

NAME _____

DATE _____

Scenario

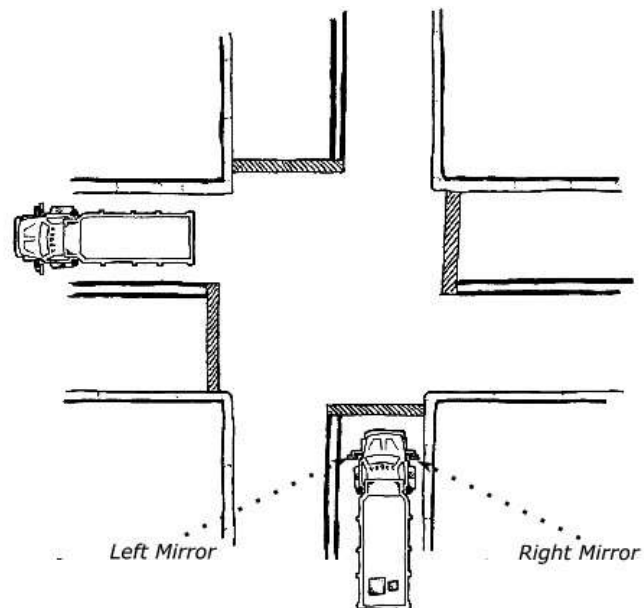
A dump truck is making a very fast left turn as shown. In the back are two blocks of ice, one mass M and one mass m ($M > m$). The truck does not roll over.

Using Representations

- PART A:** Sketch the paths that the left and right mirrors take during the turn.
- PART B:** Using two different colors, sketch the paths that the two blocks of ice take during the turn. Assume that friction between the bed of the truck and the ice may be neglected.

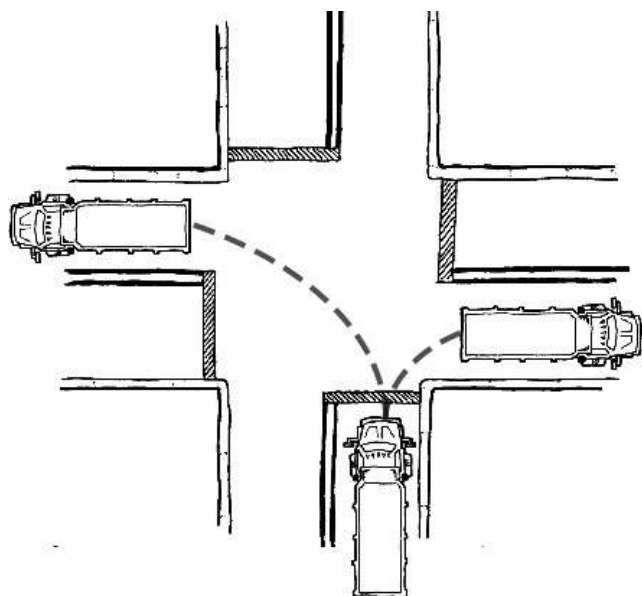
Argumentation

- PART C:** Your friend, who is not in physics class, says the blocks go to the outside of the truck because a centrifugal force is acting on them. In a few brief sentences, explain why your friend is incorrect. Reference the diagram above in your answer.



- PART D:** The truck then approaches another intersection to make a turn. The truck can either make a left turn or a right turn as shown in the diagram. Assume that the truck approaches, makes the turn, and continues in the new direction all without changing speed.

The centripetal force for the turn is provided by the force of static friction, which is determined by the relationship $F_{fs} = \mu_s F_N$. In a few short sentences, explain why the force of static friction, and not kinetic friction, is exerted on the truck even though the truck is in motion.



3.C Centrifugal Force

PART E: In a few short sentences, explain what happens if the value of $\frac{mv^2}{r}$ is greater than the value of $\mu_s F_N$.

PART F: Which turn (left or right) requires the truck to slow down more in order to make the turn safely? Explain your answer using appropriate relationships.

Checklist:

- ☐ I answered the question directly.
- ☐ I stated a law of physics that is always true.
- ☐ I connected the law or laws of physics to the specific circumstances of the situation.
- ☐ I used physics vocabulary (force, mass, acceleration, coefficient, velocity, speed, time, radius).