# *Spinning tops of Aboriginal and Torres Strait Islanders*

# Teaching and learning plan

## Learning intentions

Students will be able to:

* ask questions about, and describe changes to, objects and materials;
* identify examples of where science is used in people’s daily lives;
* predict outcomes of investigations;
* use informal measurements to make and compare observations with those of others;
* record and represent observations and communicate ideas in a variety of ways;
* use discussion to sort information and compare ideas.

## Suggested time for this CLE

The time need to complete the *Spinning tops of Aboriginal and Torres Strait* *Islanders* CLE will depend on the depth of the prior knowledge of students, the time to perform the introduction and sorting activities, and the investigation ‘Make a spinning top’ as well as following up with any further extension activities. Allow 2–4 hours.

## [Planning ahead and equipment list](http://assist.asta.edu.au/sites/assist.asta.edu.au/files/Planning_and_equipment_list_yr2_Indigenous_spinning_tops.docx)

## Safety considerations

When you and your class are completing your Risk Assessment, consider the following safety points and add any other relevant ones to the list:

* Remove any sharp points from skewers or toothpicks (if provided).
* Clearly instruct students in safe and appropriate use of materials and tools.
* Consider student allergies when choosing materials.

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## Introduction

This CLE focuses on the physical sciences, and links to Year 2 Australian Curriculum: Science.

### Equipment needed

* Computer and projector
* [PowerPoint presentation, Mystery at the museum](http://assist.asta.edu.au/sites/assist.asta.edu.au/files/Mystery_at_the_museum.pptx)

### What to do

1. Follow the instructions on the [Mystery at the museum](http://assist.asta.edu.au/sites/assist.asta.edu.au/files/Mystery_at_the_museum.pptx) PowerPoint to lead students in a discussion about the mystery objects, inviting their questions, without initially revealing any answers. The slide notes include questioning prompts to guide student thinking and conversations, and to stimulate their curiosity. For example:

* What do you think this might be? What else could it be?
* What might it be made of?
* How could it be used?
* What questions do you have?

## Core

### Investigation: Make a spinning top

In this guided inquiry, students use contemporary materials to replicate a miniature version of a spinning top, like those originally made by Aboriginal and Torres Strait Islander peoples—for example, a *mammandur, kolap* or *bunbuja.* Through a process of trial and error, they will develop their understanding of the contributing factors and forces of spinning tops.

### Equipment needed

Per class:

Provide a wide selection of materials, such as the following examples:

* plasticine
* play dough
* Blu-Tack™
* plastic straws
* match sticks
* beads
* tree seeds, e.g. acorns, gumnuts
* long nails
* cardboard
* discs
* plastic screw lids (such as those on milk containers)
* cardboard
* scissors
* old pencils/pens
* paper plates
* bamboo skewers
* small wooden rods
* axles and wheels from kits such as Meccano®

### What to do

1. Give students clear instructions about safe and appropriate behaviour for using equipment. Explain rules for accessing materials, appropriate workspaces, and the expectations for returning or disposal of unwanted materials. Where possible, encourage the reuse of materials.
2. Tell students that they will be trying their own ideas for making a spinning top. Reassure them that they will develop their expertise and knowledge through trial and error. Encourage them to share their ideas and design solutions with each other.
3. Tell students that there is as much to be learned from something that doesn’t work, as there is when it does. The alleged Thomas Edison response as he sought to perfect the light bulb may be useful for students to consider: "I have not failed 10,000 times. I've just found *10,000* *ways that won't work*"
4. Support students through guiding questions that both encourage persistence and the sharing of ideas as well as guiding their thinking. The following questions are examples of guiding questions that could be used.

* How can you build new ideas from the designs that fail?
* How will you teach and learn from each other?
* What do you think might happen if you moved the weight closer to the tip, or put the rod through the exact centre?
* What do you think is causing it to wobble? What do you think is causing it to stop spinning? What else?
* What are different actions you might use to get your top to spin?
* Did your actions involve pushing and pulling?
* What type of force did you use to get the rod to go through the plasticine?
* What kind of force did you use to change the shape of the plasticine? Could you use a different force to change the shape? How?
* What kind of force did you use to cut the card with scissors?

1. Remind students that the pictures of spinning tops that were in the PowerPoint [Mystery at the Museum](http://assist.asta.edu.au/sites/assist.asta.edu.au/files/Mystery_at_the_museum.pptx) have different designs. Ask them if it is possible there might be many ways to make a spinner?
2. Support students as they work collaboratively to make and trial different designs. Ask them to find ways to compare the spinning times of different tops.
3. Pairs of students may use digital technology (such as iPads) to record their best effort, to share what they have learned, and to explain which designs or materials worked and what didn’t.
4. Students may want to investigate other types of spinning tops. They may have spinning toys of their own, or may be interested in learning about other traditional spinners used by Aboriginal and Torres Strait Islander peoples (see [Digital content](http://assist.asta.edu.au/sites/assist.asta.edu.au/files/Digital_content_yr2_Indigenous_spinning_tops.docx)), or in other countries of the world.

### Expected results and explanations

Students will have difficulty spinning their top, if it is not balanced well.

The following tips may assist:

* Make sure the rods are located in the centre of the disc.
* Make sure the discs or balls have their weight evenly distributed.
* If the top is overbalancing, use a lighter rod or add more weight to the ball.
* Use a smooth surface on which to spin the top.
* Locate the weight of the top closer to the surface on which it is spinning.

## Conclusion

**Sorting activity: Push or pull?**

### This discussion and sorting activity aims to clarify student ideas about how push and pull forcesaffect how an object moves as well as help students apply this understanding to the experience they had making and investigating their spinning top.

### Equipment needed per class

### Either

* Computer and projector to show [PowerPoint presentation, ‘Push or pull?’](http://assist.asta.edu.au/sites/assist.asta.edu.au/files/Push_or_pull.pptx)

### Or (per group of 3 students)

* Print and cut out a set of [Push or pull? sorting cards](http://assist.asta.edu.au/sites/assist.asta.edu.au/files/Push_or_pull_sorting_cards.docx).

**Discussion:**

1. Guide students to use their discussion to clarify their thinking about push and pull forces, by asking questions such as:

* Which pictures were hard for you to identify pushing and/or pulling? Why?
* How would you describe the movement of an object that is being pulled?
* If the object was pulled even harder, what do you think would happen?
* How would you describe the movement of an object that is being pushed?
* If it was pushed harder, what do you think would happen?
* How could you stop an object from moving?
* What could make the object stop moving? What else? Think of many ways.

1. Ask students to compare their ideas with those of another group.

Ask:

* Do you all agree?
* Can you convince someone who thinks differently to you?

1. Ask students to report back to the class.

***Teacher notes***: A push or pull is often defined in terms of the direction the object moves in relation to the force (‘pushing’ as a movement of an object away from the force and pulling as it being drawn to the force). The spinners used in the core investigation move as a result of being pushed with one hand while simultaneously being pulled with the other. While students may not be able to identify this, the discussion and reflection on forces in the activity is useful to provoke student thinking and to assist students clarify their ideas and understanding about push and pull forces.

Students with a good understanding would notice a relationship between the type and amount of force, and how an object moves. They would identify whether the motion of an object was due to a ‘push’ or ‘pull’, and that the degree of force would influence how an object moves. They would use descriptive and comparative language accurately, such as ‘further’, ‘longer’, ‘faster’, ‘slower’, ‘push’, ‘pull’, ‘spin’, ‘stop’, ‘hard’, ‘gentle’ etc. Students with an excellent understanding would be able to think beyond the routine and justify their thinking. They might observe that an object (such as a pram) might be able to be moved forward by a push or backwards by a pull, or that a door might be pulled shut or pushed open (and the handle might be pulled down) and observe that different forces may cause a different motion. These students may also speculate that other factors (such as bumping into a wall) can influence an object’s movement, including causing it to stop moving, change direction or change speed.

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### Assessment opportunities

The investigation ‘Make a spinning top’ provides an opportunity to assess student understanding of the concepts related to push and pull forces, both by observing the predictions they make, and in listening to their theories and ideas.

In addition, the level of student achievement of the science inquiry skills, ‘*Participate in guided investigations to explore and answer questions’* and ‘*Use informal measurements to collect and record observations, using digital technologies as appropriate’* could be assessed.

In particular, teachers could notice student ability to reflect on what they know about forces as they:

* think flexibly, observe others, investigate options, make predictions and make intentional improvements to their design or modify their ideas in response to their observations;
* suggest possible reasons why the spinners stop spinning, including that something forced/caused them to stop;
* draw on previous experiences to inform their ideas about ‘pushing’ and pulling’.

The sorting activity provides another opportunity for the teacher to collect observational evidence of the level of student thinking.