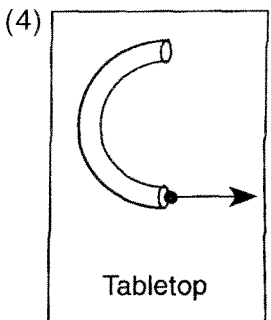
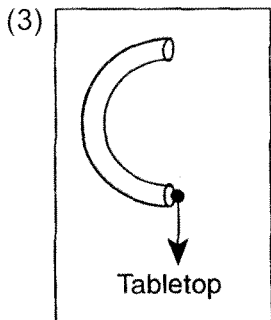
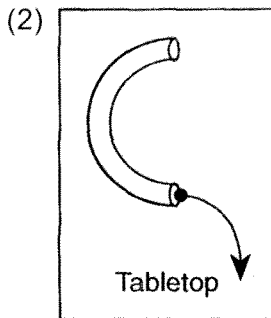
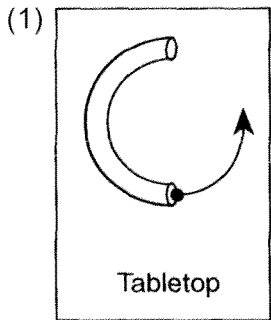


1. A ball rolls through a hollow semicircular tube lying flat on a horizontal tabletop. Which diagram best shows the path of the ball after emerging from the tube, as viewed from above?



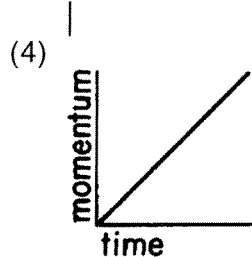
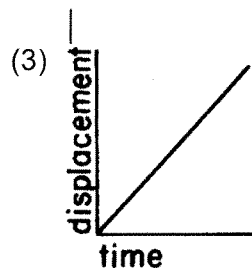
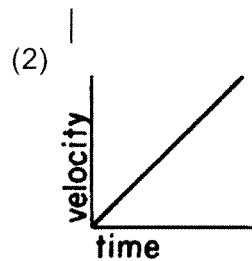
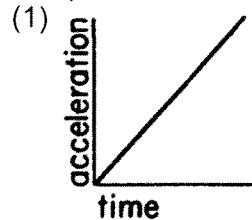
2. If the net force acting on an object is doubled, the acceleration of the object is

- (1) halved (3) unchanged
(2) doubled (4) quadrupled

3. Which statement about the movement of an object with zero acceleration is true?

- (1) The object must be at rest.
(2) The object must be slowing down.
(3) The object may be speeding up.
(4) The object may be in motion.

4. Which graph best represents an object in equilibrium?

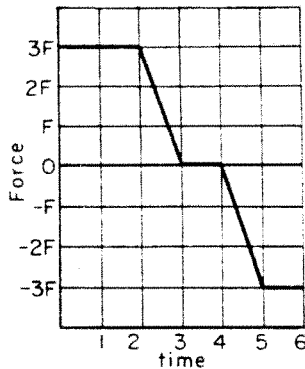


5. An unbalanced force of 10.0 Newtons causes an object to accelerate at 2.0 m/s^2 . What is the mass of the object?

- (1) 0.2 kg (3) 8.0 kg
(2) 5.0 kg (4) 20 kg

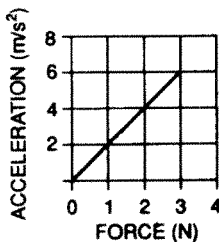
Forces and Gravity

6. The graph represents the net force acting on an object as a function of time. During which time interval is the velocity of the object constant?



- (1) 0 to 2 (3) 3 to 4
 (2) 2 to 3 (4) 4 to 5

7. In the graph below, the acceleration of an object is plotted against the unbalanced force on the object.



What is the object's mass?

- (1) 1 kg (3) 0.5 kg
 (2) 2 kg (4) 0.2 kg
8. If an unbalanced force of 10. Newtons is applied to a 4.0-kilogram mass, the acceleration of the mass will be
- (1) 0.40 m/s²
 (2) 2.5 m/s²
 (3) 14 m/s²
 (4) 40. m/s²

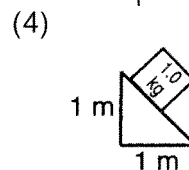
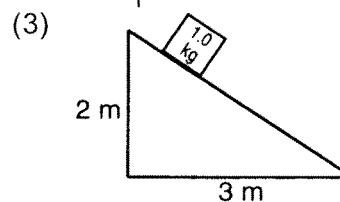
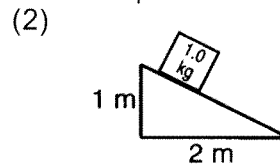
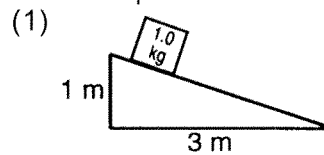
9. A bat applies an average force of 500 Newtons on a baseball for 0.20 second. What was the average force applied by the ball on the bat?

- (1) 100 N (3) 500 N
 (2) 200 N (4) 1,000 N

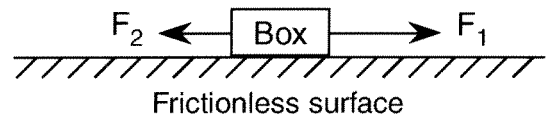
10. Two objects of equal mass are a fixed distance apart. If the mass of each object could be tripled, the gravitational force between the objects would

- (1) decrease by one-third (3) decrease by one-ninth
 (2) triple (4) increase 9 times

11. A 1.0-kilogram block is placed on each of four frictionless planes inclined at different angles. On which inclined plane will the acceleration of the block be greatest?



12. In the diagram below, a box is on a frictionless horizontal surface with forces F_1 and F_2 acting shown.



If the magnitude of F_1 is greater than the magnitude of F_2 , then the box is

- (1) moving at constant speed in the direction of F_1
 (2) moving at constant speed in the direction of F_2
 (3) accelerating in the direction of F_1
 (4) accelerating in the direction of F_2

Forces and Gravity

13. Which statement explains why a book resting on a table is in equilibrium?

- (1) There is a net force acting downward on the book.
- (2) The weight of the book equals the weight of the table.
- (3) The acceleration due to gravity is 9.8m/s^2 for both the book and the table.
- (4) The weight of the book and the table's upward force on the book are equal in magnitude, but opposite in direction.

14. Gravitational force F exists between point objects A and B separated by distance R . If the mass of A is doubled and distance R is tripled, what is the new gravitational force between A and B ?

- (1) $\frac{2F}{9}$
- (2) $\frac{2F}{3}$
- (3) $\frac{3F}{2}$
- (4) $\frac{9F}{2}$

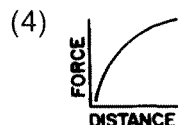
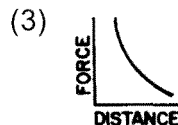
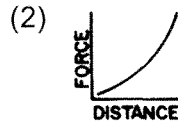
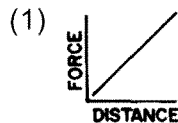
15. The centers of two 15.0-kilogram spheres are separated by 3.00 meters. The magnitude of the gravitational force between the two spheres is approximately

- (1) 1.11×10^{-10} N
- (2) 3.34×10^{-10} N
- (3) 1.67×10^{-9} N
- (4) 5.00×10^{-9} N

16. The magnitude of the gravitational force between two objects is 20. Newtons. If the mass of each object were doubled, the magnitude of the gravitational force between the objects would be

- (1) 5.0 N
- (2) 10. N
- (3) 20. N
- (4) 80 N

17. Which graph best represents the gravitational force between two point masses as a function of the distance between the masses?



18. Which graph best represents the relationship between the mass (m) of a satellite launched from Earth and the satellite's distance (r) away from Earth?

