THIRD AND FOURTH – FORCES

Teacher Guidelines:

- Pp. 107-116
- Exemplar 2: A unit of work based on forces p 38
- Exemplar 31 page 109

Linkage:

- Living Things - Myself
- Materials - Properties and characteristics of materials

Integration:

- Language Development – English and Gaeilge
- Geography – Transport, water, weather and wind
- History – Transport
- Maths – measurement/sorting
- Visual arts
- SPHE
- PE

Content Objective:

EXPLORE HOW OBJECTS MAY BE MOVED

by pushing and pulling, by twisting and stretching, by machines (e.g. rollers, wheels, pulleys), *design and make a pulley system to help a Norman builder to carry stone*, *to the top of a castle*

Some suggested activities:

- Identify machines that are used for pushing and pulling/moving things – identify parts that help the movement.
- Taking a variety of objects in the classroom – what force do they need to move them – use elastic band and then force metre to measure the force.
- Using rollers carry out the same activity as above
- Using wheels carry out the same activity as above
- Identify the parts of wheels – observe a bicycle closely – hub, axle, spokes, rim, tyre, tube and the role they play in the wheel.
- Roller blade/skate board wheels – bearings easing the movement
- See exemplar 33 pages 114 □ 115 Wheels, gears, chains and belts
- See exemplar 46 pages 138 □ 139

Some suggested investigations:

- How can I move an object (e.g. 500gr bag of pebbles) – which method uses least force?

Some suggested design and make:

- A pulley system to help Norman builder carry stone to top of castle – using a bag of pebbles to demonstrate
- A Norman castle gate or draw bridge
- A vehicle to move a set load (e.g. 500gr of pebbles or bag of sugar)

Content Objective:

HOW SOME MOVING OBJECTS MAY BE SLOWED DOWN

a bicycle wheel by a brake, a falling object by a parachute, *design and make a parachute to help transport a small object (e.g. marble, square of chocolate, matchbox)*

Some suggested activities:

- Identify different ways to slow moving objects down – friction – links with ramp investigation.
- Pulling block over different surfaces – measure with force metre
- Look at different types of brakes: school bus – air brakes, Motorcar – Kevlar brake pads, Bicycle – rubber brakes. (How does a ship slow down?)
- Look at how a bicycle brake works (also levers and cables)

Some suggested investigations:

- Investigate the parachute:
    - Does the material in the canopy affect the parachute?
    - Does the length of chord affect the parachute?
    - Does the height affect the parachute?
    - Does a hole in centre affect the parachute, what is the biggest hole I can make before it is ineffective?
    - How can I make my parachute fall even slower?

Some suggested design and make:

- A parachute to transport a small object

Content Objective:

EXPLORE THE EFFECT OF FRICTION ON MOVEMENT THROUGH EXPERIMENTING WITH TOYS AND OBJECTS ON VARIOUS SURFACES

Tiled surface, carpet, concrete, and grass, table-top.

Some suggested activities:

- Taking a variety of objects in classroom - Do they require more force to move them – elastic band and then force metre? Pulling a block on different surfaces? Which is easier/requires less force? What is slowing it down?
- Test the children's running shoes on different surfaces in school
- When do we want to increase friction/reduce friction – Brakes Vs Wheels
- Rubbing hands – Friction produces heat (lighting fire rubbing sticks)
- Moving things through water – which item moves easier?

Some suggested investigations:

- Ramp investigation:(using toy Car or the Land Yacht or a vehicle the children have designed them selves)
- Does the run-off surface make a difference?
- Do heights/inclines make a difference?
- Different weight in land yacht
- Does wheel size make a difference?
- Does sail size make a difference?

Some suggested design and make:

- A wheeled vehicle and a braking system

Content Objective:

INVESTIGATE FALLING OBJECTS

Some suggested activities:

- Observe a variety of falling objects; predict which will hit the ground first. How will I make the test fair? Keep height etc the same. Introducing the word GRAVITY
- Do all objects fall at same rate – be aware of AIR RESISTENCE – recall Parachute Investigation – What factors slowed down the falling object.
- See Falling Objects Teacher Guidelines p 111

Some suggested investigations:

- Do all objects fall at same rate?
- How can I make an object slow down/ speed up?
- Same parachute with different weights

Some suggested design and make:

- See parachute activity

Content Objective

EXPLORE HOW LEVERS MAY BE USED TO HELP LIFT DIFFERENT OBJECTS

Design and make safe see-saws

Some suggested activities:

- Identify machines and tools that use levers – door handle, hinges, hammer handle (*all handles!*), see – saw, wheel barrow, crow-bar, shovel handle. (Levers reduce the work required)
- Making simple levers using a ruler and pivot
- Opening the classroom door at different distances from hinges – whole body weight required at hinge – finger used at door edge.
- See exemplar 34 Teacher Guidelines p116 LEVERS

Some suggested investigations:

- Can I balance two different weights on my see-saw?
- What changes can I make to my wheelbarrow to reduce the force to lift a set mass (500gr of pebbles)? Using the wheel barrow to carry different weights and force metre and/or elastic band does the handle length make a difference?

Content Objective

INVESTIGATE THE PUSHING FORCE OF WATER

Compare floating and sinking in fresh and salty water

Design and make a boat or raft using an increasing variety of materials, tools and craft-handling skills

Some suggested activities:

- Identify objects that float and sink
- What objects do we want to float and sink – e.g. ship and anchor
- Pushing different objects into water, observe how the upthrust forces the object to the surface – what happens to the water level as you push down on the object?
- Observe what happens to water level in a glass as a film canister is filled with pebbles one at a time.
- Group objects as sinkers, low floaters and high floaters
- What factors determine the above?
- Look at submarines, boats, ships etc
- Observe an egg in a glass of fresh water and salty water (you need lots of salt for this to

work!). Why does this happen? Fresh water barges need a great surface area to float than a sea going vessel. Ships can't carry same load in fresh water as in sea water.

Some suggested investigations:

- Can I make different materials float? Does metal float?
- How many marbles can my boat/craft carry?
- Test your boat in fresh water and salty water – mark the water line (Plimsoll line – markings on ship – overloading craft)

- **Some suggested design and make:**
  Boats, rafts and floating containers
- Cartesian diver