8th Grade Science – Week 6

In all problems below, neglect air resistance and friction. If using the acceleration of gravity on Earth, you can round $g = 10\ m/s^2$.

$$Force\ of\ gravity = F_g = mg$$

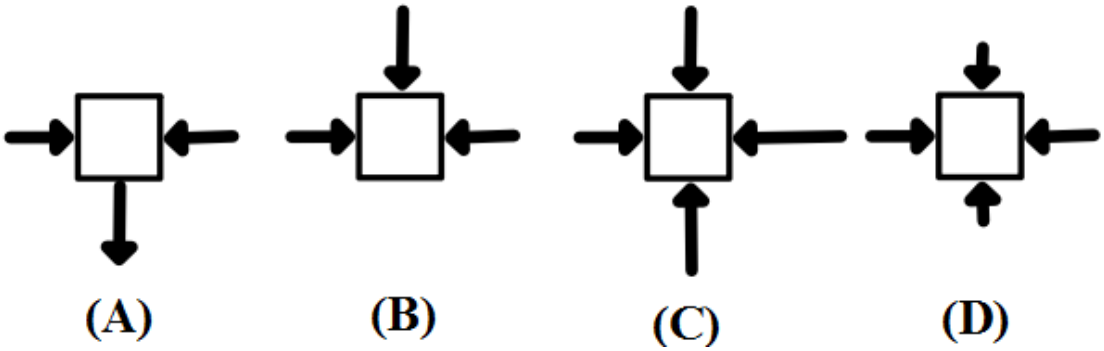
$$(Net\ Force) \quad \sum F = ma$$

$$a = \frac{Fnet}{m}$$

$$(momentum) \quad p = mv$$

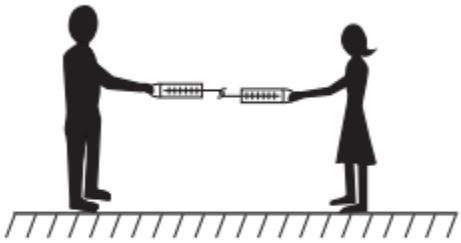
1. A 2.0-kilogram object accelerates at 6 m/s^2. If there is a force of friction of 2 N, what force of push is needed to accelerate at this rate?
   (A) 8 N
   (B) 10 N
   (C) 12 N
   (D) 14 N

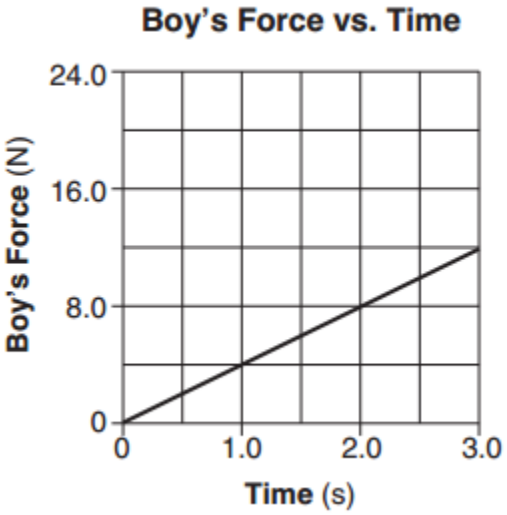
2. Which diagram represents a box that is moving at a constant velocity?



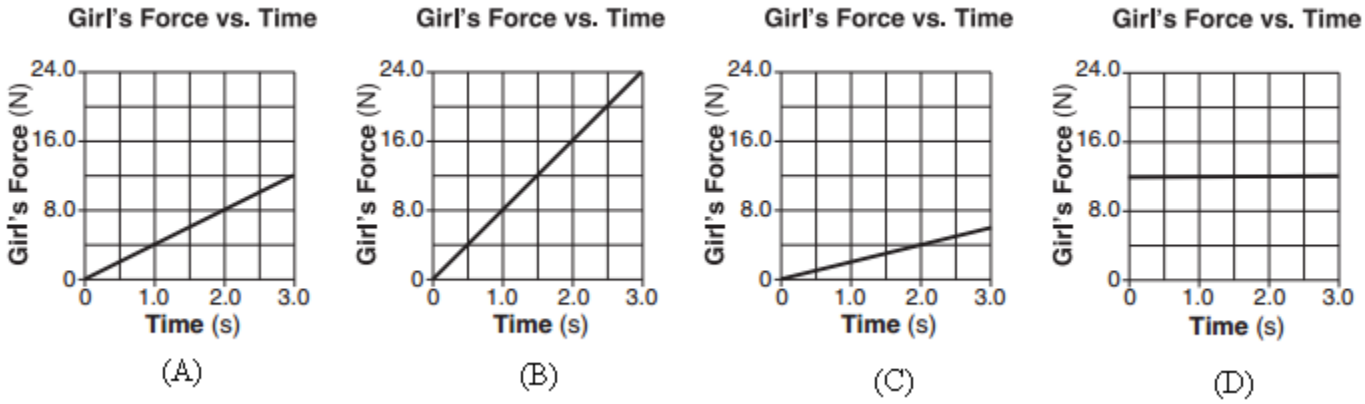
3. A 50 kg person is on the ground and holding a rope pointed upward. That rope has a force of tension of 400 N upward. What is the normal force of the ground applied to the person?
   (A) 50 N
   (B) 75 N
   (C) 100 N
   (D) 500 N

4. A 5.0-kilogram block is being pushed to the left with a force of 12 N. The force of friction to the right is 2 N. What will be the acceleration of the block?
   (A) 1 m/s^2
   (B) 2 m/s^2
   (C) 3 m/s^2
   (D) 4 m/s^2



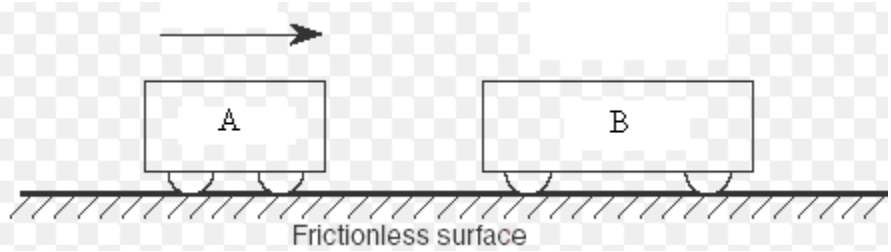


5. A boy of mass 100 kg and girl of mass 50 kg are each holding a spring scale. As they pull against each other another student is there recording the time and force of the boy. The graph of the boy's force vs. time is shown above. If another student was recording the girl's amount of force and time, what would her graph look like?



6. Which of the following objects, at different masses and speeds, will have the greatest momentum?
   (A) 1.0 kg ball traveling 9.0 m/s
   (B) 1.2 kg rock traveling 8.5 m/s
   (C) 8.0 kg bowling ball traveling 12.0 m/s
   (D) 5.0 kg lead weight traveling 2.0 m/s

7. Cart A has a mass of 2 kg and a speed of 3 m/s. Cart B has a mass of 3 kg and a speed of 2 m/s. Compare the inertia and magnitude of momentum for carts A and B.
   (A) Both carts have the same inertia but cart B has less momentum.
   (B) Both carts have the same inertia and momentum.
   (C) Cart B has greater inertia but a smaller amount of momentum.
   (D) Cart B has a greater inertia but both carts have the same amount of momentum.



Cart A has a mass of 2 kg and is traveling to the right with a speed of 8 m/s. Cart B, which has a mass of 6 kg, is initially at rest on the track. When cart A collides with cart B they lock together.

8. What is the total momentum of cart A and cart B prior to the collision?
   (A) 2 kg·m/s
   (B) 4 kg·m/s
   (C) 8 kg·m/s
   (D) 16 kg·m/s

9. What is the total momentum of cart A and B after the collision?
   (A) 2 kg·m/s
   (B) 4 kg·m/s
   (C) 8 kg·m/s
   (D) 16 kg·m/s

10. What is the speed of cart A and B after they have collided and locked together?
    (A) 0 m/s, at rest
    (B) 2 m/s
    (C) 4 m/s
    (D) 8 m/s