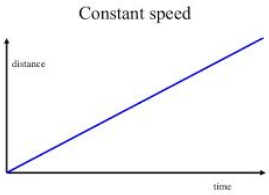
Force and Motion Unit Test Study Guide - Answers

(Only the most relevant questions were included. Any repetitive questions were omitted).

1. 

2. Speed = distance / time

3. m/s, km/h, miles/hr, km/min

4. Neils speed = 100m/4s = 25m/s

5. Unbalanced force

6. The object could be doing the following:
    a. The object stays at rest (not moving)
    b. If moving, the object will continue to move at the same speed and in the same direction

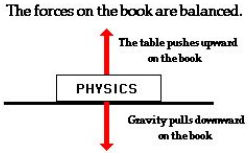
7. The ball would keep moving in a straight line.

8. Due to inertia, your body would be thrown forward as it is moving at the same speed as the car. If there were not force to stop you (as in a seatbelt, airbag or some part of the car), you would be thrown out of the car due to the collision force & inertia.

9. When a car is moving, your body is moving at the same **speed** as the car. As a result of the car's **mass** and **inertia**, the collision **force** could be great. Therefore in a car crash, your body would be thrown forward and possibly out of the car unless stopped by an unbalanced force. As the car attempts to decelerate, airbags and seatbelts react to the force of the collision by further reducing the rate of **deceleration** of the passenger, and thus avoiding further injury.

10. Net force on a balanced object is zero.

11. The total(sum / difference) of the unbalanced forces acting on the object. Anything other than zero.

12. 

Motion = at rest
Net force = 0 [Newton's 3rd law]

13. 

Motion = moving in the direction of the larger force (right)
Net force = 100N - 60N = 40N to the right

14. SUVs and trucks have a higher center of mass (or center of gravity) and are therefore "top-heavy". As a result their center of gravity shifts to either the left or right easiand they lose their balance.

15. Air hockey tables have air holes which allow a cushion of air to form between the table and the puck and keeps the puck "floating". The holes create an even and frictionless surface on which the air puck glides easily at high speeds. With no air holes, there would be friction across the play surface and a decrease in the speed of the puck.

16. Net force = 650N (right) - 750N (left) = -100N left

17. Stability refers to an object's ability to maintain its original balance.
    a. The lower the center of mass, the more stable the object.
    b. The higher the center of mass, the less stable the object.

18. Omitted

19. A fatality is a death resulting from an accident. **Safer cars have less fatalities**. Review Activity 87.

20. When the mass is doubled and the force is the same, the acceleration of the object is halved. This applies to Newton's 2nd Law of Motion. (use the F=m a equation to check if not sure)

21. When the mass is tripled and the acceleration is the same, the force is tripled. This applies to Newton's 2nd Law of Motion. (use the F=m a equation to check if not sure)

22. Newton's Laws of Motion:
    a. Law 1: **The Law of Inertia** (An object at rest stays at rest and an object in motion stays in motion unless acted on by an unbalanced force)
    b. Law 2: **F=ma** (An object's acceleration is dependent on its mass and the force being applied.
    c. Law 3: **Action-Reaction** (For every action there is an equal and opposite reaction)

23. You test only 1 independent variable. This is so that you can tell which variable is responsible for the result you observed.

24. Acceleration is zero as there is no change in the object's speed/direction (velocity)

25. Acceleration is zero as there is no change in the object's speed/direction (velocity)

26. $F = ma = 75kg \times 3m/s^2 = 225\ N$

27. The track pushing up on your sneakers.

28. Acceleration is a change in speed + direction (velocity)

29. Deceleration is a decrease in the rate of speed + direction (slowing down)

30. F=m a

31. Isolating variables in an experiment is to test 1 variable (independent) so that you can see the effect on a 2nd variable (dependent). Controlled variables must also be isolated. This is so that you can conduct a valid experiment.

32. Calculations are as follows:
    a. S = d/t = 1.5 km/10 min = .15 km/min (moving forward)
    b. S = d/t = 0 (horizontal line means the speed (slope) is zero)
    c. S = d/t = 2.5 km / 10 min = .25 km/min (moving forward)
    d. S = d/t = 0 (horizontal line means the speed (slope) is zero)

Second Part

1. m/s^2
2. Newtons

3. Omitting (repeat question)

4. Omitting (repeat question)

5. Bintou's speed = d/t = 10 m/ 5 s = 2m/s

6. Omitting (repeat question)

7. Omitting (repeat question)

8. Omitting (repeat question)

9. Net force = 30N - 25N = 5N to the left

10. An object with the same force would move farther on ice than on pavement due to the reduced friction on ice.

11. Omitting (repeat question)

12. Omitting (repeat question)

13. Omitting (repeat question)

14. a = F/m = 20N / 10 kg = 2 m/s^2

15. Calculations are as follows:

Leg	Speed	Direction
1	S = d/t = 10m / 20s = 0.5 m/s	forward
2	S = d/t = 0 (horizontal line = 0 speed)	At rest
3	S = d/t = 30m / 20 s = 1.5 m/s	forward
4	S = d/t = -40m / 40s = -1 m/s	backward

16. Omitting (repeat question)

17. Omitting (repeat question)

18. Omitting (repeat question)