

Name (printed) _____

Name (signature as on ID) _____

Lab Section Number _____

Exam II Chaps. 5-7 in Cutnell and Johnson 6th ed

Multiple Choice questions. Circle the correct answer. No work needs to be shown.

(5 pts) 1. An object is lifted from the floor to a point 4 m above the floor. During this motion the work done by the gravity force on the object is

- (a) positive
- b (b) negative
- (c) zero

(5 pts) 2. An object slides along a horizontal floor from point *A* to point *B*, which is 4 m to the right of *A*. During this motion the work done by the gravity force on the object is

- (a) positive
- (b) negative
- c (c) zero

(5 pts) 3. An object is tied to a string and set into motion in a vertical circle. At the top of the circular path, the net force on the object is

- a (a) downward
- (b) zero
- (c) upward

(5 pts) 4. A small car with mass 1200 kg has a head-on collision with a large truck that has mass 3000 kg. The road is wet, so the horizontal force from the road can be neglected. As a result of the collision

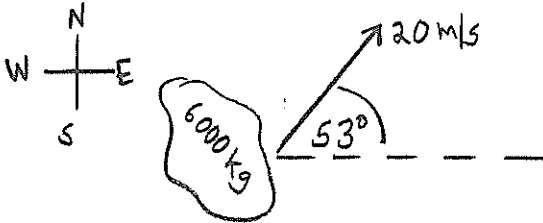
- (a) the magnitude of the momentum change of the car is greater than that of the truck
- (b) the magnitude of the momentum change of the truck is greater than that of the car
- c (c) the two vehicles have the same magnitude of momentum change

5, (5 pts) Two satellites are in circular orbits around the earth. Satellite A has mass 200 kg and is 800 km above the surface of the earth. Satellite B has mass 400 kg and is 1600 km above the surface of the earth. Which statement is correct

- a (a) The speed of A is greater than the speed of B .
(b) The speed of B is greater than the speed of A .
(c) The two satellites have the same speed, since they are both orbiting the earth.

On the following four problems show all your work. Partial credit will be given if earned. Write your answers in the blanks provided.

(16 pts) 6. On a wet road a car of mass 2000 kg is traveling due east with speed v_c . It collides with a truck of mass 4000 kg that is initially traveling due north with speed v_t . After the collision the two vehicles stick together, have a combined mass of 6000 kg and are moving together at 20 m/s at an angle of 53° north of east. What is



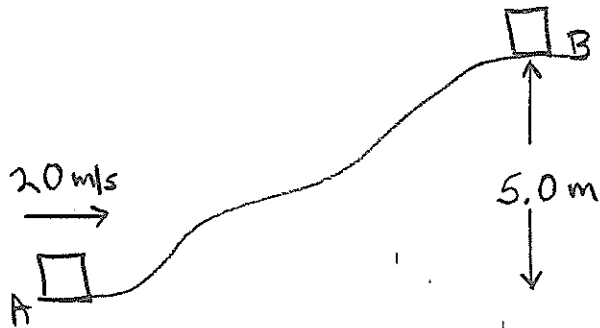
a) the speed v_c of the car immediately before the collision?

Ans. 36.1 m/s

b) the speed v_t of the truck immediately before the collision?

Ans. 24.0 m/s

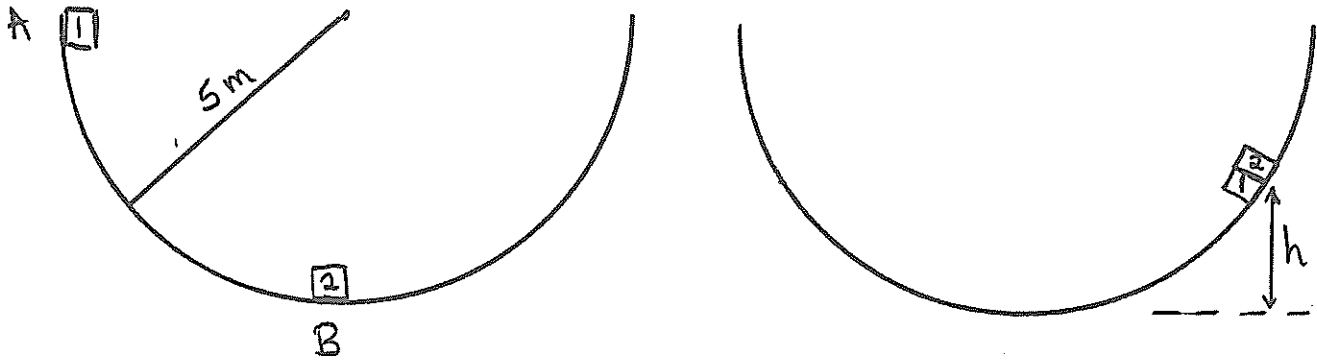
(20 pts) 7. A 2 kg block moves up a hill as shown in the sketch. At the bottom of the hill (point A) the block has speed 20 m/s. As the block moves from point A to point B , the work done by the friction force has magnitude 18.0 J. What is the speed of the block when it reaches point B ?



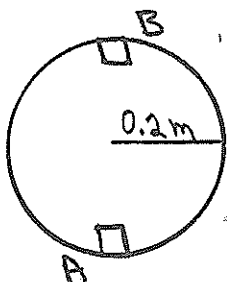
Ans. 16.9 m/s

(18 pts) 8. Block 1, mass 2 kg, is released from rest at point A , which is at the edge of a large hemispherical bowl that has radius 5 m. Block 1 slides down the inside of the bowl and collides with block 2, mass 6 kg, that is initially at rest at point B , which is at the bottom of the bowl. The two blocks stick together and the combined object slides part-way up the other side of the bowl. Friction between the bowl and the blocks can be neglected. What is the maximum height h reached by the combined object after the collision?

Ans. 0.31 m



(21 pts) 9. A small block with mass 0.30 kg is moving in a vertical circle on the inside of a circular track that has radius 0.20 m. As the block slides through point A, at the bottom of the track, it has speed 4.0 m/s. There is no friction between the block and the track.



a) As the block moves through point A, what is the normal force exerted on it by the track?

Ans. 26.9 N

b) Point B is at the top of the track. If the block has speed 4.0 m/s at point A, as in part(a), what is the normal force exerted on it by the track as it moves through point B?

Ans. 9.4 N

c) What is the minimum speed the block can have at point A and not fall off the track at point B?

Ans. 3.13 m/s