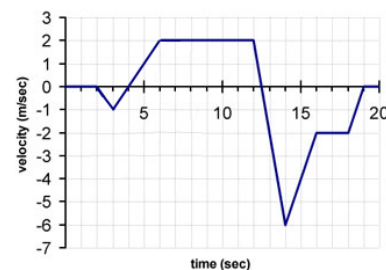


Physics I Placement Exam

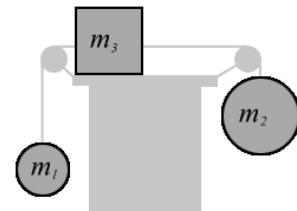
- 1) A block rests on a board, which is at an angle θ relative to the horizontal. The coefficient of static friction between the board and the block μ_s is 0.707. If the θ is increased, at what angle does the block begin to slide? Answer in units of degrees.
- 2) A daredevil is going to jump a motorcycle over a canyon 60 m wide. At the edges of the canyon, he has placed two ramps of 40° , one for launching and one for landing. How fast should the daredevil be going when he leaves the ramp to land perfectly on the ramp at the opposite side of the canyon? Neglect air resistance.

- 3) The following graph of velocity vs. time shows the motion of an object along a straight line. If the object started at a position of 7 m, what position is it in at the end of the 20 seconds?



- 4) A driver traveling at 140 km/h passes a police officer hiding behind a sign. If the officer begins to accelerate at 8.0 m/s^2 two seconds later, how far from the sign does the officer catch the driver?

- 5) Two balls of mass m_1 and m_2 hang over massless, frictionless pulleys. m_1 weighs half as much as m_2 . They are attached via a cable to a block m_3 with a mass of 1.5 times m_2 , which sits on a frictionless surface. If the center of mass of m_2 is released 0.4 m above m_1 , how fast is m_3 traveling when the centers of mass of m_1 and m_2 are at the same height?



- 6) The bulk modulus of steel is 139 GPa. If pressure increases by one atmosphere every 10 m depth underwater, how much will a steel sphere shrink at 5000 m depth in terms of percent of its original volume?