This print-out should have 13 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001 (part 1 of 2) 10.0 points
If a golf ball and a ping-pong ball both move with the same kinetic energy, which has the greater speed?

1. the ping-pong ball
2. The two balls have the same speed.
3. Cannot be determined
4. the golf ball

002 (part 2 of 2) 10.0 points
In a gaseous mixture of massive molecules and light molecules with the same average KE, which have the greater speed?

1. They have the same speed.
2. the massive molecules
3. Cannot be determined
4. the light molecules

003 10.0 points
This question is typical on some driver’s license exams: A car moving at 40 km/h skids 17 m with locked brakes.

How far will the car skid with locked brakes at 100 km/h? Answer in units of m.

004 10.0 points
Two objects of same material are travelling near you. Object A is a 1.1 kg mass traveling 10.2 m/s; object B is a 2 kg mass traveling 5 m/s.

Which object would make you feel worse if you are hit by it?

1. the same
2. B

3. unable to determine

4. A

005 10.0 points
A car is moving at 66 miles per hour. The kinetic energy of that car is $5 \times 10^5$ J.

How much energy does the same car have when it moves at 97 miles per hour? Answer in units of J.

006 10.0 points
The Joule and the kilowatt-hour are both units of energy. 14.1 kW · h is equivalent to how many Joules? Answer in units of J.

007 (part 1 of 5) 10.0 points
A 16.9 kg block is dragged over a rough, horizontal surface by a constant force of 177 N acting at an angle of angle 34° above the horizontal. The block is displaced 59.3 m, and the coefficient of kinetic friction is 0.186.

The acceleration of gravity is 9.8 m/s².

Find the work done by the 177 N force. Answer in units of J.

008 (part 2 of 5) 10.0 points
Find the magnitude of the work done by the force of friction. Answer in units of J.

009 (part 3 of 5) 10.0 points
What is the sign of the work done by the frictional force?

1. negative
2. positive
3. zero

010 (part 4 of 5) 10.0 points
Find the work done by the normal force. Answer in units of J.

011 (part 5 of 5) 10.0 points
What is the net work done on the block? Answer in units of J.

012 (part 1 of 2) 10.0 points
A force \( \vec{F} = F_x \hat{i} + F_y \hat{j} \) acts on a particle that undergoes a displacement of \( \vec{s} = s_x \hat{i} + s_y \hat{j} \).
Let: \( F_x = 4 \) N, \( F_y = -5 \) N, \( s_x = 3 \) m, and \( s_y = 1 \) m.
Find the work done by the force on the particle. Answer in units of J.

013 (part 2 of 2) 10.0 points
Find the angle between \( \vec{F} \) and \( \vec{s} \). Answer in units of \(^\circ\).