

Sample problems for Common Exam 3, Physics 105

- _____ 1. If the coefficient of static friction between the tires and road on a rainy day is 0.5, what is the fastest speed at which a car can make a turn with a radius of 80.0 meters? The road is flat.
- _____ 2. A Hooke's law spring is compressed 12.0 cm from equilibrium and the potential energy stored is 72.0 J. What is the spring constant in this case?
- _____ 3. A parachutist of mass 50.0 kg jumps out of an airplane at a height of 1 000 m. The parachute deploys, and she lands on the ground with a speed of 5.0 m/s. How much energy was lost to air friction during this jump?
- _____ 4. An amount of work equal to 1.5 J is required to compress the spring in a spring-gun. What is the "launch speed" of a 15-g marble?
- _____ 5. Old Faithful geyser in Yellowstone Park shoots water hourly to a height of 40 m. With what velocity does the water leave the ground?

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- _____ 6. A very light cart holding a 300-N box is moved at constant velocity across a 15-m level surface. What is the net work done in the process?
- _____ 7. _____
_____ 7. Preston pushes a wheelbarrow weighing 500 N to the top of a 50.0-m ramp, inclined at 20.0° with the horizontal, and leaves it. Tamara accidentally bumps the wheelbarrow. It slides back down the ramp, during which an 80.0-N frictional force acts on it over the 50.0 m. What is the wheelbarrow's kinetic energy at the bottom at of the ramp? ($g = 9.8 \text{ m/s}^2$)
- _____ 8. I use a rope 2.00 m long to swing a 10.0-kg weight around my head. The tension in the rope is 20.0 N. In half a revolution how much work is done by the rope on the weight?