6. FORCE AND ITS TYPES (KEY)

TEACHING TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. C) Writing on a paper.
Involves the use of force, as it requires physically applying pressure with a pen or pencil to create marks on the paper. The other actions do not involve physical force in the same way.

2. B) Create a new object
While force can move, change direction, or change the shape of an object, it doesn't inherently create a new object.

3. C) It depends on the mass of the objects and the distance between them.
is the true statement about gravitational force. Gravitational force is an attractive force that exists between all objects with mass, and it gets weaker as the distance between them increases.

4. C) It decreases.
As the distance between two objects increases, the gravitational force between them becomes weaker.

5. B) Because their masses are too small.
The gravitational force between small objects is usually not noticeable because their masses are insufficient to create a significant gravitational attraction compared to larger bodies.

6. C) The moon revolves around the Earth
is a result of the Earth's gravitational force. The Earth's gravity keeps the moon in orbit around it.

ADVANCED LEVEL

More than One Answer Type

7. A) Move a stationary object, C) Stop a moving object, D) Change the shape of an object.
B) Change the color of an object is not an effect of applying force.

8. A) It holds us on the surface of the Earth and stops us floating away into space, B) It keeps the moon revolving around the Earth, D) It makes the rivers flow downstream.
C) It makes rain fall upwards is not true; gravity causes rain to fall downwards.

Fill In the Blanks

9. gravitational force and electromagnetic force.
10. distance

Matching Type

11.

1. Writing on a paper - B. Changing the shape of an object.

2. Opening a door - A. Moving a stationary object.

3. Peddling a bicycle - D. Increasing or decreasing speed of a moving object.

4. Pushing an iron nail into wood - C. Changing the direction of an object.

Answer the Following Questions

12. We use force in our daily activities for several reasons:

1. Movement: To move objects, whether it's pushing a shopping cart, lifting groceries, or opening doors.

2. Manipulation: To change the shape or position of objects, such as molding clay or adjusting furniture.

3. Stopping Motion: To slow down or stop moving objects, like applying brakes in a car or catching a ball.

4. Maintaining Balance: To keep ourselves upright while walking, running, or balancing on one leg.

5. Interacting with the Environment: To engage with tools and devices, such as turning a doorknob, typing on a keyboard, or using a remote control.

Overall, force is essential for performing a wide range of tasks and activities effectively.

13. Factors that Gravitational Force Depends On:

1. Mass of the Objects: The greater the mass of the objects, the stronger the gravitational force between them.

2. Distance Between the Objects: The gravitational force decreases as the distance between the objects increases.

Four Effects of Earth's Gravitational Force:

1. Keeps us grounded: It holds us on the surface of the Earth, preventing us from floating into space.

2. Moon's orbit: It keeps the moon in orbit around the Earth.

3. Formation of tides: It causes ocean tides due to the gravitational pull between the Earth and the moon (and the sun).

4. Fall of objects: It causes objects to fall towards the Earth when dropped, influencing the motion of everything from raindrops to falling apples.

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. B) Gravitational force and frictional force.
These are two of the main types of forces that act on a body in nature.

2. B) Force can be seen directly
is NOT true about force. While the effects of force can be observed, force itself is not something that can be seen directly.

3.C) Gravitational force.
A ball thrown upwards comes back down to Earth because of the gravi-

tational force pulling it back toward the Earth's center.

4. D) Gravitational force.
This is the force that attracts all bodies toward the Earth.

5. A) It makes them revolve around the Sun.
The gravitational force of the Sun keeps the Earth and other planets in orbit around it.

6. D) Wind blowing across the surface
is NOT a result of Earth's gravitational force. While gravity influences the motion of water and rain, wind is primarily caused by differences in air pressure rather than gravitational force.

ADVANCED LEVEL

More than One Answer Type
7. A) Writing on a paper, B) Opening a door, D) Pushing an iron nail into the wood.
C) Thinking about a problem does not involve the use of force.

8. A) Gravitational force depends on the mass of the objects, D) Gravitational force is a pulling force.
B) Gravitational force increases with the distance between the objects is false; it actually decreases with distance.
C) Gravitational force can be easily observed with small objects is also false; it is usually not noticeable with small objects due to their low mass.

Fill In the Blanks
9. Effects
10. Gravitational force

Matching Type
11.

1. Gravitational force depends on - C. The mass of the objects and the distance between their centres.

2. Gravitational force between - B. Is too small to be noticed in small objects.

3. Gravitational force of the sun - D. Pulls the earth and other planets to orbit around it.

4. Gravitational force of the earth - A. Keeps the moon revolving around the earth.

Answer the Following Questions

12. No, we cannot see force directly. Force is an interaction that causes an object to change its motion, but it does not have a physical form that can be observed. Instead, we can only see the effects of force, such as an object moving, changing direction, stopping, or deforming. For example, when you push a swing, you can see it move, but the push (the force) itself is invisible.

13. Here are five effects of applying force on an object:

1. Change in Motion: A force can cause a stationary object to move or change the speed of a moving object.

2. Change in Direction: A force can alter the direction of an object's movement, such as when a car turns or a ball is kicked.

3. Change in Shape: Applying force can deform an object, such as squishing a sponge or bending a piece of metal.

4. Stopping Motion: A force can bring a moving object to a stop, like applying brakes on a bicycle.

5. Rotational Motion: A force can cause an object to rotate, such as pushing the edge of a door to open it.

14. Gravitational force is the attractive force that exists between any two objects with mass. It pulls objects toward each other, and its strength depends on the masses of the objects and the distance between them.

No, gravitational force does not exist only between the Earth and other large bodies. It acts between all objects with mass, regardless of their size. For example, gravitational force exists between small objects like a pen and a notebook, as well as between planets, stars, and galaxies. However, the effects of gravitational force are more noticeable between larger bodies due to their greater mass.

FRICTION (KEY)

TEACHING TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. B) Frictional force.
When you stop pedaling a bicycle, the frictional force (between the tires and the ground, as well as air resistance) opposes the motion and causes the bicycle to slow down and eventually stop.

2. A) Glass and marble
tend to have less friction when sliding against each other. These surfaces are smooth and have low friction compared to the other combinations listed.

3. C) It enables walking and running on the ground.
Friction is essential for providing the grip needed to walk and run without slipping.

4. B) It increases energy wastage.
Friction in machines and engines converts some of the energy into heat, which can reduce overall efficiency and lead to energy loss.

5. C) As a result of friction.
Worn-out tires lose their tread due to friction with the road, which reduces traction and safety, making replacement necessary for optimal performance.

6. B) They change sliding friction into rolling friction.
Ball bearings facilitate smoother movement by allowing parts to roll over each other rather than slide, significantly reducing friction and increasing efficiency.

ADVANCED LEVEL

More than One Answer Type

7. A) Enabling walking and running on the ground, C) Facilitating writing with a pencil, D) Stopping fast-moving vehicles by applying brakes.
B) Allowing birds to fly is not an advantage of friction.

8. A) Streamlined bodies of sports cars, B) Streamlined bodies of cyclists, C) Streamlined bodies of swimmers, D) Streamlined bodies of ships.
All of these options are designed to reduce drag and improve efficiency in their respective environments.

Fill In the Blanks

9. Friction
10. Lubricants

Matching Type

11.

1. Enables walking and running - B. Friction between shoes and the ground.

2. Heating of engine parts - C. Results from friction between moving parts.

3. Bird flight - A. Made possible by air resistance on the ground.

4. Enables vehicle to stop - D. Caused by friction when brakes are applied.

Answer the Following Questions

12. Here are three methods to reduce friction:

1. Lubrication: Applying lubricants (like oil or grease) between surfaces reduces friction by creating a thin layer that separates the moving parts. This minimizes direct contact and allows smoother motion, which is essential in machines and engines.

2. Using Ball Bearings: Incorporating ball bearings or roller bearings in machinery changes sliding friction into rolling friction. Rolling friction is significantly lower than sliding friction, which allows parts to move more easily and efficiently.

3. Smoothing Surfaces: Polishing or smoothing the surfaces of objects can reduce friction. Rough surfaces create more resistance, while smooth surfaces decrease contact area and resistance, allowing for easier movement.
These methods enhance efficiency and performance in various applications.

13. Advantages of Friction:

1. Enables Movement Control: Friction provides the necessary grip for walking, running, and driving. Without sufficient friction, we would slip and fall, and vehicles would have difficulty stopping or turning.

2. Facilitates Mechanical Operations: Friction is essential in machines for processes like braking. It allows brakes to function effectively, bringing vehicles to a stop, and is crucial in many tools and devices, such as drills and saws, where grip is necessary for operation.

Disadvantages of Friction:

1. Energy Loss: Friction can lead to energy loss in the form of heat, reducing the efficiency of machines and engines. This wasted energy requires more fuel or power to maintain performance.

2. Wear and Tear: Continuous friction between moving parts leads to wear and tear, resulting in damage over time. This can increase maintenance costs and shorten the lifespan of components and equipment.

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. C) Frictional force.
Frictional force slows down and stops moving objects by opposing their motion.

2. C) Frictional force.
This force appears when a moving object is in contact with another surface, opposing the motion between them.

3. D) It causes moving parts of engines to become very hot.

This is a disadvantage of friction, as it can lead to energy loss and potential damage to the engine over time.

4. C) Using rollers or wheels.
This method reduces friction by changing sliding friction into rolling friction, which is generally much lower.

5. C) Using narrow and hard tires.
Cyclists reduce friction with the road by using narrow and hard tires, which have less surface area in contact with the ground, allowing for less rolling resistance.

6. C) To reduce air or water friction. Streamlined shapes help sports cars and swimmers move more efficiently by minimizing drag from air or water, allowing for faster speeds.

ADVANCED LEVEL

More than One Answer Type
7. B) Wear and tear of vehicle tires, C) Heat generation in moving parts of engines, D) Reduction in speed of moving objects.
A) Increased grip between shoes and the ground is actually an advantage of friction.

8. A) Polishing the surfaces of both objects, B) Using lubricants between the objects, C) Using rollers or wheels, D) Using ball bearings.
All of these methods effectively reduce friction.

Fill In the Blanks
9. friction.
10. rollers or wheels.

Matching Type
11.

1. Polishing of Surfaces - B. Reduces friction by making surfaces smooth.

2. Using lubricants - A. Applying oil or grease between moving parts of machines.

3. Using rollers or wheels - C. Converting sliding friction into rolling friction by placing around an axle.

4. Using ball bearings - D. Using narrow and hard tires on bicycle to minimize road friction.

Answer the Following Questions

12. When smooth surfaces slide over each other, the amount of friction is significantly lower compared to rough surfaces. Smooth surfaces have less microscopic interlocking, which reduces the resistance to motion. In contrast, rough surfaces create more interlocking and resistance, leading to higher friction.

13. Examples of surfaces that have more friction when they slide over each other include:

1. Sandpaper on wood: The rough texture of sandpaper creates significant friction against wood surfaces.

2. Rubber on asphalt: The rubber tires of vehicles create high friction against the rough asphalt surface.

3. Bricks against concrete: The rough surfaces of bricks generate considerable friction when they slide against concrete.

4. Textured metal on metal: Surfaces like a rough metal plate sliding against another rough metal plate produce high friction.

These combinations result in greater resistance to movement due to their textures.

Work And Machines (KEY)

TEACHING TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. B) Lifting a book off the floor.
According to the scientific definition, work is done when a force causes an object to move in the direction of that force. Lifting the book involves both a force (lifting) and movement (upward), which qualifies as doing

work.

2. D) All of the above.
Machines can make work easier by changing the amount of force you need to use, changing the direction of the force, and increasing the speed of the work. Each of these factors can help reduce effort and make tasks more manageable.

3. C) The axle also turns.
In a wheel and axle system, when you turn the wheel, the axle turns along with it, allowing for efficient movement and the transfer of force.

4. B) Changes the direction of the force applied.
A pulley makes lifting heavy loads easier by allowing you to pull down on the rope, which in turn lifts the load upward. This change in direction helps reduce the effort needed to lift the load.

5. D) Inclined Plane.
An inclined plane is described as a flat surface set at an angle, which helps in raising or lowering loads with less effort.

6. C. Screws.
While wheels and axles, levers, and pulleys are components or mechanisms that play a role in a bicycle's operation, screws are not typically mentioned as part of a bicycle's main components.

ADVANCED LEVEL

More than One Answer Type

7. A) A force must be applied, C) The object must move in the direction of the force.
B) The object must be heavy is not a requirement, and D) You must feel tired afterward is irrelevant to the scientific definition of work.

8. B) Ramp, C) Slide.
Both ramps and slides use the inclined plane principle to make it easier to move objects up or down.

Fill In the Blanks

9. in the direction of the force.

10. axle.

Matching Type

11.

1. Lever - C. A rigid bar that pivots around a fixed point.

2. Wheel and Axle - A. Consists of a larger wheel attached to a smaller rod.

3. Pulley - D. Has a wheel with a groove through which a rope can run.

4. Inclined Plane - B. A flat surface set at an angle.

Answer the Following Questions

12. In scientific terms, *work* is defined as the transfer of energy that occurs when a force is applied to an object, causing it to move in the direction of that force.

The two essential requirements for work to be done are:

1. A Force Must Be Applied: There must be an exerted force on the object.

2. The Object Must Move in the Direction of the Force: The object must move at least partially in the direction in which the force is applied. If there is no movement, or if the movement is perpendicular to the force, no work is done.

13. Main Purpose of Simple Machines

The main purpose of simple machines is to make work easier by allowing us to apply force more effectively. They can change the amount of force needed, the direction of the force, or the distance over which the force is applied, thereby increasing efficiency and reducing the effort required to perform tasks.

How a Lever Works

A lever consists of a rigid bar that pivots around a fixed point called the fulcrum. When a force (the effort) is applied to one end of the lever, it causes the lever to rotate around the fulcrum. The other end of the lever, which can hold a load, will move upward if the applied force is greater than the weight of the load.

There are three types of levers, classified by the relative positions of the fulcrum, effort, and load:

1. First-Class Lever: The fulcrum is located between the effort and the load (e.g., a seesaw).

2. Second-Class Lever: The load is between the fulcrum and the effort (e.g., a wheelbarrow).

3. Third-Class Lever: The effort is applied between the fulcrum and the load (e.g., a fishing rod).

By adjusting the position of the fulcrum and the lengths of the arms of the lever, you can multiply the force applied, making it easier to lift heavier loads.

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. A) A force must be applied, and the object must move in the direction of the force.
This is the scientific definition of work.

2. B) To help you do work by making it easier.
The primary purpose of a machine is to assist in performing tasks more efficiently and with less effort.

3. B) To allow us to use less force or change the direction of the force.
The main purpose of simple machines is to make work easier by reducing the effort needed to perform tasks or by altering the direction of the applied force.

4. C) Seesaw.
A seesaw is a classic example of a lever, where a rigid bar pivots around a fulcrum.

5. B) Screw.
A screw is essentially an inclined plane wrapped around a cylinder,

which allows it to convert rotational motion into linear motion.

6. C) Screws.
Screws are commonly used in cars for various components, including fastening parts together.

ADVANCED LEVEL

More than One Answer Type

7. A) Pushing against a stationary wall, C) Watching television.
In both cases, either there is no movement (in the case of the wall) or the activity does not involve applying a force that causes movement in the direction of that force (watching television).

8. A) Wheel and Axle, C) Screw.
Both of these machines utilize rotational motion to perform work. A pulley can also involve rotational motion, but it primarily changes the direction of force rather than rotation itself. The wedge does not involve rotational motion.

Fill In the Blanks

9. Force.
10. Fulcrum.

Matching Type

11.

1. Using a bottle opener - B. Lever
2. Riding a bike - D. Wheels and Axles
3. Climbing a hill - A. Inclined Plane
4. Fastening materials - C. Screws

Answer the Following Questions

12. Definition of "Machine"

A machine is a device that uses mechanical advantage to help perform work by changing the amount of force needed, the direction of the force, or the distance over which the force is applied.

How Machines Make Work Easier

Machines make work easier by allowing us to perform tasks with less effort or more efficiency. They can help reduce the amount of force required to move an object, change the direction of the applied force, or increase the speed of a task.

Three Ways Machines Can Help with Work

1. Changing the Direction of Force: Machines like pulleys allow you to pull down on a rope to lift an object upward, making it easier to lift heavy loads.

2. Reducing the Amount of Force Needed: Levers, such as a seesaw, allow you to lift a heavy object with less force by increasing the distance over which the force is applied.

3. Increasing Speed: Machines such as gears in a bicycle can increase the speed of the output while requiring less force, allowing for efficient movement over long distances.

14. A pulley helps lift heavy loads by changing the direction of the force applied. Here's how it works:

1. Direction Change: When you pull down on one side of the rope that runs through the pulley, it lifts the load on the other side. This makes it easier to lift heavy objects because you can use your body weight to pull down.

2. Mechanical Advantage: If multiple pulleys (a block and tackle system) are used, they can provide a mechanical advantage, allowing you to lift heavier loads with less effort. The more pulleys you have, the less force you need to apply to lift the same weight.

3. Even Distribution of Weight: Pulleys distribute the weight of the load, making it easier to manage and lift, especially in construction or industrial settings.

Overall, pulleys reduce the effort needed to lift heavy objects by allowing you to apply force in a more efficient manner.