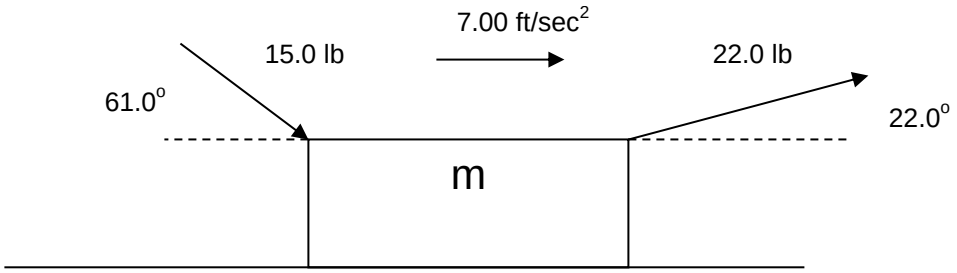
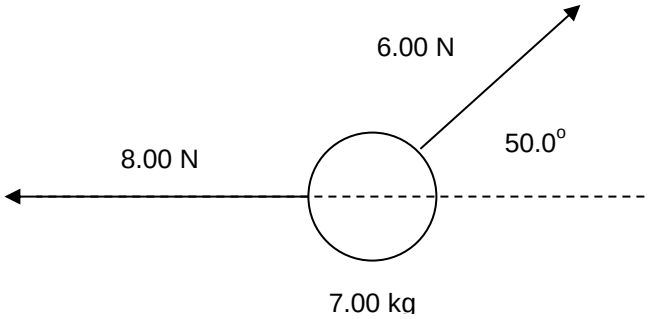
Dynamics Worksheet

1. A 150 lb frictionless crate of bananas is pushed along by a 30 lb force. What is its acceleration?

2. Find the mass.



3. For this particle in space (there is no gravity), find the accelerations and directions (an angle) of the mass shown.



4. (p. 67 #28) A roller coaster reaches the top of the steepest hill with a speed of 5.0 km/h. It then descends the hill which is at an average angle of 45^o and is 50-m long. What will its speed be when it reaches the bottom? Neglect friction. (Hint: what did you just learn about the component of gravity's acceleration down an incline?)

5. (p. 67 #30) A wet bar of soap slides freely down a ramp 2.0 m long inclined at 6.8^o. How long does it take to reach the bottom? Neglect friction. (Hint: look at the hint for the previous problem.)

6. (p. 68 #36) A 5000-kg helicopter accelerates upward at 0.550 m/s^2 while lifting a 1500-kg car.
   a) What is the lift force exerted by the air on the blades of the helicopter?
   b) What is the tension in the cable (ignore its mass) that connects car to helicopter?

ANSWERS:

1. 6.40 ft/sec^2
2. 3.95 slugs
3. a = .884 m/sec^2; θ = 48.0^o above the direction of the 8N force
4. 26.4 m/s
5. 1.86 sec
6. a) 6.73x10^4 N; b) 1.55x10^4 N