

# Assignment 4

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and latex-tikz code from

<https://github.com/ArunSiddardha/Assignment5/Assignment5.tex>

## 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  $1\text{ms}^{-2}$ , 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 train is 0.1N and the direction is  $\hat{i}$ .