Review - Chapter 1

The distance d that a certain particle moves may be calculated from the expression $d = at + bt^2$

where a and b are constants; and t is the elapsed time.

The dimensions of the quantities a and b

are, respectively:

(a) $\frac{[L]}{[T]}, \frac{[L]}{[T]^2}$

(b) $[L], [L]^2$

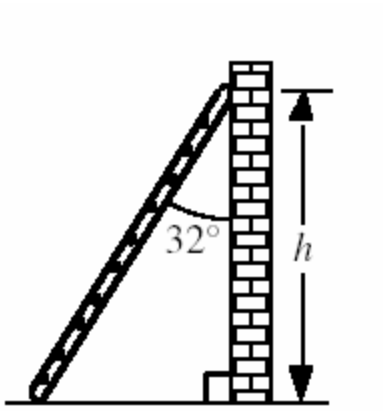
(c) $\frac{[L]}{[T]^2}, \frac{[L]}{[T]^3}$

(d) $\frac{[L]}{[T]}, \frac{[L]^2}{[T]^2}$

(e) $\frac{1}{[T]}, \frac{1}{[T]^2}$

Review - Chapter 1

A 2.5-m ladder leans against a wall and makes an angle with the wall of 32° as shown in the figure. What is the height *h* above the floor where the ladder makes contact with the wall?



Ans: 2.12m

Review - Chapter 2

A bus leaves New York City, takes a non-direct route and arrives in St. Louis, Missouri 23 hours, 16

minutes later. If the distance between the two cities is 1250 km, what is the magnitude of the bus'

average velocity?

Ans: 53.7km/h

Review - Chapter 2

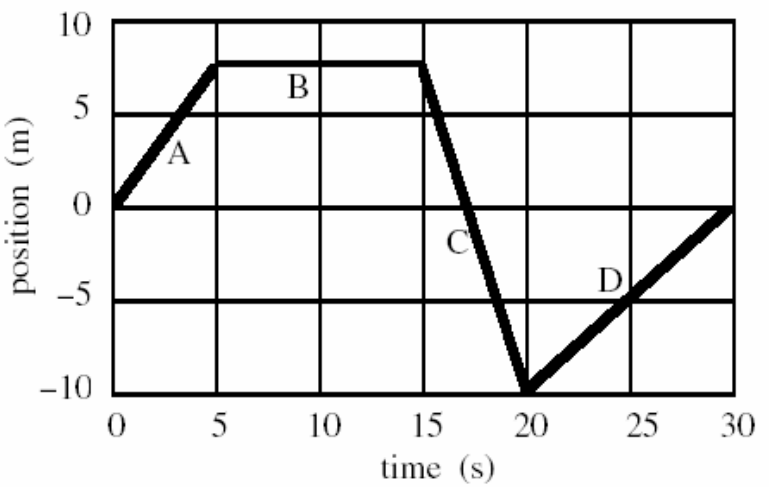
A ball is dropped from rest from a tower and strikes the ground 125 m below. Approximately how many seconds does it take the ball to strike the ground after being dropped? Neglect air resistance.

Ans: 5.05 s

Review - Chapter 2

An object is moving along a straight line in the positive *x* direction. The graph shows its position from the starting point as a function of time.

Various segments of the graph are identified by the letters A, B, C, and D.



Which segment(s) of the graph represent(s) a *constant velocity* of +1.0 m/s?

Ans: D

What was the *instantaneous velocity* of the object at the end of the eighth second?

Ans: zero m/s

During which interval(s) did the object move in the negative *x* direction?

Ans: C

Review - Chapter 3

An eagle is flying due east at 8.9 m/s carrying a gopher in its talons. The gopher manages to break free at a height of 12 m.

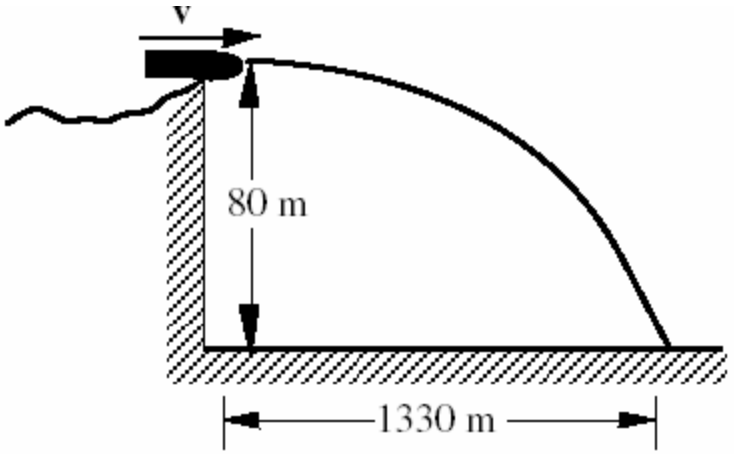
What is the magnitude of the gopher's velocity as it reaches the ground?

Ans: 18 m/s

Review - Chapter 3

A shell is fired with a horizontal velocity in the positive *x* direction from the top of an 80-m high cliff.

The shell strikes the ground 1330 m from the base of the cliff.



Determine the time it takes for the shell to hit the ground.

Ans: 4.04 s

Determine the initial speed of the shell.

Ans: 329 m/s

Determine the speed of the shell as it hits the ground.

Ans: 332.37 m/s

Review - Chapter 4

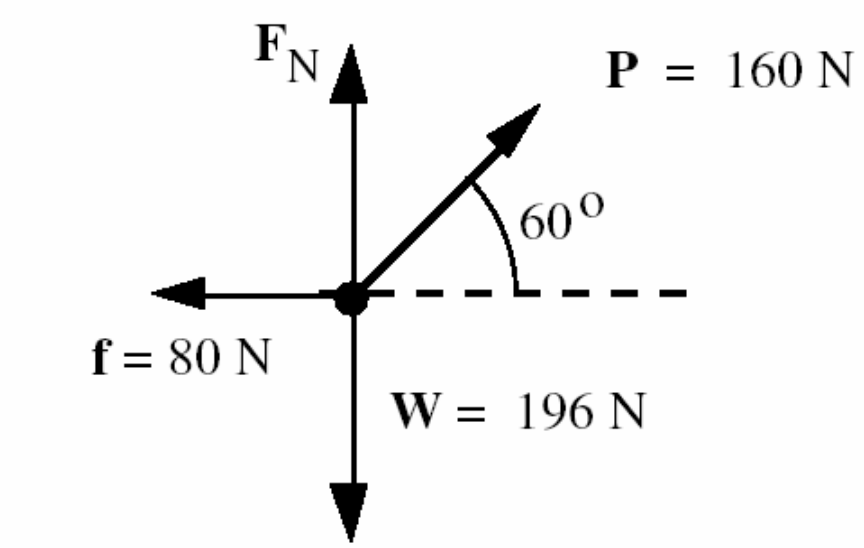
An apple crate with a weight of 225 N accelerates along a *frictionless* surface as the crate is pulled with a force of 14.5 N as shown in the drawing. What is the horizontal acceleration of the crate?

(e) 0.644 m/s^2

Ans: 0.597 m/s^2

Review - Chapter 4

A force **P** pulls on a crate of mass *m* on a rough surface. The figure show the magnitudes and directions of the forces that act on the crate in this situation. **W** represents the weight of the crate. $\mathbf{F}_N$ represents the normal force on the crate, and **f** represents the frictional force.



What is the magnitude of $\mathbf{F}_N$, the normal force on the crate?

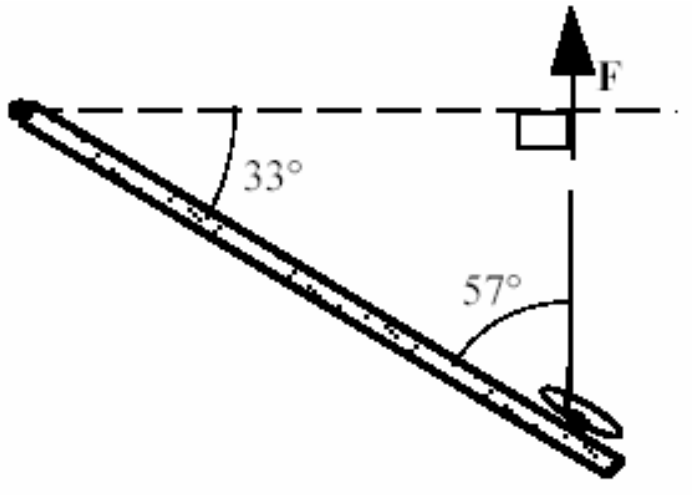
Ans: 57N

What is the acceleration in the horizontal direction?

Ans: zero m/s^2

Review - Chapter 9 (Torques)

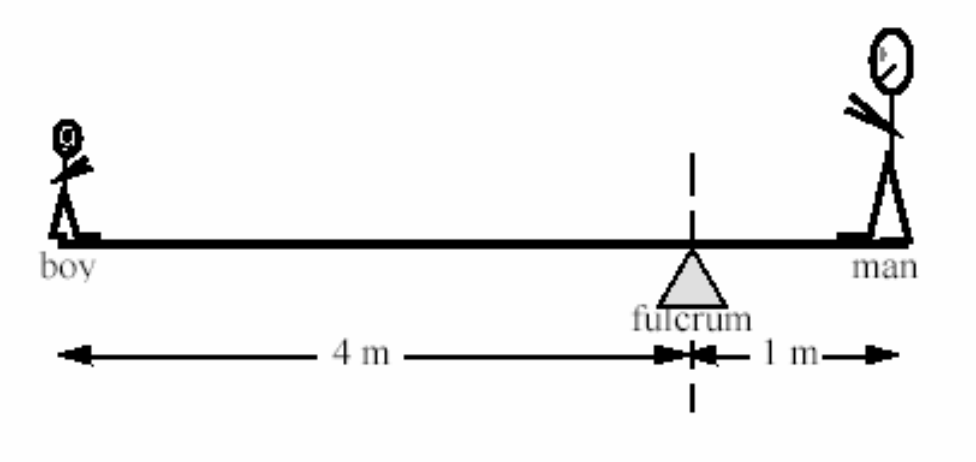
A string is tied to a doorknob 0.79 m from the hinge as shown in the figure. At the instant shown, the force applied to the string is 5.0 N. What is the torque on the door?



Ans: 3.3 N.m

Review - Chapter 9 (Torques)

An 80-kg man balances the boy on a teeter-totter as shown.
(*Ignore the weight of the board).*



What is the approximate mass of the boy?

Ans: 20 kg

What, approximately, is the magnitude of the downward force exerted on the fulcrum?

Ans: 980N

Review - Chapter 5

A car traveling at 20 m/s rounds a curve so that its centripetal acceleration is 5 m/s^2.

What is the radius of the curve?

Ans: 80 m

Review - Chapter 5

A 0.25-kg ball attached to a string is rotating in a horizontal circle of radius 0.5 m.

If the ball revolves twice every second, what is the tension in the string?

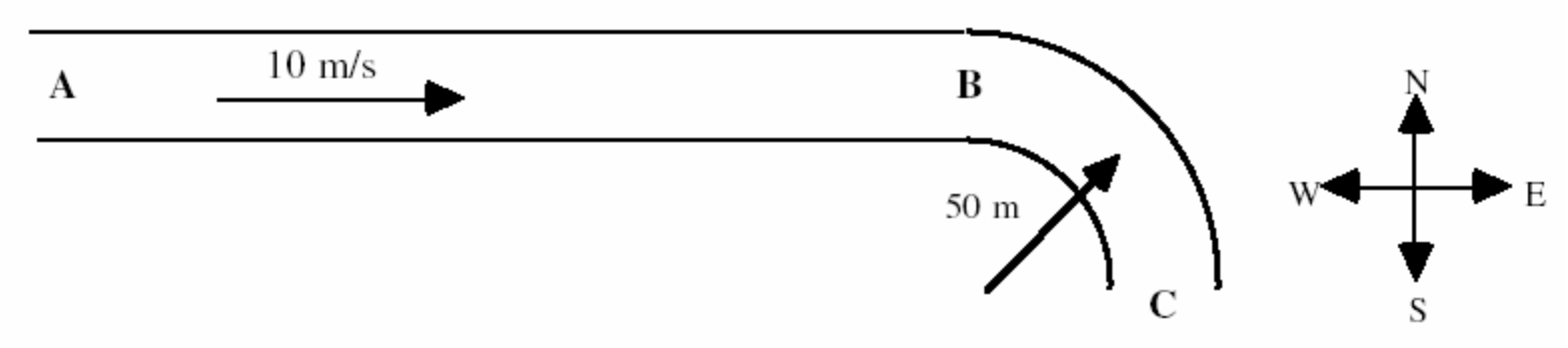
Ans: 20 N

Review - Chapter 5

A 1000-kg car travels along a straight 500-m portion of highway (from **A** to **B**) at a constant speed of 10 m/s.

At **B**, the car encounters an unbanked curve of radius 50 m.

The car follows the road from **B** to **C** traveling at a constant speed of 10 m/s while the direction of the car changes from east to south.

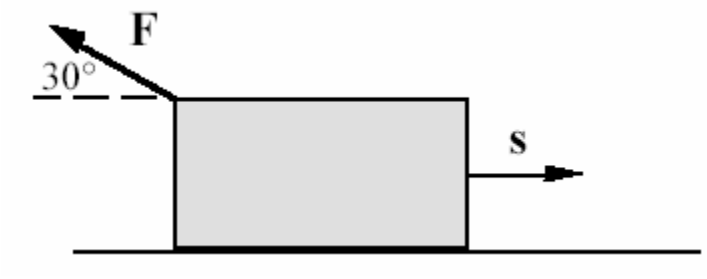


What is the magnitude of the acceleration of the car as it travels from B to C?

Ans: 2 m/s^2

Review - Chapter 6

A constant force of 25 N is applied as shown to a block which undergoes a displacement of 7.5 m to the right along a frictionless surface while the force acts. What is the work done by the force?

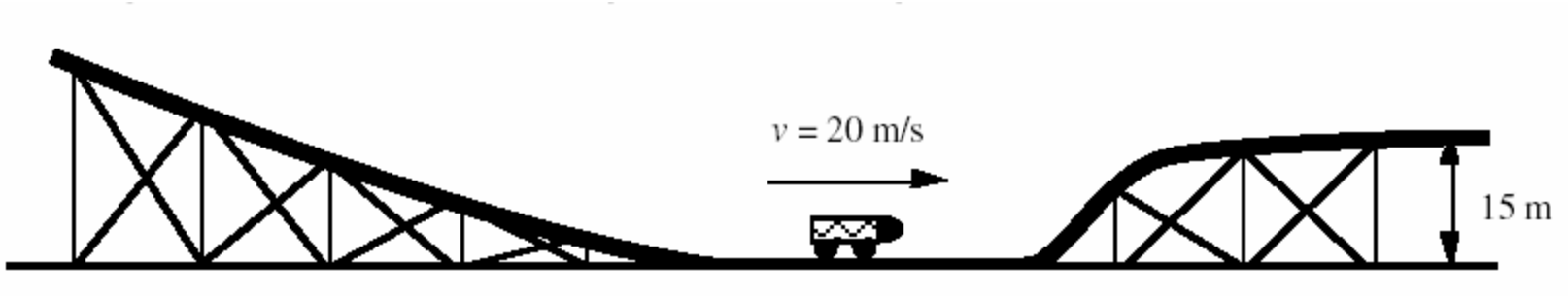


Ans: -160 J

Review - Chapter 6

A roller-coaster car is moving at 20 m/s along a straight horizontal track.

What will its speed be after climbing the 15-m hill shown in the figure if friction is ignored?



Ans: 10 m/s

Review - Chapter 7

A 50-kg toboggan is coasting on level snow. As it passes beneath a bridge, a 20-kg parcel is

dropped straight down and lands in the toboggan. If (KE)1 is the original kinetic energy of the

toboggan and (KE)2 is the kinetic energy after the parcel has been added, what is the ratio

(KE)2/(KE)1.

Ans: 0.7

Review - Chapter 7

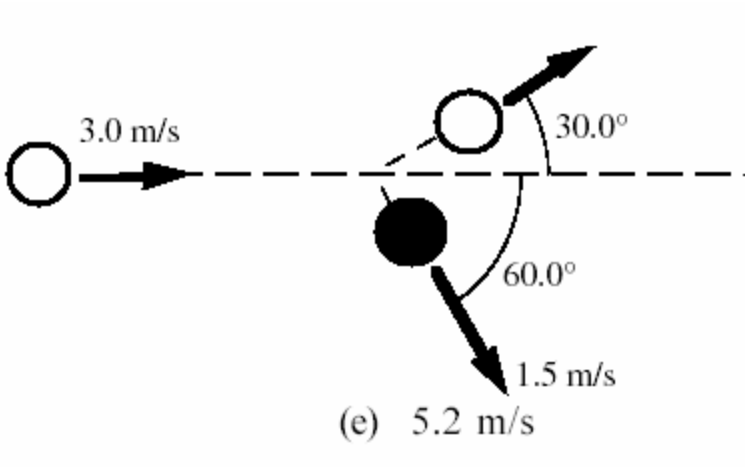
A 1000-kg car traveling east at 20 m/s collides with a 1500-kg car traveling west at 10 m/s. The

cars stick together after the collision. What is their common velocity after the collision?

Ans: 2 m/s, east

Review - Chapter 7

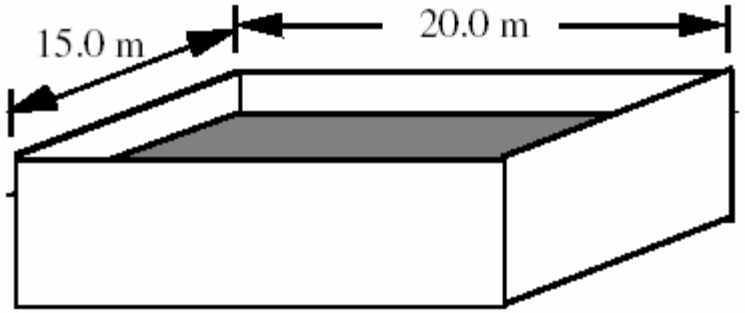
In the game of billiards, all the balls have approximately the same mass, about 0.17 kg. In the figure, the cue ball strikes another ball such that it follows the path shown. The other ball has a speed of 1.5 m/s immediately after the collision. What is the speed of the cue ball after the collision?



Ans: 2.6 m/s

Review - Chapter 11

A swimming pool has the dimensions shown in the drawing. It is filled with water to a uniform depth of 8.00 m.
The density of water = $1.00 \cdot 10^3$ kg/m^3



What is the total pressure exerted on the bottom of the swimming pool?

Ans: 1.8×10^5 Pa

What is the total force exerted on the bottom of the swimming pool?

Ans: 5.4×10^7 N

The Water Tank

Water is leaving a tank at a speed of 3.0 m/s. The tank is open to air on the top. What is the height of the water level above the spigot?

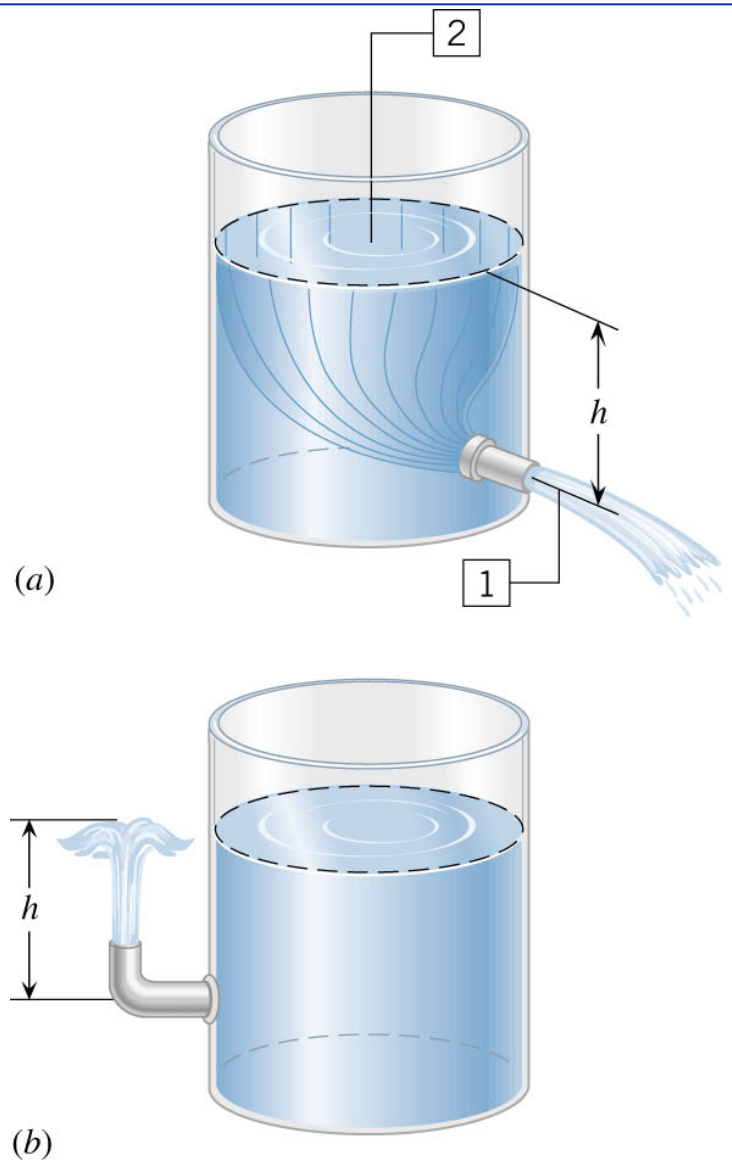
Assume the area of the tank is much larger than the area of the spigot.

$P_2+\rho g h_2=P_1+\rho g h_1+(1/2)\,\rho(v_1)^2$

Since $P_1=P_2$

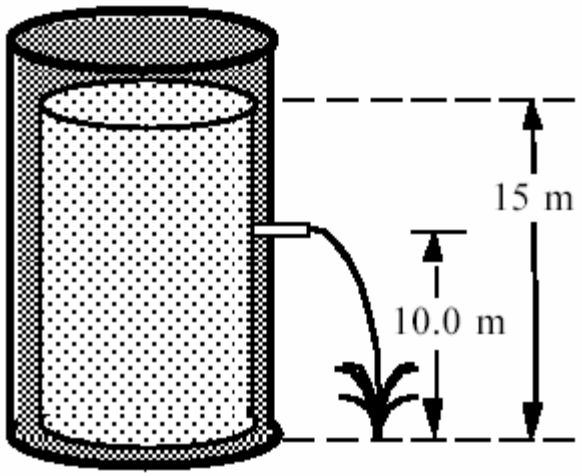
$h_2-h_1=h = 0.459\text{m}$

What would happen if the tank were closed at the top and filled to the top?



Review - Chapter 11

A large tank is filled with water to a depth of 15 m. A spout located 10.0 m above the bottom of the tank is then opened as shown in the drawing. With what speed will water emerge from the spout?



Ans: 9.9 m/s

Review - Chapter 8

A 0.254-m diameter circular saw blade rotates at a constant angular speed of 117 rad/s.

What is the tangential speed of the tip of a saw tooth at the edge of the blade?

Ans: 14.9 m/s

Review - Chapter 8

A grindstone of radius 4.0 m is initially spinning with an angular speed of 8.0 rad/s. The angular

speed is then increased to 10 rad/s over the next 4.0 seconds. Assume that the angular acceleration is constant.

What is the magnitude of the angular acceleration of the grindstone?

Ans: 0.5 rad/s^2

Through how many revolutions does the grindstone turn during the 4.0-second interval?

Ans: 5.7

Review - Chapter 8

On an amusement park ride, passengers are seated in a horizontal circle of radius 7.5 m.

The seats begin from rest and are uniformly accelerated for 21 seconds to a maximum rotational speed of 1.4 rad/s.

What is the tangential acceleration of the passengers during the first 21 s of the ride?

Ans: 0.5 m/s^2

What is the instantaneous tangential speed of the passengers 15 s after the acceleration begins?

Ans: 7.5 m/s