Year 5: Forces

SCIENTIFIC CONTEXT: Physics

KEY VOCABULARY:

Force	Friction	Earth
Newton	Mechanism	Gravity
Air resistance	Force meter	Mass
Upthrust	Moving surface	Weight

Key Questions

1) What is Gravity?

2) What is friction?

3) How do gears, pulleys and levers work?

As Scientists we will:

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.

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.

Notable Scientist: Galileo Galilei and Isaac Newton

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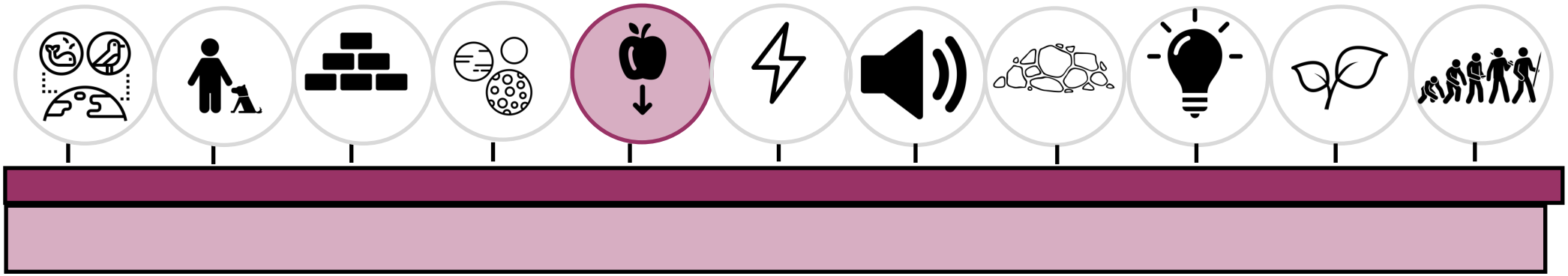

What I need to know?

Gravity is a force of attraction that pulls everything in the Universe together. Everything that exists has a gravitational pull. The size of this gravitational pull depends on the object's mass. In a vacuum, objects of different mass fall at the same rate. This is because the sole force that is acting upon them is gravity. We only notice gravity from extremely large objects, such as the Earth or other planets, which cause objects to accelerate towards their centre. The gravitational field is the area around an object where the force of gravity can be felt.

Weight is the force of gravity acting on an object. On Earth, gravity causes objects to accelerate at approximately 10N/kg. Each kilogram of mass has a weight, or force, of around 10N. Mass is a measure of the amount of matter inside an object. It is unchanging. Weight, on the other hand, depends on the force of gravity experienced. In space, gravity is extremely low, so a body becomes weightless but

Opportunities for Science Capital

Fantastic Forces workshop at We The Curious.

Assessment:

identify and explain the different forces acting on objects; • explain Newton's role in discovering gravity; • accurately measure an object's weight and mass; • explain how to increase the effects of air resistance; • explain Galileo's 'Tower of Pisa' experiment into gravity and air resistance; • identify streamlined shapes; • explain how friction is used in brake pads; • investigate the effects of friction; • explain how different mechanisms work; • design their own mechanism to achieve a given purpose; • identify the variables in an investigation; • make observations and conclusions; • be able to answer questions based on their learning.

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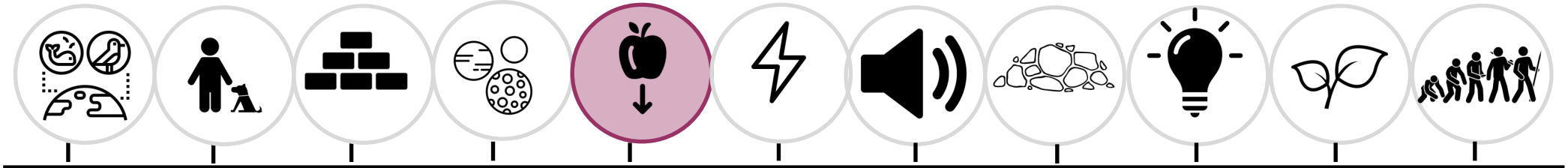

Gravity

Starter

KWL grid

- Drop a few items on the floor. Ask the children to describe what they see and explain, if they can, why it's happening.

Ask the children to explain why we remain on the Earth's surface and do not float out into space. It is likely that the children will have heard the term gravity and will know that it pulls us down. Listen to other explanations and help the children to explore any misconceptions, but do not elaborate at this point on where precisely gravity is pulling.

Main

https://www.tigtagworld.co.uk/mindmap/#/lessons/CLASS00298/activities/main

Spring Scales: https://www.tigtagworld.co.uk/mindmap/#/lessons/CLASS00298/activities/practical/ACTVTY00419

Practical: https://www.tigtagworld.co.uk/mindmap/#/lessons/CLASS00298/activities/practical/ACTVTY00420

Plenary

What if there was no gravity?

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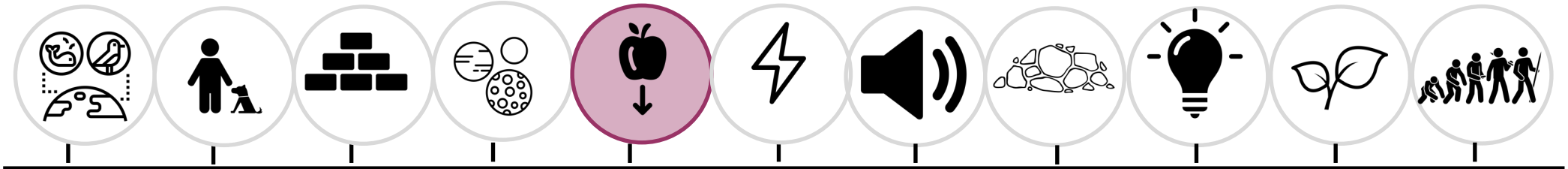

Friction

Starter

RECAP

- Ask the children to name some forces. They may simply mention push/pull or other forces (magnetism, gravity, perhaps electrostatic) mentioned in the previous lesson, but some may mention friction. Give credit for all the answers given.
- Ask the children to rub their hands together.
- Explain to the children that the heat between their palms is coming from the force of friction, which occurs whenever two surfaces rub together. Friction always acts in the opposite direction to movement or intended movement, so for each hand it pushes back as the hand moves forward, and vice versa.

Ask the children to try rubbing their hands on different surfaces. What do they notice about the friction produced? *It varies with the surface. Some surfaces create less friction than others.*

Main

https://www.tigtagworld.co.uk/mindmap/#/lessons/CLASS00296/activities/main

Practical: https://www.tigtagworld.co.uk/mindmap/#/lessons/CLASS00296/activities/practical/ACTVTY00410

Plenary

Odd one out- sleek designs

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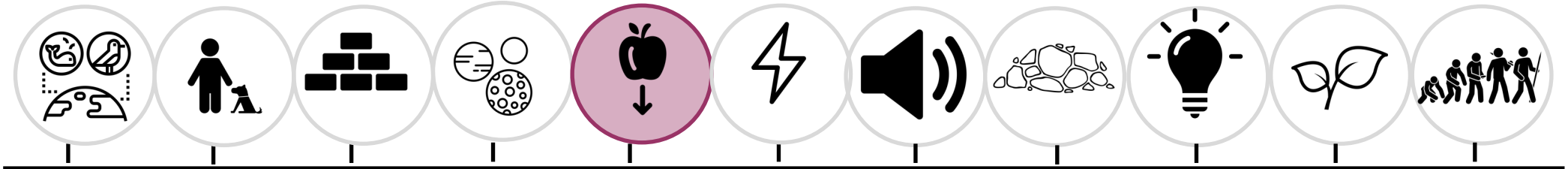

Gears, levers and pulleys

Starter

RECAP

- Organise the children into groups of four or five. Give each group a sheet of paper and pencils/ pens.
- Ask the groups to think about different machines that make their lives easier but don't use electricity. Ask them to write down or draw their ideas. Give the groups around 5 minutes to complete this task.

Write the heading "Simple mechanical machine" on the whiteboard. Ask the groups to share their ideas about machines with the rest of the class and write each of them on the whiteboard.

Main

https://www.tigtagworld.co.uk/mindmap/#/lessons/CLASS00300/activities/main

Practical: levers https://www.tigtagworld.co.uk/mindmap/#/lessons/CLASS00300/activities/practical/ACTVTY00416

Plenary

Odd one out- best foot forward

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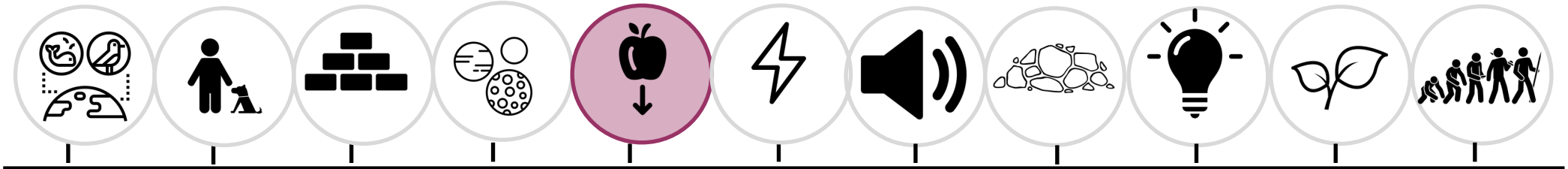

Assessment

Potential Enquiries

Comparative & fair testing: paper planes, zipline, cup-cake parachutes, dropping shapes in water, bouncy balls, o-wing (new), wind power vehicles (new)

Main

Rotation of different activities as assessment.

https://pstt.org.uk/application/files/7816/1166/3537/EEE_-_Forces.pdf