Name: _____ Period: _____ Due: _____ EN: 7

1st Law Problems

1 Imagine a place in the *cosmos* far from all gravitational and frictional influences. Suppose that you visit that place (just suppose) and throw a rock. The rock will

a. gradually stop.

(b.) continue in motion in the same direction at constant speed. inertia

2. A 2-kg object is moving horizontally with a speed of 4 m/s. How much net force is required to keep the object moving at this speed and in this direction?

3. Mac and Tosh are arguing in the cafeteria. Mac says that if he flings the Jell-O with a greater speed it will have a greater inertia. Tosh argues that inertia does not depend upon speed, but rather upon mass. Who do you agree with? Explain why.

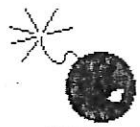
↑mass = ↑ Inertia direct linear > relationship

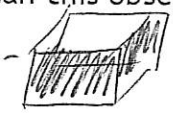
4. Supposing you were in space in a *weightless environment*, would it require a force to set an object in motion?

5. Fred spends most Sunday afternoons at rest on the sofa, watching pro football games and consuming large quantities of food. What effect (if any) does this practice have upon his inertia? Explain. ↑m ↑I

6. Ben Tooclose is being chased through the woods by a bull moose which he was attempting to photograph. The enormous mass of the bull moose is extremely intimidating. Yet, if Ben makes a zigzag pattern through the woods, he will be able to use the large mass of the moose to his own advantage. Explain this in terms of inertia and Newton's first law of motion.

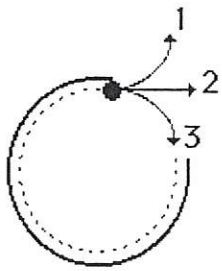
7. Two bricks are resting on edge of the lab table. Shirley Sheshort stands on her toes and spots the two bricks. She acquires an intense desire to know which of the two bricks are most massive. Since Shirley is vertically challenged, she is unable to reach high enough and lift the bricks; she can however reach high enough to give the bricks a push. Discuss how the process of pushing the bricks will allow Shirley to determine which of the two bricks is most massive. What difference will Shirley observe and how can this observation lead to the necessary conclusion?



Brick -   - Foam

more Inertia (harder to move)

8. The group of physics teachers are taking some time off for a little putt-putt golf. The 15th hole at the Hole-In-One Putt-Putt Golf Course has a large metal rim which putters must use to guide their ball towards the hole. Mr. S guides a golf ball around the metal rim When the ball leaves the rim, which path (1, 2, or 3) will the golf ball follow?

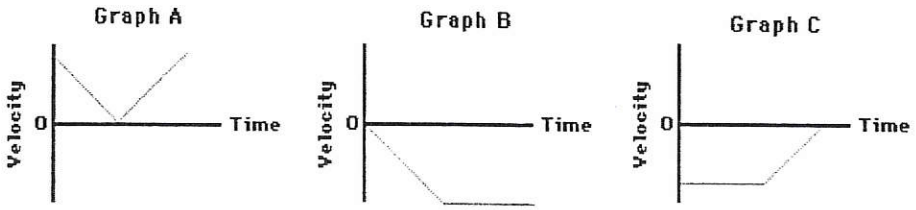


9. 4.0-kg object is moving across a friction-free surface with a constant velocity of 2 m/s. Which one of the following horizontal forces is necessary to maintain this state of motion?

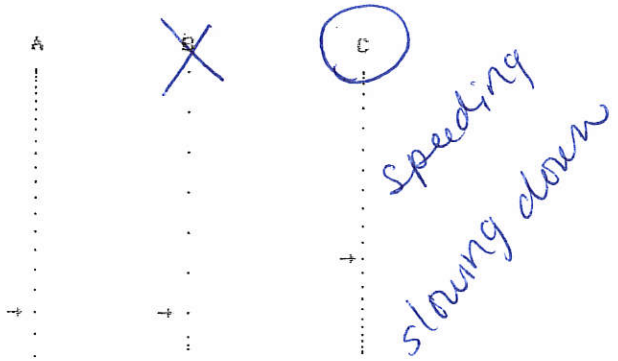
a. 0 N b. 0.5 N c. 2.0 N d. 8.0 N
e. depends on the speed.

Luke Autbeloe drops an approximately 5.0 kg fat cat (weight = 50.0 N) off the roof of his house into the swimming pool below. Upon encountering the pool, the cat encounters a 50.0 N upward resistance force (assumed to be constant). Use this description to answer the following questions.

10 Which one of the velocity-time graphs best describes the motion of the cat? Support your answer with sound reasoning.



11. Which of the following dot diagrams best describes the motion of the falling cat from the time that they are dropped to the time that they hit the bottom of the pool? The arrows on the diagram represent the point at which the cat hits the water. Support your answer with sound reasoning.



12. Several of Luke's friends were watching the motion of the falling cat. Being "physics types", they began discussing the motion and made the following comments. Indicate whether each of the comments are correct or incorrect? Support your answers.

a. Once the cat hits the water, the forces are balanced and the cat will stop.
b. Upon hitting the water, the cat will accelerate upwards because the water applies an upward force.
c. Upon hitting the water, the cat will bounce upwards due to the upwards force.

13. If the forces acting upon an object are balanced, then the object: not moving OR constant velocity