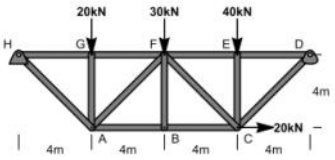
Problem 1

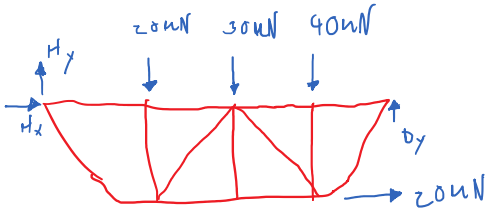
Thursday, November 5, 2020 4:49 PM

Alex Gaskins

1. Consider the truss pictured. The truss is supported by a pinned connection at point H and a roller at point D.
   a. Draw a free body diagram for the overall truss and solve for reactions at the supports
   b. Identify any zero-force members in truss
   c. Determine the load in members EC, FC and BC and state whether they are in tension or compression



A.)



$\sum M_H = 0$

$\sum M_H = -20(4) - 30(8) - 40(12) + D_y(16) + 20(4)$

$16D_y = 720$

$D_y = 45\ kN$

$\sum F_y = 0$

$\sum F_y = H_y = 20 + 30 + 40 - 45$

$H_y = 45\ kN$

$\sum F_x = 0$

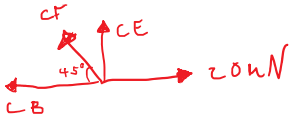
$\sum F_x = H_x + 20 = 0$

$H_x = -20\ kN$

B.)

BF is a zero force member.

C.)



$\sum F_y = 0$

$45 - 40 + CF\sin(45) = 0$

$CF = -7\ kN$

$\sum F_x = 0$

$20 - CB - CF\cos(45) = 0$

$CB = -CF\cos(45)(20)$

$CB = 20\ kN$

$\sum F_y = 0$

$CE + CF + CF\sin(45) = 0$

$CE = -CF\sin(45)$

$CE = 5\,kN$