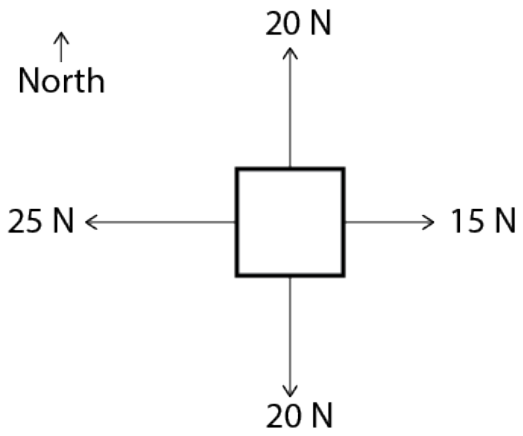
Review Pak #4

"Why Can't I Force This Thing To Move?"

Multiple Choice Questions

1. Four forces act on a box as shown in the image below.



Calculate the net force acting on the box.

(A) $F_{net} = 0$ N
(B) $F_{net} = 5$ N East
(C) $F_{net} = 10$ N East
(D) $F_{net} = 10$ N West

2. Which one of the following statements is true of an object that is at rest?

(A) There are no forces acting upon the object.
(B) There is no gravity acting upon the object.
(C) The individual forces acting upon the object are **balanced**.
(D) The individual forces acting upon the object are **NOT balanced**.

3. An object is moving to the left with a constant speed. What can be concluded about the forces acting upon the object?

(A) There is a leftward force but no rightward force.

(B) There are only vertical forces acting upon the object.

(C) There is a stronger leftward force than the rightward force.

(D) All the individual forces acting upon the object are balanced.

4. A net force acts upon an object. What can be known for certain to be true of the object?

(A) The object is at rest.

(B) The object is accelerating.

(C) The object is moving at a constant speed.

5. An object experiences a rightward force of 5 N, a leftward force of 5 N, an upward force of 10 N and a downward force of 10 N. Which one of the following conclusions can be made about the object's motion?

(A) It will accelerate.

(B) If it is at rest, then it will stay at rest.

(C) If it is moving, then it will slow down.

(D) If it is moving, then it will speed up.

6. An object that is experiencing two horizontal forces – a rightward and a leftward force – is moving to the left with a constant speed. What can be concluded about the strength of these two forces?

(A) The two forces have the same strength.

(B) The rightward force is stronger than the leftward force.

(C) The leftward force is stronger than the rightward force.

7. An elevator is supported by a cable and moving downward through the elevator shaft at a constant speed. How does the upward tension force compare to the downward force of gravity?

   (A) The upward tension force is stronger than the downward force of gravity.
   (B) The downward force of gravity is stronger than the upward tension force.
   (C) The tension force and the force of gravity are of equal strength.

8. The tendency of objects to resist changes in their motion is called

   (A) inertia.
   (B) velocity.
   (C) acceleration.
   (D) force.

9. Which object has the greatest inertia?

   (A) A 5 kg mass moving at 10 m/s.
   (B) A 10 kg mass moving at 1 m/s.
   (C) A 15 kg mass moving at 10 m/s.
   (D) A 20 kg mass moving at 1 m/s.

10. An object is accelerating. What can be known for certain to be true of the object?

    (A) The object is not experiencing any force.
    (B) The individual forces acting upon the object are balanced.
    (C) There is a force acting in the direction of the object's motion.
    (D) The individual forces that act upon the object are not balanced.

11. A leftward moving object is slowing down. Which of the following statements correctly describes the forces acting upon the object?

    (A) The leftward force is stronger than the rightward force.

    (B) The rightward force is stronger than the leftward force.

    (C) The rightward force is equal in strength to the leftward force.

12. A 1000 kg car and a 5000 kg truck are both accelerating at the **same** rate. Which vehicle has the biggest force acting on it?

    (A) The car.

    (B) The truck.

    (C) Neither. The force on both is the same.

13. The net force experienced by an object is decreased. The acceleration of the object

    (A) is increased.

    (B) is decreased.

    (C) is not affected by this change.

14. Your shopping cart has a mass of 65 kg. What net force is required to accelerate the shopping cart at a rate of 0.3 m/s^2?

    (A) 0.005 N

    (B) 4.6 N

    (C) 19.5 N

    (D) 217 N

15. A small child has a wagon with a mass of 10 kilograms. The child pulls on the wagon with a force of 2 N. What is the acceleration of the wagon?

(A) 20 m/s^2

(B) 5 m/s^2

(C) 2 m/s^2

(D) 0.2 m/s^2

16. An object has an acceleration of 12.0 m/s^2. The net force acting on the object is doubled while the mass of the object is held constant. What will be the new acceleration?

(A) 2.0 m/s^2

(B) 6.0 m/s^2

(C) 14.0 m/s^2

(D) 24.0 m/s^2

17. A large truck traveling at 50 km/h collides with a Monarch butterfly that is crossing the road. How do the forces acting upon these two objects compare to one another?

(A) The truck experiences the greater force.

(B) The butterfly experiences the greater force.

(C) The butterfly and the truck experience the same amount of force.

18. If you blow up a balloon, and then release it, the balloon will fly away. This is an illustration of

(A) Newton's first law.

(B) Newton's second law.

(C) Newton's third law.

19. Violent collisions are part of the game of football. Besides penalties for dangerous hits, which of the following is true with respect to these collisions?

(A) No matter who is getting hit, each player in the collision receives the same force.

(B) The player running at a tackler will always hit the tackler with a greater force.

(C) The player tackling a running player will always hit the runner with a greater force.

(D) The player with the larger mass always hits the other player with a larger force.

20. A baseball bat exerts a force of magnitude F on a ball. If the mass of the bat is three time the mass of the ball, the magnitude of the force of the ball on the bat is

(A) $\frac{F}{3}$

(B) F

(C) $3F$

(D) $2F$

Part B – Free Response Questions

1. A skater pushes with 30 N of force and accelerates at 0.5 m/s^2. What is the skater's mass?

2. What is the acceleration of a 6.4 kg bowling ball if a force of 12 N is applied to it?

3. Using one or more of Newton's laws, explain why it is necessary to wear a seat belt to hold you in place if your car stops suddenly.

4. Using Newton's third law of motion, explain how you are able to walk forward.