CBSE

FORCE AND LAWS OF MOTIONS WS 5

Class 09 - Science

Section A

1. According to the third law of motion, action and reaction **[1]**

   a) act on either body at normal to each other
   b) always act on different bodies in opposite directions
   c) have same magnitude and direction
   d) always act on the same body

2. **Statement 1:** If a person push a massive truck parked along the roadside by using its muscular force only, it will not move. **[1]**

   Statement 2: Two opposite and equal forces acted on two bodies in contact cancel each other.

   a) Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.
   b) Statement 1 is true but statement 2 is false.
   c) Statement 1 is false but statement 2 is true.
   d) Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.

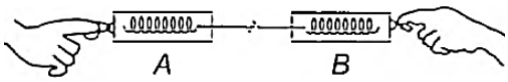
3. A jet engine works on the principle of Newton's: **[1]**

   a) second law of motion
   b) first law of motion
   c) Fourth law of motion
   d) third law of motion

4. A man is at rest in the middle of the pond on perfectly smooth ice. He can get himself to the shore by making use of Newton's: **[1]**

   a) Third law of motion
   b) Fourth
   c) First
   d) Second

5. Consider two spring balances hooked as shown in the figure. We pull them in opposite directions. If the reading shown by A is 1.5 N, the reading shown by B will be **[1]**



   a) Zero
   b) 2.5 N
   c) 3.0 N
   d) 1.5 N

6. Action reaction forces act: **[1]**

   a) on the same body
   b) on different bodies
   c) in the same direction
   d) along different bodies

7. **Assertion (A):** Newton’s third law applies to all types of forces. e.g. gravitational, electric, or magnetic forces, etc. **[1]**

Reason (R): Newton's third law of motion is applicable only when bodies are in motion.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

8. **Assertion (A):** The third law of motion states that when one object exerts a force on another object, the second object instantaneously exerts a force back on the first. **[1]**

Reason (R): The two forces are always equal in magnitude but opposite in direction.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

9. **Assertion (A):** When we sit on a chair, our body exerts a force downward and that chair needs to exert an equal force upward or the chair will collapse. **[1]**

Reason (R): The third law says that for every action there is an equal and opposite reaction.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

10. **Assertion (A):** When a bullet is fired from a gun, there is a forward force on the bullet and recoil of gun. **[1]**

Reason (R): Every action has an equal and opposite reaction.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

11. **Assertion (A):** When a gun is fired, it exerts a forward force on the bullet. **[1]**

Reason (R): The bullet exerts an equal and opposite reaction force on the gun.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

12. **Assertion (A):** Force exerted by the ground on the man moves him forward. **[1]**

Reason (R): It is a reactional force.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

13. As the sailor jumps forward out of a rowing boat, the force on the boat moves it backward. This is an example of **[1]**

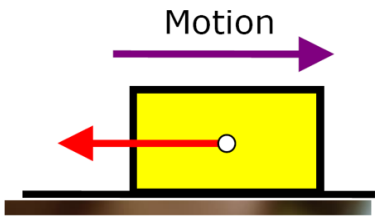
a) law of conservation of momentum

b) second law of motion

c) first law of motion

d) third law of motion

14. The image shows a force which always opposes the motion of one body over another body. This is: **[1]**



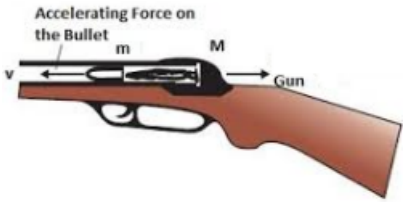
a) Gravitational force

b) Frictional force

c) Electrostatic force

d) Magnetic force

15. The image shows the firing of a gun. What happens when a gun is fired? **[1]**



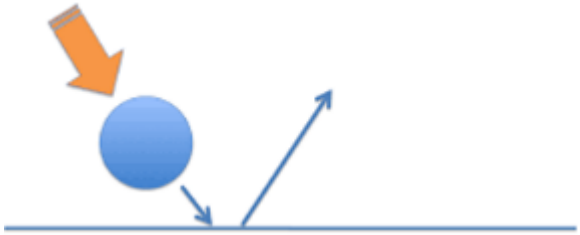
a) Exerts a backward force on the bullet

b) Exerts a forward force on the arm

c) Exerts a forward force on the bullet

d) Exerts a backward force on the arm

16. What does the given image illustrate? **[1]**



a) Second law of motion

b) Law of conservation of momentum

c) Third law of motion

d) First law of motion

17. Newton's third law tells that _____ force does not exist. **[1]**

a) motion

b) isolated

c) movement

d) momentum

18. Which is incorrect statement about action and reaction referred to Newton’s third law of motion? **[1]**

A. They are not equal.

B. They are opposite.

C. They act on same object.

D. They act simultaneously.

a) A and C

b) A, B and C

c) B and C

d) All of these

19. Find the incorrect statement about Newton’s law of action and reaction. Action and reaction: **[1]**

a) are equal in magnitude

b) act on the same bodies

c) act simultaneously

d) are different in direction

20. The incorrect option regarding action-reaction pair is **[1]**

a) they are equal and opposite
b) their sum on/by a body is zero
c) they act only between bodies in contact
d) they act on two different bodies

21. Which is an incorrect statement about action and reaction referred to in Newton's third law of motion? **[1]**

A. They are not equal
B. They are opposite
C. They act on the same object
D. They act simultaneously

a) A and C
b) All of these
c) A and D
d) B and C

22. When a force acting on a body has equal and opposite reaction, then why should the body move at all? **[1]**
23. Does Newton's third law apply to a system where bodies do not actually touch each other? **[1]**
24. Using a horizontal force of 200 N, we intend to move a wooden cabinet across a floor at a constant velocity. What is the friction force that will be exerted on the cabinet? **[1]**
25. Do action and reaction act on the same body? **[1]**

Section B

26. **State True or False:** **[2]**
    (a) Newton’s Third Law of Motion states that the action and reaction forces act on two different bodies and never cancel each other. **[1]**
    (b) As the sailor jumps forward out of a rowing boat, the force on the boat moves it backward. **[1]**
27. **Fill in the blanks:** **[2]**
    (a) When a gun is fired, it exerts a _____ force on the bullet. **[1]**
    (b) Newton’s _____ law of motion states that the action and reaction forces act on two different bodies and never cancel each other. **[1]**
28. State Newton's third law of motion and how does it explain the walking of man on the ground? **[2]**
29. Give a few examples of Newton's third law of motion. **[2]**
30. A stone of 1 kg is thrown with a velocity of 20 ms^{-1} across the frozen surface of the lake and comes to rest after travelling a distance of 50 m. What is the force of friction between the stone and the ice? **[2]**
31. Water sprinkler used for grass lawns begins to rotate as soon as the water is supplied. Explain the principle on which it works. **[2]**
32. A bullet of mass 10 g travelling horizontally with a velocity of 150 ms^{-1} strikes a stationary wooden block and comes to rest in 0.03 s. Calculate a distance of penetration of the bullet into the block. Also calculate the magnitude of the force exerted by the wooden block on the bullet. **[2]**
33. A batsman hits a cricket ball which then rolls on a level ground. After covering a short distance, why does the ball come to rest? **[2]**
34. Describe our walking in terms of Newton’s third law of motion. **[2]**
35. Why does a boat tend to leave the shore, when passengers are alighting from it? **[2]**
36. According to the third law of motion, when we push on an object, the object pushes back on us with an equal and opposite force. If the object is a massive truck parked along the roadside, it will probably not move. A student justifies this by answering that the two opposite and equal forces cancel each other. Comment on this logic and explain why the truck does not move. **[2]**

Section C

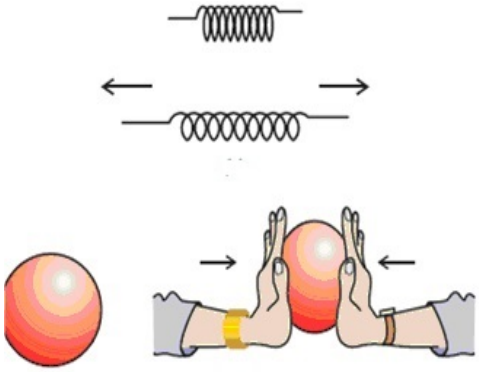
37. i. Explain, why is it difficult to walk on sand? **[3]**

ii. Why is the recoil of a heavy gun, on firing, not so strong as that of a light gun using the same cartridge?

Section D

38. **Read the following and answer any four questions:** **[4]**

The third law of motion states that when one object exerts a force on another object, the second object instantaneously exerts a force back on the first. These two forces are always equal in magnitude but opposite in direction.



i. Recoiling of the gun is an example of

a. Newton's first law of motion

b. Newton's second law of motion

c. Newton's third law of motion

d. Newton's law of gravitation

ii. Which of the following is an incorrect statement?

I. The two opposite forces are known as the cation force

II. The two forces are equal in magnitude

III. There is a pair of forces.

IV. The two forces are not equal in magnitude

Options:

a. (I) and (II)

b. (II) and (III)

c. (IV) and (III)

d. (I) and (III)

iii. A boy of mass 50 kg standing on the ground exerts a force of 500 N on the ground. The force exerted by the ground on the boy will be :

a. 50 N

b. 25000 N

c. 10 N

d. 500 N

iv. The acceleration produced by a force of 5 N acting on a mass of 20 kg in m/s^2 is :

a. 4

b. 100

c. 0.25

d. 2.5

v. In the following diagram the direction of the boat will be

a. move away from the shore

b. move towards the shore

c. remain stationary

d. none of these

Section E

39. Describe Newton's third law of motion. **[5]**