This print-out should have 10 questions. Multiple-choice questions may continue on the next column or page — find all choices before answering.

001 10.0 points
A block accelerates 3 m/s² down a plane inclined at angle 26.0°. The acceleration of gravity is 9.81 m/s².

Find $\mu_k$ between the block and the inclined plane.

002 10.0 points
Two blocks are arranged at the ends of a massless string as shown in the figure. The system starts from rest. When the 1.47 kg mass has fallen through 0.326 m, its downward speed is 1.25 m/s.

The acceleration of gravity is 9.8 m/s².

What is the frictional force between the 3.02 kg mass and the table? Answer in units of N. See Example 4.13 in text.

003 (part 1 of 3) 10.0 points
A block is at rest on the incline shown in the figure. The coefficients of static and kinetic friction are $\mu_s = 0.73$ and $\mu_k = 0.62$, respectively.

The acceleration of gravity is 9.8 m/s².

004 (part 2 of 3) 10.0 points
What is the largest angle which the incline can have so that the mass does not slide down the incline? Answer in units of °.

005 (part 3 of 3) 10.0 points
What is the acceleration of the block down the incline if the angle of the incline is 43°? Answer in units of m/s².

006 (part 1 of 2) 10.0 points
A car is traveling at 34.9 mi/h on a horizontal highway. The acceleration of gravity is 9.8 m/s².

If the coefficient of friction between road and tires on a rainy day is 0.11, what is the minimum distance in which the car will stop? (1 mi = 1.609 km) Answer in units of m.

007 (part 2 of 2) 10.0 points
What is the stopping distance when the surface is dry and $\mu_{dry} = 0.655$? Answer in units of m.

008 10.0 points
A force $\vec{F}$ applied to a crate of mass $M$ at an angle $\alpha$ makes the crate move horizontally with a constant acceleration of magnitude $a$. The coefficient of kinetic friction between the crate and the surface is $\mu_k$.

Careful! $N \neq Mg$!!
Select the correct expression for $||\vec{F}||$, the magnitude of the force.

1. $||\vec{F}|| = \frac{M a + \mu_k M g}{\mu_k \sin \alpha}$
2. $||\vec{F}|| = \frac{M a + \mu_k M g}{\cos \alpha - \mu_k \sin \alpha}$
3. $||\vec{F}|| = \frac{M a + \mu_k M g}{\cos \alpha}$
4. $||\vec{F}|| = \frac{M a - \mu_k M g}{\cos \alpha}$
5. $||\vec{F}|| = \frac{\mu_k M g - M a}{\cos \alpha - \mu_k \sin \alpha}$
6. $||\vec{F}|| = \frac{M a - \mu_k M g}{\cos \alpha + \mu_k \sin \alpha}$
7. $||\vec{F}|| = \frac{M a - \mu_k M g}{\cos \alpha - \mu_k \sin \alpha}$
8. $||\vec{F}|| = \frac{M a + \mu_k M g}{\cos \alpha + \mu_k \sin \alpha}$
9. $||\vec{F}|| = \frac{\mu_k M g - M a}{\cos \alpha + \mu_k \sin \alpha}$
10. $||\vec{F}|| = \frac{M a - \mu_k M g}{\mu_k \sin \alpha}$

009 (part 1 of 2) 10.0 points

Hint: This problem requires a train of logic.

(1) Analyze force diagram,
(2) use Newton’s Laws, and
(3) solve the equations of motion.

A block starts from rest at a height of 3 m on a fixed inclined plane.

The acceleration of gravity is 9.8 m/s².

What is the speed of the block at the bottom of the ramp? Answer in units of m/s.

010 (part 2 of 2) 10.0 points

If the block continues to slide on the ground with the same coefficient of friction, how far will the block slide on the ground until coming to rest? Answer in units of m.