1. Question Details SerCP9 3.P.028. [1631975]

From the window of a building, a ball is tossed from a height y_0 above the ground with an initial velocity of 8.90 m/s and angle of 22.0° below the horizontal. It strikes the ground 5.00 s later.

(a) If the base of the building is taken to be the origin of the coordinates, with upward the positive y-direction, what are the initial coordinates of the ball? (Use the following as necessary: y_0.)

$x_i =$

$y_i =$

(b) With the positive x-direction chosen to be out the window, find the x- and y-components of the initial velocity.

$v_{i,x} =$ ☐ m/s

$v_{i,y} =$ ☐ m/s

(c) Find the equations for the x- and y- components of the position as functions of time. (Use the following as necessary: y_0 and t. Let the variable t be measured in seconds.)

$x =$ m

$y =$ m

(d) How far horizontally from the base of the building does the ball strike the ground?

☐ m

(e) Find the height from which the ball was thrown.

☐ m

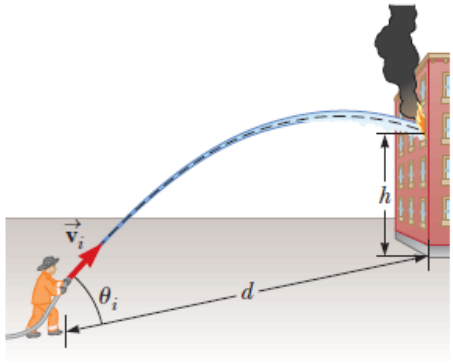
(f) How long does it take the ball to reach a point 10.0 m below the level of launching?

☐ s

2. Question Details SerCP9 3.P.032.WI. [1631988]

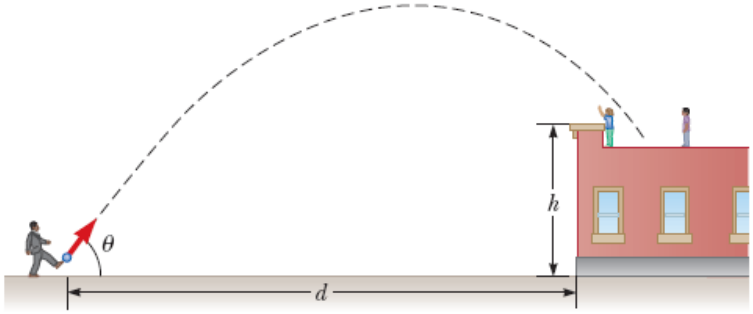
A fireman d = 60.0 m away from a burning building directs a stream of water from a ground-level fire hose at an angle of θ_i = 37.0° above the horizontal as shown in the figure. If the speed of the stream as it leaves the hose is v_i = 40.0 m/s, at what height will the stream of water strike the building?

[ ] m



3. Question Details SerCP9 3.P.034. [1594449]

A playground is on the flat roof of a city school, 4.9 m above the street below (see figure). The vertical wall of the building is h = 6.40 m high, to form a 1.5-m-high railing around the playground. A ball has fallen to the street below, and a passerby returns it by launching it at an angle of θ = 53.0° above the horizontal at a point d = 24.0 m from the base of the building wall. The ball takes 2.20 s to reach a point vertically above the wall.



(a) Find the speed at which the ball was launched.

[ ] m/s

(b) Find the vertical distance by which the ball clears the wall.

[ ] m

(c) Find the horizontal distance from the wall to the point on the roof where the ball lands.

[ ] m

4. Question Details SerCP9 4.P.002. [1588924]

A football punter accelerates a football from rest to a speed of 11 m/s during the time in which his toe is in contact with the ball (about 0.16 s). If the football has a mass of 0.50 kg, what average force does the punter exert on the ball?

[ ] N

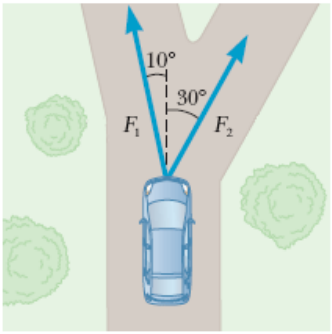
5. Question Details SerCP9 4.P.006. [1588519]

A freight train has a mass of 1.9 × 10^7 kg. If the locomotive can exert a constant pull of 7.9 × 10^5 N, how long does it take to increase the speed of the train from rest to 70 km/h?

[ ] min

6. Question Details SerCP9 4.P.012. [1594439]

Two forces are applied to a car in an effort to move it, as shown in the following figure, where F_1 = 406 N and F_2 = 394 N. (Assume up and to the right as positive directions.)



(a) What is the resultant of these two forces?

magnitude [ ] N

direction [ ] ° to the right of the forward direction

(b) If the car has a mass of 3,000 kg, what acceleration does it have? Ignore friction.

[ ] m/s^2

7. Question Details SerCP9 4.P.016.MI.FB. [1623805]

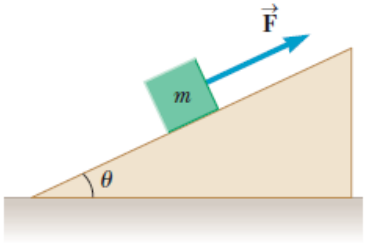
The force exerted by the wind on the sails of a sailboat is F_{sail} = 310 N north. The water exerts a force of F_{keel} = 240 N east. If the boat (including its crew) has a mass of 260 kg, what are the magnitude and direction of its acceleration?

magnitude [ ] m/s^2

direction [ ] ° north of east

8. Question Details SerCP9 4.P.030. [1625385]

A block of mass m = 6.0 kg is pulled up a θ = 21° incline as in the figure with a force of magnitude F = 38 N.



(a) Find the acceleration of the block if the incline is frictionless.

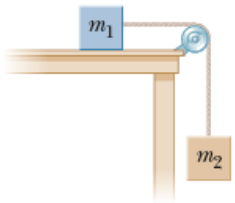
[ ] m/s^2

(b) Find the acceleration of the block if the coefficient of kinetic friction between the block and incline is 0.12.

[ ] m/s^2

9. Question Details SerCP9 4.P.036.WI.soln. [1625407]

An object with mass m_1 = 3.30 kg, rests on a frictionless horizontal table and is connected to a cable that passes over a pulley and is then fastened to a hanging object with mass m_2 = 11.3 kg, as shown in the figure.



(a) Find the magnitude of the acceleration of each object.

a_1 = [ ] m/s^2

a_2 = [ ] m/s^2

(b) Find the tension in the cable.

[ ] N

10. Question Details SerCP9 4.P.048. [1588395]

A student decides to move a box of books into her dormitory room by pulling on a rope attached to the box. She pulls with a force of 174 N at an angle of 27.0° above the horizontal. The box has a mass of 24.0 kg, and the coefficient of kinetic friction between box and floor is 0.300.

(a) Find the acceleration of the box.

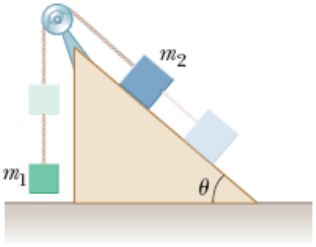
[ ] m/s^2

(b) The student now starts moving the box up a 10.0° incline, keeping her 174 N force directed at 27.0° above the line of the incline. If the coefficient of friction is unchanged, what is the new acceleration of the box?

[ ] m/s^2, up the incline

11. Question Details SerCP9 4.P.054. [1759234]

Objects of masses m_1 = 4.00 kg and m_2 = 9.00 kg are connected by a light string that passes over a frictionless pulley as in the figure below. The object m_1 is held at rest on the floor, and m_2 rests on a fixed incline of θ = 45.0°. The objects are released from rest, and m_2 slides 1.70 m down the slope of the incline in 3.50 s.



(a) Determine the acceleration of each object. (Enter the magnitude only.)

[ ] m/s^2

(b) Determine the tension in the string. (Enter the magnitude only.)

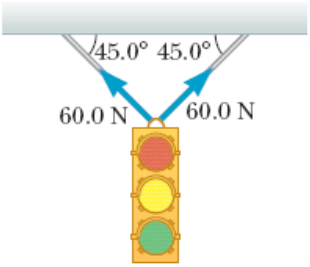
[ ] N

(c) Determine the coefficient of kinetic friction between m_2 and the incline.

[ ]

12. Question Details SerCP9 4.P.059. [1594394]

Consider the figure below.



(a) What is the resultant force exerted by the two cables supporting the traffic light in the figure?

magnitude [ ] N

direction ---Select---

(b) What is the weight of the light?

[ ] N

Assignment Details