

Problem Sheet No. 5

1. If block B has a leftward velocity of 1.2 m/s, determine the velocity of cylinder A.

Ans. $v_A = 0.4$ m/s down.

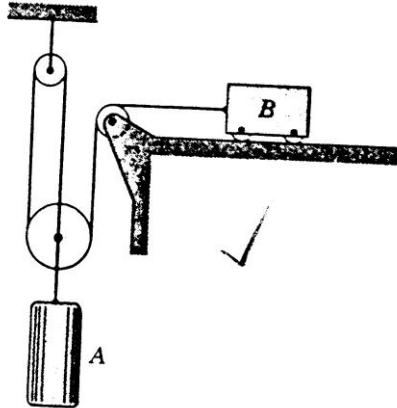


Figure-1

2. Determine the relationship that governs the velocities of the four cylinders. Express all velocities as positive down. How many degrees of freedom are there.

Ans. $4v_A + 8v_B + 4v_C + v_D = 0$

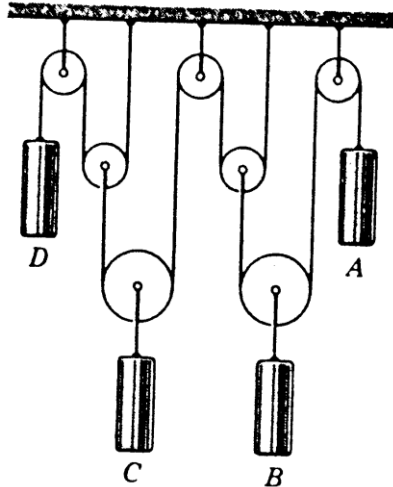


Figure -2

3. Under the action of force P, the constant acceleration of block B is 3 m/s^2 to the right, determine the velocity of B relative to A, the acceleration of B relative to A, and the absolute velocity of point C of the cable.

Ans. $v_{B/A} = 0.5$ m/s, $a_{B/A} = 0.75 \text{ m/s}^2$
 $v_C = 1$ m/s, all to the right.

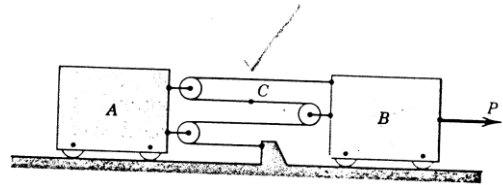


Figure-3

4. Neglect the diameter of the small pulley attached to body A and determine the magnitude of the total velocity of B in terms of the velocity v_A that body A has to the right. Assume that the cable between B and the pulley remains vertical and solve for a given value of x.

$$\text{Ans. } v_B = v_A \sqrt{\frac{2x^2 + h^2}{x^2 + h^2}}$$

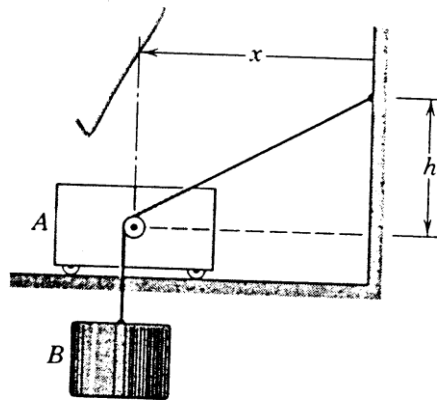


Figure -4