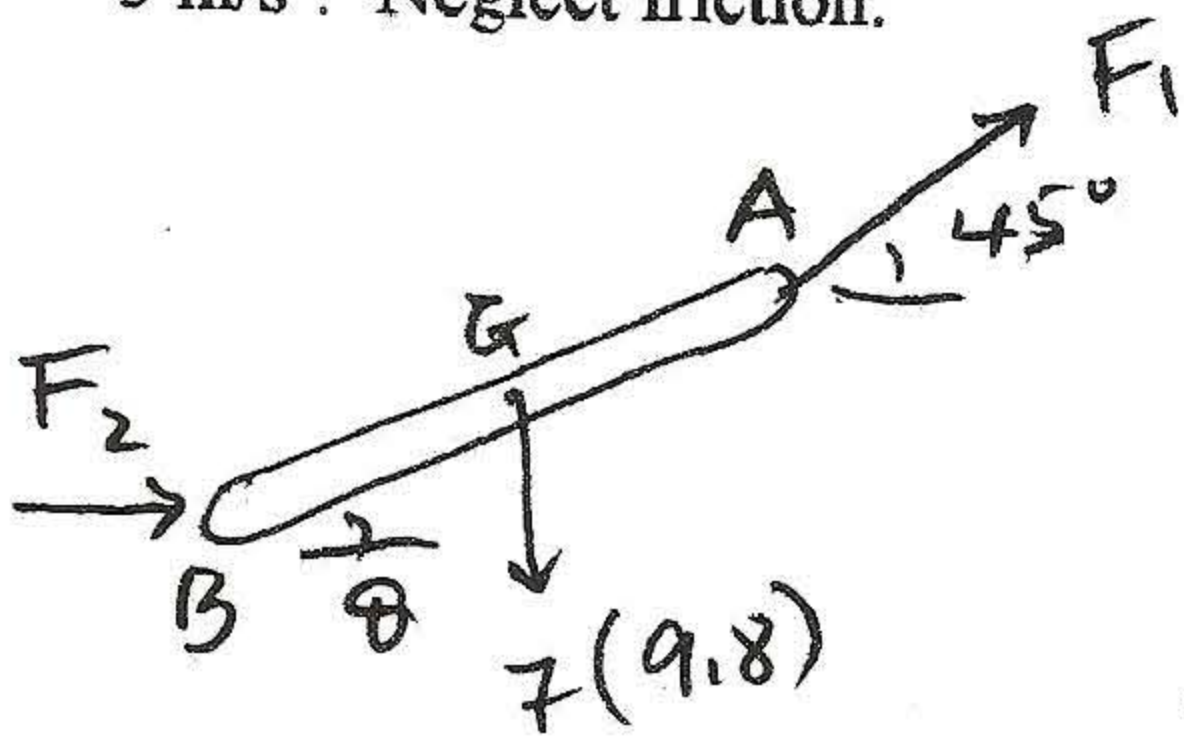
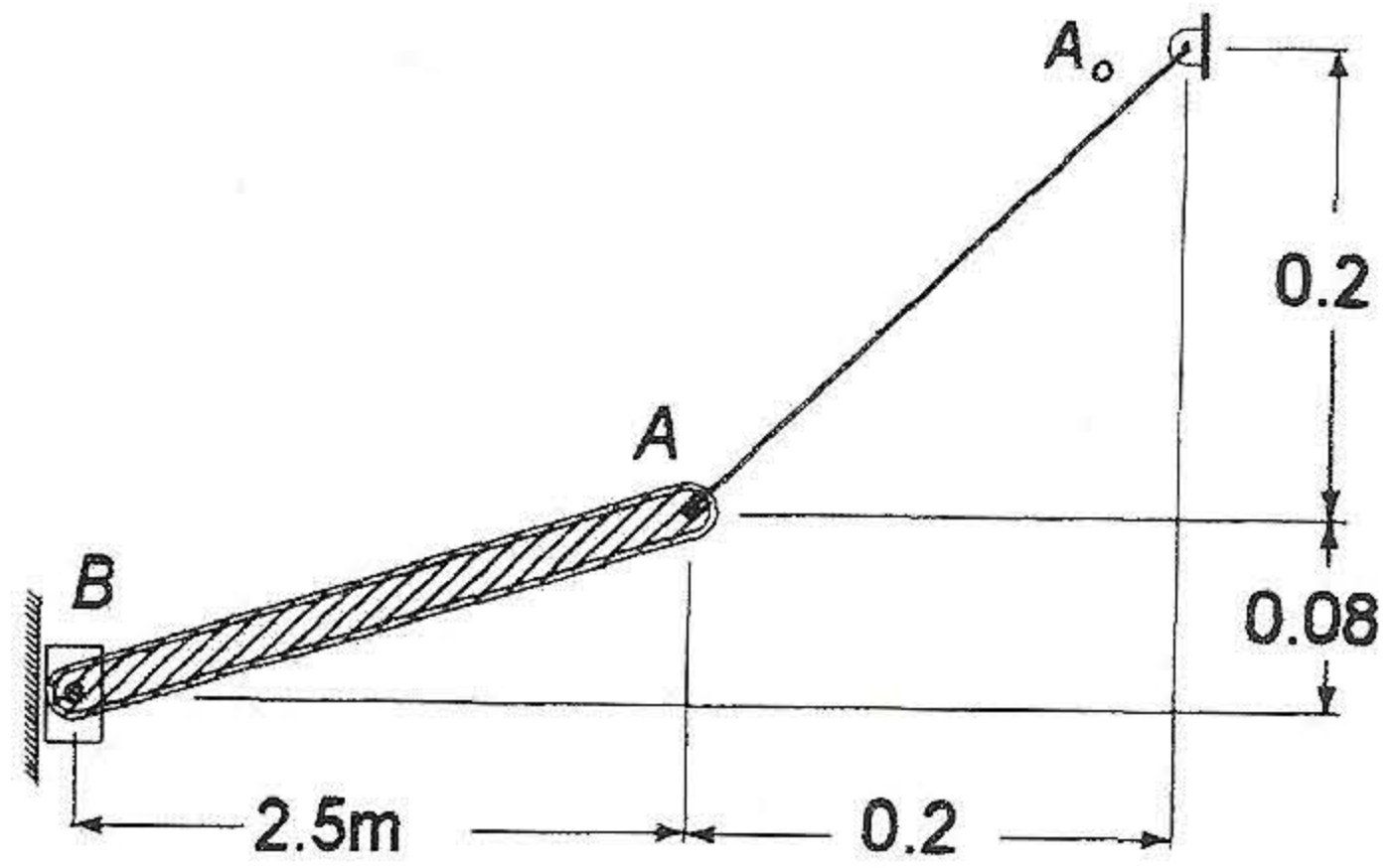


Name _____

Comp No. _____

The 7-kg rod AB is at rest at the position shown. It is supported by weightless string A₀A and massless slider at B. Find the reactions at A and B immediately after slider B is given a downward acceleration of 5 m/s². Neglect friction.



$$\vec{a}_B = -10\vec{j}$$

$$\sum \vec{F} = m \vec{a}_G$$

$$F_2 \vec{i} - 7(9.8) \vec{j} + F_1 (\cos 45 \vec{i} + \sin 45 \vec{j}) = 7 \vec{a}_G \quad \dots$$

where

$$\vec{a}_B = -10\vec{j} = \vec{a}_A + \alpha_{AB} \times \vec{r}_{AB}$$

$$\vec{a}_A = \vec{a}_{A_0} + \alpha_{A_0A} \times \vec{r}_{A_0A} = \alpha_{A_0A} \vec{k} \times (-\cos 45 \vec{i} - \sin 45 \vec{j})$$

$$\tan \theta = \frac{0.08}{2.5} \rightarrow \theta \approx 1.8^\circ \rightarrow \vec{r}_{AB} = -0.08\vec{j} - 2.5\vec{i}$$

Processing

$$\vec{a}_B = -10\vec{j} = -\alpha_{A_0A} \cos 45 \vec{j} + \alpha_{A_0A} \sin 45 \vec{i} + 0.08 \alpha_{AB} \vec{i} - 2.5 \alpha_{AB} \vec{j}$$

$$0 = \alpha_{A_0A} \sin 45 + 0.08 \alpha_{AB}$$

$$-10 = -\alpha_{A_0A} \cos 45 - 2.5 \alpha_{AB}$$

Dividing after transposing: