Physics 161, Sample Multiple Choice Questions

Special Note: Please take note that the following set of questions is just a sampling of the type of questions you can expect to see on the multiple choice section of the final exam.

1). The topics covered in the multiple choice section will be from CH 2-11. They will NOT be limited to just the topics appearing in the following list.

2). The multiple choice questions will mostly be taken from HW, Lecture, Lecture Quizzes, Discussion Quizzes, previous exams and the textbook.

Multiple Choice Questions:

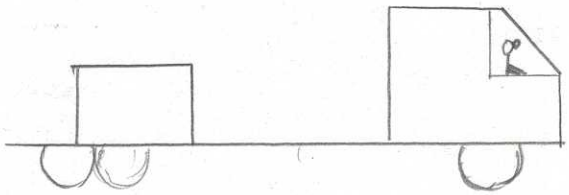
Q1). A box of mass M **sits without slipping** on the back of a truck that is moving to the right but is slowing down. The force of friction on the box

a). points to the right and is equal to $\mu_s F_N$

b). points to the right but is not necessarily equal to $\mu_s F_N$

c). points to the left and is equal to $\mu_s F_N$

d). points to the left but is not necessarily equal to $\mu_s F_N$



Q2). A car, having a mass of 800-kg , collides head-on with a truck having a mass of 1600-kg. In this collision, the magnitude of the force exerted **on the car by the truck** F_{CT} and the force exerted **on the truck by the car** F_{TC} are such that

a). $F_{CT} = F_{TC}$

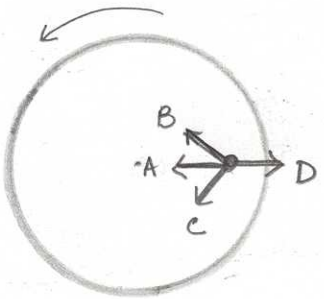
b). $F_{CT} > F_{TC}$

c). $F_{CT} < F_{TC}$

d). Not enough information, need to know if frictional forces are present or not.

Q3). A coin lies on the horizontal turntable of a record player. As the turntable starts rotating with **increasing rotational speed** the coin rotates with the turntable, remaining at rest relative to it. At an instant when the coin is at the position indicated in the figure below, the friction force exerted on the coin by the turntable is

directed along one of the arrows indicated in the figure. Which of these arrows best indicates the direction of this friction force?



a). A

b). B

c). C

d). D

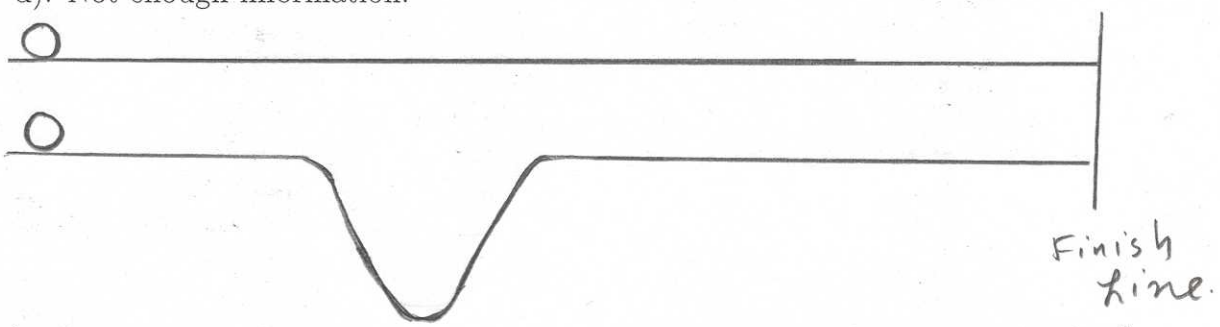
Q4). Two balls race along two parallel tracks, starting with the same initial speed v_0. One track is level. The second track has a dip in it as shown. Which ball reaches the finish line first?

a). The ball on the level track

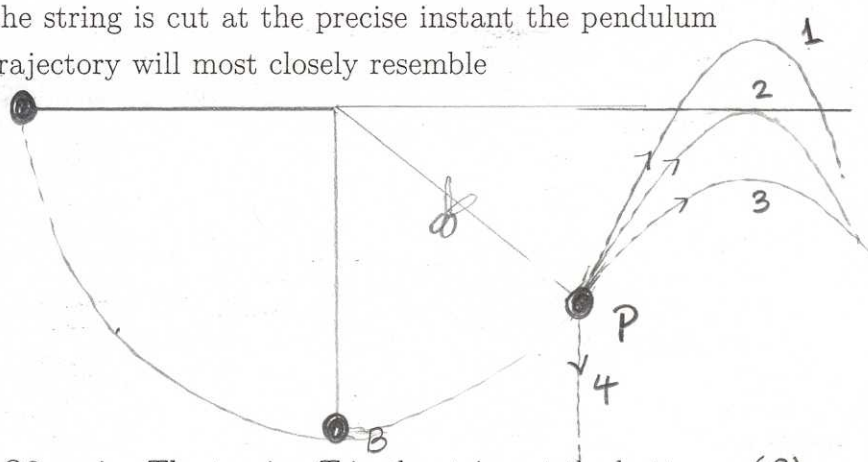
b). The ball on the dipped track

c). They both reach the finish line together

d). Not enough information.



Q5). A pendulum of length L and mass m is released at rest from an angle of 90^0 with respect to the vertical. If the string is cut at the precise instant the pendulum bob reaches point P, the bob's trajectory will most closely resemble



a). Path 1

b). Path 2

c). Path 3

d). Path 4

Q6). Consider the pendulum of Q3 again. The tension T in the string at the bottom of the swing is such that (B)

a). $T = mg$ because the pendulum is neither moving up nor down at that instant

b). $T < mg$ because the pendulum has a radial acceleration

c). $T > mg$ because the pendulum has a radial acceleration

d). T is either greater than mg or less than mg, need to know the speed to be sure.

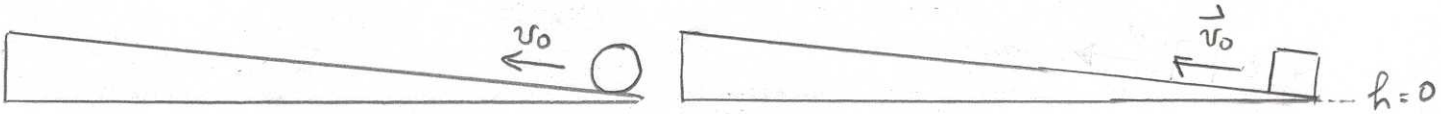
Q7). A wheel of mass m and a block also of mass m are each given an initial push such that each has the same initial translational velocity v_0. Suppose the wheel rolls without slipping up the incline and the block slides up an identical incline without friction. Which one will make it higher up the incline?

a). The wheel because it has more kinetic energy: it has the same amount of translational energy as the block but in addition it has rotational kinetic energy.

b). The block because all its initial energy is in the form of translational kinetic energy.

c). The block because it doesn't have any frictional force acting on it but the wheel has a force of static friction acting on it.

d). They both reach the same height.



Q8). The figure below shows a meter stick, half wood, half steel, that is pivoted at the wood end at O. A force $\vec{\mathbf{F}}$ is applied to the steel end at a. In Fig b, the stick is reversed and pivoted at the steel end at O' and the same force is applied at the wood end at a'. The resulting angular accelerations α are such that

a). $\alpha_a > \alpha_b$

b) $\alpha_a < \alpha_b$

c). $\alpha_a = \alpha_b$

d). Insufficient information.

Q9). Which of the following statements are true:

1). In a perfectly inelastic collision, kinetic energy of the center of mass $K.E_{cm}$ is completely lost.

2). In a perfectly inelastic collision, **all but** the kinetic energy of the center of mass $K.E_{cm}$ is completely lost.

3). The equation $v_{2i} - v_{1i} = -(v_{2f} - v_{1f})$ is valid for ALL elastic collisions.

4). The equation $v_{2i} - v_{1i} = -(v_{2f} - v_{1f})$ is valid only for an elastic collision in which the masses of the two colliding objects are the same.

5). The equation $v_{2i} - v_{1i} = -(v_{2f} - v_{1f})$ is valid for Both elastic and inelastic collisions.

a). 1 and 3 only.

b). 2 and 3 only.

c). 2 and 4 only.

d). 1 and 5 only.

Q10). The figure below shows a satellite moving in an elliptical orbit around the earth. At point A, the satellite is at its smallest distance R from the earth. At point B, it is at its farthest distance $3R$ from the earth. The velocities of the satellite at point A and B are such that

a). $v_A = v_B$ because kinetic energy is conserved

b). $v_A = 3v_B$ because angular momentum of the earth-satellite system is conserved

c). $v_A = 1/3\, v_B$ because angular momentum of the earth-satellite system is conserved

d). not enough information.