

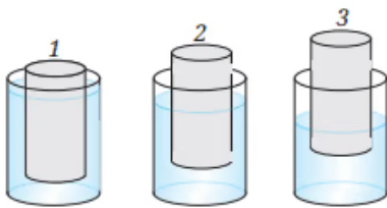
EXPLORING FORCES

Class 08 - Science (Curiosity)

Time Allowed: 1 hour and 27 minutes

Maximum Marks: 133

- Force is [1]
 - friction
 - pressure
 - power
 - None of these
- The force is always attractive in nature and extends to infinity [1]
 - magnetic force
 - gravitational force
 - frictional force
 - electrostatic force
- 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 figure. If the weights of the three objects 1, 2, and 3 are w_1 , w_2 , and w_3 , respectively, then choose the correct relation. [1]



- a) $w_1 = w_2 = w_3$ b) $w_1 > w_2 > w_3$
 c) $w_3 > w_1 > w_2$ d) $w_2 > w_3 > w_1$

4. A spring balance is used for measuring [1]
 a) mass b) pressure
 c) speed d) weight

5. Force changes the [1]
 a) speed of the body b) shape of body
 c) all of these d) motion of the body

6. Why does a force disappear when interaction stops between two objects? [1]
 a) Objects move away from each other b) Objects change shape
 c) Objects become heavier d) Interaction is necessary for force generation

7. A _____ exerted by an object on another is a force. [1]
 a) Push or pull b) Pressure
 c) Contact or non-contact force d) Magnitude

8. Which two objects interact when you push a table? [1]
 a) Your hand and the table b) The chair and the table

- c) The table and the floor
d) Your hand and your arm

9. What is required for a force to act on an object? [1]
a) The object must be heavy
b) The object must be stationary
c) One object must be moving
d) Two objects must interact

10. Which one of the following forces is a contact force? [1]
a) Force of gravity
b) Magnetic force
c) Electrostatic force
d) Force of friction

11. If you kick a ball on the ground, which objects are involved in the force? [1]
a) The ground and the ball
b) Your foot and the ball
c) The ball and the wall
d) Your foot and the air

12. What happens when balanced forces are acting on an object at rest? [1]
a) The object changes color
b) The object remains at rest
c) The object changes shape
d) The object starts moving

13. Which of the following statements best explains the difference between mass and weight? [1]
a) Weight changes depending on location, while mass doesn't
b) Mass decreases as objects heat up, weight increases
c) Mass varies with gravity, weight doesn't
d) Both are completely interchangeable

14. What unit is used to measure the weight of an object? [1]
a) Gram
b) Kilogram
c) Meter
d) Newton

15. The force exerted by the Earth to pull the object towards itself is called [1]
a) muscular force
b) contact force
c) gravitational force
d) electrostatic force

16. The force exerted by an animal's body is called [1]
a) mechanical force
b) gravitational force
c) magnetic force
d) muscular force

17. During dry weather, while combing hair, sometimes we experience hair flying apart. The force responsible for this is [1]
a) force of gravity
b) electrostatic force
c) magnetic force
d) force of friction

18. How would you measure weight using a spring balance? [1]
a) Hang an object and observe the stretching of the spring
b) Attach the object to a pendulum platform
c) Place the object on a scale
d) Fill a container with water and place

the object inside

19. When a book is resting on a table, how many objects are interacting? [1]
a) Four b) One
c) Two d) Three
20. Which device can be used to measure the weight of an object? [1]
a) Pedometer b) Barometer
c) Thermometer d) Spring balance
21. **Assertion (A):** A force can bring about a change in the direction of an object in motion. [1]
Reason (R): Hitting a moving ball with a bat changes its 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.
22. **Assertion (A):** Water has the ability to exert force in a vertical direction. [1]
Reason (R): When an object is placed in water, the force of buoyancy always acts downwards.
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.
23. **Assertion (A):** Pumice can float on water because it is porous and filled with air pockets. [1]
Reason (R): Pumice has a density higher than that of water due to its formation process.
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.
24. **Assertion (A):** A force can change the shape of an object. [1]
Reason (R): Applying pressure to an inflated balloon changes its shape.
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.
25. What is muscular force and in what situations do we apply it? [1]
26. How does the downhill speed without pedaling relate to gravitational pull as a form of force? [1]
27. What symbol is used to represent the unit of force, and what is the standard unit called? [1]
28. Name two effects a pushing force can have on an object. [1]
29. Define contact forces. Give two examples of contact forces. [1]
30. How does a pull affect a stationary object? Give an example. [1]
31. Is any force being applied to an object in a non-uniform motion? [1]
32. What is the scientific term used to describe a push or pull applied to an object? [1]
33. Why do ships have specific shapes to move through water? [1]
34. How does friction depend on the surface? [1]
35. Using the concept of force interaction, explain why a book kept on a table does not slide on its [2]

own.

36. Describe an everyday action that demonstrates the interaction of force between two objects and identify the forces involved. [2]
37. Why is it easier to slip on a wet surface? [2]
38. Define buoyant force and explain how it affects an object placed in a liquid. [2]
39. In what way do forces change if the interaction between objects shifts in direction? Provide an example. [2]
40. Why do we sometimes slip on smooth surfaces like ice or polished floors? Explain. [2]
41. Explain the relationship between buoyant force and gravitational force when an object is submerged in a liquid. [2]
42. What happens when you try to pull a mug out of the water while it's inside the bucket, and why does it feel lighter? [2]
43. How do objects like aeroplanes utilize designs to overcome frictional forces? [2]
44. What happens when someone cycles against the wind? [2]
45. Devise an experiment to demonstrate the effects of magnetic force on non-magnetic materials and outline what you expect to observe. [3]
46. Explain why weight can vary while mass remains constant on different planets. [3]
47. What is the basic definition of force in the context of motion? [3]
48. Describe a real-life application of Archimedes' Principle. [3]
49. Why is it important to use exact scientific terms and units in science, despite casual use in everyday language? [3]
50. If a ball is thrown upwards, it slows down, stops momentarily, and then falls back to the ground. Name the forces acting on the ball and specify their directions. [3]
- i. During its upward motion
 - ii. During its downward motion
 - iii. At its topmost position
51. How can the mass of an object be indirectly measured using a spring balance or a beam balance? [3]
52. What is the gravitational weight of a 1 kg object on the Moon compared to Earth, and why does it differ? [3]
53. Analyze the role of friction in everyday activities by giving examples of both its beneficial and disadvantageous effects. [3]
54. What does "forces work in pairs" mean? [3]
55. **State whether the given statement is True or False:** [4]
- (a) When your hand pushes a table, only the table experiences a force. [1]
 - (b) Due to friction, the speed of the ball rolling on a flat ground increases. [1]
 - (c) Magnitude is the strength of a force. [1]
 - (d) A force is always required to change the speed of motion of an object. [1]
56. How does the concept of force relate to everyday activities, such as cycling? [5]
57. Describe a real-life situation where Archimedes' Principle might be applied, explaining how it relates to floating or sinking. [5]
58. Explain why hitting a moving ball with a bat is an example of force application, and discuss the outcome of such a force. [5]

59. **Read the following text carefully and answer the questions that follow:** [5]

When an object is placed in water, it experiences two forces: the downward gravitational force and the upward buoyant force (upthrust). If gravity is greater, the object sinks; if both are equal, it floats. Archimedes' Principle states that an immersed object experiences an upward force equal to the weight of liquid displaced. The buoyant force also depends on liquid density. Interestingly, light porous rocks like pumice can float because they are less dense than water.

Questions:

- What is the force applied by a liquid in the upward direction called? (1)
- State Archimedes' Principle in simple terms. (1)
- Why does a plastic bottle float in water but a stone sinks? (2)

OR

Why can pumice rock float on water while most rocks sink? (2)

60. **Read the following text carefully and answer the questions that follow:** [5]

Sonali and Ragini went cycling during their summer vacation. While riding against the wind, they noticed it was harder to pedal. On rough paths, cycling was difficult, but smoother paths made it easier. When returning downhill, their bicycles moved quickly even without pedalling, making them realise that something was pulling them downward. This experience introduces the idea of force, which in science is described as a push or pull acting on an object.

Questions:

- What is an unbalanced force? (1)
- Why did Sonali and Ragini find it difficult to cycle against the wind? (1)
- How does the experience of riding downhill without pedalling explain the concept of force? (2)

OR

Compare the effect of rough and smooth roads on cycling. What does this tell us about forces? (2)

61. **Read the following text carefully and answer the questions that follow:** [5]

Forces are of two types-contact and non-contact. Contact forces, like muscular force and friction, act only when objects touch each other. Friction always opposes motion and depends on the surface type. Non-contact forces act without contact, such as magnetic force (attraction/repulsion of magnets), electrostatic force (forces between charged bodies), and gravitational force (Earth pulling objects downward). While magnetic and electrostatic forces may attract or repel, gravitational force is always attractive.

Questions:

- Which force is always attractive in nature? (1)
- Differentiate between contact and non-contact forces with examples. (1)
- How does friction act as a contact force? Explain with examples. (2)

OR

Compare gravitational, magnetic, and electrostatic forces in terms of nature and effects. (2)

62. **Read the following text carefully and answer the questions that follow:** [5]

Weight is the force with which the Earth pulls an object towards itself, measured in newton (N). It varies with gravitational force, while mass remains constant everywhere. A spring balance is commonly used to measure weight, where stretching of the spring shows readings. Objects of

the same mass weigh differently on different planets. In daily life, people often confuse mass and weight, though scientifically mass is the matter in an object and weight is gravitational pull.

Questions:

- a. Name the instrument commonly used to measure the weight of an object. **(1)**
- b. Differentiate between mass and weight. **(1)**
- c. How does a spring balance measure weight? Explain with an example. **(2)**

OR

Why does the same object have different weights on different planets? **(2)**

63. Fill in the blanks:

[10]

- (a) A force is a _____ or _____. **[1]**
- (b) The body at rest is called _____ body. **[1]**
- (c) _____ force is the force resulting due to the action of muscles. **[1]**
- (d) Force has _____ as well as direction. **[1]**
- (e) The upward force exerted by a liquid on an immersed object is called _____ force. **[1]**
- (f) Gravity is always _____. **[1]**
- (g) If an object's speed or direction changes, a _____ has acted. **[1]**
- (h) Force exerted by magnet is called _____ force. **[1]**
- (i) Force is _____ to pressure. **[1]**
- (j) The SI unit of force is _____. **[1]**

USP

Solution
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1.
(d) None of these
Explanation:
A force is a push or pull acting on an object. It is different from power (the rate of doing work), pressure (force acting per unit area), and friction (a specific type of force).
2.
(b) gravitational force
Explanation:
Gravitational force is the force of attraction between any two objects having mass. It is always attractive in nature and acts over very large distances, theoretically extending to infinity, although it becomes weaker with increasing distance.
3.
(b) $w_1 > w_2 > w_3$
Explanation:
Heavier objects sink deeper because their weight overcomes buoyant force more, while lighter ones float higher.
4.
(d) weight
Explanation:
A spring balance measures the weight of an object. It works by measuring the force with which gravity pulls the object, causing the spring inside the balance to stretch.
5.
(c) all of these
Explanation:
A force can produce several effects on an object. It can change its state of motion, increase or decrease its speed, and change its shape or size.
6.
(d) Interaction is necessary for force generation
Explanation:
Forces exist only during the interaction between objects.
7. **(a)** Push or pull
Explanation:
A force is defined as a push or pull exerted by one object on another. Whenever an object is pushed or pulled, a force acts on it.
8. **(a)** Your hand and the table
Explanation:
When you push the table, your hand and the table interact.
9.
(d) Two objects must interact
Explanation:
Forces result from the interaction between objects.

10. **(d)** Force of friction
Explanation:
Frictional force acts only when two surfaces are in contact with each other. Since physical contact is necessary for friction to occur, it is a contact force. Gravity, magnetic force, and electrostatic force can act without direct contact, so they are non-contact forces.
11. **(b)** Your foot and the ball
Explanation:
Your foot applies a force to the ball.
12. **(b)** The object remains at rest
Explanation:
Balanced forces keep an object at rest in its state.
13. **(a)** Weight changes depending on location, while mass doesn't
Explanation:
Unlike mass, weight is dependent on the gravitational pull, which can vary.
14. **(d)** Newton
Explanation:
The weight of an object is measured in newton (N).
15. **(c)** gravitational force
Explanation:
The Earth attracts all objects towards its center due to gravity. The force responsible for this attraction is called gravitational force. It acts without direct contact between the Earth and the object, making it a non-contact force.
16. **(d)** muscular force
Explanation:
Animals use their muscles to perform activities such as pulling, carrying, running, and lifting. The force produced by the muscles of an animal's body is called muscular force.
17. **(b)** electrostatic force
Explanation:
When a comb is rubbed through dry hair, electric charges build up on the comb and the hair. These charges exert an electrostatic force on the hair strands, causing them to repel each other and fly apart.
18. **(a)** Hang an object and observe the stretching of the spring
Explanation:
When an object is hung from a spring balance, the stretching of the spring indicates the weight.
19. **(c)** Two
Explanation:

The book and the table are interacting through gravitational force.

20. **(d)** Spring balance
Explanation:
A spring balance is used to measure the weight of an object.
21. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation:
Applying force to a moving object can alter its course, exemplified in sports.
22. **(c)** A is true, but R is false.
Explanation:
Buoyant force acts upwards, counteracting gravity.
23. **(c)** A is true, but R is false.
Explanation:
Pumice floats because it is less dense than water.
24. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation:
Applying pressure or force can alter the shape of objects, as seen with balloons.
25. Muscular force refers to the force exerted by the muscles of the body. It is applied when performing activities like walking, running, jumping, or lifting objects.
26. Gravitational pull causes the bicycles to accelerate downhill, demonstrating gravity's force.
27. The standard unit of force is called newton, represented by the symbol 'N'.
28. A pushing force can change the direction of a moving object or cause it to deform, e.g., hitting a ball or pressing clay.
29. Contact forces require physical interaction between two objects. Examples include muscular force and friction.
30. A pull can affect a stationary object by causing it to move, such as pulling a toy car with a string.
31. Yes, a force is applied to an object in **non-uniform motion** (when speed or direction changes). Force causes these changes, like speeding up, slowing down, or turning.
32. The scientific term for a push or pull applied to an object is called 'force'.
33. Ships are shaped specifically to reduce water resistance or friction, allowing them to glide more easily through water.
34. Friction varies based on the roughness of the surface; it is higher on rough surfaces and lower on smooth surfaces.
35. A book remains stationary on a table because of the static frictional force acting upwards at the point of contact, balancing the gravitational pull downwards. This interaction ensures no net movement.
36. Driving a car involves various interactions like the engine applying force to propel the vehicle forward, while the tires apply force on the road surface, showing interaction-induced forces at play.
37. Wet surfaces have less friction compared to dry surfaces. Friction is the force that helps in gripping the ground when walking or moving. When a surface is wet, the thin layer of water reduces the irregularities between the surfaces of shoes and the floor, causing the friction to decrease. With less friction, it is easy to slip and fall.
38. Buoyant force is the upward force exerted by a fluid on an object placed in it. It affects the object by counteracting the downward gravitational force. If the buoyant force is greater than or equal to the object's weight, the object will float. Otherwise, the object will sink if the gravitational force is stronger.
39. If you push a door sideways, the force applied changes direction and influences the door's swing accordingly. Changing the force direction alters the interaction results, demonstrating forces'

- dependency on direction.
40. We slip on smooth surfaces because there is very **little friction** between our feet and the surface. Without enough friction to grip and oppose sliding, it's easy to lose balance and fall.
41. When an object is submerged in a liquid, the buoyant force works upward, while the gravitational force acts downward. If the forces are equal, the object floats. However, if the gravitational force surpasses the buoyant force, the object sinks.
42. The mug feels lighter when lifted inside water because it experiences upthrust or buoyant force exerted by the water, which acts in the upward direction. This upward force reduces the net downward force acting on the mug, making it feel lighter.
43. Aeroplanes are designed with **streamlined shapes** to reduce **air resistance**, enabling them to move efficiently through the air by minimizing friction. Additionally, their **smooth surfaces** and **aerodynamically shaped wings** help decrease drag further, allowing the engines' thrust to overcome the remaining frictional forces and maintain speed.
44. When someone cycles against the wind, it becomes difficult because the wind pushes against them, requiring more effort to move forward.
45. An experiment to demonstrate the magnetic force involves placing a wooden block (non-magnetic) on a table with small paperclips (magnetic) scattered around. Introduce a strong magnet beneath the table's surface, moving it slowly. Expect to see the paperclips respond to the magnetic force by moving about, attracted and following the magnet's path, while the wooden block remains unaffected, highlighting the non-magnetic nature of the wood.
46. Weight is the measure of gravitational pull on an object, and this force varies among different planets due to varying gravitational fields. For example, while a 1 kg mass remains constant on Earth, the weight changes-10 N on Earth, 3.8 N on Mars-because Mars has a weaker gravitational force than Earth. Mass remains unaffected by location, as it measures the amount of matter in an object, while weight is subjective to gravitational conditions.
47. Force is generally defined as a push or a pull applied to an object which causes the object to move, stop, or change direction. In the context of motion, force is crucial as it influences the movement of objects. For instance, when riding a bicycle, pushing on the pedals applies force that propels the bicycle forward. Similarly, the wind against a cyclist exerts a counter force, requiring more effort to maintain speed. Therefore, force is a fundamental component in understanding how objects interact and move in response to pushes and pulls.
48. Ships and submarines apply Archimedes' Principle to control buoyancy. A ship floats because it displaces a volume of water whose weight is equal to the weight of the ship, creating an upward buoyant force that balances its weight. Submarines can submerge or surface by adjusting their buoyancy: they take in water to increase weight and sink, or pump out water to decrease weight and rise, all while obeying Archimedes' Principle. This principle ensures safe navigation and stability of vessels in water.
49. Using the correct scientific terms and units is crucial for clarity, accuracy, and consistency in communication and experiments. For example, while everyday language might refer to a 'weight' of 10 kg, scientifically, **weight is a force** measured in newtons, not an amount of matter. Misusing terms can lead to misunderstandings, inaccurate calculations, and flawed conclusions, especially in scientific research, engineering, and technology, where precision is essential. Correct usage ensures that results are universally understood and reproducible.
50. i. **During its upward motion:** Gravitational force pulls the ball **downward**, slowing it down, while the initial throwing force acts **upward** but weakens.
ii. **During its downward motion:** Only gravitational force pulls the ball **downward**, making it speed up.
iii. **At its topmost position:** Gravitational force pulls **downward**; the ball stops momentarily before falling, with zero speed at that instant.
51. The mass of an object can be indirectly measured by first finding its weight using a spring balance. Since weight is related to mass through gravitational force, determining the weight allows the calculation of mass. Alternatively, a beam balance can compare the weight of the unknown mass object to a known mass object, inferring the mass of the unknown object.

52. A 1 kg object weighs 10 N on Earth and only 1.6 N on the Moon. This difference occurs because weight is the force of gravity acting on an object, and the Moon's gravitational pull is much weaker than Earth's. While the object's **mass** remains constant at 1 kg, its **weight** changes depending on the strength of the gravitational field it is in. Therefore, objects weigh less on the Moon even though their mass does not change.
53. Friction plays a critical role in daily activities. On the beneficial side, it allows us to walk without slipping, enables vehicles to grip the road and stop, and allows objects to be placed on surfaces without sliding off. However, friction can also be disadvantageous; it causes wear and tear on moving parts, reduces efficiency by generating heat (as seen in machinery and engines), and necessitates more energy to maintain motion. The advantages and disadvantages depend on the context of the interaction.
54. When you push an object, it exerts an equal and opposite force on you. The interaction ends when contact ends.
Opening a door involves a 'pull' or 'push' depending on the direction. Lifting a book is a 'pull', whereas closing a drawer requires a 'push'.
Some examples are pushing a shopping cart (push), tugging a rope in tug-of-war (pull), and playing with a computer mouse (push/pull).
Pulling up your socks is a 'pull', pushing a button is a 'push', and pulling a kite string is a 'pull'.
Examples include: sliding a window (push or pull), pushing a paper pin to a corkboard (push), and dragging a suitcase (pull).
55. State whether the given statement is True or False:
- (a) **(b) False**
Explanation:
Each interacting object feels a force from the other.
 - (b) **(b) False**
Explanation:
Friction slows down or stops moving objects.
 - (c) **(a) True**
Explanation:
The statement "Magnitude is the strength of a force" is actually True, not False. The magnitude of a force refers to how strong or large the force is. For example, a force of 20 N has a greater magnitude than a force of 10 N.
 - (d) **(a) True**
Explanation:
Force changes speed, direction, or shape.
56. The concept of force is intrinsically related to everyday activities such as cycling. When cycling, the rider uses their legs to **exert force on the pedals**, creating motion that propels the bicycle forward. At the same time, cyclists encounter **external forces** such as **wind resistance, friction between tires and road, and gravitational pull**. For example, when cycling **uphill**, greater force is needed to overcome gravity and friction, whereas **descending a slope**, gravity assists in moving the bicycle downhill, reducing the pedaling effort required. Cyclists also adjust their posture to **minimize air resistance**, showing how force and motion are interconnected. Thus, the **interaction between applied and external forces** determines the ease, speed, and energy expenditure during cycling, illustrating the practical application of force in daily life.
57. A real-life situation where Archimedes' Principle applies is in **designing ships and submarines**. Shipbuilders use this principle to calculate **buoyancy**, ensuring that the **weight of water displaced by a ship is equal to or greater than the ship's weight**, allowing it to float safely. Submarines utilize this principle to **dive and rise** by adjusting water intake to **change their overall density relative to ocean water**. Additionally, **the shape and volume of the vessel** are carefully designed to maximize displacement and stability. By calculating buoyancy accurately, engineers ensure that vessels **function efficiently, remain stable, and avoid capsizing**, demonstrating the application of Archimedes' Principle in determining **stability, flotation, and controlled submersion** of vessels in water.

58. When a bat hits a moving ball, a **force is applied in the form of a push**. This action exemplifies **force application** because it externally **impacts the ball**, changing its motion. The applied force can **redirect the ball's trajectory, increase or decrease its speed**, and sometimes **slightly deform the ball** at the point of contact. The **outcome of the force** depends on several factors: the **angle of impact**, the **strength of the hit**, the **direction of the applied force**, and the **mass of the ball**. Additionally, the interaction demonstrates **Newton's laws of motion**—the ball accelerates in the direction of the applied force, and an equal and opposite reaction acts on the bat. This example clearly shows how **external forces can manipulate an object's motion and state**, making it an ideal real-life illustration of force application.

59. a. The force applied by a liquid in the upward direction is called buoyant force.
b. Archimedes' Principle states that when an object is fully or partially immersed in a liquid, it experiences an upward force equal to the weight of the liquid displaced. This principle helps explain why objects float or sink.
c. A plastic bottle is lighter and displaces enough water to balance its weight, so the buoyant force equals the gravitational force, making it float. A stone, however, is denser and heavier. The water displaced is not enough to balance its weight, so the downward gravitational pull is stronger, causing it to sink.

OR

Pumice forms during volcanic eruptions when lava cools quickly with trapped gases, creating air-filled pores. These pores reduce its density, making it less dense than water. Since buoyant force can balance its weight, pumice floats. In contrast, most rocks are much denser than water, so their gravitational force is greater than buoyant force, causing them to sink.

60. a. When forces acting on an object are unequal, causing a change in its motion, they are unbalanced forces.
b. Cycling against the wind was difficult because the wind exerted a force in the opposite direction of their motion. This opposing force resisted their pedalling, requiring them to apply more effort to move forward.
c. When Sonali and Ragini cycled downhill, their bicycles moved faster even without pedalling. This happened because the force of gravity pulled them downward along the slope. This shows that force can act on objects without physical contact, changing their motion by increasing speed in the direction of the pull.

OR

On rough roads, frictional force was higher, making it harder for Sonali and Ragini to pedal. On smooth paths, friction was lower, so cycling became easier. This shows that friction, a type of force, resists motion. The smoother the surface, the lesser the opposing force, making movement easier.

61. a. Gravitational force is always attractive.
b. Contact forces require physical touch, like muscular force (pushing a cart) or friction (slowing a bicycle). Non-contact forces act from a distance, like magnetic force, electrostatic force, and gravitational force. Both types change motion, speed, or shape of objects.
c. Friction is a contact force that opposes motion between two surfaces in contact. It arises due to surface irregularities. For example, a rolling ball slows down due to ground friction, and a bicycle stops sooner on rough roads. Friction is useful for walking, writing, or holding objects but can also cause wear and energy loss.

OR

Gravitational force is always attractive and pulls objects toward Earth. Magnetic force can be attractive or repulsive depending on pole interactions. Electrostatic force also shows both attraction and repulsion between charged bodies. While gravity acts universally on all masses, magnetic and electrostatic forces depend on material type and electric charge. All three act without physical contact.

62. a. Spring balance is commonly used to measure the weight of an object.
b. Mass is the amount of matter in an object, measured in grams (g) or kilograms (kg), and remains constant everywhere. Weight is the gravitational force acting on an object, measured in newtons (N), and can vary from place to place or on different planets.

- c. A spring balance has a spring fixed at one end and a hook at the other. When an object is hung, Earth's pull (weight) stretches the spring. The amount of stretch shows the weight on a calibrated scale. For example, a pencil box hung on a spring balance may stretch it to indicate 2 N, which represents its weight.

OR

Weight depends on the gravitational pull of the planet. Since different planets exert different gravitational forces, the same mass shows different weights. For example, a 1 kg object weighs 10 N on Earth, 1.6 N on the Moon, and 25.4 N on Jupiter. This proves that mass stays constant, but weight changes with location and planetary gravity.

63. Fill in the blanks:

- (a) push, pull
- (b) Stationary
- (c) Muscular
- (d) Magnitude
- (e) buoyant (or upthrust)
- (f) attractive
- (g) force
- (h) Magnetic
- (i) Directly Proportional
- (j) newton

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