


Subject:	Science: Forces		
Class: T1 (Nurture)	Teacher: Sukhi Lall	Term: 1	
Key Vocabulary: Force Push Pull Contact Force Non-contact force Gravity Friction, Newton (N) Newton meter (force meter), Gravity, Friction, Weight Balanced force, Unbalanced force, Motion, Stationary, Acceleration, Resultant force Friction, Opposing force, Surface, Contac, Resistance	Alternative Learning Environments School field, forest school Forest school pond	Resources: PowerPoint or visual slides. Balloon, spring, sponge (demonstration) Sorting activity cards Whiteboards or notebooks Newton meters (1 per group) Variety of objects to measure (e.g. rubber, toy, mass set) Range of surface materials (cloth, sandpaper, plastic tray) Worksheets or tables for recording data Worksheet with force scenarios or arrow diagrams Spring scales/Newton meters (if doing practical) Small trolleys or objects for demonstrating motion Whiteboards or printed templates for diagrams	

Unit Aim: To understand the different types of forces, how they affect motion, and how they can be measured and represented.

Prior Learning: Ability to make simple predictions based on everyday experiences. Basic skills in using measuring equipment (e.g. rulers, timers). Understanding how to record data in tables and draw simple bar charts. Experience with carrying out simple investigations and following safety rules.

Future Learning: **Pressure in solids, liquids, and gases.** Understanding how force and area relate to pressure. Applications like hydraulics, atmospheric pressure, and diving. **Moments and turning forces.** Concept of moments (turning effects) and using levers and pivots. Calculations using $\text{moment} = \text{force} \times \text{distance}$. **Speed and motion graphs** Describing motion using distance-time and speed-time graphs. Calculating $\text{speed} = \text{distance} \div \text{time}$. **Magnetism and Electromagnetism.** Understanding magnetic fields as non-contact forces. Using forces in electric motors and magnetic devices.

Unit Expectations:

All: Identify different types of forces (e.g. gravity, friction, air resistance). Describe forces as pushes or pulls. Recognise that forces can change the shape, speed, or direction of an object. Measure forces using a Newton meter. Understand that gravity pulls objects toward Earth.

Some: Predict how multiple forces affect an object's motion using calculations or diagrams. Explain the relationship between mass, weight, and gravity using the formula: **Weight = Mass × Gravitational field strength**. Apply understanding of forces to unfamiliar situations or solve more complex problems (e.g. comparing motion in different environments). Describe Hooke's Law and interpret data from spring extension experiments

A Few: Distinguish between contact and non-contact forces. Explain the difference between balanced and unbalanced forces. Describe how friction and air resistance affect motion. Use force diagrams to represent size and direction of forces. Describe how weight is a force caused by gravity and depends on mass

Links with other subjects:

ICT: Research and power point presentations.

Art: Creating posters, drawing & colouring

Literacy: Writing and reading skills

Week	
1	<p>Lesson Objective</p> <p>Success Criteria: I will be able to describe a force as a push or pull. will be able to identify examples of contact and non-contact forces. students will be able to explain how different forces affect objects in terms of shape and motion.</p> <p>Activities</p> <p>Ask students: “<i>What happens when you kick a ball?</i>” or “<i>What forces are acting when you ride a bike?</i>”. Display images of everyday activities – ask students to identify where forces are acting.</p> <p>Key Concepts:</p>

- A **force** is a **push or a pull**.
- Forces can cause objects to **start, stop, speed up, slow down, change direction, or change shape**.
- There are **contact** (e.g. friction, air resistance) and **non-contact** forces (e.g. gravity, magnetism).

Visuals and Demonstration:

- Use a balloon, spring, or sponge to show that forces can change shape.
- Drop an object to demonstrate gravity as a non-contact force.

Forces Sorting Task (Individual or Pairs):

- Give students cards with different situations (e.g. kicking a ball, magnet attracting a pin, parachute falling).
- Sort into:
 - **Contact forces**
 - **Non-contact forces**

Extension: Ask students to explain how each force affects the object (change in motion or shape). **Think-Pair-Share:** “*Where do you experience forces on your way to school?*” Share a few ideas and reinforce the idea that forces are everywhere.

2

How Do We Measure Forces?

Lesson Objective

students will be able to name the unit of force (newton). students will be able to use a Newton meter to measure force. students will be able to explain how different materials or surfaces affect the size of a force

Success Criteria

I can name the unit of force and use a Newton meter to measure force. I can explain how different materials or surfaces affect the size of a force

Activities: Ask students to answer:

1. What is a force?
2. Name one contact force and one non-contact force.
3. What does a force do to an object?

Use mini whiteboards or a quiz slide to engage the class.

Introduce Measurement of Forces:

- Explain that forces are measured in **newtons (N)**, named after **Isaac Newton**.
- Show a **Newton meter** (force meter) and explain how it works.
- Demonstrate measuring the weight of an object using a Newton meter (e.g. pencil case, small mass).

Key Point:

- The Newton meter measures the force of **gravity** pulling down on an object (its **weight**).
- Emphasise that **mass is not the same as weight** (but don't go into formulas yet).
- In small groups, students use Newton meters to measure the force required to:
 1. Lift different objects (record the weight in newtons).
 2. Pull an object across different surfaces (e.g. desk, fabric, sandpaper) to explore friction.

Record results in a table.

Challenge Questions (for higher ability):

- Which surface had the most friction?
- Why do different objects have different weights?
- How do the size and shape of the object affect the force required?
- **Plenary (5 mins)**

Exit Questions:

- What unit is force measured in?
- What does a Newton meter do?
- Describe one thing you discovered in today's practical.

Lesson Objective to able to describe what balanced and unbalanced forces are. To able to predict how an object moves when forces are balanced or unbalanced. To explain the effects of unbalanced forces on motion using examples.

Success Criteria

I can describe a balanced and unbalanced force. I can make predictions about how an object moves when forces are balanced/unbalanced

Activities

- **Balanced forces:** Equal in size, opposite in direction → no change in motion.
 - Object stays still or moves at a constant speed.
- **Unbalanced forces:** One force is bigger than the other → change in motion.
 - Object speeds up, slows down, or changes direction.

Examples and Visuals:

- Tug of war (even teams vs. one stronger side)
- Car at rest vs. car accelerating
- Use arrows to show size and direction of forces (introduce basic force diagrams)

Key Term:

- **Resultant force** = overall force acting on an object (bigger force minus smaller one)

Activity (20–25 mins)*Option A: Force Arrows and Motion (Worksheet or Cards)*

- Students are given different scenarios (e.g. object falling, box pushed from both sides).
- Draw force diagrams with arrows.
- Say whether forces are balanced or unbalanced and predict what happens.

Option B: Mini Practical – Tug of War with Spring Scales

- Use two spring scales (force meters) pulling in opposite directions on a small object.
- Vary the forces to show balance and imbalance.
- Record and explain observations.

Challenge Questions:

- What is the resultant force in each case?
- What would happen if the object was already moving?

Plenary (5 mins)

Exit Slip / Quickfire Questions:

- What are balanced forces?
- What do unbalanced forces do?
- What is the resultant force if two forces of 4N and 6N act in opposite directions?

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Lesson Objective

- **All** students will be able to describe friction as a force that opposes motion.
- **Most** students will be able to identify where friction is useful or a problem in everyday life.
- **Some** students will be able to compare the effects of friction on different surfaces using results from an investigation

Success Criteria

Activities

Starter (5 mins)

Class Discussion:

- Ask: “*What happens when you slide on a wooden floor vs. a carpet?*”
- Show a short video or images of people slipping, car tyres, or athletes using friction.
- Elicit the idea that **friction is a force that resists movement between two surfaces.**

Main Teaching (10–15 mins)

Key Concepts:

- **Friction** is a **contact force** that acts in the opposite direction to motion.
- It occurs when two surfaces rub together.
- It can **slow objects down, produce heat, or stop motion** entirely.

Useful vs. Not Useful Examples:

- **Useful:** Brakes on a bike, gripping shoes, sand on icy roads.
- **Not useful:** Engine parts wearing out, sliding a heavy box, skin burns from falls.

Activity (25 mins)

Practical Investigation: Friction and Surfaces

Question:

Which surface creates the most friction?

Method:

- Use a **Newton meter** to pull an

Success Criteria

Activities

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Lesson Objective

- **All** students will be able to describe air resistance as a force that acts against movement through air.
- **Most** students will be able to explain how surface area and shape affect air resistance.
- **Some** students will be able to evaluate how air resistance is used or reduced in real-world applications.

Prior Knowledge Required

- Understand that friction is a force that opposes motion.
- Know what balanced and unbalanced forces are.
- Familiarity with how to measure forces using Newton meters.

Key Vocabulary

- Air resistance
- Drag
- Surface area
- Streamlined
- Gravity
- Terminal velocity

Starter (5 mins)

Demonstration or Video Clip:

- Drop a flat piece of paper and a crumpled-up paper ball.
- Ask: “*Why does one fall faster than the other?*”
- Link to air resistance acting on the falling object.

Main Teaching (10–15 mins)

Key Concepts:

- **Air resistance** (also called **drag**) is a type of **frictional force** that acts against objects moving through air.
- It increases with **speed** and **surface area**.
- Air resistance slows objects down as they fall or move through air.
- Objects can be made **streamlined** to reduce air resistance.

Examples to Discuss:

- Skydivers and parachutes
- Cyclists wearing tight suits and helmets
- Shape of cars, planes, rockets

Force Diagram Idea:

- Draw arrows for gravity and air resistance on a falling object.

Activity (20–25 mins)

Practical: Investigating Air Resistance with Paper Parachutes

Task:

- In groups, students make simple parachutes of different sizes using paper, string, and weights (e.g. paperclips or washers).
- Drop them from the same height and time how long they take to fall.

- Compare how parachute size affects air resistance and fall time.

Record in a table:

- Parachute size
- Time taken to fall
- Observations

Challenge/Extension:

- Discuss what would happen on the Moon (no air resistance).
- Relate findings to skydiving or space capsule landings.

Success Criteria

Activities

Lesson Objective

What Is Gravity and How Is It Different from Weight?

6

Learning Objectives

By the end of the lesson:

- **All** students will be able to state that gravity is a non-contact force pulling objects toward the Earth.
- **Most** students will be able to describe the difference between mass and weight.
- **Some** students will be able to use the formula:
Weight (N) = Mass (kg) × Gravitational field strength (N/kg)

Prior Knowledge Required

- Forces can be contact or non-contact.
- Gravity causes things to fall toward the Earth.
- Familiarity with using Newton meters.

Key Vocabulary

- Gravity
- Mass
- Weight
- Non-contact force
- Newton
- Kilogram
- Gravitational field strength

Starter (5 mins)

Think-Pair-Share:

- *“If you went to the Moon, would your mass change? Would your weight change?”*
- Discuss ideas – this hooks into the concept of weight depending on gravity.

Main Teaching (15 mins)

Key Concepts:

- **Gravity** is a **non-contact force** that pulls all objects with mass toward each other.

- On Earth, gravity pulls objects **toward the center of the planet**.
- **Mass** is the amount of matter in something (measured in **kg**); it **does not change**.
- **Weight** is the force of gravity acting on a mass (measured in **Newtons**); it **can change** depending on location.
- Use the formula:
Weight = Mass × Gravitational field strength
 On Earth, $g = 10 \text{ N/kg}$ (approx.)

Example Calculation:

- Mass = 5 kg
- Weight = $5 \times 10 = 50 \text{ N}$

Activity (20–25 mins)

Practical: Measuring Mass and Calculating Weight

Task:

- Students use scales to measure the mass of various objects.
- Use the formula to calculate the **weight** of each object on Earth.
- Optional: Compare how weight would change on the Moon ($g = 1.6 \text{ N/kg}$).

Record in a table:

Object Mass (kg) g (N/kg) Weight (N)

Book 1.0 10 10

Extension:

- Create their own “weight on the Moon” chart.
- Predict the weight of a person on different planets using their gravitational field strengths.

Plenary (5 mins)

Quick Quiz / Exit Ticket:

- What is the difference between mass and weight?
- What is the formula to calculate weight?
- What is the gravitational field strength on Earth?

Assessment Opportunities

- Accuracy of weight calculations.
- Quality of explanations during group discussion.
- Exit question answers or quiz scores.

Resources Needed

- Digital or spring scales (to find mass)
- Newton meters (optional)
- Calculator (for weight calculations)
- Worksheets or recording table
- Gravitational field strength chart (optional for extension)

Success Criteria

Activities