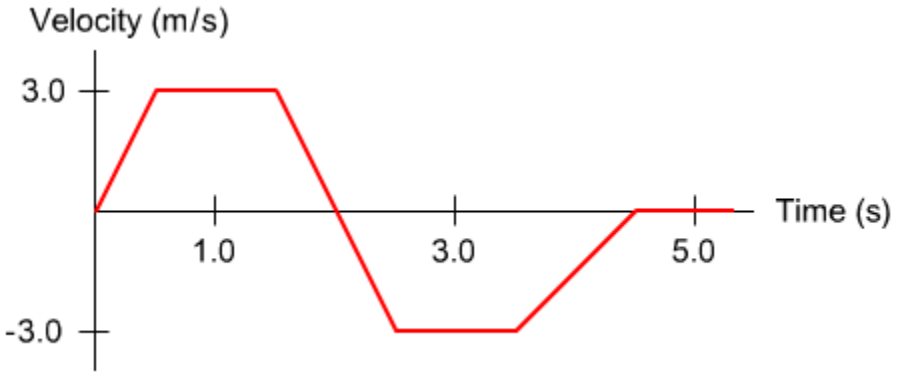
Displacement, velocity, and acceleration graphs

Use the graph below to answer questions #1-5.



1. Determine the acceleration for each segment of the graph.
2. Determine the displacement for t = 0s to t = 2.0 s.
3. Determine the displacement for t = 2.0 s to t = 3.5 s.
4. Determine the total displacement for the entire graph.
5. Describe the motion of the ball. Use velocities and accelerations in your description!

6. Determine the *average* velocity for t = 0 s to t = 3 s for figure 3-12. Determine the *instantaneous* velocity for t = 2 s.

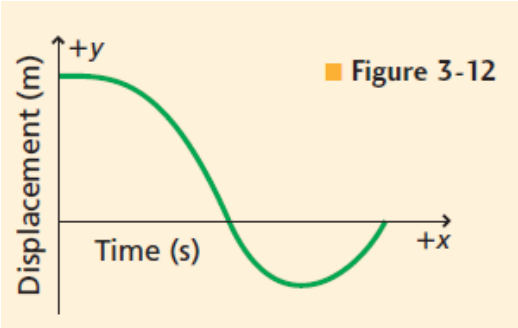
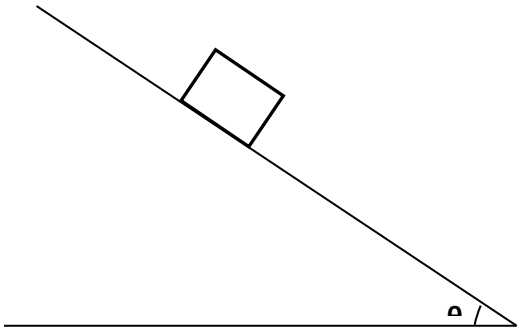


Figure 3-12

Friction

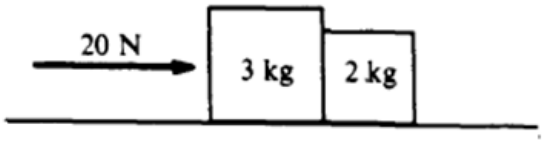
7. A block weighing 300. N is being moved *at constant speed* over a horizontal surface by a force of 50.0 N applied parallel to the surface. Draw a free body diagram for the block. What is the coefficient of kinetic friction? *(0.167)*
8. A 100. N force is applied horizontally to a 50.0 kg crate resting on a level floor. The coefficient of kinetic friction is 0.150. What is the acceleration?
9. A 250.0 kg box is on a 45° angle. If the coefficient of static friction is 0.25, does the box slide down the incline?



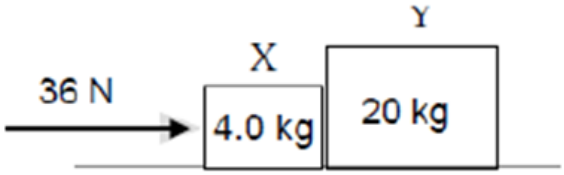
10. For the incline above, what is the acceleration of the box if the coefficient of kinetic friction is 0.20?
11. A different box is accelerating down an incline at an angle of 24°. The box has a mass of 10.0 kg. The box has an acceleration of 2.5 m/s2 down the incline. What is the coefficient of kinetic friction on the slope?

Newton's third law

12. What is the force of the 3 kg mass on the 2 kg mass? What is the force of the 2 kg mass on the 3 kg mass?



13. What is the force of Y on X?



Force and motion

14. A model rocket is accelerating upward at 105 m/s^2. The thrust force is 2940 N. What is the mass of the rocket? *(25.6 kg)*
15. A hot-air balloon is hovering over a country-fair when a passenger drops a camera. If a camera is 45.0 m above the ground when it is dropped, how long does it take for the camera to reach the ground?
16. A ball is thrown horizontally at 10.0 m/s from the top of a hill 50.0 m high. How far from the base of the cliff would the ball hit the ground?
17. Susan drops a ball, and 4 seconds later the ball has a speed of 40 m/s. What is the ball's acceleration?