SW9 Partnership SCIENCE Medium Term Plan: Year Group: 5 Term: Teacher:

TOPIC	NATIONAL CURRICULUM	KEY VOCABULARY	POSSIBLE TRIP
FORCES AND MAGNETS	• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. • Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.	**TIER 2 (Academic):** Measure, predict, control, compare, oppose, reduce, exert, calculate. **TIER 3 (Topic Specific):** Gravity, gravitational pull, mass, weight, newtons, air resistance, water resistance, friction, streamlining, surface area, levers, pulleys, gears, cogs, mechanisms, Isaac Newton, Galileo Galilei, force meter, buoyancy.	**Science Museum:** Features hands-on friction slides on different materials, giant pulley seats where children lift their own weight, and interactive gear mechanisms, alongside live shows such as Feel the Force. **One Day Creative** (In-School Provider): Delivers hall-based drama workshops where pupils use movement to model forces, air and water resistance, friction, and gravitational pull.
PRIOR LEARNING	**Y3:** Forces and Magnets (pushes, pulls, surface friction, contact vs non-contact forces).		

	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6
ENQUIRY QUESTION	What is gravity and how does it pull unsupported objects Earthward?	How does air resistance oppose falling and moving objects?	How does water resistance affect movement through liquids?	How can we measure friction between different rubbing surfaces?	How do levers and pulleys allow a smaller force to lift heavy loads?	How do gears and cogs change the speed and direction of motion?
LEARNING OBJECTIVES	To explain gravity and measure gravitational force (weight in Newtons).	To investigate air resistance by altering parachute surface area.	To investigate water resistance and test streamlined shapes.	To measure frictional forces between surfaces using force meters.	To construct and evaluate lever and pulley mechanisms.	To investigate gear ratios and mechanical advantage.
ACTIVITY **WORKING SCIENTIFICALLY SKILLS**	**RESEARCHING & MEASURING:** Measure weight of objects in Newtons (N) using force meters; contrast mass (kg) vs weight (N); study Newton & Galileo.	**COMPARATIVE TESTING:** Drop parachutes of varied canopy surface areas (100 cm^2 to 900 cm^2); measure fall times.	**COMPARATIVE TESTING:** Time plasticine shapes (cone, sphere, cube, flat disc) falling through tall cylinder water columns.	**COMPARATIVE TESTING:** Pull weighted shoes across carpet, wood, vinyl, and sandpaper using force meters; record friction in Newtons.	**MODELLING:** Build card/ruler levers adjusting fulcrum positions; set up single vs double pulley systems to lift hanging weights.	**MODELLING:** Interlock plastic gear wheels of varied tooth counts (12-tooth vs 24-tooth); observe turn direction and rotational speed.

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ASSESSMENT	State that gravity pulls objects Earthward and weight is measured in Newtons.	Explain that larger surface area increases air resistance, slowing fall speed.	Define streamlining as reducing surface area to cut water resistance.	Identify smooth surfaces as generating low friction and rough surfaces as high friction.	Explain that moving the fulcrum closer to the load reduces required effort force.	State that driving a larger gear turns a smaller gear faster in the opposite direction.
END POINT ASSESSMENT	Pupils can explain gravity as an attractive force pulling objects Earthward, differentiate mass from weight (measured in Newtons), evaluate resistive forces (air, water, friction), design streamlined shapes, and explain how levers, pulleys, and gears multiply force.					
HIGHER ORDER QUESTIONS	If Earth's gravity pulls on you, do you also exert a gravitational pull on the Earth?	Why does a crumpled piece of paper fall faster than a flat sheet of paper of identical mass?	Why do fish have smooth scales and teardrop bodies rather than blocky shapes?	What would happen to car braking distances if roads had zero friction?	Why is a long-handled crowbar more effective at opening a sealed crate than a short screwdriver?	How do bicycle gears make riding up a steep hill much easier for a cyclist?
FURTHER OPTIONAL QUESTIONS/BIG QUESTIONS FOR DISPLAY	Why do heavy bowling balls and light tennis balls fall at the exact same speed in a vacuum? How can a small child easily lift an adult using a playground seesaw? Why do high-speed trains and racing cars have pointed, sleek noses?					
INCLUSION & ADAPTATION	Spring force meters with pre-marked visual colour bands (Green=Light, Red=Heavy).	Pre-cut parachute canopies with standard string lengths and stop-watch visual cues.	Moulded plasticine shape templates (Pointed vs Flat) with drop timer sheets.	Surface pull mat with visual scale markings showing Newton arrow length.	Desktop wooden seesaw lever with movable weight pegs and "Easy/Hard" markers.	Color-coded interlocking gear pegs with rotational directional arrow stickers.
GREATER DEPTH	Calculate gravitational force variations on Earth vs Moon ($g_{\text{Earth}} \approx 9.8$ N/kg vs $g_{\text{Moon}} \approx 1.6$ N/kg).	Graph air resistance data (surface area vs terminal velocity) on scatter plots.	Analyse hydrofoil design and fluid dynamic drag coefficients in water transport.	Calculate coefficients of static vs kinetic friction across industrial material pairs.	Calculate mechanical advantage ratios ($\text{MA} = \frac{\text{Load}}{\text{Effort}}$) for compound pulley systems.	Calculate gear ratios and torque outputs in multi-stage gear trains.