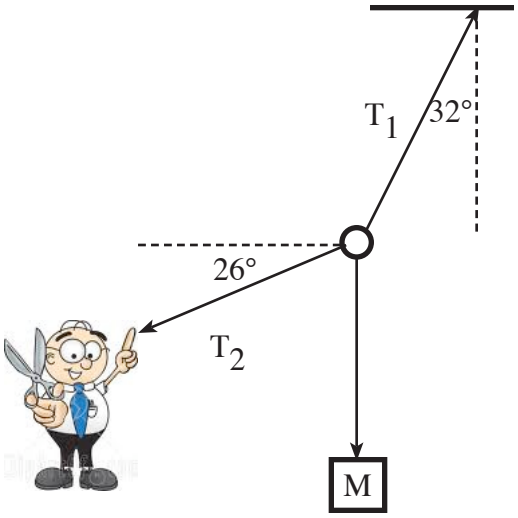
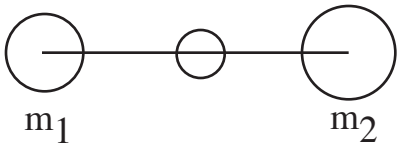
Beverly Hills High School -- AP Physics C -- Exam #4 -- 100 points

Be complete and clear in all your presentations. If it is sloppy and unorganized, you won't get the full credit. Partial credit for partial performance. Pencils only.

1) A man is positioning a large concrete block of weight 1140 N to be dropped into its place. Just before its line is cut, the block is motionless. Find the tensions in each line as shown. Fifteen points.



2) Two masses, m_1 and m_2, are shown below. m_1 has a mass of 28 g and m_2 has a mass of 17 g. They are placed 12 m apart. Assume they are point masses. How far from m_1 must a third mass of mass 9 g be placed, along the line shown, so that the gravitational attraction it experiences is equivalent in magnitude from m_1 and m_2? Ten points.



3) A wooden block, of mass 83.6 kg, is on an inclined plane raised at an angle of 21°. The block is connected to a second block via a massless rope over a frictionless pulley at the top of the inclined plane. The second block has a mass of 49.5 kg. Make a proper diagram. Find the tension in the rope and the acceleration of the system. Fifteen points.

4) During a recent curling match, a 24.5 kg stone was slid along the ice with an initial velocity of 3.47 m/s. If the ice has a coefficient of sliding friction of 0.107, determine how far the stone will travel and how long it will take to stop? Ten points.

5) Indiana Jones is trapped at the bottom of a slime-covered cave in Outer Slobovia with a beautiful blonde, half his weight, that he wishes to rescue. The cave is 41.7 m deep. His faithful companion drops a rope down to the two of them. This rope can withstand a tension of 683 N without breaking. Indiana Jones weighs 890 N. The rope is lowered and he grabs her as they go up. What is the minimum amount of time it can take for the couple to escape the trap? Ten points and an honorary bullwhip.

6) Holding on to a towrope moving parallel to a frictionless ski slope, an 80.0 kg skier (me) is pulled up the slope, which is at an angle of 11.5° with the horizontal. What is the magnitude Frope of the force on the skier from the rope when a) the magnitude v of the skier's velocity is constant at 2.50 m/s and b) v = 2.50 m/s as v increases at a rate of 0.150 m/s/s? Ten points.

Multiple Choice. Write the letter that best answers each example. Five points each.

_____ 7) A water skier is being pulled by a motor boat at a constant velocity. Which statement is not true?

a) Her acceleration is exactly zero; net force is zero.
b) The frictional forces are equal but opposite to the pulling forces of the boat.
c) Net force is zero; her velocity is necessarily zero.
d) She is in dynamic equilibrium.

_____ 8) A free-body diagram

a) shows all of the forces on the body.
b) shows the net force on the body.
c) shows the velocity of the body.
d) shows the position of the body.

_____ 9) A man is in an elevator going up to the 12th floor. As the elevator reaches the 12th floor, it slows down. His apparent weight is

a) more than his true weight.
b) less than his true weight.
c) equal to his true weight.

_____ 10) The two facts you would need to determine the acceleration due to gravity on the surface of an unknown world are

a) the radius of the planet and its distance from its sun.
b) the diameter of the planet and the mass of the planet.
c) the mass of the planet and the mass of the body you are measuring.
d) none of these pairs of facts are sufficient to find g.

_____ 11) When a body is moved from sea level to the top of a mountain what changes?

a) The body's mass b) The body's weight. c) Both. d) Neither.

_____ 12) The maximum value that static friction can have is the product of

a) the coefficient of static friction and the coefficient of kinetic friction.
b) the coefficient of static friction and the mass of the body in question.
c) the coefficient of static friction and the normal force of the body in question.
d) the coefficient of static friction and the accleration due to gravity.