Department of Aeronautics & Astronautics, M.I.T.
16.001 - Materials & Structures

Quiz No. 1

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Student's name:_____

Question	Points	Score
1	7	
Total:	7	

Letter grade: _____

Question 1 [7 points]

A homogeneous block of mass m rests on an inclined plane which makes an angle θ with the horizontal, as shown in Figure 1. The plane exerts a normal reaction at points A and B, but it cannot prevent the box from lifting up from the plane. Also, there is no friction. A cable parallel to the inclined plane impedes the displacement of the top surface of the block in the direction of the inclined plane. The dimensions d and h of the block are shown in the Figure.

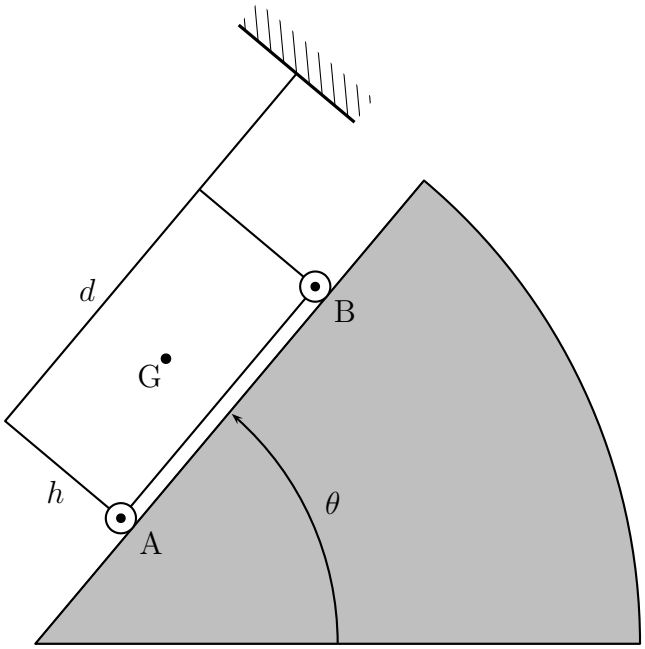

Figure 1: Block on an inclined plane

(a) (4 points) Find the reactions at points A, B and the tension in the cable following the usual procedure: a) draw FBD exposing unknown reactions and external forces, b) Explain clearly what type of force system the problem constitutes, and based on this what equilibrium equations need to be applied, c) Express the equilibrium equations in terms of the problem parameters: m, g, h, d, θ, d) Solve the problem.

(b) (3 points) Determine the range of values of the aspect ratio of the block $\lambda = \frac{h}{d}$ for which the block remains in equilibrium as a function of θ

End of Test

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16.001 Unified Engineering: Materials and Structures
Fall 2021

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