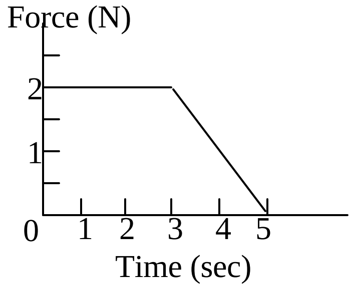
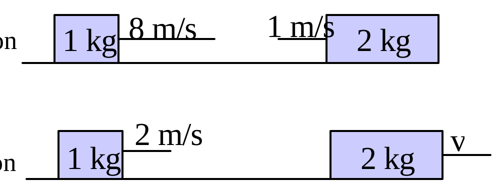


6-1A. The force shown in the force-time diagram at the right versus time acts on a 2 kg mass. What is the impulse of the force on the mass from 0 to 5 sec?
(a) 9 N-s (b) 6 N-s (c) 5 N-s (d) 8 N-s (e) 10 N-s

6-2A. The force in the force-time diagram of 6-1A acts for 5 sec on a 2 kg mass that is initially at rest. What is the final speed of the mass?
(a) 2 m/s (b) 3 m/s (c) 4 m/s (d) 5 m/s (e) 8 m/s

6-3A. An object of mass m, moving to the right with speed v, collides head-on in a perfectly inelastic collision with an object of twice the mass but half the speed moving in the opposite direction. What is the speed of the combined mass after the collision?
(a) zero (b) v/2 (c) v (d) 2v (e) None of these is correct.

6-4A. The two blocks shown at the right slide without friction on flat ground. What is the speed v of the 2 kg block after the collision?
(a) 1 m/s (b) 2 m/s (c) 3 m/s (d) 4 m/s
(e) You can't tell without knowing if the collision is elastic.

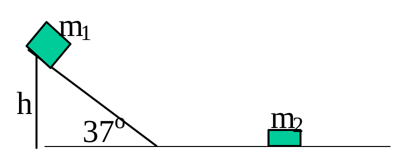


6-5A. A man of mass M = 70 kG standing on a frictionless surface throws a ball of mass m = 7 kG forward with velocity v = + 10 m/s. What velocity does the man acquire as a result?
(a) - 1 m/s (b) + 1 m/s (c) - 10 m/s (d) + 10 m/s (e) None, because there is no friction.

6-6A. A 0.10 kg object moving initially with velocity v = 0.20 m/s eastward collides head-on and elastically with a second 0.10 kg object initially at rest. What is the velocity of the first 0.10 kg object after the collision?
(a) 0.16 m/s eastward. (b) 0.16 m/s westward. (c) 0.04 m/s eastward. (d) 0.04 m/s westward. (e) zero.

6-7A. A skater is standing still on frictionless ice. Her friend throws a Frisbee straight to her. In which of the following cases is the final magnitude of momentum transferred to the skater largest?
(a) She catches the Frisbee and holds onto it.
(b) She catches the Frisbee momentarily, and then drops it straight down.
(c) She catches the Frisbee momentarily, and then throws it back to her friend.
(d) She catches the Frisbee momentarily, and then throws it in a direction opposite to that of her friend.
(e) All four of the above processes involve the same final momentum transfer to the girl.

6-8A. A block of mass m_1 = 3 kg slides down, from rest, from a height h = 3.2 m above the ground on a frictionless hill that makes an angle of 37^o with the horizontal as shown at the right. The block then slides on frictionless flat ground until it hits and sticks to a mass m_2 = 1 kg that was initially at rest. What is the speed of the composite mass?
(a) 2 m/s (b) 3 m/s (c) 4 m/s (d) 5 m/s (e) 6 m/s



6-9A. A projectile in flight explodes into several fragments. The total momentum of the fragments immediately after the explosion:
(a) is the same as immediately before the explosion.
(b) has been changed into kinetic energy of the fragments.
(c) is less than immediately before the explosion.
(d) is more than immediately before the explosion.
(e) none of these is correct.

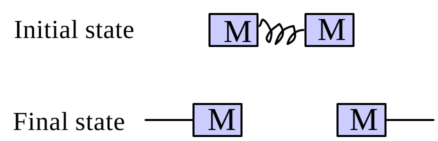
6-10A. A 10.0 g bullet is fired into a 200-g block of wood that is initially at rest on a horizontal surface that has coefficient of kinetic friction μ_k = 0.400 . If, after impact, the block slides 8 m before coming to rest, what was the speed of the bullet before the collision?
(a) 8 m/s (b) 168 m/s (c) 119 m/s (d) 286 m/s (e) 336 m/s

6-11A. If two different masses have the same kinetic energy, then the ratio of their momenta is:
(a) proportional to the square of the ratio of their masses.
(b) inversely proportional to the ratio of their masses.
(c) proportional to the ratio of their masses.
(d) inversely proportional to the square root of the ratio of their masses.
(e) proportional to the square root of the ratio of their masses.

6-12A. Which one of the following statements is WRONG?
(a) A person sitting in a car that runs into a brick wall should experience the same impulse in stopping, whether or not the car has an airbag.
(b) When two moving masses collide and stick together, the total kinetic energy of the system always decreases due to the collision.
(c) If a vehicle of mass m going north at speed v collides inelastically with an identical vehicle going east at speed v, and the two vehicles stick together, then the combined mass should move off to the north-east (i.e., at an angle of 45^o with respect to both north and east). Neglect friction with the ground.
(d) If a moving mass A collides elastically with a mass B that is initially at rest, the momentum transferred to B becomes smaller as B becomes heavier.
(e) If a car and a large truck are involved in a head-on, perfectly elastic collision, the magnitude of the change in momentum of each is the same.

6-13A. Which one of the following statements is WRONG?
(a) If a light and a heavy body have equal kinetic energies, then the light mass has the smaller momentum.
(b) Total momentum will be conserved in an inelastic collision, so long as no external force acts on the colliding particles.
(c) You shoot a particle of mass m_1 at a particle of mass m_2 that is initially at rest. To have m_1 recoil (rebound) backward with the largest possible speed, you want m_2 to be as light as possible.
(d) If a light and a heavy body have equal momenta, then the heavier one will have the smaller kinetic energy
(e) Total momentum will be conserved in an elastic collision, so long as no external force acts on the colliding particles

6-14A. A massless spring of force constant k = 50 N/m is compressed a distance x = 0.2 m from its unstretched length and placed between two equal masses M = 0.1 kg as shown at the right. The system is initially at rest, held together by a massless string. If the spring breaks, the speed of each mass will be about:



(a) 4.5 m/s (b) 10 m/s (c) 5 m/s (d) 3.2 m/s (e) 6.3 m/s

6-15A. A mass m_1 = 2 kg slides along a horizontal surface that has a coefficient of kinetic friction μ = 0.1 until it collides with a second mass m_2 = 2 kg that is initially at rest. If the two masses stick together and stop in a distance x = 1m, what was the speed of m_1 *just before the collision*?
(a) 1 m/s (b) 2.8 m/s (c) 4.9 m/s (d) 1.4 m/s (e) 2 m/s

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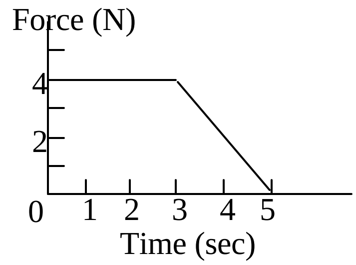
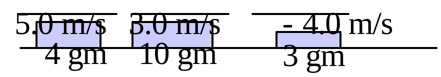
6-1B. The force shown in the force-time diagram at the right acts on a 2 kg mass. What is the impulse of the force on the mass?
(a) 8 N-s (b) 4 N-s (c) 32 N-s (d) 12 N-s (e) 16 N-s



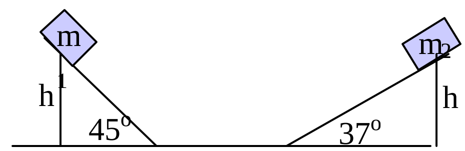
6-2B. For the force-time diagram of Fig. 6-1B, what is the final speed of the 2 kg mass if its initial speed is –2.0 m/s?
(a) 6 m/s (b) 8 m/s (c) 12 m/s (d) 3 m/s (e) None of these is close.

6-3B. A mass of 3 kg, initially sliding to the right with speed v = 8 m/s on a horizontal frictionless surface, collides inelastically with a mass of 9 kg that is initially at rest, so that the two masses stick together. What is the speed of the composite mass?
(a) 2.7 m/s (b) 32 m/s (c) 4 m/s (d) 2 m/s (e) 8 m/s

6-4B. Three carts of masses 4.0 kg, 10 kg, and 3.0 kg move on a frictionless horizontal track with speeds of 5.0 m/s, 3.0 m/s, and 4.0 m/s as shown at the right. The carts stick together after colliding. Find the final velocity of the resulting composite cart. (Q: Does it matter whether the carts collide and stick at the same time?)
(a) + 3.6 m/s, no (b) +2.2 m/s, no (c) – 2.2 m/s, yes (d) – 3.6 m/s, yes (e) + 3.6 m/s, yes



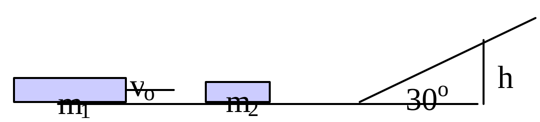
6-5B. Two masses, m_1 = 4.0 kg and m_2 = 2.0 kg are initially at rest at the same height h = 5.0 m above the ground on frictionless hills with the angles shown at the right. If the two masses slide down their hills, collide on the flat ground, and stick together, to what height, and up which hill, does the combined mass move?
(a) 0.39 m, left hill (b) 0.39 m, right hill (c) 0.56 m, right hill (d) 0.56m, left hill
(e) None of these is correct.



6-6B. A 1 kg object moving initially with velocity v = 2 m/s eastward collides head-on and elastically with a 1 kg object initially at rest. What is the velocity of the second 1 kg object after the collision?
(a) zero (b) 1 m/s westward. (c) 1 m/s eastward. (d) 2 m/s westward. (e) 2 m/s eastward.

6-7B. A skater is standing still on frictionless ice throws a Frisbee straight to a friend standing on solid ground. In which of the following cases is the final magnitude of momentum transferred to the skater largest?
(a) The friend catches the Frisbee and holds onto it.
(b) The friend catches the Frisbee momentarily, and then drops it straight down.
(c) The friend catches the Frisbee momentarily, and then throws it back to the skater who catches it.
(d) The friend catches the Frisbee momentarily, and then throws it in a direction opposite to that of the skater.
(e) All four of the above processes involve the same final momentum transfer to the skater.

6-8B. A mass m_1 = 3 kg, initially sliding to the right with speed v_o = 8 m/s on a horizontal frictionless surface, collides inelastically with a mass m_2 = 1 kg that is initially at rest, so that the two masses stick together and slide up a frictionless incline that makes an angle of 30° with the horizontal. What is the maximum height h to which the masses rise?
(a) 2.7 m (b) 0.2 m (c) 4 m (d) 1.8 m (e) 16 m



6-9B. A projectile in flight explodes into several fragments. The total kinetic energy of the fragments immediately after the explosion:
(a) is the same as immediately before the explosion.
(b) has been changed into momentum of the fragments.
(c) is more than immediately before the explosion.
(d) is less than immediately before the explosion.
(e) none of these is correct.

6-10B. A 10.0 g bullet is fired into a 100-g block of wood that is initially at rest on a horizontal surface that has coefficient of kinetic friction $\mu_k = 0.200$. If, after impact, the block slides 9 m before coming to rest, what was the speed of the bullet before the collision?
(a) 33 m/s (b) 66 m/s (c) 33 m/s (d) 86 m/s (e) 128 m/s

6-11B. If two different masses have the same momenta, then the ratio of their kinetic energies is:
(a) proportional to the ratio of their masses.
(b) proportional to the square of the ratio of their masses.
(c) proportional to the square root of the ratio of their masses.
(d) inversely proportional to the square root of the ratio of their masses.
(e) inversely proportional to the ratio of their masses.

6-12B. Which one of the following statements is WRONG?
(a) A person sitting in a car that runs into a brick wall should experience a smaller impulse in stopping if the car has an airbag.
(b) When two moving masses collide and stick together, the total kinetic energy of the system always decreases due to the collision.
(c) If a vehicle of mass m going north at speed v collides inelastically with an identical vehicle going east at speed v, and the two vehicles stick together, then the combined mass should move off to the north-east (i.e., at an angle of 45^o with respect to both north and east). Neglect friction with the ground.
(d) If a moving mass A collides elastically with a mass B that is initially at rest, the momentum transferred to B becomes larger as B becomes heavier.
(e) If a car and a large truck are involved in a head-on, perfectly elastic collision, the magnitude of the impulse each exerts on the other is the same.

6-13B. Which one of the following statements is WRONG?
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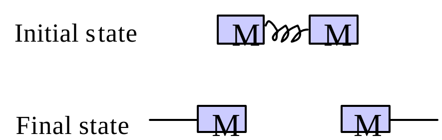
(c) If a light and a heavy body have equal momenta, then the heavier one will have the smaller kinetic energy
(d) Total momentum will be conserved in an elastic collision, so long as no external force acts on the colliding particles
(e) You shoot a particle of mass m_1 at a particle of mass m_2 that is initially at rest. To have m_1 recoil (rebound) backward with the largest possible speed, you want m_2 to be as heavy as possible.

6-14B. A massless spring of force constant k = 50 N/m is compressed a distance x = 0.1 m from its unstretched length and placed between two equal masses M = 0.2 kg as shown at the right. The system is initially at rest, held together by a massless string. If the spring breaks, the speed of each mass will be about:



(a) 0.8 m/s (b) 1.1 m/s (c) 0.7 m/s (d) 1.6 m/s (e) 2.2 m/s

6-15B. A mass $m_1 = 4$ kg slides along a horizontal surface that has a coefficient of kinetic friction $\mu = 0.1$ until it collides with a second mass $m_2 = 2$ kg that is initially at rest. If the two masses stick together and stop in a distance x = 1m, what was the speed of m_1 *just before the collision*?
(a) 1 m/s (b) 2.8 m/s (c) 4.9 m/s (d) 2.1 m/s (e) 1.4 m/s

6-1A) d   2A) c   3A) a   4A) b   5A) a   6A) e   7A) c   8A) e   9A) a   10A) b   11A) e   12A) d   13A) c   14A) d   15A) b

6-1B) e   2B) a   3B) d   4B) b   5B) c   6B) e   7B) c   8B) d   9B) c   10B) b   11B) e   12B) a   13B) a   14B) b   15B) d