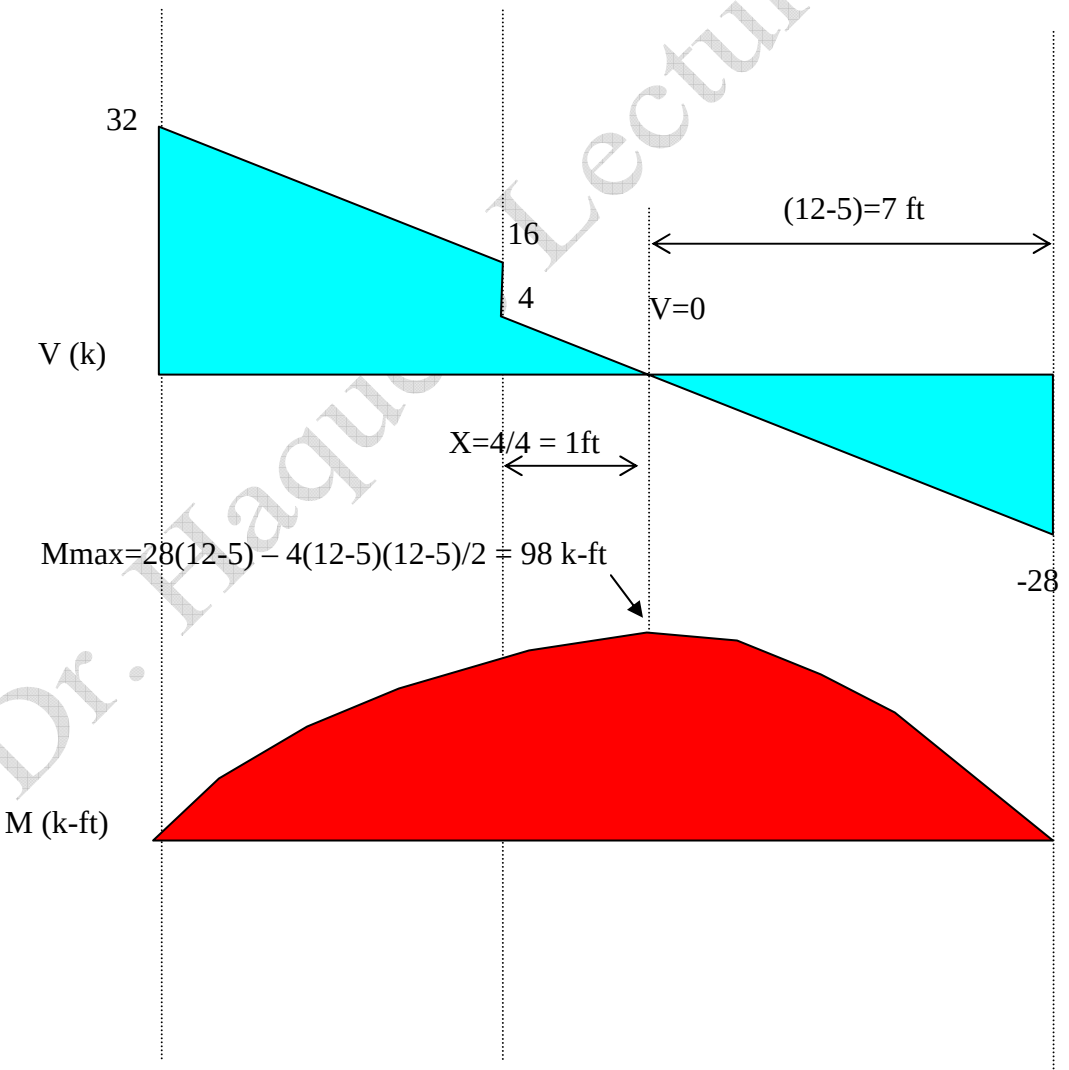


Q5: Calculate Reactions at A and B. Draw Shear Force Diagram. Find location of Zero Shear force. Find the Maximum Moment. Draw the Moment Diagram.

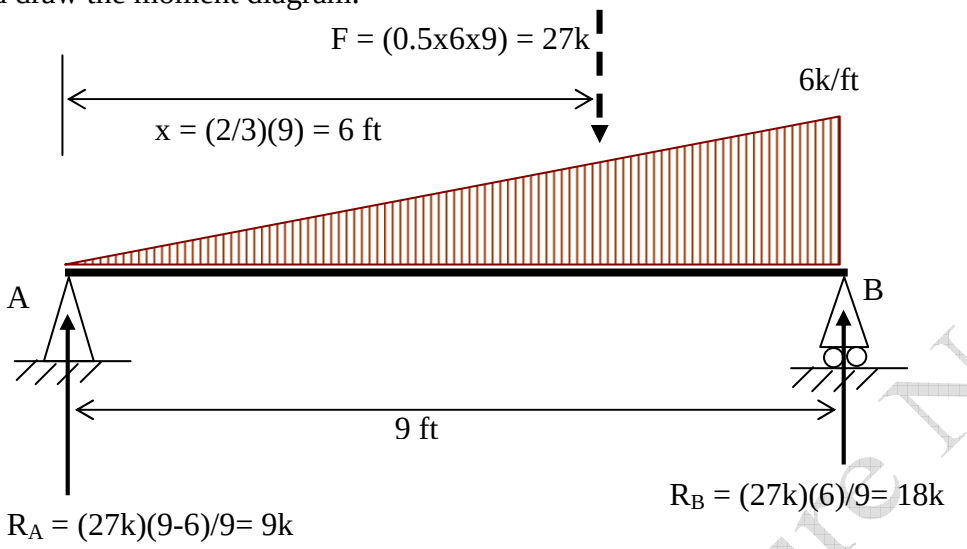


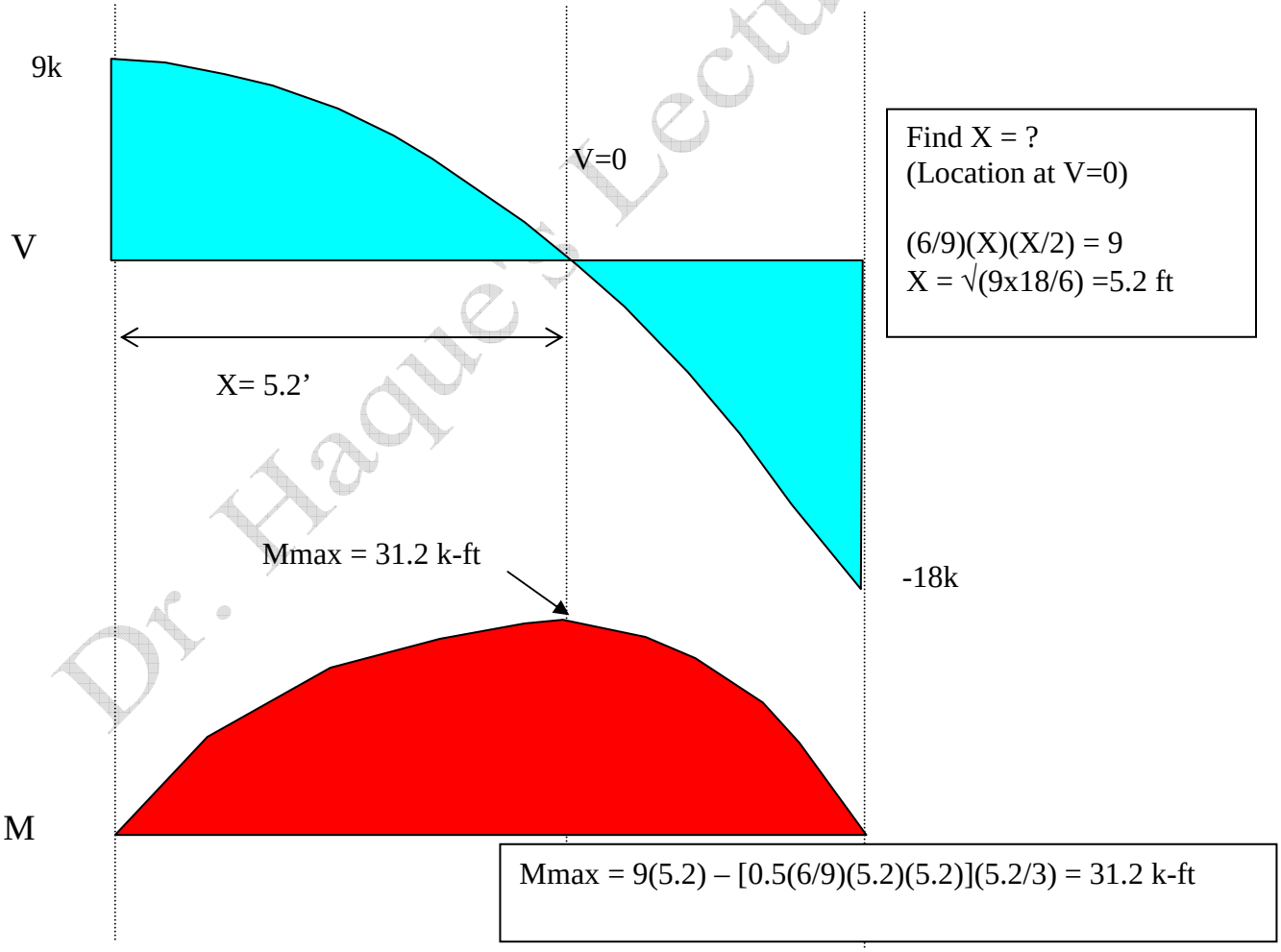
R_A = [12x8 + (4x12x6)]/12 = 32k

R_B = [12x4 + (4x12x6)]/12 = 28k

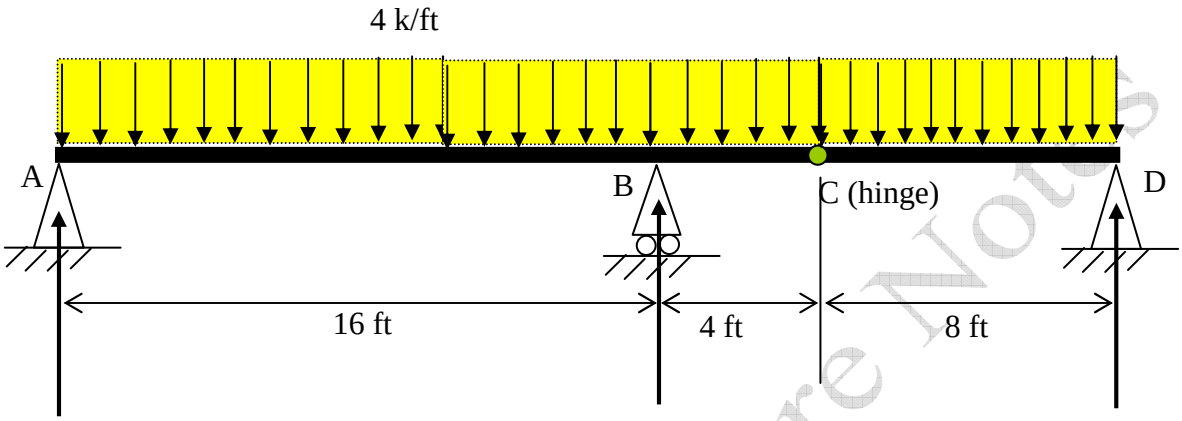


Q6: A simply supported beam with a triangularly distributed downward load is shown in Fig. Calculate reaction; draw shear force diagram; find location of V=0; calculate maximum moment, and draw the moment diagram.

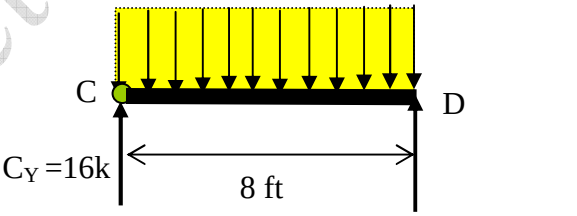




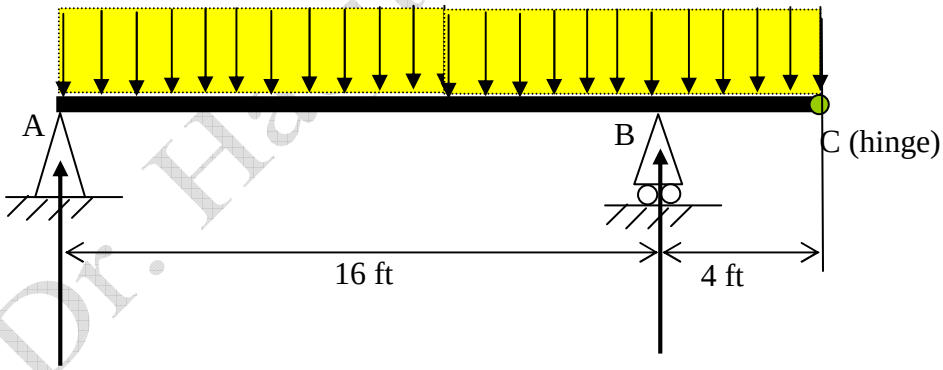
Q7:



Calculate Reactions

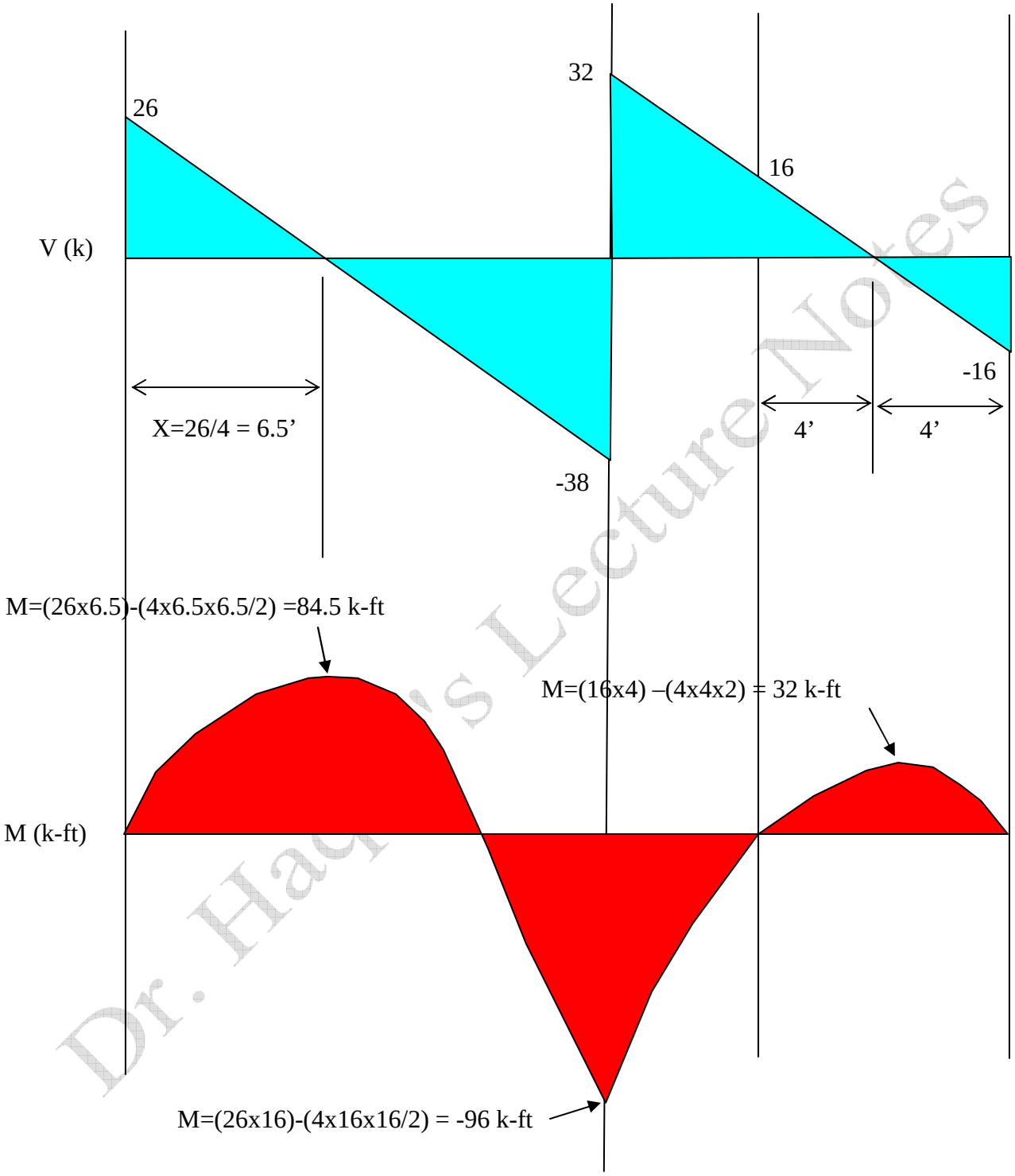


C_Y =16k



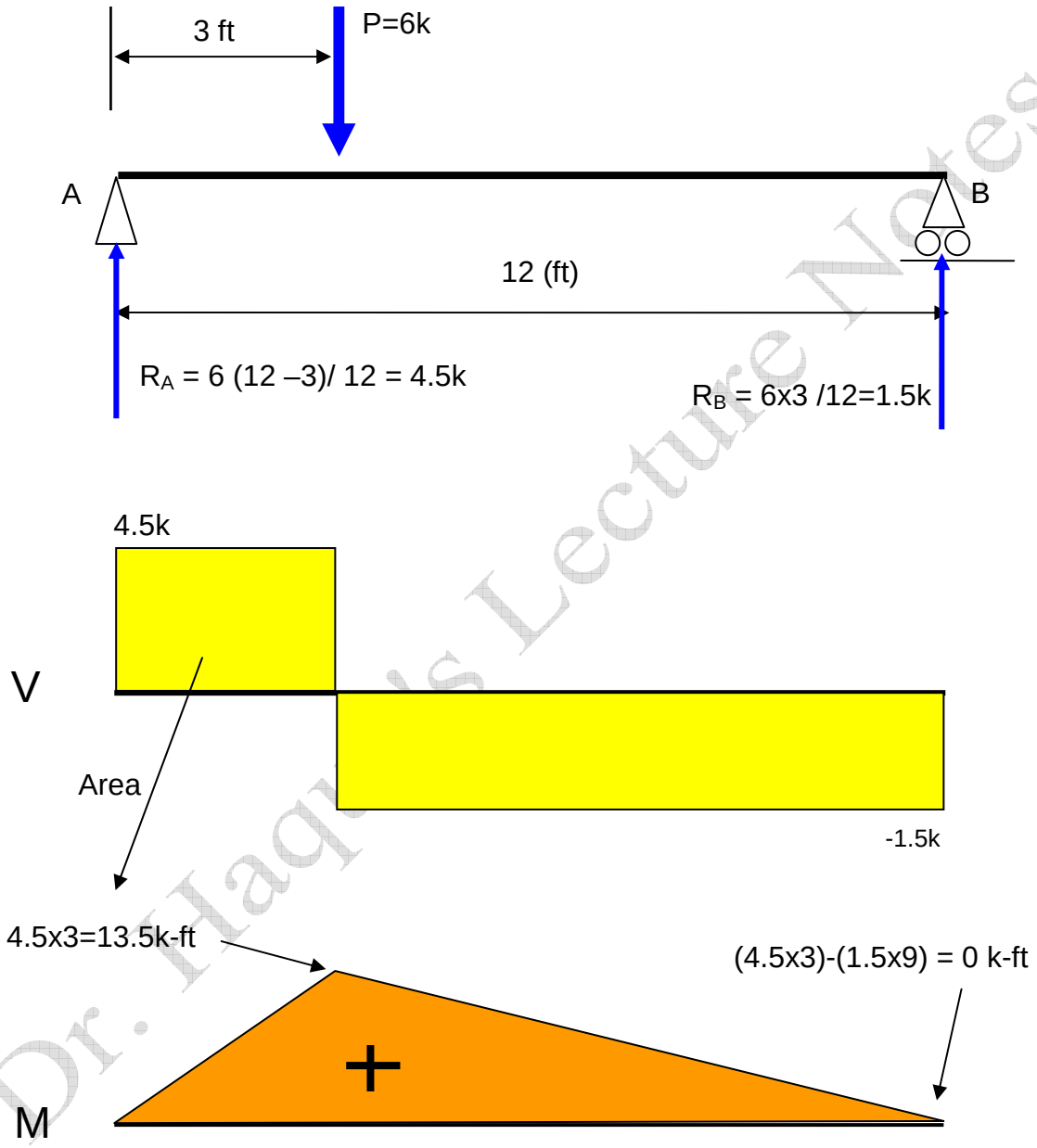
R_B = (4x20) + 16 –70 = 26k

R_B =[(4x20x10) + (16x20)]/16=70k

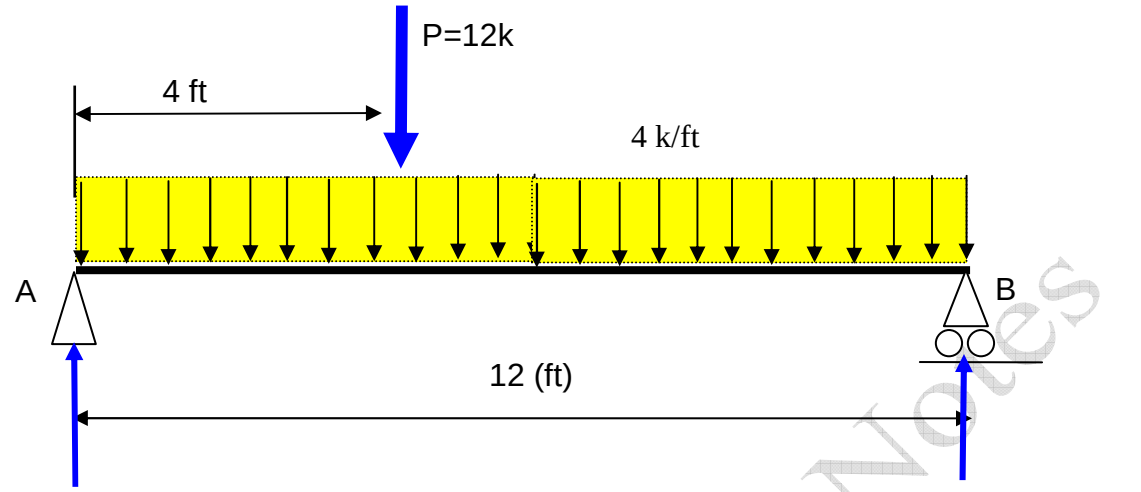


Semi-graphical Method for V and M Diagrams

Q8:



Q9:



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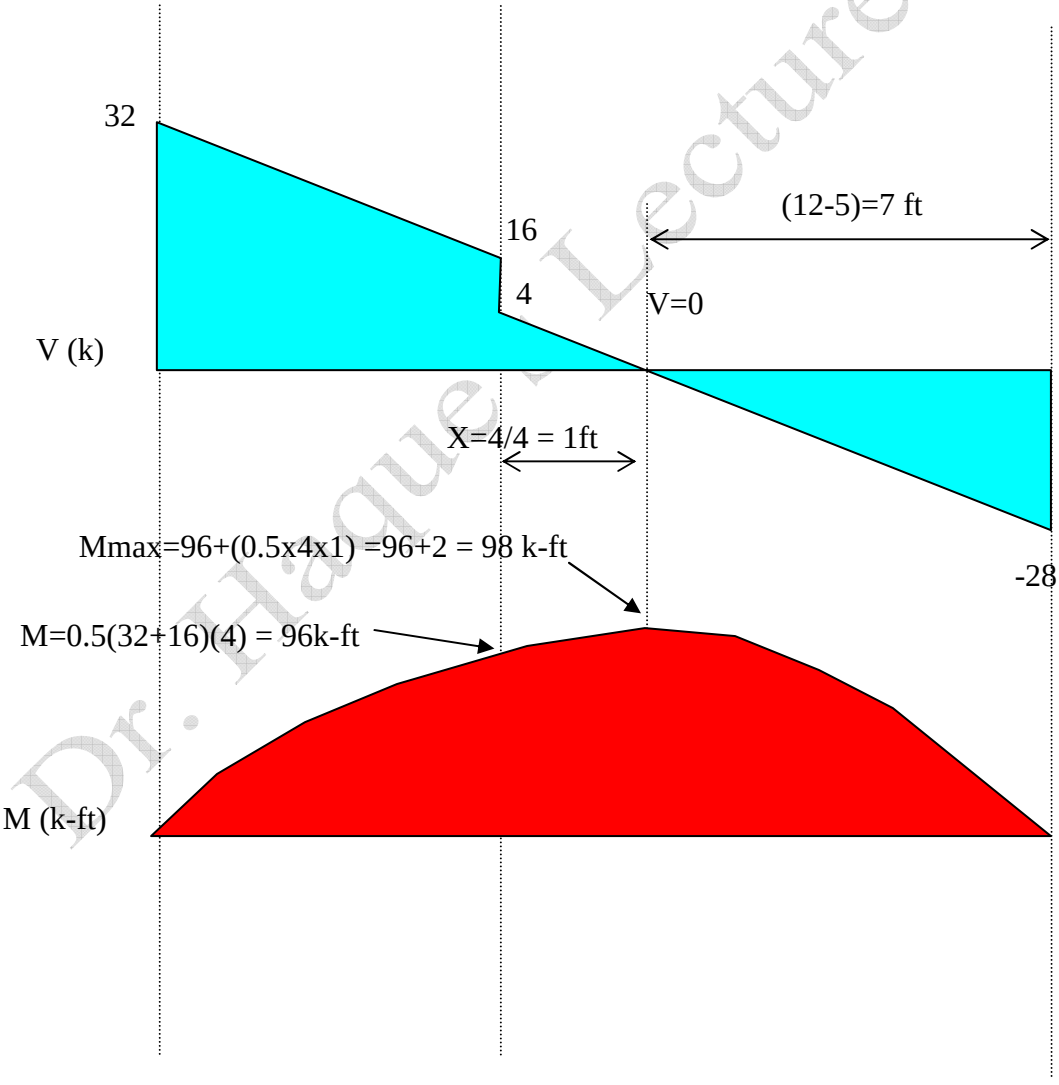
$R_B = [12x4 + (4x12x6)]/12 = 28k$



Thank you.