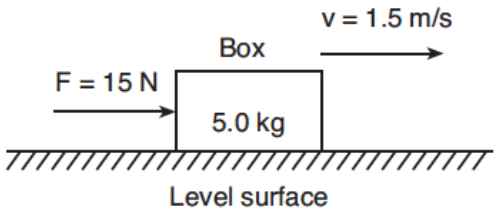
Name: _____ Period: _____

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.



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 kg
2. 10^1 kg
3. 10^2 kg
4. 10^3 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)
A	4.0	6.0
B	6.0	5.0
C	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
3. 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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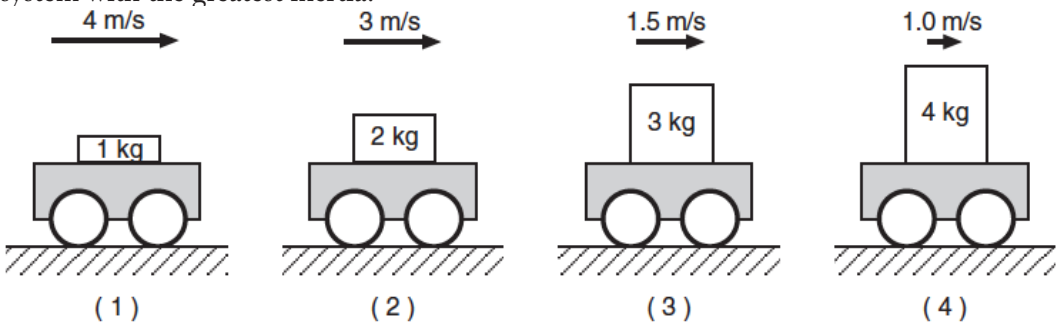
Dynamics-Newton's 1st Law

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. $kg \cdot m/s$
    3. $kg \cdot m^2/s^2$
    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

17. Which object has the greatest inertia?
    1. a 0.010-kg bullet traveling at 90 m/s
    2. a 30-kg child traveling at 10 m/s on her bike
    3. a 490-kg elephant walking with a speed of 1 m/s
    4. a 1500-kg car at rest in a parking lot

18. A 15-kilogram cart is at rest on a horizontal surface. A 5-kilogram box is placed in the cart. Compared to the mass and inertia of the cart, the cart-box system has
    1. more mass and more inertia
    2. more mass and the same inertia
    3. the same mass and more inertia
    4. less mass and more inertia

19. A different force is applied to each of four different blocks on a frictionless, horizontal surface. In which diagram does the block have the greatest inertia 2.0 seconds after starting from rest?