Year 5: Physical Science: Forces (Balanced and Unbalanced Forces) Unit 2

Scientific Model (KS2):

Use arrow of different lengths to represent balanced and unbalanced forces when discussing the impact this has on the movement of objects.

Scientific Investigations:

- Researching Using Secondary Sources
- Comparative and Fair Testing

Scientists:

- Isaac Newton- developed his theory of gravity when he saw an apple fall to the ground from an apple tree.

Scientific Skills Taught:

ASK
- To ask different kinds of questions
- To identify appropriate secondary sources to research ideas and ask questions
- To make predictions based on evidence

BREAKDOWN
- To recognise and control variables in tests
- To plan different enquiries to answer questions
- To recognise when to use comparative and fair tests
- To plan when to take repeat readings

CAPTURE
- To choose and use a range of equipment precisely
- To decide how to record data
- To create classification keys
- To decide what observations and measurements to make

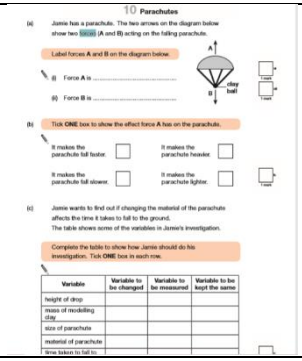
DESCRIBE
- To use evidence from enquiry to support or refute ideas being tested
- To use varied ways to present data
- To explain how scientific ideas develop over time
- To identify and comment, using appropriate language, on patterns they notice
- To use relevant scientific language and illustrations in reports and when drawing conclusions

Prior Learning:

Compare how things move on different surfaces. (Y3 - Forces and magnets)
• Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets) • Observe how magnets attract or repel each other and attract some materials and not others. (Y3 - Forces and magnets)
• Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 - Forces and magnets)
• Describe magnets as having two poles. (Y3 - Forces and magnets)
• Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 - Forces and magnets)

Curriculum	Learning Intention	Knowledge and Key Vocabulary
Making links to learning and discuss the model (if needed)	What is a force? • Sort vocabulary and pictures/diagrams showing contact and non-contact forces in action • Explore the use of a force meter	**Knowledge:** • Explain a force is a push or a pull that causes an object to move or change • Explain opposite poles attract • Explain matching poles repel

		• Explain a magnetic force does not require contact between objects • Know friction is created when two surfaces slide against each other **Vocabulary:** Pull, push, repel, attract, magnetic, non-magnetic, contact, distance, friction
Knowledge and skills through investigations Pupils should be taught to: 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. Notes and guidance (non-statutory) Pupils should explore falling objects and raise questions about the effects of air resistance. They should explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. They should experience forces that make things begin to move, get faster or slow down. Pupils should explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel. Pupils should explore the effects of levers, pulleys and simple machines on movement. Pupils might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation. Pupils might work scientifically by: exploring falling paper cones or cup-cake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective. They might explore resistance in water by making and testing boats of different shapes. They might design and make products that use levers, pulleys, gears and/or springs and explore their effects.	Why does an unsupported object fall towards Earth? • Describe forces in a variety of images • Use an arrow model to show the direction of gravity and resistance forces • Identify whether forces are balanced or unbalanced What affects the speed at which objects fall to Earth? • Investigate how long it takes different objects to fall to the ground • Explain the difference between weight and mass How can we change the speed that an object moves through the air? • Design and test a parachute, choosing a variable to test. How does water effect the rate at which an object falls? • Investigate the movement of objects through water • Compare the rate at which objects travel through water and air Which shapes will move more easily through water? • Investigate the speed at which different shapes travel to the bottom of a large container of water. • Investigate the speed of different shaped tin foil boats moving through water. • Explain why streamlined shapes move more easily through water.	**Knowledge:** • Know gravity is a pulling force exerted by the earth • Know gravity force (weight) is measured in newtons (N) • Know mass is how much matter something is made up of and is measured in kilograms (kg) • Explain a balanced force • Explain an unbalanced force is where two opposing forces are unequal. • Explain the impact being streamline has on movement **Vocabulary:** Gravity; gravitational force; friction; force; thrust; upthrust; air resistance; water resistance; push; pull; stationary; contact force; non-contact force; buoyancy; zero gravity; motion; unsupported force; supported force; levers; pulleys; gears; springs; fulcrum/pivot; hinge; motion; particle; surface area; Mass (g & kg); Balance; weight

Application and Assessment Activity	

10 Parachutes

(a) Jamie has a parachute. The two arrows on the diagram below show two forces (A and B) acting on the falling parachute.

Label forces **A** and **B** on the diagram below.

(i) Force **A** is .....

(ii) Force **B** is .....

(b) Tick **ONE** box to show the effect force **A** has on the parachute.

It makes the parachute fall faster. ☐	It makes the parachute heavier. ☐
It makes the parachute fall slower. ☐	It makes the parachute lighter. ☐

(c) Jamie wants to find out if changing the material of the parachute affects the time it takes to fall to the ground.
The table shows some of the variables in Jamie's investigation.

Complete the table to show how Jamie should do his investigation. Tick **ONE** box in each row.

Variable	Variable to be changed	Variable to be measured	Variable to be kept the same
height of drop			
mass of modelling clay			
size of parachute			
material of parachute			
time taken to fall to			

Thinking Deeper:

How would our world look and work if the strength of the Earth's gravitation pull changed?

Links to other subjects:

- Subject Specific links – Maths – shape, measures
- Personal Development – working cooperatively within a team
- SMSC – social, ability to discuss and debate predictions, findings, methods
- Cultural Capital – develop an understanding of how things work and move and an appreciation of the significance of when parachutes were used in WW11
- Careers – designers of vehicles (boats, aeroplanes, cars etc)
- British Values – laws linked to moving objects/speed etc
- Equality – linked to careers- equal opportunities of people working in design and engineering roles