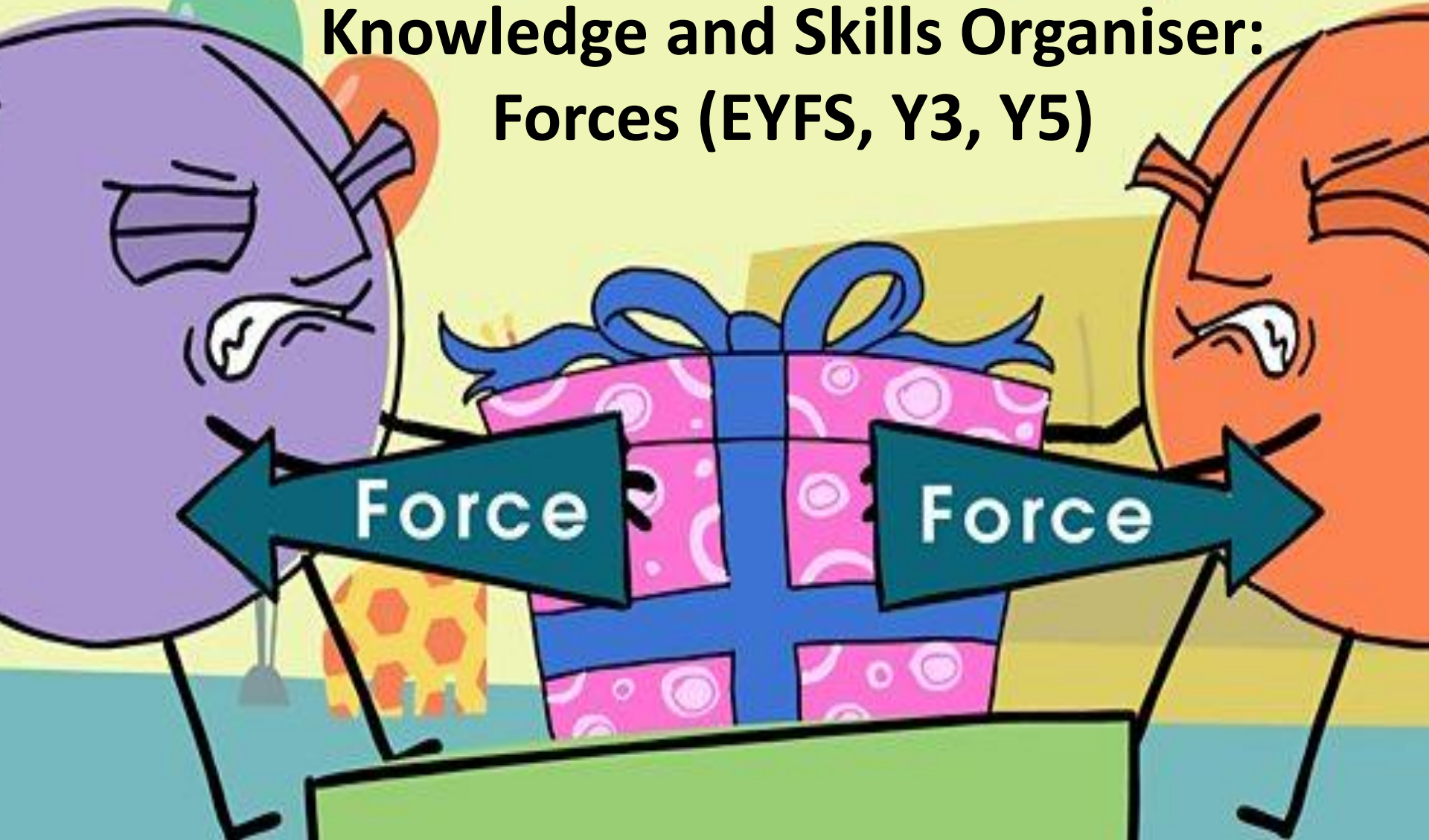


Science

Knowledge and Skills Organiser: Forces (EYFS, Y3, Y5)



Our Science Knowledge and Skills organisers are primarily a planning guide for the teachers. They include the statutory statements (**Subject Knowledge to be covered**) and the non statutory guidance (in blue). They offer suggestions (in red) for how these statements might be taught **working scientifically** – which is a requirement of the National Curriculum.

The Knowledge and Skills Organisers map out how and when these areas are taught and help to build a clear, progressive scientific statement of intent for our children as they progress through the school.

We have added additional ideas and guidance for the teachers, which they can choose to use and interpret i.e. how the local area might be used, key questions and ideas which might be pursued, outdoor learning opportunities and cross curricular links as these are features we recognise are important in terms of our holistic curriculum provision.

Parental/ carer support:

By mapping out our curriculum in this way we hope that these documents also help parents and carers support the learning of their child/ren by

- Showing the knowledge being covered
- Offering some suggestions which might also be investigated at home
- Sharing key vocabulary, which can be discussed to ensure your child's understanding
- Suggestions of places to visit

EYFS

Nursery

Development Matters Ages and Stages to be covered:

3-4 Year olds:

- Talk about what they see, using a wide vocabulary.
- Explore and talk about different forces they can feel.

• Characteristics of Effective Learning to be covered

- *Creating and Thinking Critically thinking*
- **Having their own ideas**
 - Thinking of ideas
 - Finding ways to solve problems
 - Finding new ways to do things
- **Making links**
 - Making links and noticing patterns in their experience
 - Making predictions
 - Testing their ideas
 - Developing ideas of grouping, sequences, cause and effect
- **Choosing ways to do things**
 - Planning, making decisions about how to approach a task, solve a problem and reach a goal
 - Checking how well their activities are going
 - Changing strategy as needed
 - Reviewing how well the approach worked

Reception

Development Matters Ages and Stages to be covered:

- Recognise some environments that are different from the one in which they live. Understand the effect of changing seasons on the natural world around them.

Early learning goals:

- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

• Characteristics of Effective Learning to be covered

- *Creating and Thinking Critically thinking*
- **Having their own ideas**
 - Thinking of ideas
 - Finding ways to solve problems
 - Finding new ways to do things
- **Making links**
 - Making links and noticing patterns in their experience
 - Making predictions
 - Testing their ideas
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Science skills (**Working Scientifically**) to be covered

- asking relevant questions and using different types of scientific enquiries to answer them
- **setting up simple practical enquiries, comparative and fair tests e.g**
- **making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers – e.g and carrying out tests to find out how far things move on different surfaces, and gathering and recording data to find answers to their questions; exploring the strengths of different magnets and finding a fair way to compare them; sorting materials into those that are magnetic and those that are not; looking for patterns in the way that magnets behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another; identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets**
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- **identifying differences, similarities or changes related to simple scientific ideas and processes e.g comparing how different things move and grouping them – magnetic, not magnetic. Why?**
- using straightforward scientific evidence to answer questions or to support their findings.

Subject Knowledge to be covered:

compare how things move on different surfaces

notice that some forces need contact between 2 objects, but magnetic forces can act at a distance (ie the children should observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing)).

observe how magnets attract or repel each other and attract some materials and not others ie They should explore the behaviour and everyday uses of different magnets (for example, bar, ring, button and horseshoe).

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

describe magnets as having 2 poles
predict whether 2 magnets will attract or repel each other, depending on which poles are facing

Outdoor Learning:

Find magnet materials in the outdoor environment.

Explore different outdoor surfaces and how they affect the movement of objects

Year 3 – Forces and Magnets

Key Vocabulary for topic

Force, push, pull, twist, magnet, strength, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole.

Resources Phizzi boxes with investigation booklet. Please keep all these together and replace anything used.

Force meters, box of resources

Magnets

Ramps and cars

Possible Questions

What is a force? Can you see a force? Can you think of forces in everyday life?

How does the surface affect how an object moves?

(Which surface would be best for chariot racing?)

Which materials are magnetic?

Why are magnets useful?

Explore the way magnets behave in relation to each other.

Explore how magnets work at distance. Eg through the table, in water, jumping paper clips

Which magnet is strongest?

Cross -Curricular links

History – Link to chariot racing

DT Make magnetic games (fishing, Racing cars, Chariot race arena)

History/ICT – uses of magnets time line (medical etc)

Science skills (Working Scientifically) to be covered

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary -They should explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall.
- E.g exploring falling paper cones or cupcake 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.
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments

Outdoor Learning:

Using the banks and different outdoor surfaces to investigate how far cars, balls roll.

Possible Local Links

STEM Discovery Centre
Stevenage – forces show and interactive activities

Key Vocabulary for topic

Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears.

Resources Phizzi boxes with investigation booklet. Please keep all these together and replace anything used.

Force meters, box of resources
Magnets
Ramps and cars
Use BBC programs

Year 5 – Forces Topic:

Possible Questions

What is a force and what are some different forces?
What are the effects of a force?
Investigate gravity, air resistance, water resistance and friction.eg
Which parachute is best and why? Why does the parachute slow down an object's descent? What design of rocket is best?
How does the shape of the hull affect the boat travelling through water?
Investigate friction in a range of contexts eg trainers, bathmats, mats for helter-skelter.
'How could you....?' questions to explore levers, pulley and gears.
Design and make a product that involves a lever, pulley or gears.

Subject Knowledge to be covered:

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 –ie Pupils should explore falling objects and raise questions about the effects of air resistance. They should experience forces that make things begin to move, get faster or slow down

recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect ie. - 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.

Cross -Curricular links

DT – making mechanisms with pulley, levers or gears
Could be based on the lighthouse keepers lunch
Tomato Challenge-

<https://globaldimension.org.uk/resource/the-squashed-tomato-challenge/>
STEM Squashed tomato challenge
www.practicalaction/education/squashedtomatochallenge

History -/Literacy biography famous historical scientist - Issac Newton, Herschel, Galileo

Maths – statistics - interpreting and analysing data – types of graphs.

Measurements and speed

Science – link to space topic – rockets, parachutes