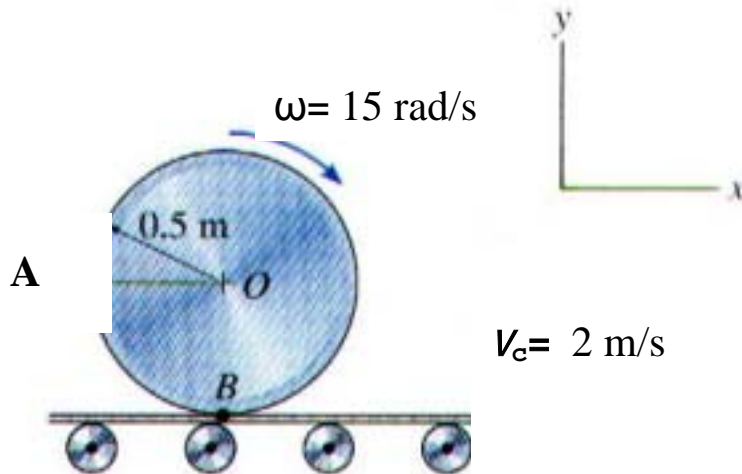1. The cylinder rolls freely on the surface of a conveyor belt which is moving at 2m/s. Assuming that no slipping occurs between the cylinder and the belt, determine the velocity of point A. The cylinder has a clockwise angular velocity = 15 rad/s at the instant shown.

ω= 15 rad/s

0.5 m

A

O

V_c= 2 m/s

B

2. A 90-N load is suspended from the hook shown in the following figure. The load is supported by two cables and a spring having stiffness k = 500 N/m. Determine the force in the cables and the stretch of the spring for equilibrium. Cable AD lies in the x-y plane an⁻¹ ⁻⁻ᵇ¹⁻ AC lies in the x-z plane.

C

5   3

4

30

K= 500 N/m

y

A

B

D

X

90N
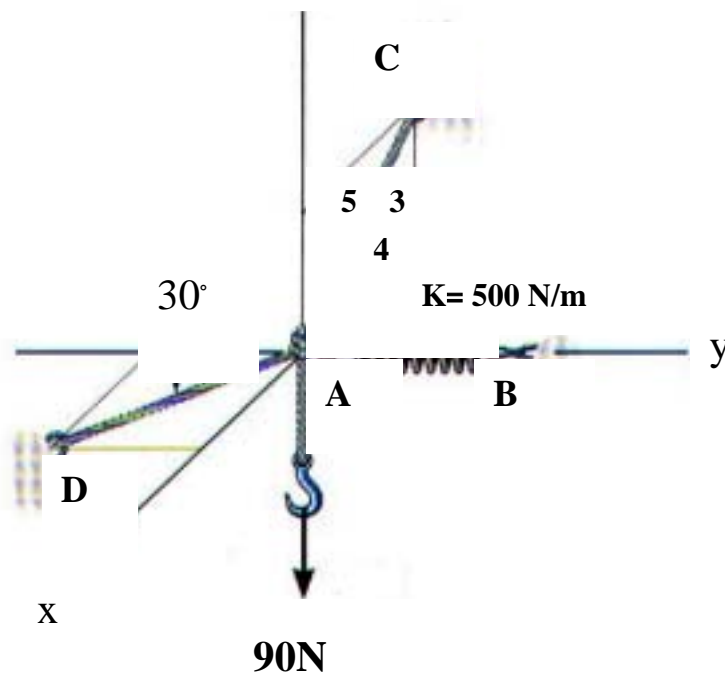
3. A beam is loaded and supported as shown in the following figure. The beam has a uniform cross section and a mass of 275 kg. Determine the reaction at support A.
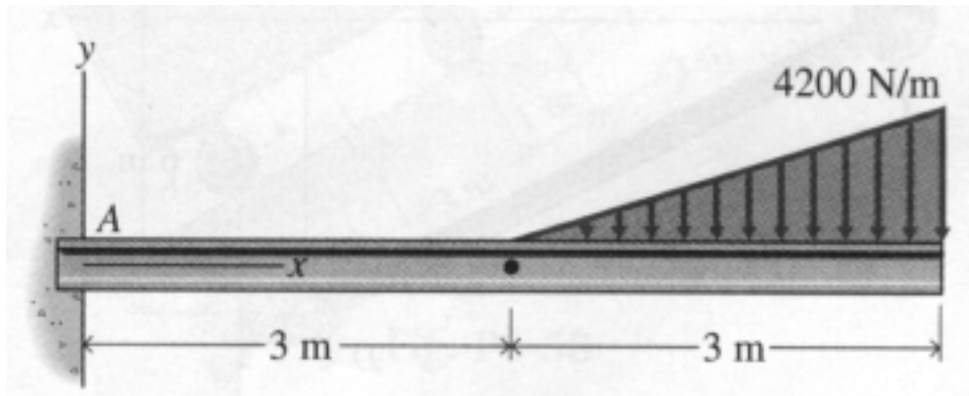
4. The pair of blocks shown in the following figure are released from rest with d=500 mm. The masses of the blocks are m_A=6 kg and m_B=4 kg, and the spring is initially unstretched. Determine the minimum spring modulus such that the block B does not hit the floor in the ensuring motion.