

# Year 8 Science - Forces

## Physics - Forces Topic

A comprehensive overview including sample questions

Forces are a fundamental concept in physics. They are the pushes and pulls that cause objects to move, stop, change direction, or change shape. Understanding forces is essential for understanding the physical world around us.

In this topic, you will learn about different types of forces, how they interact, and their effects on objects.

This guide includes key definitions, examples, and a selection of quiz questions to test your understanding.

### Sample Questions:

Q1: What is the force that pulls objects toward the center of the Earth?

Answer: Gravity

Q2: What is the difference between mass and weight?

Answer: Mass is the amount of matter, weight is the force due to gravity

Q3: What is the unit of mass in the SI system?

Answer: Kilogram (kg)

Q4: How is weight calculated on the Moon compared to Earth?

Answer: Weight is lower on the Moon due to lower gravity

Q5: What is the formula for calculating momentum?

Answer: Momentum = Mass x Velocity ( $p = mv$ )

Q6: What is the effect of friction on a moving object?

Answer: It slows the object down

Q7: What is the unit of acceleration?

Answer: Meters per second squared ( $\text{m/s}^2$ )

Q8: What is the relationship between force and acceleration?

Answer: Force is directly proportional to acceleration ( $F = ma$ )

Q9: What type of force is exerted by a compressed spring?

Answer: Elastic (restoring) force

Q10: What is the net force on an object at rest?

Answer: Zero

Q11: What is inertia?

Answer: The tendency of an object to resist a change in motion

Q12: How does increasing the mass of an object affect its inertia?

Answer: Increases inertia

Q13: What is terminal velocity?

Answer: The constant speed reached by a falling object when air resistance balances gravitational force

Q14: What type of force acts at a distance without physical contact?

Answer: Non-contact force

Q15: How do you calculate pressure?

Answer:  $\text{Pressure} = \text{Force} / \text{Area}$

Q16: What is the effect of air resistance on a falling object?

Answer: It slows down the object

Q17: What type of force keeps planets in orbit around the Sun?

Answer: Gravitational force

Q18: What is the relationship between mass and gravitational force?

Answer: Directly proportional

Q19: What is Newton's second law of motion?

Answer:  $F = ma$

Q20: What is the difference between static and kinetic friction?

Answer: Static friction resists initial motion, kinetic friction acts on moving objects

Q21: What is a vector quantity?

Answer: A quantity with both magnitude and direction

Q22: How is work calculated in physics?

Answer:  $\text{Work} = \text{Force} \times \text{Distance}$

Q23: What is the difference between force and pressure?

Answer: Force is a push or pull, pressure is force per unit area

Q24: What happens when forces are balanced on an object?

Answer: The object remains at rest or moves at constant velocity

Q25: What is the formula for kinetic energy?

Answer:  $\text{KE} = \frac{1}{2} m v^2$

Q26: What is the difference between elastic and inelastic collisions?

Answer: Elastic collisions conserve kinetic energy, inelastic do not

Q27: What is the center of mass of an object?

Answer: The point where the mass of an object is concentrated

Q28: What is the effect of increasing surface area on air resistance?

Answer: Increases air resistance

Q29: What is the relationship between force, distance, and work?

Answer:  $\text{Work} = \text{Force} \times \text{Distance}$

Q30: What is the unit of force in the SI system?

Answer: Newton (N)

Q31: What is the effect of reducing mass on acceleration?

Answer: Increases acceleration

Q32: How is power calculated in physics?

Answer:  $\text{Power} = \text{Work} / \text{Time}$

Q33: What is Newton's third law of motion?

Answer: For every action, there is an equal and opposite reaction

Q34: What is the difference between a contact and non-contact force?

Answer: Contact forces require physical contact, non-contact do not

Q35: What is the gravitational constant?

Answer:  $6.674 \times 10^{-11} \text{ N(m}^2\text{)/kg}^2$

Q36: What is a free body diagram?

Answer: A diagram showing all forces acting on an object

Q37: What is the law of conservation of momentum?

Answer: Momentum is conserved in an isolated system

Q38: What is centripetal force?

Answer: The force that keeps an object moving in a circular path

Q39: What is the effect of mass on gravitational attraction?

Answer: Greater mass increases gravitational attraction

Q40: What is the role of friction in walking?

Answer: Provides the necessary grip for movement

### **Additional Information:**

Forces are categorized into two main types:

1. Contact Forces: Forces that act when objects are physically touching.

- Examples: Friction, Tension, Normal Force, Air Resistance.

2. Non-Contact Forces: Forces that act without physical contact.

- Examples: Gravity, Magnetic Force, Electrostatic Force.

Key Equations:

- Force (F) = Mass (m) x Acceleration (a)
- Weight (W) = Mass (m) x Gravitational Field Strength (g)

Understanding these forces and their effects is crucial for studying motion, mechanics, and the physical world.