1) What is the weight of the 5.0-kilogram object at the surface of the Earth?

A) 49 N   B) 25 N   C) 49 kg   D) 5.0 kg

2) Compared to the mass of an object at the surface of the Earth, the mass of the object a distance of two Earth radii from the center of the Earth is

A) one-fourth as great   B) one-half as great   C) twice as great   D) the same

3) As a satellite is accelerated away from the Earth by a rocket, the satellite's mass

A) increases   C) remains the same
B) decreases

4) If the direction of the momentum of an object is west, the direction of the velocity of the object is

A) west   B) south   C) north   D) east

5) As shown in the diagram below, an inflated balloon released from rest moves horizontally with velocity v.
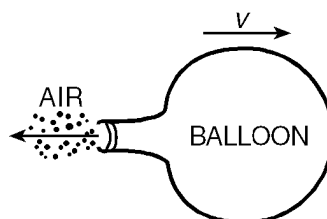

The velocity of the balloon is most likely cause by

A) centripetal force   B) gravitational attraction C) action-reaction   D) rolling friction

6) The graph below shows speed as a function of time for four cars, A, B, C, and D, in straight-line motion.
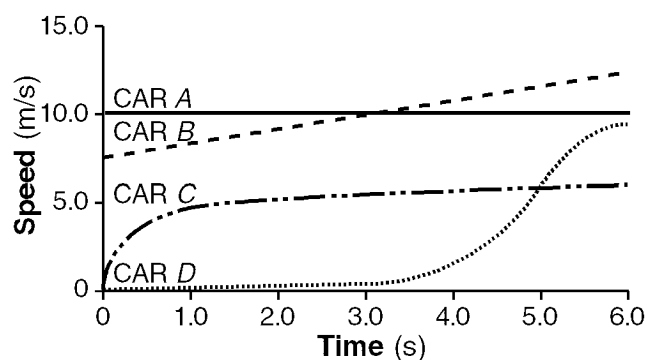
Which car experienced the *greatest* average acceleration during this 6.0-second interval?

A) car A B) car B C) car C D) car D

7) A 0.025-kilogram bullet is fired from a rifle by an unbalanced force of 200 newtons. If the force acts on the bullet for 0.1 second, what is the maximum speed attained by the bullet?

A) 20 m/s   B) 800 m/s   C) 5 m/s   D) 400 m/s

8) What is the magnitude of the velocity of a 25-kilogram mass that is moving with a momentum of 100. kilogram-meters per second?

A) 0.25 m/s   B) 40. m/s   C) 4.0 m/s   D) 2,500 m/s

9) A 20-kilogram cart traveling east with a speed of 6 meters per second collides with a 30-kilogram cart traveling west. If both carts come to rest immediately after the collision, what was the speed of the westbound cart before the collision?

A) 2 m/s   B) 4 m/s   C) 6 m/s   D) 3 m/s

10) A rock falls freely from rest near the surface of a planet where the acceleration due to gravity is 4.0 meters per second^2. What is the speed of this rock after it falls 32 meters?

A) 16 m/s   B) 32 m/s   C) 8.0 m/s   D) 25 m/s

11) An 80.-kilogram skater and a 60.-kilogram skater stand at rest in the center of a skating rink. The two skaters push each other apart. The 60.-kilogram skater moves with a velocity of 10. meters per second east. What is the velocity of the 80.-kilogram skater? [*Neglect any frictional effects*.]

A) 0.13 m/s west   B) 7.5 m/s west   C) 10. m/s east   D) 13. m/s east

12) Two disk magnets are arranged at rest on a frictionless horizontal surface as shown in the diagram below. When the string holding them together is cut, they move apart under a magnetic force of repulsion.
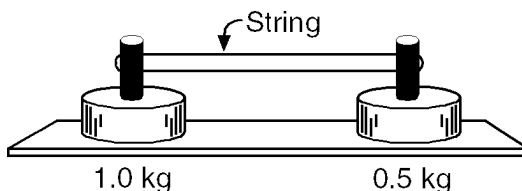
When the 1.0-kilogram disk reaches a speed of 3.0 meters per second, what is the speed of the 0.5-kilogram disk?

A) 3.0 m/sec   B) 6.0 m/sec   C) 1.0 m/sec   D) 0.50 m/sec

13) The diagram below shows two carts on a horizontal, frictionless surface being pushed apart when a compressed spring attached to one of the carts is released. Cart *A* has a mass of 3.0 kilograms and cart *B* has a mass of 5.0 kilograms. The speed of cart *A* is 0.33 meter per second after the spring is released.
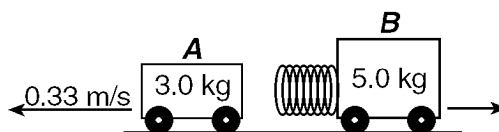
If the carts are initially at rest, what is the approximate speed of cart *B* after the spring is released?

A) 0.20 m/s   B) 0.33 m/s   C) 0.55 m/s   D) 0.12 m/s

14) A 2-kilogram car and a 3-kilogram car are originally at rest on a horizontal frictionless surface as shown in the diagram below. A compressed spring is released, causing the cars to separate. The 3-kilogram car reaches a maximum speed of 2 meters per second.
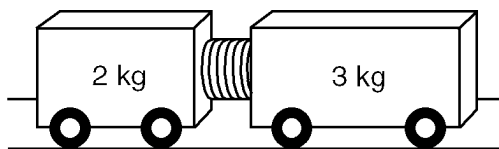
What is the maximum speed of the 2-kilogram car?

A) 2 m/s   B) 1 m/s   C) 6 m/s   D) 3 m/s

15) The diagram below represents two identical carts, attached by a cord, moving to the right at speed V.
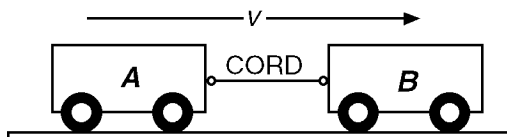
If the cord is cut, what would be the speed of cart A?

A) 0   B) $\frac{V}{2}$ C) V D) $2V$

16) A spring is compressed between two stationary blocks as shown in the diagram below. Block A has a mass of 6.0 kilograms. After the spring is released, block A moves west at 8.0 meters per second and block B moves east at 16 meters per second.
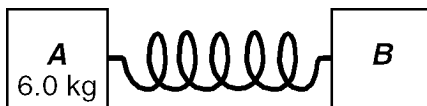
What is the mass of block B? [*Assume no frictional effects.*]

A) 12 kg   B) 16 kg   C) 3.0 kg   D) 6.0 kg

17) The mass of a space shuttle is approximately 2.0×10^6 kilograms. During lift-off, the net force on the shuttle is 1.0×10^7 newtons directed upward. What is the speed of the shuttle 10. seconds after lift-off? [*Neglect air resistance and the mass change of the shuttle.*]

A) 5.0×10^0 m/s   B) 5.0×10^3 m/s   C) 5.0×10^2 m/s   D) 5.0×10^1 m/s