

Assignment 1

RONGALA ARUN SIDDARDHA - AI20BTECH11019

Download latex-tikz code from

https://github.com/ArunSiddardha/EE3900/tree/main/Assignment_1

PROBLEM

(Vectors 2.17d) Give the magnitude and direction of the net force acting on a stone of mass 0.1 kg, lying on the floor of a train which is accelerating with 1ms^{-2} , the stone being at rest relative to the train. Neglect air resistance throughout.

SOLUTION

Given $m = 0.1\text{kg}$,

Let us assume train is moving with acceleration in direction of \hat{i} .

lets assume vertically down direction as \hat{j} .

Force acting on stone due to train is given by

$$F_T = ma$$

$$a = 1\text{ms}^{-2}\hat{i}$$

$$\begin{aligned} F_T &= (0.1\text{kg}) * (1\text{ms}^{-2}\hat{i}) \\ &= 0.1\text{N} \end{aligned}$$

Force acting on stone due to gravity is given by

$$F = mg$$

$$g = 9.8\text{ms}^{-2}\hat{j}$$

$$\begin{aligned} F &= (0.1\text{kg}) * (9.8\text{ms}^{-2}\hat{j}) \\ &= 9.8\text{N} \end{aligned}$$

But since gravitational force is balanced by normal force of the train.

So, Therefore the magnitude of netforce acting on the stone is 0.1N and the direction is \hat{i} .