

Science – Push & Pull Unit of Work

Grade F/1/2

Summary

This unit of work focuses on learning about different pushes and pulls and how students can identify these within different contexts. Students experience an Introduction to Pushes and Pulls, Forces on Land and Water, Toys and Motion, Machines and Sinking and Floating.

Australian Curriculum Links

ENGLISH

F: Share feelings and thoughts about the events and characters in texts, Identify some familiar texts and the contexts in which they are used, Explore the different contribution of words and images to meaning in stories and informative texts.

<http://ausvels.vcaa.vic.edu.au/Foundationlevel?layout=1&d=E>

1: Discuss characters and events in a range of literary texts and share personal responses to these texts, making connections with students' own experiences, Use comprehension strategies to build literal and inferred meaning about key events, ideas and information in texts that they listen to, view and read by drawing on growing knowledge of context, text structures and language features.

<http://ausvels.vcaa.vic.edu.au/Level1?layout=1&d=E>

2: Use comprehension strategies to build literal and inferred meaning and begin to analyse texts by drawing on growing knowledge of context, language and visual features and print and multimodal text structures, Listen for specific purposes and information, including instructions, and extend students' own and others' ideas in discussions.

<http://ausvels.vcaa.vic.edu.au/Level2?layout=1&d=E>

SCIENCE

F: The way objects move depends on a variety of factors, including their size and shape, Respond to questions about familiar objects and events, Engage in discussions about observations and use methods such as drawing to represent ideas.

<http://ausvels.vcaa.vic.edu.au/Foundationlevel?layout=1&d=S>

1: Respond to and pose questions, and make predictions about familiar objects and events, Participate in different types of guided investigations to explore and answer questions, such as manipulating materials, testing ideas, and accessing information sources.

<http://ausvels.vcaa.vic.edu.au/Level1?layout=1&d=S>

2: A push or a pull affects how an object moves or changes shape, Respond to and pose questions, and make predictions about familiar objects and events.

<http://ausvels.vcaa.vic.edu.au/Level2?layout=1&d=S>

INTERPERSONAL DEVELOPMENT

F: With teacher support, students begin to identify and develop the skills required to work together in a group, including taking turns, and sharing and caring for equipment and resources. Through supported reflection on their own experiences of working with a partner, in small group and whole-class situations, students share their thoughts on group collaboration and learn to describe and practice skills that contribute to the formation of positive relationships, and explain why these skills are desirable.

<http://ausvels.vcaa.vic.edu.au/Foundationlevel?layout=1&d=id>

1: Students learn to work in teams to complete structured activities within a set timeframe (the teacher may select the teams and allocate roles and responsibilities). Students learn to stay on task and share resources fairly. In response to questions and prompts, they learn to reflect on the team's challenges and successes and their contribution to the team's effectiveness.

<http://ausvels.vcaa.vic.edu.au/Level1?layout=1&d=id>

2: Students learn to work in teams to complete structured activities within a set timeframe (the teacher may select the teams and allocate roles and responsibilities). Students learn to stay on task and share resources fairly. In response to questions and prompts, they learn to reflect on the team's challenges and successes and their contribution to the team's effectiveness.

<http://ausvels.vcaa.vic.edu.au/Level2?layout=1&d=id>

DESIGN, CREATIVITY & TECHNOLOGY

F: Students independently, or in collaboration with peers or adults, explore the use of common materials such as paper, cardboard, glue, fabric, wood, soil and plants, plastic containers, string, paddle-pop sticks and food ingredients. They develop skills in the safe use of basic tools and equipment, such as safety scissors, mixing bowls, cups and rulers, to cut, join, shape, mix and follow instructions to construct simple products or models based on their design ideas.

<http://ausvels.vcaa.vic.edu.au/Foundationlevel?layout=1&d=dct>

1: In response to simple design briefs, students develop basic design ideas based on their experiences of working with materials/ingredients and components. They talk about their design ideas and thought processes and start to represent these visually by using models, pictures and words. They consider that more than one solution may be possible and begin to give reasons for changes in their thinking.

<http://ausvels.vcaa.vic.edu.au/Level1?layout=1&d=dct>

2: In response to simple design briefs, students develop basic design ideas based on their experiences of working with materials/ingredients and components. They talk about their design ideas and thought processes and start to represent these visually by using models, pictures and words. They consider that more than one solution may be possible and begin to give reasons for changes in their thinking.

<http://ausvels.vcaa.vic.edu.au/Level2?layout=1&d=dct>

Indicators of Success

Knowledge

What students will know...

- Changes in movement and shape are caused by pushes and pulls (forces)
- A large push or pull will make an object move further or faster than will a small push or pull
- How to identify the forces and motions
- How to identify different simple machines
- How to identify the different characteristics of the machinery based on their push or pull capabilities
- How to ask questions relating to different aspects of pushes and pulls
- How to identify the importance of pushes and pulls in toys, cars, machinery
- How to present learning in multiple forms
- How to participate in class discussions through multiple means

Discipline Based Skills

Students will be able to ...

- Explore and describe how pushes and pulls can make toys move
- Collect toys that move and classify them according to their type of movement
- With teacher assistance, use technology to assist in learning experiences

- Explore and describe how pushes and pulls can make things move and occur in everyday activities around the classroom, home and playground
- Use test arrows to demonstrate the direction of pushes and pulls
- Test and record with various materials and forms to observe and report on floating or sinking
- Identify ways to change an object that sinks into one that floats
- Investigate that the shapes of an object influences whether it will sink or float
- Describe their understanding of push, pull, floating or sinking
- Create force arrow diagrams to indicate push and pull forces
- Working in pairs, develop a plan with a drawing and some labels for making a floating device
- Identify and collect materials and resources that could be useful for making a floating device
- Develop a plan with a drawing and labels for making a floating device

Interdisciplinary Skills

Students will be able to ...

- Monitor and evaluate their involvement in all activities, based on teacher input and individual student reflection
- Use ICT to organise thoughts and ideas
- Socialise and behave appropriately in group and whole class situations
- Show their learning in different contexts
- Share knowledge with others
- Collaboratively work with others to achieve a common goal
- Exhibit critical thinking skills through effective feedback and thinking creatively

Unit of Work Sequence

Key Vocabulary for the Unit	
Push Pull Force Land Water Toys Machines Sinking Floating Towards Away from Right Left Amusement Park Treasure Hunt Balloon Experiment Parachute Experiment Toys Motion Local Mini Excursion Exploration Experiment Investigation Creation Simple Machines Invention Sinking	Week One Weekly Focus: Introduction to Pushes and Pulls Learning Intention: To learn about different pushes and pulls and how they are created with different materials and equipment. Success Criteria: Successful completion of tasks and participation in introductory activities. 1. Introduction to Pushes and Pulls This lesson will focus on introducing students to pushes and pulls in different environments. Have students brainstorm different pushes and pulls that they undertake in different environment (such as pulling a door, pushing a door, pulling a chair, etc.). Have students choose one choose one and create a poster to add to a class display. 2. Pushes and Pulls Identification Provide students with a selection of images to sort into pushes and pulls. Have students spilt into small groups and sort these into headings under Push and Pull. 3. Push and Pull Video Using www.youtube.com to show students different videos relating to pushes and pulls. Have students act out the demonstrations and have remaining students in the class guess what they are acting out. Introduce students to experimenting and predicting. Add to Key Vocabulary. Provide students with a range of materials to experiment with pushing and pulling. Record results on a Google doc (https://drive.google.com/#my-drive). This is for use as a class collection of results on the IWB.

Floating	4. Push, Pull, Roll Pushes and Pulls – Students bring in toys that have wheels to work on their pushes and pulls. Experimentation – Students will first play with their wheeled toy on a level area of floor in the classroom. Ask them to find a personal space to explore with their toy and pushes and pulls. Give students directions to follow that involve the key vocabulary and related language. Have students identify a push or a pull when their toys are moved in different directions. 5. Making things move! Revise knowledge on materials and equipment that move through pushes and pulls. Have a series of picture flash cards available for students to use to sort into push and pulls. Provide students with a Venn diagram to sort objects into push or pull. Introduce students to the middle section that relates to objects that involve both a push and a pull to move. Week Two Weekly Focus: Forces on Land and in Water Learning Intention: To learn about different forces that influence movement of objects on land and in water Success Criteria: Participation in class activities and ability to correctly identify objects that require different forces to move. 1. & 2. Fun with Forces To begin this activity, ask students to imagine they are at an amusement park. They’re watching people get on a ride and trying to decide whether they should get on it, too. It looks like a big round cage. People are standing along a round wall, facing towards the center. When the ride starts to spin, slowly one side tilts up into the air. It keeps tilting! Ask kids, “Do you think the people will fall out? What will happen?” Now introduce the concept of force. Ask, “Do you know what a force is?” (A force is a push or pull.) Then ask, “What happens when you are riding in a car and the driver brakes really hard?” (Answers will vary.) Explain that when they ride in a car, their body moves really fast with the car. Even though a driver may press on the brakes to make the car stop, their body doesn’t stop right away. It tries to keep moving in the same direction. The seat belt helps to stop them. Make a mini-bucket in front of the group—it takes no more than five minutes (see diagram on the Fun With Forces sheet). Then do a demo. Put a ball or a coin in the bucket and swing it in a small circle, so that the cup goes upside down like a loop-the-loop roller coaster. Swing it fast enough to keep the item from falling out. Ask students: “Why didn’t the ball fall out? What would happen if I swung the mini-bucket more slowly?” (Gravity would pull the item toward the ground). Ask kids, “Now that we tried it with a ball or coin, what do you think will happen with a ping pong ball or water?” 1. Divide your students into groups of two or more. 2. Give each group a set of materials — the Fun with Forces activity sheet, one cup, a ballpoint pen and a piece of string, as well as whatever items
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you've chosen to put in the cups.

3. Each group can do the activity on their own. Discuss observations and results as a class.

When the group comes back together, discuss together the questions posed on the student sheet: Why didn't the coin and water fall out when you whipped the cup around over your head? How is this similar to a loop-de-loop roller coaster? What outside is at work in this experiment and on roller coasters?

3. Forces Treasure Hunt
As a class, play the following game on the IWB, discussing the different forces listed and observed. Have student's problem solve using the instructions given by the game.
<http://www.sciencekids.co.nz/gamesactivities/forcesinaction.html>
Provide students with a template to complete a Forces Treasure Hunt around the classroom and the school. Have students check off each item as it is found.

4. Balloon Rocket Experiment - Forces
As a class, conduct the Balloon Rocket experiment with students. This focuses on the use of forces to move an object.

5. Parachute Experiment
As a class, conduct the Parachute Experiment. This experiment focuses on the use of weight to steer an object around the environment.

Week Three

Weekly Focus: Toys & Motion

Learning Intention: That there are many sorts of movement which can be described in many ways. To recognise hazards and risks to themselves in moving objects.

Success Criteria: Participation in class discussions and activities through effective questioning

1. Local Mini Excursion

Make a short visit to a local park with swings, slide etc. Before the visit, explain that we will be looking for examples of things that move both on the journey and while at the park. Ask the students what things we will need to consider both on the journey and in the park to keep ourselves safe. (If a visit is not appropriate due to weather or limited support then the same discussion to be held while looking at pictures and photographs of parks, playgrounds).

On return ask them to name the things they saw that moved. Get them to describe how the things moved - the direction in which they moved (up, down, forwards, backwards, around etc.) and the speed. Did they pass anything on the road that moved? Can the students think of other things that would move more quickly or more slowly than those already named? Did anything they saw move on its own? *Did the students recognise and describe a range of movement, understanding it as a change of direction as well as moving from place to place?* Use images to assist students to identify images in which the objects move fast or slow.

2. Exploration of Toys

Tell the students that this lesson we will be finding out more about forces by sharing our toys. Ask them to give you examples of 'forces' (pushes and pulls). Before beginning to share the toys ask students if they can say how toys might move. Sort the toys into groups according to the student's ideas. Make some labels together to label the sets when the toys are sorted - electricity, batteries, clockwork, moving air, pull, push.

Share the toys. Ask students to guess how they will move then ask the owners to demonstrate what they do and get the others to identify how they move. Were they right? Let students observe toys, such as spinners that need to be twisted or turned to make them work, or spinning tops where a pushing down and pulling up movement makes the toy spin.

Include a toy that has a spring - students should watch what you need to do to make the toy work, watch what happens and then discuss what happens to the spring. Ensure that students understand that twists and turns are a combination of pushes and pulls and those levers are used in many toys to make them move. Sort the toys into sets that match the labels made earlier in the lesson.

Divide the students into small groups and give each a clockwork toy. Explain that we are going to do an investigation to see which toy will move the furthest when the toy is fully wound. Which toy do they think will win? Ask them to put the toy at the start of the paper and fully wind it. They mark the paper with pencil at the point where the toy stops and then cut the paper to that point.

Bring the students back together as a class group and pin the paper onto the wall to make a simple bar graph or block graph with cubes, putting a label to the left of each strip in order to name the toy. Discuss if their prediction was right. Can they explain why the winner did go the furthest?

3. Who Sank the Boat?

Read the story 'Who Sank the Boat?' Discuss why the boat sank - would it have done so if the animals had not got in? Ask students if they know any toys with which they can play upon water. Do they know of any toys that use water to make things move? Share the toys, observe what they do and discuss how they work. Ask students if they have stood in the sea and felt the waves moving over their feet. How does it feel? Discuss the fact that water can push and pull so it is a force. It throws pebbles and shells up onto the beach and can drag them back. Have they felt the sand moving through their toes?

Explain that we are going to do a range of activities to find out more about different forces. Have the students predict what they think might happen when they use the materials and toys set out around the classroom. They are then going to use them and will need to observe carefully in order to report back to everyone else at the end of the lesson. Students to rotate around a series of activities involving water power, floating and sinking and magnets. Give each a focused task.

Further discussion - explain that gravity is a force - it makes everything fall

back to earth - see what happens when things are dropped. Explain that this gravity is like the magnet's force as you can't see it but you can see its effects. Talk about the lack of gravity in space and what astronauts have to do to compensate for it.

4. Experiment

Students will learn how to conduct and record a simple investigation. Students will be able to make predictions and begin to think about the importance of keeping the test fair. **Resources needed** A selection of 4 squirters for each group - jiff lemon, washing up liquid bottle, shampoo bottle, water pistol, sauce bottle, plant spray, clipboard for each group, rough paper, pencils, copies of 'My Investigation' worksheet.

Explain that we are going to do an investigation to find out what is the best squirter. Discuss what we mean by the best squirter - in this instance guide the students to make it mean the squirter that pushes water the furthest. Discuss how we will try to make the test fair. Go through the format with the students. Blu tac the headings to the board - such as 'What do we want to find out?' and then write the class's agreed response in a different colour beside for them to copy. e.g. Which is the best squirter?

Take class outside. One person in each group should record results on rough paper on clipboard. On returning to class, students could discuss what they did and what they found out, and then complete their investigation sheet.

5. Toy Creation

Provide students with materials to create their own toy. Create a set of guidelines for the activity where students will need to create a toy that can move across the water with either a push or a pull. Materials could include boxes, plastic containers, plastic cups, etc.

Have students complete the activity and reflect on their experiences individually and with the whole class.

Week Four

Weekly Focus: Machines

Learning Intention: To learn about Simple Machines through hands on activities.

Success Criteria: Successful participation in activities through individual work and group activities.

1. Simple Machines

Discuss and brainstorm different simple machines around different environments. Have students discuss with pairs and share with the class. Use www.wordle.com to record student responses. Introduce key vocabulary for Simple Machines.

2. Search for Simple Machines

Go on a Scavenger Hunt around the school to find different examples of Simple Machines. Have students brainstorm different examples before heading out on the hunt. Record answers on a related worksheet and discuss findings at the end. Have students pick one of their favourite simple machines and identify the force used to move the object.

3. Different types of Simple Machines

Using the following website, have student investigate different machines through images, multimedia clips and small passages of text. Simple integrated activities accompany each Simple Machine.

<http://www.mikids.com/Smachines.htm>

4. & 5. Inventing a Simple Machine

Have students create a Simple Machine focusing on a specific machine of interest. Provide students with a template to complete their Design Brief before moving onto creating their Simple Machine. Materials could include cardboard boxes, plastic containers, plastic bottles, etc.

Week Five

Weekly Focus: Sinking and Floating

Learning Intention: To experiment with different materials and objects to observe their sinking and floating.

Success Criteria: To be able to successfully identify different materials that sink and float in water.

Over the duration of the week, students will rotate through the following activities:

Toy Boats - a selection of boats in the water tray including small sailing boats, boats with string attached, windup boats. The challenge is to move the boat across the water tray and say whether they used a push or a pull. Have a race with the different boats. Which gets to the other side first?

Water Play - a selection of water toys including a water wheel, squirter, tubing, sieves, a plastic bottle with holes down the side, containers, water pump. Challenge the students to pour water into each of these and see what happens. Predict first and try to explain what is happening to a partner.

Floating and Sinking - a selection of different objects including floaters, sinkers and at least one that hangs below the water. Students to record their findings on the 'Float or Sink?' worksheet.

Making a floater sink - give each child in the group a small container that floats in a stable position. In a large tray leave a selection of objects that students may wish to use to make the container sink such as corks, marbles, bottle tops, cubes, polystyrene packing chips.

Magnets - a range of magnets and different small items. Challenge the students to move the objects from one side of the table to the other. Can they find different ways to do this (hopefully they will discover that the magnets will both attract and repel - pull and push)

Assessment

Week One

Observations made and recorded by the teacher

Successful completion of activities

Participation in class and small group discussions (knowledge attained through this)

Questioning is used throughout the unit to help students develop their higher-order thinking skills and process content

Assessment of key vocabulary

Identification of Pushes and Pulls in different environments

Classifying pushes and pulls using different criteria

Week Two

Observations made and recorded by the teacher

Successful completion of activities

Participation in class and small group discussions (knowledge attained through this)

Questioning is used throughout the unit to help students develop their higher-order thinking skills and process content

Assessment of key vocabulary

Identification of different forces – definition and examples

Successful creation and completion of Balloon Rocket and Parachute experiment – through discussions, write-ups and effective questioning

Week Three

Observations made and recorded by the teacher

Successful completion of activities

Participation in class and small group discussions (knowledge attained through this)

Questioning is used throughout the unit to help students develop their higher-order thinking skills and process content

Assessment of key vocabulary

Participation in Local Mini Excursion

Ability to define different toys based on their characteristics

Completion of experiment – through a pre discussion, experiments and post discussion

Week Four

Observations made and recorded by the teacher

Successful completion of activities

Participation in class and small group discussions (knowledge attained through this)

Questioning is used throughout the unit to help students develop their higher-order thinking skills and process content

Assessment of key vocabulary

Exploration of Simple Machines

Ability to identify Simple Machines from a selection of machines

Invention of a Simple Machine

Week Five

Observations made and recorded by the teacher

Successful completion of activities

Participation in class and small group discussions (knowledge attained through this)

Questioning is used throughout the unit to help students develop their higher-order thinking skills and process content

Assessment of key vocabulary

Participation in whole class rotations throughout the week, displaying a sound knowledge of pushes, pulls, forces and motions

Resources

- bucket or medium-sized container filled with water –
- clear plastic tub, large, filled with water –
- transparent cup
- transparent plastic container
- factual text
- heavy object with thick string tied around it (e.g., 1L plastic bottle filled with water)
- objects that sink or float from the following range:
 - big and light (e.g., polystyrene tray, air-filled ball, empty plastic bottle)
 - small and light (e.g., paper clip, elastic band, cork, bottle top or lid)
 - big and heavy (e.g., metal tools, a rock, a plastic bottle filled with water)
 - small and heavy (e.g., a sinker, nuts and bolts, a ball of plasticine)
- object that floats (e.g., an empty plastic bottle)
- paper
- A4 paper
- piece of paper approximately 10cm x 15cm (e.g., an A4 sheet of paper cut into quarters)
- piece of tissue
- self-adhesive notes *optional*
- very large sheet of paper or cardboard
- paper towel
- plastic bags
- plasticine
- resource sheets
- scissors
- toy, large with wheels
- toys that demonstrate different types of push and pull movement
- word wall for key vocabulary