8th Grade Science – Week 5

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.

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

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

1. A 2.0-kilogram cart is rolling at a speed of 2.50 m/s. If the speed of the cart is doubled to 5.00 m/s, the inertia of the cart is:
   (A) Halved
   (B) Doubled
   (C) Quadrupled
   (D) Unchanged

2. Which object has the greatest inertia?
   (A) A 30 kg mass not moving
   (B) A 20 kg mass moving at 15 m/s
   (C) A 15 kg mass moving at 1 m/s
   (D) A 5 kg mass moving at 40 m/s

3. Which of the following forces represents a field force (NOT a contact force)?
   (A) Force of friction
   (B) Normal force
   (C) Force of gravity
   (D) Force of pushing

4. If there are no forces acting upon an object that is moving, what will happen to the object?
   (A) The object will accelerate
   (B) The object will continue moving with a constant velocity
   (C) The object will change its direction
   (D) The object will slow down and eventually stop

5. A 7.5 kg object is sitting on a table. What is the approximate force of gravity acting upon this object?
   (A) 7.5 N
   (B) 55 N
   (C) 75 N
   (D) 750 N

6. A person is sitting on a balance that registers the normal force. The balance reads 800 N. What is the approximate mass of the person?
   (A) 40 kg
   (B) 80 kg
   (C) 400 kg
   (D) 800 kg

7. A circus performer loses his balance and falls off a tightrope and free-falls to the safety net below. Neglecting air resistance, give the best representation for the free body diagram of this scenario.

   F_{norm} F_{tens} F_{tens}

   F_{grav} F_{grav} F_{grav} No Forces

   (A)   (B)   (C)   (D)
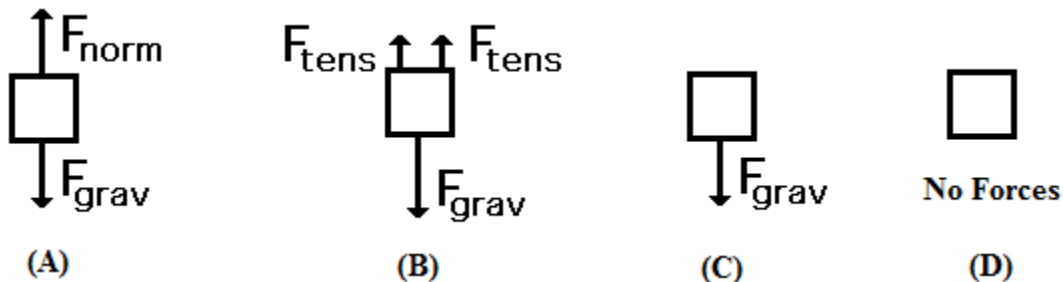
8. A student is sitting at rest in a classroom on a chair barely staying awake. Give the best representation for the free body diagram of this scenario.

   F_{norm} F_{tens} F_{tens}

   F_{grav} F_{grav} F_{grav} No Forces

   (A)   (B)   (C)   (D)
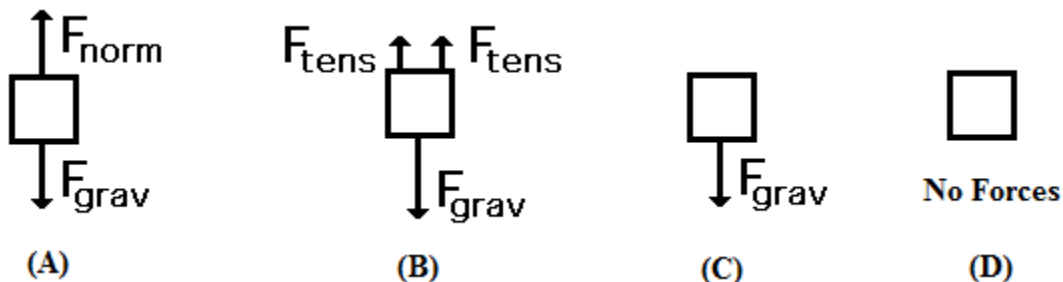
9. If an object is thrown vertically upward, the direction and magnitude of acceleration while it is in the air is
   (A) Upward and decreasing
   (B) Upward and constant
   (C) Downward and decreasing
   (D) Downward and constant

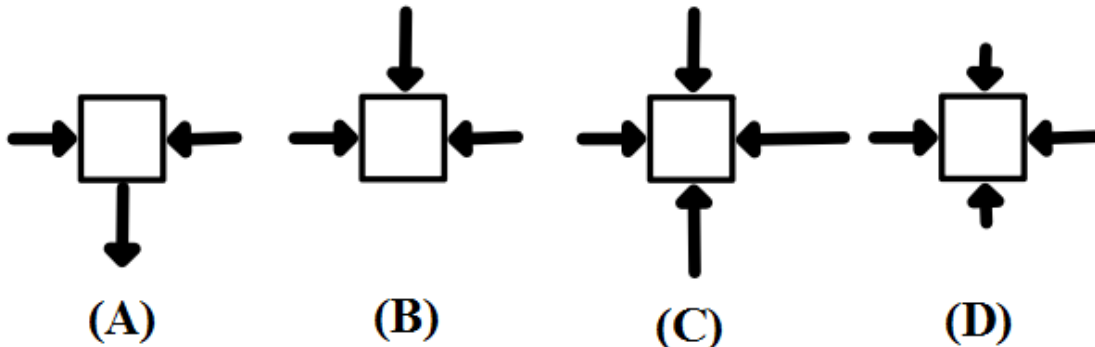10. Which object below will have the greatest resistance to being set in motion?

    12 kg sand   10 kg water
                                      2 kg pillow
               15 kg iron

    A   B   C   D
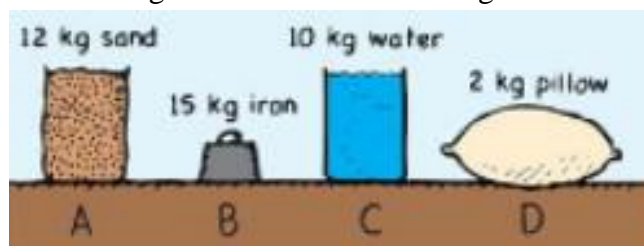
11. A 5.0-kilogram object accelerates at 6 m/s². What is the net force acting on this object?
  (A) 5 N
  (B) 6 N
  (C) 6/5 N
  (D) 30 N

12. Which diagram represents a box that is moving at a constant velocity (or is in equilibrium)?

  (A)   **(B)**   **(C)**   **(D)**

13. A 5.0-kilogram box is moving to the right with an applied force of 18 N. There is a frictional force of 7 N acting to the left. What is the net force on this box?
  (A) 11 N
  (B) 5 N
  (C) 6 N
  (D) 25 N

14. A crate has a 5 N force of gravity. It is also experiencing a 5 N normal force. If a young boy gets the crate moving and continues to apply a 2 N force to the right while the force of friction is 2 N to the left, what can be said about this crate?
  (A) The object will accelerate
  (B) The object will continue moving with a constant velocity
  (C) The object will change its direction
  (D) The object will slow down and eventually stop

15. 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/s²
  (B) 2 m/s²
  (C) 3 m/s²
  (D) 4 m/s²

16. A boy that has a mass of 50-kilograms is about to jump up. He jumps with a force of 700 N. What will be this boy's acceleration?
  (A) 2 m/s²
  (B) 4 m/s²
  (C) 6 m/s²
  (D) 8 m/s²