

DISCOVER THE POWER OF PHYSICS!



Guide for teachers:

THE AIM IS SIMPLE

Choose an interesting physics question, investigate it, try something, and show what you discovered.

KEEP IT SIMPLE

Projects do not need to be complicated or use expensive equipment. We are much more interested in pupils exploring an idea for themselves and understanding the physics behind it.

HOW IT WORKS

01

ASK

Ask a question

02

EXPLORE

Investigate

03

TRY

Try something

04

EXPLAIN

Tell us

CHOOSE A PROJECT THEME

01

SPACE

Be a Space Scientist

02

WEATHER & CLIMATE

Become a Weather Scientist

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Explore Forces and Motion

These questions are examples only. Pupils may choose any question within the suggested topic areas and are encouraged to explore their own ideas.

THEME 1 OF 9

SPACE

Be a Space Scientist

Space gives pupils a way to investigate gravity, light, motion, planets and exploration through questions that naturally spark curiosity.

1. How big is the Solar System?

Make a scale model of planet distances using a corridor, school yard or playing field.

3. What would I weigh on another planet?

Compare gravity on the Moon, Mars, Jupiter and other worlds, and explain why mass stays the same.

5. Why do we have seasons?

Use a globe or tilted ball and a lamp to investigate how Earth's tilt changes the sunlight received during the year.

SUITABLE MATERIALS

Balloons, string, straws, torches, balls, modelling materials, measuring tapes, metre sticks and everyday craft materials.

2. How does a rocket fly?

Use a balloon rocket on a string to investigate action and reaction. Change the air or carried mass and compare the motion.

4. Why does the Moon change shape?

Use a ball and lamp or torch to model the Sun, Earth and Moon and reproduce the lunar phases.

6. Could we live on Mars?

Investigate temperature, atmosphere, water, radiation and gravity, then design a simple Mars-base solution.

PROJECT FOCUS

Choose one space question and show one thing you can model, measure, calculate or demonstrate.

THEME 2 OF 9

WEATHER & CLIMATE

Become a Weather Scientist

Weather and climate let pupils investigate heat, light, air, water and energy using phenomena they experience every day.

1. Which surfaces get hottest in sunlight?

Compare light and dark surfaces under sunlight or a lamp. Measure temperature over time and graph the results.

3. Can we make our own weather station?

Construct a rain gauge, wind vane or simple anemometer and collect measurements over several days.

5. What is the greenhouse effect?

Use a simple model to explore incoming sunlight, outgoing heat and how the atmosphere influences Earth's temperature.

SUITABLE MATERIALS

Thermometers, plastic containers, lamps, dark and light materials, bottles, balloons, measuring cylinders and simple weather instruments.

2. How are clouds formed?

Make a simple cloud model and investigate the role of cooling and condensation.

4. What makes air move?

Investigate convection using warm and cool air and connect the result with winds and atmospheric circulation.

6. Can we predict tomorrow's weather?

Record temperature, rainfall, wind, pressure or cloud cover, make a prediction and compare it with what happens.

PROJECT FOCUS

Focus on one physical process. A clear small investigation is better than trying to explain the whole climate system.

ROBOTS & MACHINES

Discover How Things Work

Pupils do not need to build a robot. The goal is to uncover one simple piece of physics that a machine or robot could use.

1. Can you lift something heavy using one finger?

Build a lever and test how changing the pivot position changes the force needed.

3. Can magnets make something move without touching it?

Guide an object through a small obstacle course using magnets without direct contact.

5. Can you make a simple electric motor?

With suitable equipment and supervision, investigate how electricity and magnetism can produce movement.

SUITABLE MATERIALS

Cardboard, wheels, toy construction sets, magnets, string, pulleys, balloons, straws, skewers, elastic bands and low-voltage electrical equipment.

2. Can a pulley make lifting easier?

Construct a simple pulley system and compare different arrangements.

4. How do gears change movement?

Use construction toys or cardboard gears to compare speed, direction and turning force.

6. Build a simple moving machine

Make a balloon-powered car or simple vehicle and test what changes make it travel farther or faster.

PROJECT FOCUS

Finish by explaining what piece of physics your machine uses and why it works.

PLANET EARTH

Investigate Our Amazing Planet

Planet Earth introduces pupils to earthquakes, magnetism, density, waves and the structure of the world beneath our feet.

1. Can you build an earthquake-proof building?

Build towers from simple materials, place them on a shake table and compare which designs survive best.

3. Why do some things float?

Test different materials and shapes, then discuss why large ships can float even when made from dense materials.

5. What is inside the Earth?

Make a layered model of the crust, mantle and core and explain how scientists know the layers exist.

SUITABLE MATERIALS

Magnets, compasses, springs, ropes, water containers, modelling clay, straws, spaghetti, card, building blocks and household craft materials.

2. How can an earthquake tell us what is underground?

Explore waves with springs or ropes and connect them with how seismic waves reveal Earth's interior.

4. Can you make a compass?

Magnetise a needle and allow it to rotate freely. Investigate how it responds to Earth's magnetic field.

6. Why do volcanoes erupt?

Use a safe model to investigate pressure and gases and relate it to pressure building below Earth's surface.

PROJECT FOCUS

Reveal something happening on or inside Earth that we cannot normally see directly.

ELECTRICITY & ENERGY AROUND US

Power Up Your Investigation

Electricity and energy are everywhere - in lights, toys, batteries, motors and the devices we use every day. Pupils can explore them safely using simple low-voltage circuits.

1. Which materials conduct electricity?

Build a simple tester and compare metals, plastics, graphite, foil and other classroom materials.

3. What makes a bulb or LED brighter?

Compare simple circuit arrangements and test how the number of cells or components changes the result.

5. Can we generate electricity?

Use a hand-crank generator, small motor or suitable kit to investigate how movement can produce electrical energy.

2. Can you make a switch?

Design a simple switch from card, paper clips or foil and use it to control a low-voltage circuit.

4. Where does energy go?

Follow the energy changes in a torch, toy car, fan or small motor - from stored energy to light, movement, sound or heat.

6. Which energy source would you choose?

Compare simple renewable-energy ideas such as solar, wind or water power and explain where each might work best.

SUITABLE MATERIALS

Cells or battery holders, wires, crocodile clips, bulbs or LEDs with suitable resistors, foil, paper clips, buzzers, small motors and classroom circuit kits.

PROJECT FOCUS

Use only low-voltage classroom equipment. Never connect a pupil experiment directly to mains electricity.

LIGHT & COLOUR

See Physics in a New Way

Light can reflect, bend, spread, form shadows and split into colours. Many investigations need only a torch, mirror, water and simple materials.

1. How does a mirror change the path of light?

Shine a narrow beam at a mirror and compare the incoming and reflected directions.

3. Can white light be split into colours?

Use a prism, diffraction glasses or water to look for a spectrum and explain what you observe.

5. Can you build a periscope?

Use two mirrors to redirect light and explain how the image reaches your eyes.

2. Why do shadows change size?

Move a torch, object and screen to investigate how distance changes the size and sharpness of a shadow.

4. What happens when coloured light or filters mix?

Use coloured filters or transparent materials to investigate which colours pass through and which are absorbed.

6. Which surfaces reflect light best?

Compare shiny, dull, light and dark materials using the same light source and a simple fair test.

SUITABLE MATERIALS

Torches, mirrors, card, white paper, transparent coloured film, prisms or diffraction glasses, water containers, rulers and simple screens.

PROJECT FOCUS

Encourage pupils to draw ray paths or photograph the setup so they can explain what the light did.

SOUND & WAVES

Make, Measure and Explore Sound

Sound begins with vibrations and travels as a wave. Pupils can make those vibrations visible or compare how pitch, volume and materials affect what they hear.

1. What changes the pitch of a sound?

Vibrate rulers, strings or elastic bands and change their length or tension. Compare the pitch.

3. Can you see a vibration?

Use rice, paper or another light material on a vibrating surface to show that sound starts with movement.

5. How do waves move?

Use a rope, spring or slinky to make pulses and waves and compare different kinds of motion.

2. Can sound travel through a string?

Build a cup-and-string telephone and test different lengths, tensions or string materials.

4. Which materials block sound best?

Wrap or surround a sound source with different materials and compare how much the sound is reduced.

6. Can bottles make a musical scale?

Change the water level in bottles and investigate how the amount of air or water changes the sound.

SUITABLE MATERIALS

Rulers, elastic bands, string, cups, bottles, water, springs or slinkies, rice, simple sound sources and safe classroom materials for insulation tests.

PROJECT FOCUS

The key idea is vibration: show what is vibrating and how changing it changes the sound or wave.

MAGNETISM & FORCES AT A DISTANCE

Move Things Without Touching

Some forces can act without objects touching. Magnets, gravity and static electricity give pupils dramatic ways to investigate invisible interactions.

1. Which materials are magnetic?

Test a range of everyday objects and sort them by whether a magnet attracts them.

3. Can you make a floating or balancing magnet?

Explore attraction and repulsion using magnets arranged in different orientations.

5. Can static electricity move something?

Charge a balloon or plastic object by rubbing and test its effect on paper, hair or a thin stream of water.

2. How far can a magnet still pull?

Measure how magnetic attraction changes as the distance between a magnet and an object increases.

4. Can you make a compass?

Magnetise a needle and investigate why it settles in a particular direction.

6. How does gravity act at a distance?

Compare falling objects or model orbits to discuss how gravity pulls without direct contact.

SUITABLE MATERIALS

Bar or disc magnets, paper clips, mixed classroom objects, thread, balloons, plastic rods or rulers, tissue paper, compasses and rulers for distance measurements.

PROJECT FOCUS

Ask pupils to predict attraction, repulsion or movement before each test, then use the evidence to explain the invisible force.

PUSH, PULL & GO!

Explore Forces and Motion

Every moving object has a story of pushes, pulls, friction, gravity and resistance. This theme is ideal for practical tests and fair comparisons.

1. Which surface has the most friction? Pull or roll the same object across different surfaces and compare the force needed or distance travelled.	2. Does a steeper ramp make an object go farther? Change the ramp height while keeping the vehicle and surface the same, then measure the distance.
3. Can you make a balloon-powered car? Build a simple vehicle and test how wheel size, mass or balloon size affects its motion.	4. What makes a paper helicopter fall slowly? Change one feature at a time - blade length, paper size or added mass - and compare fall times.
5. How does mass affect movement? Push or pull objects with different masses using the same method and compare how easily they speed up or stop.	6. Can you reduce air resistance? Compare shapes moving through air and investigate why streamlined shapes are useful in vehicles and sport.
SUITABLE MATERIALS Toy cars, ramps, books, rulers, tape measures, cardboard, balloons, straws, paper, stopwatches, string, elastic bands and surfaces with different textures.	PROJECT FOCUS Change one thing at a time, measure what happens and make the test as fair as possible.

WHAT SHOULD PUPILS PRESENT?

The finished project does not need to be elaborate. Each pupil or team should be able to take the audience through five simple parts:

01 OUR QUESTION What did we want to find out?	02 WHAT WE DID What did we investigate, build, observe or measure?	03 WHAT HAPPENED Show the experiment, model, measurements, photographs, graphs or results.
04 PHYSICS Explain the idea in your own words.	05 SURPRISE Share the most interesting thing you learned.	