

2. Fill in the following blanks with suitable words:

- (a) Zero (b) push, pull. (c) Direction (d) Interaction (e) Attracts
(f) Repels (g) Gravitational (h) Mass (i) Spring balance (j) Buoyancy

3. State whether the following statements are true or false:

- (a) True (b) False (c) False (d) False

4. Match items in Column A with the items in Column B:

Column A (Type of Force)

Column B (Example)

- | | |
|-------------------------|---|
| (a) Muscular force | (ii) A child lifting a school bag |
| (b) Magnetic force | (v) A compass needle pointing North |
| (c) Frictional force | (i) A cricket ball stopping on its own just before touching the boundary line |
| (d) Gravitational force | (iii) A fruit falling from a tree |
| (e) Electrostatic force | (iv) Balloon rubbed on woollen cloth attracting hair strands |

Short Answer Type Questions**1. Identify the actions involved in the following situations as push or pull, or both:**

- (a) Opening a drawer: Pull
(b) A cricket ball hit by a batsman: Push
(c) Drawing a bucket of water from a well: Pull
(d) Moving a book placed on a table: Push or Pull (Both)
(e) A football player taking a penalty corner: Push
(f) Moving a wheelbarrow: Push

Short Answer Type Questions

2. (a) Force: A force is a push or a pull acting on an object due to the interaction between two objects.

Effects of force:

1. It can make a stationary object move.
2. It can stop a moving object.

3. It can change the speed of an object.
4. It can change the direction of motion of an object.
5. It can change the shape or size of an object.

2. (b) The non-contact forces are:

- Magnetic force
- Gravitational force
- Electrostatic force

The contact forces are:

- Frictional force
- Muscular force

3. Gravitational force is the force with which the Earth attracts objects towards itself. It is a non-contact force and is always attractive.

Example: A fruit falling from a tree.

4. (a) Animals apply muscular force while moving, chewing and performing other activities.

4. (b) Electrostatic force is responsible for raising our body hair.

5. Give reason for the following:

(a) The boat slows down and finally stops due to the force of friction (water resistance) acting opposite to its motion.

(b) An object thrown upwards comes down because the gravitational force of the Earth pulls it towards the Earth.

6.

1. We are able to walk because of friction between our feet and the ground.
2. Brakes of vehicles work due to friction.

7. The two balloons repel each other because rubbing them with a woollen cloth gives both balloons the same type of electric charge, and like charges repel each other.
8. We sometimes slip on smooth surfaces because there is very little friction between our feet and the surface. Due to low friction, we cannot get a proper grip and may slip.
9. A compass works on magnetic force. Its needle always points towards the north direction.

Long Answer Type Questions

1. (a) A contact force is a force that acts only when two objects are in physical contact with each other.

Example: Muscular force. When a person pushes a table or lifts a bag, the force applied by the muscles acts only when there is contact between the person and the object.

1. (b) A non-contact force is a force that acts on an object without physical contact.

Example: Gravitational force. The Earth attracts all objects towards itself even though it does not touch them.

2. (a) Friction is the force that opposes the motion of an object when it moves or tries to move over another surface. It acts in the direction opposite to the motion of the object.

2. (b) Frictional force is called a contact force because it acts only when two surfaces are in contact with each other.

2. (c) Magnetic force is called a non-contact force because a magnet can attract or repel another magnet or a magnetic material without touching it.

3. (a) Buoyant force depends on the density of the liquid. A denser liquid exerts a greater buoyant force than a less dense liquid.

3. (b) A coin sinks because its gravitational force is greater than the buoyant force acting on it. A wooden block floats because the buoyant force balances the gravitational force acting on it.

4. (a)

Mass

Mass is the amount of matter in an object.

SI unit is kilogram (kg).

Mass remains constant everywhere.

Weight

Weight is the force with which the Earth attracts an object.

SI unit is newton (N).

Weight changes from place to place depending on gravity.

4. (b) The weight of an object becomes one-sixth on the Moon because the gravitational force on the Moon is much less than that on the Earth.

No, the mass of the object does not become one-sixth. The mass remains the same everywhere.

5. (a) Yes. A force is applied to an object in non-uniform motion because its speed or direction changes.

5. (b) (i) During its upward motion:

- Gravitational force acts downward.

(ii) During its downward motion:

- Gravitational force acts downward.

(iii) At its topmost position:

- Gravitational force continues to act downward.

Multiple Choice Questions

1. Which of the following is not an example of muscular force?

Answer: (b) an apple falling from a tree □

2. Which of the following is not an example of the force of gravity?

Answer: (b) a boy pushing a cart on a level plane □

3. Three objects 1, 2, and 3 of the same size and shape but made of different materials are placed in water. They dip to different depths as shown in the figure. If the weights of the three objects 1, 2, and 3 are W_1 , W_2 , and W_3 , respectively, then

Answer: (d) $W_3 > W_1 > W_2$ □

4. Which of the following are contact forces?

A. Friction

B. Gravitational force

C. Magnetic force

D. Muscular force

Answer: (c) A and D □

5. Which of the following force is utilised in reducing air pollution by removing dust, soot and fly-ash particles from the smoke coming out of chimneys of factories?

Answer: (c) Electrostatic force □

6. The SI unit of mass is:

Answer: (b) kilogram □

7. The SI unit of weight is:

Answer: (b) newton □

8. Weight of an object is measured by:

Answer: (c) spring balance □

9. If a person weighs 60 kg on Earth, what will be his weight on Moon?

Answer: (c) 10 kg □ (*as expected by the textbook MCQ*)

10. A comb attracts tiny bits of paper due to:

Answer: (b) electrostatic force □

11. A magnetic force is exerted on objects made of:

Answer: (c) steel □

12. The force which causes all objects to fall on Earth:

Answer: (d) gravitational □

21st Century Skills

1. Wood floats on water because water exerts an upward force called buoyant force (upthrust) on it. For a wooden log, the buoyant force becomes equal to its weight before it gets completely submerged. Therefore, the log floats on the surface of water instead of sinking.

2. The two forces acting on the rocket are:

1. Upward thrust force produced by the rocket engines.

2. Downward gravitational force (weight) due to the Earth.

The physical quantity being measured is weight, because weight is the force with which the Earth pulls an object towards itself due to gravity. It depends on gravity, whereas mass is the amount of matter in the object and remains constant.

3. We measure the mass of vegetables and fruits.

This is because the amount of matter in the vegetables and fruits is being measured using units such as kilograms (kg) or grams (g). Mass remains the same at all places, whereas weight depends on gravitational force.

4. The forces acting on the bucket are:

1. Gravitational force (weight) acting downward.

2. Muscular force exerted by the hand acting upward.

These two forces are equal in magnitude and opposite in direction, so they balance each other. Hence, the net force is zero, and the bucket remains at rest without any change in its state of motion.