## Dynamics-Newton's 1st Law

1. As shown in the diagram, an open box and its contents have a combined mass of 5.0 kilograms. A horizontal force of 15 newtons is required to push the box at a constant speed of 1.5 meters per second across a level surface.

Box = 1.5 m/s

F = 15 N

5.0 kg

Level surface

The inertia of the box and its contents increases if there is an increase in the

- 1. speed of the box
- 2. mass of the contents of the box
- 3. magnitude of the horizontal force applied to the box
- 4. coefficient of kinetic friction between the box and the level surface
- 2. Which unit is equivalent to a newton per kilogram?
  - 1.  $m/s^2$
  - 2. W/m
  - 3. J·s
  - 4. kg·m/s
- 3. Which object has the most inertia?
  - 1. A 0.001-kilogram bumblebee traveling at 2 meters per second
  - 2. A 0.1-kilogram baseball traveling at 20 meters per second
  - 3. A 5-kilogram bowling ball traveling at 3 meters per second
  - 4. A 10-kilogram sled at rest
- 4. If the sum of all the forces acting on a moving object is zero, the object will
  - 1. slow down and stop
  - 2. change the direction of its motion
  - 3. accelerate uniformly
  - 4. continue moving with constant velocity
- 5. The mass of a high school football player is approximately
  - 1.  $10^0 \, \text{kg}$
  - $2. 10^1 \, \text{kg}$
  - 3.  $10^2 \text{ kg}$
  - 4.  $10^3 \text{ kg}$
- 6. Which object has the greatest inertia?
  - 1. A 5-kg mass moving at 10 m/s
  - 2. A 10-kg mass moving at 1 m/s
  - 3. A 15-kg mass moving at 10 m/s
  - 4. A 20-kg mass moving at 1 m/s

7. The data table below lists the mass and speed of four different objects

## Data Table

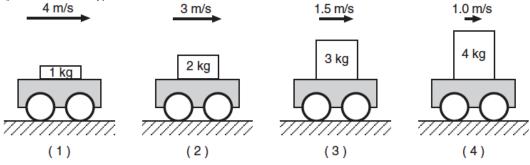
Object	Mass (kg)	Speed (m/s)
Α	4.0	6.0
В	6.0	5.0
С	8.0	3.0
D	16.0	1.5

Which object has the greatest inertia?

- 1. A
- 2. B
- 3. C
- 4. D
- 8. A 0.50-kilogram cart is rolling at a speed of 0.40 meter per second. If the speed of the cart is doubled, the inertia of the cart is
  - 1. halved
  - 2. doubled
  - quadrupled
  - 4. unchanged
- 9. Which person has the greatest inertia?
  - 1. A 110-kg wrestler resting on a mat
  - 2. A 90-kg man walking at 2 m/s
  - 3. A 70-kg long-distance runner traveling 5 m/s
  - 4. A 50-kg girl sprinting at 10 m/s
- 10. Which object has the greatest inertia?
  - 1. a falling leaf
  - 2. a softball in flight
  - 3. a seated high school student
  - 4. a rising helium-filled toy balloon

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11. A lab cart is loaded with different masses and moved at various velocities. Which diagram shows the cart-mass system with the greatest inertia?



- 12. Which object has the greatest inertia?
  - 1. A 5-kg object moving at 5 m/s
  - 2. A 10-kg object moving at 3 m/s
  - 3. A 15-kg object moving at 1 m/s
  - 4. A 20-kg object at rest
- 13. A force of 1 newton is equivalent to 1
  - 1.  $kg \cdot m/s^2$
  - 2. kg·m/s
  - 3. kg·m<sup>2</sup>/s<sup>2</sup>
  - 4.  $kg^2 \cdot m^2/s^2$
- 14. Which object has the greatest inertia?
  - 1. a 1-kg object moving at 15 m/s
  - 2. a 5-kg object at rest
  - 3. a 10-kg object moving at 2 m/s
  - 4. a 15-kg object at rest
- 15. Which cart has the greatest inertia?
  - 1. a 1-kg cart traveling at 4 m/s
  - 2. a 2-kg cart traveling at 3 m/s
  - 3. a 3-kg cart traveling at 2 m/s
  - 4. a 4-kg cart traveling at 1 m/s
- 16. Which object has the greatest inertia?
  - 1. a 15-kg mass traveling at 5 m/s
  - 2. a 10-kg mass traveling at 10 m/s
  - 3. a 10-kg mass traveling at 5 m/s
  - 4. a 5-kg mass traveling at 15 m/s