

## Review: Newton's Laws of Motion.

.....1) When you sit on a chair, the net force on you is  
A) zero. B) up. C) down. D) depending on your weight.

.....2) In the absence of an external force, a moving object will  
A) stop immediately. C) go faster and faster.  
B) slow down and eventually come to a stop. D) move with constant velocity.

.....3) You are standing in a moving bus, facing forward, and you suddenly fall forward. You can imply from this that the bus's  
A) velocity decreased. C) speed remained the same, but it's turning to the right.  
B) velocity increased. D) speed remained the same, but it's turning to the left.

.....4) You are standing in a moving bus, facing forward, and you suddenly fall forward as the bus comes to an immediate stop. What force caused you to fall forward?  
A) gravity  
B) normal force due to your contact with the floor of the bus  
C) force due to friction between you and the floor of the bus  
D) There is **not** a force leading to your fall.

.....5) A constant net force acts on an object. Describe the motion of the object.  
A) constant acceleration C) constant velocity  
B) constant speed D) increasing acceleration

.....6) The acceleration of an object is inversely proportional to  
A) the net force acting on it. C) its velocity.  
B) its position. D) its mass.

.....7) A net force  $F$  accelerates a mass  $m$  with an acceleration  $a$ . If the same net force is applied to mass  $2m$ , then the acceleration will be  
A)  $4a$ . B)  $2a$ . C)  $a/2$ . D)  $a/4$ .

.....8) A net force  $F$  acts on a mass  $m$  and produces an acceleration  $a$ . What acceleration results if a net force  $2F$  acts on mass  $4m$ ?  
A)  $a/2$  B)  $8a$  C)  $4a$  D)  $2a$

.....9) 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. C) Newton's third law.  
B) Newton's second law. D) Galileo's law of inertia.

.....10) If you exert a force  $F$  on an object, the force which the object exerts on you will  
A) depend on whether or not the object is moving.  
B) depend on whether or not you are moving.  
C) depend on the relative masses of you and the object.  
D) always be  $F$ .

.....11) Action-reaction forces

- A) sometimes act on the same object.
- B) always act on the same object.
- C) may be at right angles.
- D) always act on different objects.

.....12) Action-reaction forces are

- A) equal in magnitude and point in the same direction.
- B) equal in magnitude but point in opposite directions.
- C) unequal in magnitude but point in the same direction.
- D) unequal in magnitude and point in opposite directions

.....13) A golf club hits a golf ball with a force of 2400 N. The golf ball hits the club with a force

- A) slightly less than 2400 N.
- B) exactly 2400 N.
- C) slightly more than 2400 N.
- D) close to 0 N.

.....14) A 20-ton truck collides with a 1500-lb car and causes a lot of damage to the car. Since a lot of damage is done on the car

- A) the force on the truck is greater than the force on the car.
- B) the force on the truck is equal to the force on the car.
- C) the force on the truck is smaller than the force on the car.
- D) the truck did not slow down during the collision.

.....15) Your bat hits the ball pitched to you with a 1500-N instantaneous force. The ball hits the bat with an instantaneous force, whose magnitude is

- A) somewhat less than 1500 N.
- B) somewhat greater than 1500 N.
- C) exactly equal to 1500 N.
- D) essentially zero.

.....16) A 20-N weight and a 5.0-N weight are dropped simultaneously from the same height. Ignore air resistance. Compare their accelerations.

- A) The 20 N weight accelerates faster because it is heavier.
- B) The 20 N weight accelerates faster because it has more inertia.
- C) The 5.0 N weight accelerates faster because it has a smaller mass.
- D) They both accelerate at the same rate because they have the same weight to mass ratio.

.....17) An object of mass  $m$  is hanging by a string from the ceiling of an elevator. The elevator is moving up at constant speed. What is the tension in the string?

- A) less than  $mg$
- B) exactly  $mg$
- C) greater than  $mg$
- D) cannot be determined without knowing the speed

.....18) An elevator is moving upwards at a constant velocity of 5 m/s. What is the net acceleration the elevator experiences?

- (A)  $0 \text{ m/s}^2$
- (B)  $1/2g$
- (C)  $1/4g$
- (D)  $g$
- (E)  $2g$

.....19) A force  $F$  gives an object with a mass  $m$  an acceleration  $a$ . If this force  $F$  is applied to an object of mass  $\frac{1}{4}m$ , what would the acceleration be?

- (A)  $1/8a$
- (B)  $1/4a$
- (C)  $2a$
- (D)  $4a$
- (E)  $8a$

.....20) A physics teacher pushes against the wall with a force of 100 N. What is the magnitude of the force exerted on the physics teacher by the wall.

- (A) 0 N
- (B) 100 N
- (C) Depends on the mass of the teacher
- (D) Depends on the mass of the wall
- (E) Depends on both the mass of the teacher and the mass of the wall

.....21) According to Newton's Third Law,

- (A) for every action there is a weaker, and opposite, reaction
- (B) for every action there is an equal, but delayed, reaction
- (C) for every action there is an equal, and similar, reaction
- (D) for every action there is an equal, but opposite, reaction
- (E) for every action there is a weaker, but opposite, reaction

.....22) A child of mass 60 kg is standing on a frictionless surface. The child throws a ball of mass 5 kg with a force of 30 N. What is ratio of the force felt by the child to the force felt by the ball?

- (A) 12:1
- (B) 6:1
- (C) 1:1
- (D) 1:6
- (E) 1:12

.....23) Two skaters, one of mass 100 kg, the other of mass 50 kg are on a frozen pond (negligible friction). If the heavier person pushed the lighter one with a force  $F$ , the ratio of the magnitude of the acceleration of the lighter skater to that of the heavier is

- (A) 1:4
- (B) 1:2
- (C) 1:1
- (D) 2:1
- (E) 4:1

.....24) Two skaters, one of mass 75 kg, the other of mass 50 kg, stand next to each other on ice (negligible friction). If the heavier skater pushes the lighter with a force  $F$ , the ratio of the force felt by the lighter to the force felt by the heavier is

- (A) 1:3
- (B) 2:3
- (C) 1:1
- (D) 3:2
- (E) 3:1

.....25) There are two forces acting upon an object at rest on a horizontal floor: the pull of gravity and the normal force from the floor. These two forces

- (A) have different magnitudes and the same direction
- (B) have different magnitudes and opposite directions
- (C) have the same magnitude and the same direction
- (D) have the same magnitude and opposite directions
- (E) have the same magnitude and are perpendicular

.....26) Starting from rest, a 4.0-kg body reaches a speed of 8.0 m/s in 2.0 s. What is the net force acting on the body?

- (A) 4.0 N
- (B) 8.0 N
- (C) 16 N
- (D) 32 N

.....27) Sue and Sean are having a tug-of-war by pulling on opposite ends of a 5.0-kg rope. Sue pulls with a 15-N force. What is Sean's force if the rope accelerates toward Sue at 2.0 m/s<sup>2</sup>?

- (A) 3.0 N
- (B) 5.0 N
- (C) 25 N
- (D) 50 N

.....28) A 15 N force is applied to a 12 kg box for 6 s. The box is initially at rest. What is the speed of the box at the end of the 6 s interval?

- (A) 1.8 m/s
- (B) 3 m/s
- (C) 7.5 m/s
- (D) 15 m/s
- (E) 30 m/s