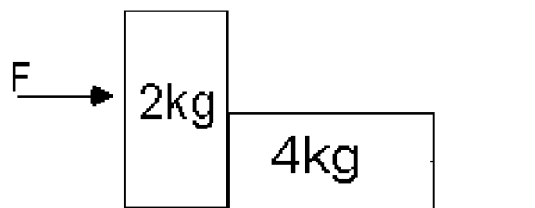1. A car drives along a curved track. The frictional force exerted by the track on the car is

   1) greater than the frictional force exerted by the car on the track

   2) directed radially outward

   3) opposite in direction to the frictional force exerted by the car on the track

   4) zero if the car's speed is constant

   5) dependent on the radius of the track

2.

   A force of magnitude F pushes two blocks on a frictionless surface. What is the force the 4 kg block exerts on the 2 kg block?

   1) $4F$

   2) $2F$

   3) $\frac{4}{3}F$

   4) $\frac{2}{3}F$

   5) $\frac{1}{3}F$

3. There are two forces acting upon an object at rest on a horizontal floor: the pull of gravity and the normal force from the floor. These two forces

   1) have different magnitudes and the same direction

   2) have different magnitudes and opposite directions

   3) have the same magnitude and the same direction

   4) have the same magnitude and opposite directions

   5) have the same magnitude and are perpendicular

4. Two skaters, one of mass 75 kg, the other of mass 50 kg, stand next to each other on ice (negligible friction). If the heavier skater pushes the lighter with a force F, the ratio of the force felt by the lighter to the force felt by the heavier is

   1) 1:3

   2) 2:3

   3) 1:1

   4) 3:2

   5) 3:1

5. Two skaters, one of mass 100 kg, the other of mass 50 kg are on a frozen pond (negligible friction). If the heavier person pushed the lighter one with a force F, the ratio of the magnitude of the acceleration of the lighter skater to that of the heavier is

   1) 1:4

   2) 1:2

   3) 1:1

   4) 2:1

   5) 4:1

6. A rocket engine acquires motion by ejecting hot gases in the opposite direction. This is an example of the law of

   1) conservation of heat

   2) conservation of energy

   3) conservation of linear momentum

   4) conservation of mass

   5) conservation of angular momentum

Base your answers to questions **7** and **8** on the information below.

A cannon of mass 55 kg fires a projectile, exerting a force of 150 N on the object. The cannon rests on a surface with a coefficient of static friction of 0.4.

7. What happens to the cannon after it fires?

   1) The cannon moves back 15 m before coming to rest.

   2) The cannon moves back 30 m before coming to rest.

   3) The cannon moves back 0.15 m before coming to rest

   4) The cannon moves back 0.3 meters before coming to rest.

   5) The cannon does not move.

8. What is the minimum amount of force the cannon must exert on the object for it to overcome the force of friction?

   1) 150 N

   2) 220 N

   3) 280 N

   4) 350 N

   5) 475 N

Base your answers to questions **9** and **10** on the information below.

A child of mass 60 kg is standing on a frictionless surface. The child throws a ball of mass 5 kg with a force of 30 N.

9. What is the magnitude of the child's acceleration over the surface?

   1) 0.25 m/s^2

   2) 0.5 m/s^2

   3) 0.75 m/s^2

   4) 1 m/s^2

   5) 1.25 m/s^2

10. What is ratio of the force felt by the child to the force felt by the ball?

   1) 12:1

   2) 6:1

   3) 1:1

   4) 1:6

   5) 1:12

11. According to Newton's Third Law,

   1) for every action there is a weaker, and opposite, reaction

   2) for every action there is an equal, but delayed, reaction

   3) for every action there is an equal, and similar, reaction

   4) for every action there is an equal, but opposite, reaction

   5) for every action there is a weaker, but opposite, reaction

12. Block A of mass 2*M* rests upon Block B of mass *M*. What is the ratio of the normal force exerted by Block B on Block A to the force of gravity exerted on the Block A-Block B system?

   1) 5:2

   2) 3:2

   3) 1:1

   4) 2:3

   5) 2:5

13. A woman of mass *M* standing on an ice rink (friction negligible) fires a bullet of mass *m* from a gun parallel to the surface of the rink. The bullet accelerates at a rate of *a*, leaving the gun at velocity *v* and hitting the surface of the rink after time *t*. What is the magnitude of the woman's acceleration?

   1) *vt/a*

   2) *ta/m*

   3) *vtm/aM*

   4) *2vm/M*

   5) *ma/M*

14. The pain experienced when kicking a large boulder can be explained by

   1) Newton's First Law of Motion

   2) Newton's Second Law of Motion

   3) Newton's Third Law of Motion

   4) Faraday's Law

   5) Lenz's Law

15. The momentum of an object is directly proportional to its

   1) kinetic energy

   2) potential energy

   3) velocity

   4) velocity squared

   5) power

16. A physics teacher pushes against the wall with a force of 100 N. What is the magnitude of the force exerted on the physics teacher by the wall.

   1) 0 N

   2) 100 N

   3) Depends on the mass of the teacher

   4) Depends on the mass of the wall

   5) Depends on both the mass of the teacher and the mass of the wall

17. How can Newton's Third Law be explained with an object experiencing fluid friction?

   1) The fluid exerts a force on the object that is an isolated force.

   2) The fluid exerts a force on the object and the object exerts an equal force on the molecules of the fluid.

   3) The force does work to create heat energy.

   4) The object decelerates as the sum of all forces is negative.

   5) The object's motion is slowed because there is a force exerted on it in a direction opposite to its motion.

18. A golfer swings a club and hits a golf ball. Which of the following best describes the collision between the club and the ball?

   1) The club exerts a force on the ball that causes it to accelerate for a short period of time.

   2) The club exerts a force on the ball that cause it to accelerate through the air.

   3) The club and the ball exert equal and opposite forces on each other, but only ball accelerates due to this force.

   4) The club and the ball exert equal and opposite forces on each other and both objects experience an acceleration.

   5) The momentum of the club is the same before and after it hits the ball.

19. A golfer swings a golf club and hits a ball. Which of the following best explains why the effects of the collision on the club are difficult to observe?

  I. The club's mass is large compared to that of the ball.
 II. The club's initial momentum is large compared to the impulse imparted to it by the collision.
III. The collision causes only the ball to accelerate, not the club.

1) I only

2) III only

3) I and II only

4) II and III only

5) I, II, and III

Answer Key
Second Law General Questions [Mar 28, 2011]

1. _____3_____

2. _____4_____

3. _____4_____

4. _____3_____

5. _____4_____

6. _____3_____

7. _____5_____

8. _____2_____

9. _____2_____

10. _____3_____

11. _____4_____

12. _____4_____

13. _____5_____

14. _____3_____

15. _____3_____

16. _____2_____

17. _____2_____

18. _____4_____

19. _____3_____

Name _____   Class _____   Date _____

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

17. _____

18. _____

19. _____