

1. On the open seas, a cannonball is shot from a cannon at 12 m/s at an angle of  $35^\circ$  above horizontal. It leaves the cannon on the ship's deck 4 m above the ocean and lands on another ship's deck 2 m above the ocean. What is the final velocity (in components) of the cannonball? How much time does it take to get there?

2. Two children fighting over a 55 kg toy pull on the toy in different directions. One child pulls with a force of magnitude 65 N directed 59 degrees clockwise from the positive x-axis, and the other has a magnitude of 35 N at 32 degrees clockwise from the positive y-axis. What is the magnitude of this toy's acceleration?

3. Two blocks, of mass 12.0 kg and 24.0 kg, are connected by a string over an ideal, frictionless pulley. The 24.0 kg mass is placed on a frictionless ramp which is angled  $30.0^\circ$  above the horizontal, and the 12.0 kg mass is hanging off the edge, not touching any surface. When you release the blocks from rest, they accelerate downward. Calculate the acceleration.

4. A stunt man drives a car at a speed of 20 m/s off a 30 m high cliff. The road leading to the cliff's edge is inclined upward at an angle of  $20^\circ$ . How far from the base of the cliff does the car land? What is the car's impact speed?

5. A person pushes a filing cabinet up a ramp that's inclined 25 degrees from the horizontal, with a constant force (parallel to ramp) of 440 N, and it moves at a constant speed of 6.2 m/s. If the total mass of the filing cabinet is 82 kg, what is the coefficient of friction between the filing cabinet and the ramp?