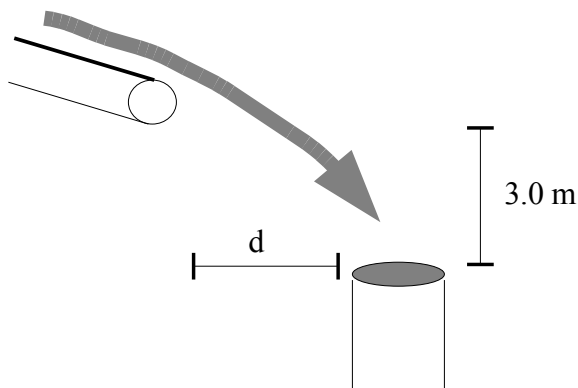


**Physics 100/102H**  
**Assignment 3**  
**Assignment quiz on the week of Oct. 27-31, 2008**

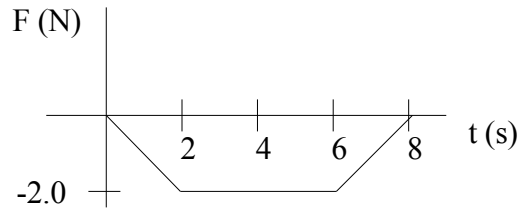
Remember the steps to solving a problem: (i) Draw a picture that defines your variables. Draw FBD or motion diagrams if appropriate. (ii) State the physical principle involved. (iii) Write down the math, starting with the basic equations, for example  $\sum F_x = ma_x$  and  $\sum F_y = ma_y$ . (iv) Now figure out what your known and unknown variables are, and solve for the answer. **Remember, you are graded on your solution, not just your answer.**

1. Sand moves without slipping at 6.0 m/s down a conveyer that is tilted at  $15^\circ$ . The sand enters a vertical pipe 3.0 m below the end of the conveyer belt, as shown in the figure below. What is the horizontal distance between the conveyer belt and the pipe?



2. A plane has an airspeed of 200 km/h. The pilot wishes to reach a destination 600 km due east, but a wind is blowing at 50 km/h in the direction  $30^\circ$  north of east.
  - a) In what direction must the pilot head the plane in order to reach her destination?
  - b) How long will the trip take?
3. A high speed drill rotating counter-clockwise at 2400 rpm comes to a halt in 2.5 s.
  - a) What is the drill's angular acceleration?
  - b) How many revolutions does it make as it stops?
4. A heavy ball with a weight of 100 N (mass  $m = 10.2 \text{ kg}$ ) is hung from the ceiling of a lecture hall on a 4.5-m-long rope. The ball is pulled to one side and released to swing as a pendulum, reaching a speed of 5.5 m/s as it passes through the lowest point. What is the tension in the rope at this point?

5. A 2.0 kg object is moving to the right (positive direction) with a speed of 1.0 m/s when it experiences the force shown in the figure below. What are the object's speed and direction after the force ends?



6. A 10 g bullet is fired into a 10 kg wood block that is at rest on a wood table. The block, with the bullet embedded, slides 5.0 cm across the table. What was the speed of the bullet? Coefficients of friction are given in the back of Knight. (Note that this is one way of measuring the muzzle velocity of a gun.)