

Instructions:

1. Do all of your work on this sheet.
2. **Show all of your steps** in problems for full credit.
3. **Be clear and neat** in your work. Any illegible work, or scribbling in the margins, will not be graded.
4. Place your **answers in a box**.
5. If you need more space, you may use the back of the page and write **On back** in the problem space.

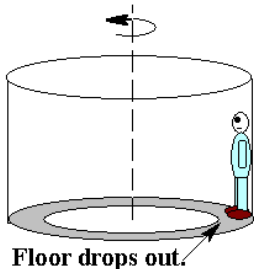
1. Multiple Guess (3 pts) Find the answer which best fits the question and **write it in the space** provided.

- a. The angle of repose is _____
 - a) the angle for a properly banked track.
 - b) the angle of an inclined plane at which a body would begin to slide.
 - c) the proper angle for walking a tightrope.
 - d) the angle at which you can no longer read the blackboard.
 - e) none of these.
- b. The angle for a properly banked track does not depend on _____
 - a) the radius of the track.
 - b) the speed of the car.
 - c) the coefficient of friction.
 - d) the normal force.
 - e) none of the above.
- c. In the absence of a net force, an object will always _____
 - a) be at rest.
 - b) be accelerated.
 - c) be in motion with a constant non-zero velocity.
 - d) None of the above.

2. Definition/Principle (5 pts)

- a. State Newton's First Law of Motion.

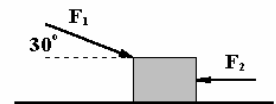
- b. An amusement park ride consists of a large rotating cylinder in which the floor drops out. Carefully draw and label the forces on the person, assuming that there is friction between the person and the wall and no floor.



Bonus: What is the maximum speed at which a car can safely negotiate an unbanked turn of radius 100.0 m in icy weather with coefficient of static friction = 0.100?

3. Problems (12 pts)

- a. A net force of 5.00 N is continuously applied to a 500.0 kg object at rest. How long will it take to raise its velocity to 25.0 m/s?
- b. A 50.0 kg crate is at rest on a level floor. If the coefficient of static friction is 0.25, then what horizontal force is needed to get the crate moving?
- c. A pail of water is rotated in a vertical circle of radius 1.05 m. What must be the minimum speed of the pail at the top of the circle in order for no water to spill out?
- d. (3 pts) Two forces with magnitudes $F_1 = 15.0\text{N}$ and $F_2 = 20.0\text{N}$ act on a 5.0 kg block as shown below.
 - i. What is the horizontal acceleration of the block?



- ii. What is the normal force?

- e. (3 pts) A 200.0 N block and 100.0 N block are connected by a rope. If they are pulled across a smooth surface (no friction) with a force of 50.0 N, then what is the tension in the rope and the resulting acceleration of the blocks?

