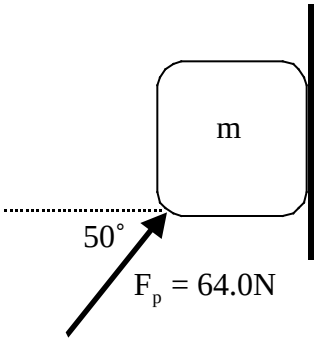
Name:_____

Solve the following problems in the space provided. Use the back of the page if needed. Each problem is worth 20 points. You must show your work in a logical fashion starting with the correctly applied physical principles which are on the last page. Your score will be maximized if your work is easy to follow because partial credit will be awarded.

1. A block is held up against a smooth wall by a person pushing upward and toward the right with a force of 64.0N at an angle of 50˚ below the horizontal as shown. (a)Name and indicate in the drawing the direction of the other forces that are acting on the block and (b)find their magnitudes. (c)Find the mass of the block.



2. A 50.0g ball is twirled overhead at the end of a 35.0cm string. The string will break when the tension exceeds 15.0N. Neglecting vertical forces such as gravity, find (a)the maximum speed that the ball may have without the string breaking and (b)the maximum number of revolutions per minute that the string can withstand.

3. A woman throws a ball of mass 0.200kg by accelerating it from rest to 30.0m/s over a distance (assumed to be along a straight line) of 85.0cm. Find (a)the initial kinetic energy of the ball, (b)the final kinetic energy of the ball, (c)the work done on the ball by the woman and (d)the average force exerted on the ball by the woman.

4. A bug flying northward at 8.00m/s collides with the windshield of a car traveling southward at 20.0m/s. Answer the following questions. For full credit, you must explain your thinking. Be sure to cite any relevant principles of physics. Which object, the bug or the car:

(a)feels the greater force during the collision?

(b)has the greater acceleration during the collision?

(c)has the greater work done on it during the collision?

(d)has the greater change in kinetic energy during the collision?

(e)has the greater kinetic energy after the collision?

5. A 3.00kg block is released from rest and drops vertically from a height of 50.0cm on to a 10.0cm tall spring. The spring compresses 6.00cm when the block is again (temporarily) at rest. Find the spring constant of the spring.