Mammoth Q's
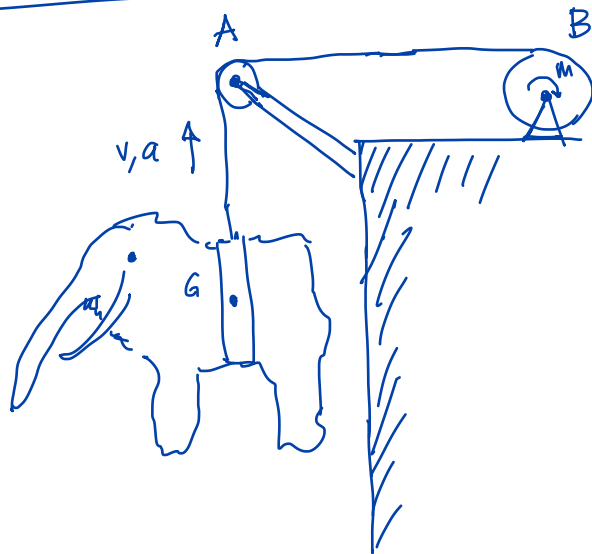

pulley @ B $\quad r = r_B = 2m$
Pulley @ A $\quad r = r_A = 0.5m$

You are hoisting a woolly Mammoth (mass m) upwards using a moment, M, applied at pulley B.

$m = 5440$ kg (I looked this up!)

① If the pulley at B applies a moment of $300 t^2 + 30000$ N-m determine the velocity of the mammoth @ $t = 2s$. The mammoth starts from rest.

② If the mammoth has a radius of gyration, $k_G = 3.2m$, determine the natural frequency of the system if the mammoth is hanging 2 m from the top.

③ If $M = 40000$ N-m, determine the velocity of the mammoth when it has travelled upward by 4 m. The mammoth starts from rest.

④ The mammoth has a radius of gyration of $k_G = 2.8m$. Assume the hoist strap has a coefficient of friction of μ_s with the mammoth. If the mammoth is hung so that the strap is 0.2m in front of its centre of gravity, G, and the mammoth is released from rest (hanging, stationary + horizontal), at what angle from the horizontal will the mammoth start to slide within it's hoist strap?

⑤ If pulley A experiences a frictional moment of $\overline{M}_f = -2000$ N-m $(\hat{k})$, how much moment, M, is needed to hoist the mammoth at velocity of 0.8 m/s upwords?