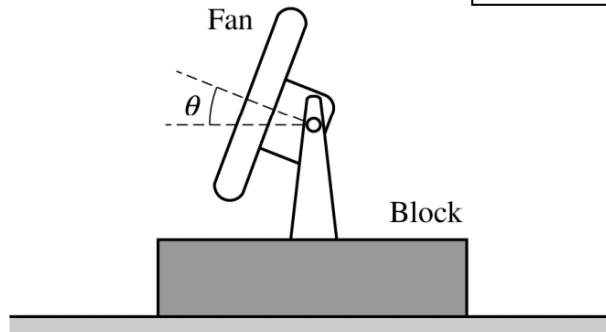


LAB EXAM 1

Name:

(12 points, suggested time 25 minutes)

This was a terribly answered question in the exam – students that did not fully understand what was happening generally scored 0/12.



The angle **CAN** be changed. If you select anything other than 0° or 90° you are a fool and will get 0/12....

A student in a physics lab has a block with a fan attached to it, as shown in the figure above. The fan has a pivot so that the angle θ it makes with the horizontal can be adjusted between 0° and 90° . When the fan is pointed horizontally so that $\theta = 0$, the block accelerates from rest along a track, even though there is friction between the block and the track. For the following questions, assume that the student has access to equipment that would usually be found in a school physics laboratory.

- a) Describe the experimental procedure that the student could use to measure the force F that the air exerts on the fan-block system when the fan is turned on. Assume that the magnitude of the force is the same for all angles θ .

i) What quantities would be measured?

TWO possible methods, only need ONE

READ THE WHOLE SECTION BEFORE ANSWERING ANY SUB-SECTION.

Really think about how you are going to do the experiment. Use the space around the diagram for scratch work.

ii) What equipment would be used for the measurements, and how would that equipment be used? Include a labelled diagram of the experimental set up.

iii) Describe the overall procedure to be used. Give enough detail so that another student could replicate the experiment.

iv) Describe how the force can be determined from the measurements described in parts (a) i – iii.

b) Describe an experimental procedure that would allow the student to use the fan-block system, with the fan turned on, to find the coefficient of kinetic friction between the block and the track.

IF you stuffed part a) you won't get this one right. SAME RULES APPLY – Read entire SECTION first. KNOW what you are doing BEFORE you write it

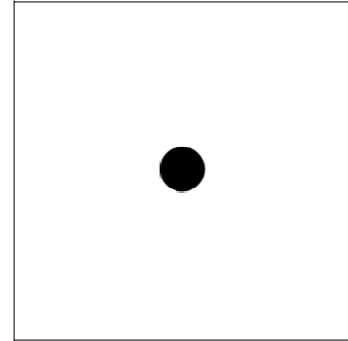
i) What quantities would be measured?

If forces are balanced, then motion DOESN'T CHANGE

ii) What equipment would be used for the measurements, and how would that equipment be used? Include a labelled diagram of the experimental set up.

iii) Describe the overall procedure to be used. Give enough detail so that another student could replicate the experiment.

- iv) On the dot to the right, which represents the fan-block system, draw and label the forces **(not components)** that are exerted on the system during the experiment described in parts b) i – iii. Represent each force by a distinct arrow starting on, pointing away from the dot.



- c) Describe how to analyse the data from the experiment described in parts b) i – iii in order to determine the coefficient of kinetic friction between the block and the track. Your analysis may include the force F exerted by the air on the fan-block system. Do not add to the free-body diagram in part b) iv.

Essentially this question is testing your understanding of STATICS (Newton's 1st Law).

The keys points are:

- a) Not to select stooopid angles for the fan.
- b) Close your eyes and imagine doing this in the lab BEFORE you write anything. You have space for doodling diagrams and ideas around the picture at the start – use it.

There are at least two possible solutions to this that I came up with.