

# Science in the early years: Concept cartoons as monitoring tools

## Activity description

Cartoons can be used as a way of monitoring children's developing understanding of concepts ('concept cartoons'). Cartoons provide a simple narrative in which two or more characters provide commentary or opinions about a phenomenon. The cartoon format is likely to be familiar to children, so is a non-threatening format to present and elicit their thoughts on the opinions provided by the characters.

There are four concept cartoons in this resource. Each concept cartoon provides a monitoring tool for finding out how children's understanding about science concepts is developing.

Each cartoon is customised to one of the activities in the educator resources for [Paper 1](#) and [Paper 2](#). Although concept cartoons can be used at any time for a particular topic, in this case, we suggest the cartoons be used with the children after completing each activity.



Science in the early years is a series of papers about the learning and monitoring of science in the early years to support early years educators.

All related content is available from [research.acer.edu.au/earlyyearsscience](https://research.acer.edu.au/earlyyearsscience) [↗](#)

## Refer to the activity

### Plant treasure hunt

This activity addresses the misconception that all plants are stereotypically a pot plant that has green leaves and flowers.

In the resource activity, children create 'before' and 'after' drawings of plants as evidence of learning.

This concept cartoon can be used to check (as an additional monitoring tool) the extent to which children's concept of a plant has changed as a result of participating in the Plant treasure hunt activity.

## What to do?

Show the children the concept cartoon on the next page (enlarged to A3 size) that depicts a slightly overgrown back garden, with some prominent weeds, pumpkins and a bunch of carrots on a bench, grass, and a large lemon tree in the background.

The educator then reads the accompanying story.

**Let's talk about who might have the right idea about grandma's garden. Who do you think is right?**

*What to look for:* Children who have not yet moved from a having a narrow view of a plant as being a stereotypical pot plant, or plants with green leaves and coloured flowers.

Children who have not yet expanded their view to include vegetables and fruits as having been produced by plants (lemons and pumpkins are fruits; carrots are vegetables).

Children who have not yet expanded their view to include weeds as types of plants.

*Note:* Although pumpkins are commonly thought of as vegetables, they are technically 'fruits' because they grow as a result of a flower being pollinated, after which the ovary enlarges and produces seeds inside a protective fruit. Tomatoes are also fruits as they develop after flowers have been pollinated. Carrots are the enlarged roots of a plant, and so are a 'root vegetable'. Vegetables grow from the roots, leaves (e.g. lettuce, spinach) or stems of plants (e.g. celery, asparagus).

Indira is right.



**Savesh, Indira and Ramesh are visiting grandma's garden.**

**They have different ideas about what grandma is growing.**

**Savesh says, 'Grandma doesn't have any plants in her garden. She only has weeds and big pumpkins and lemons.'**

**Indira says, 'Grandma has lots of different kinds of plants in her garden.'**

**Ramesh says, 'Grandma isn't growing any flowers, so she doesn't have any plants.'**

## Refer to the activity

### Floating and sinking

This activity addresses the misconception that the size of a solid object determines whether it will sink or float. In the resource activity, children make observations about the behaviour of a variety of solid objects, and then suggest what is more important about whether an object will float or sink: its size or what it is made of. They record findings in a variety of ways as evidence of learning.

This concept cartoon can be used to check (as an additional monitoring tool) the extent to which children's concepts about what determines whether a solid object sinks or floats has changed as a result of participating in the Floating and sinking activity.

## What to do?

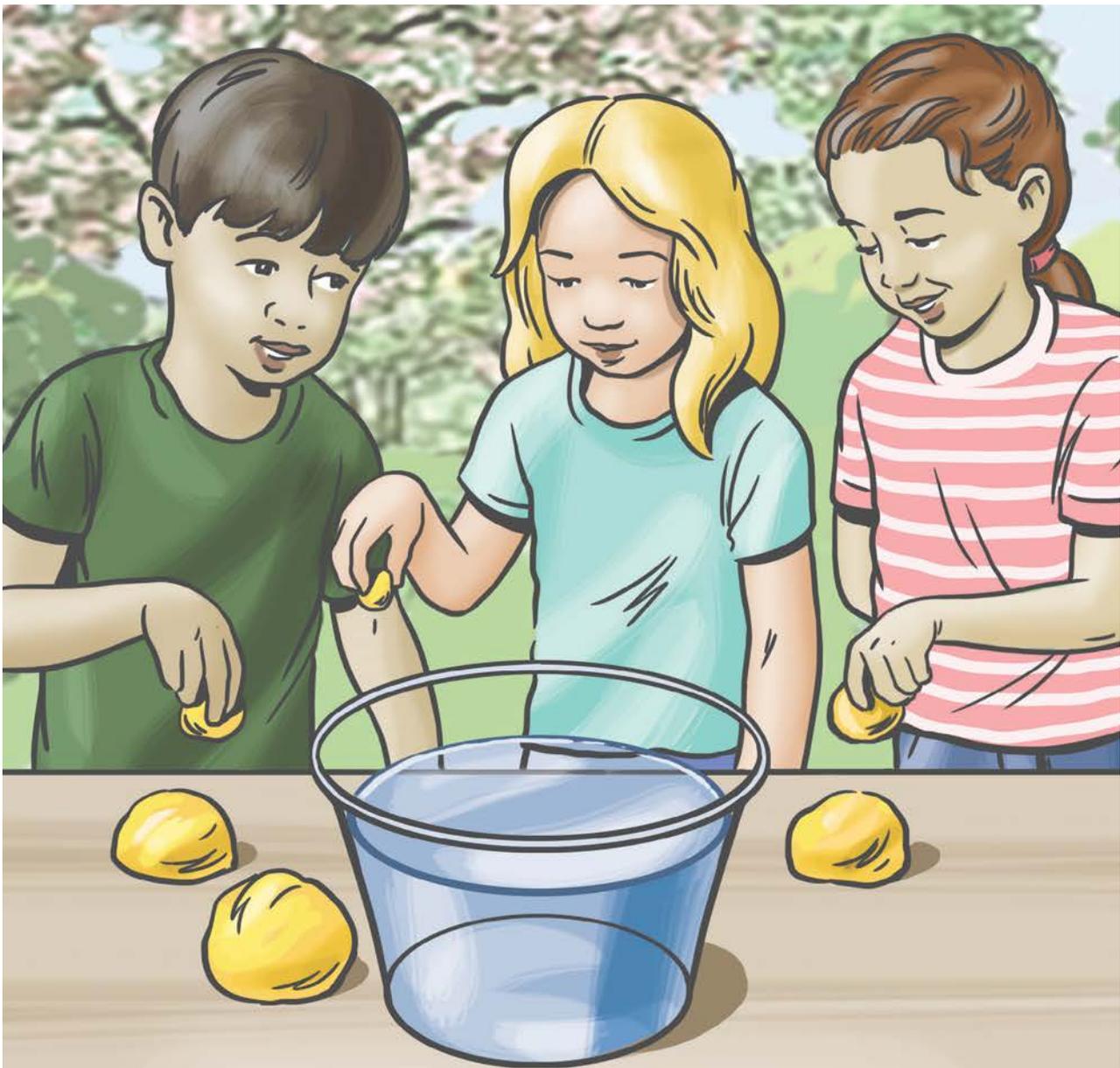
Show the children the concept cartoon on the next page (enlarged to A3 size) that depicts three children predicting what will happen to solid balls of plasticine when they are dropped into a bucket of water: there are six balls of plasticine of different sizes on a table in an outdoor play area, and a large bucket of water next to the table.

The educator then reads the accompanying story.

**Let's talk about who might have the right idea about what will happen. Who do you think is right?**

*What to look for:* Children who have not yet moved from thinking that it is the size of a solid object that determines whether it will sink compared to the material it is made of being the determining factor.

Abby is right.



**Max, Abby and Mae are going to find out what happens when they drop some solid balls of plasticine into a bucket of water. The balls are made out of the same kind of plasticine.**

**They have different ideas about what will happen.**

**Max says, 'Only the really big ball will sink.'**

**Abby says, 'They will all sink, even the very small one.'**

**Mae says, 'The three bigger ones will sink, and the three smaller ones will float.'**

## Refer to the activity

### Light and shadows [↗](#)

This activity addresses the misconception that shadows are formed by an object producing darkness or a 'black substance', whereas objects must be placed so they can block light rays from a light source to create shadows.

In the resource activity, children create and explore the conditions for making shadows. They use toys to block out the light from a torch beam; they make predictions about the relative positions of the torch and toy to form a shadow, and consider what shape it will have, and how large it will be. They then check their ideas by placing a torch and an object in different positions. They are given the opportunity to go beyond describing what they observe, to explaining that objects must block light from the torch for a shadow to form.

This concept cartoon could be used to check (as an additional monitoring tool) the extent to which children's concepts about shadows have developed as a result of participating in the Light and shadows activity.

## What to do?

Show the children the concept cartoon on the next page (enlarged to A3 size) that depicts two children standing side-by-side, looking at their shadows cast on the ground in an outdoor play area. One child is taller than the other, and so is casting a longer shadow. The sun is shown in the sky behind the children.

The educator then reads the accompanying story.

**Let's talk about who might have the right idea about how shadows form. Who do you think is right?**

*What to look for:* Children who have not yet moved from thinking objects produce darkness, rather than block light coming from a light source.

Amelia is right.



**Darcy and Amelia are looking at their shadows on the ground.**

**They have different ideas about what makes the shadows.**

**Darcy says, 'Look, Amelia! Your shadow is longer than mine. Your body is sending out more darkness onto the ground than mine is.'**

**Amelia says, 'I'm a bit taller than you so I'm blocking out more of the light coming from the sun.'**

## Refer to the activity

### Exploring mixtures

This activity focuses on the inquiry methods used to investigate observed behaviour when different materials (oil and water) are mixed. It also introduces the concepts of mixtures and solutions. Children are likely to be familiar with substances dissolving in water (e.g. adults stirring sugar into cups of tea, or adding cordial to water). In these cases, a solution is formed: the sugar can no longer be seen as separate to the water and sugar solution, and the cordial is no longer separate to the water. However, mixing some materials does not result in a solution: the materials stay separate from one another.

In the resource activity, children are provided with guidance to predict what might happen when trying to mix two materials, observe what happens, check back on their prediction and record what they have found out. They then think about what they can change and try out their ideas to make the oil and water stay mixed (e.g. change the amounts of each material; shake it more).

Children should observe that some materials do not mix (oil and water); adding more oil or water doesn't make any difference; shaking the jar for longer doesn't make any difference: the oil and water do not stayed mixed.

This concept cartoon could be used to check (as an additional monitoring tool) the extent to which children's concept of mixtures has developed as a result of participating in the Exploring mixtures activity.

## What to do?

Show the children the concept cartoon on the next page (enlarged to A3 size) that depicts two children looking at the contents of a jar with a lid on it. One child, Jake, is holding the jar, and both children are looking at the contents of the jar. The contents of the jar shows two distinct layers (clear water at the bottom and slightly yellow oil at the top).

The educator then reads the accompanying story.

**Let's talk about who might have the right idea about what will happen to the layers in the jar when Jake shakes the jar.**

*Who do you think is right:* Jake or Ella? Or is it too hard to know what will happen? What else would we need to know to be sure?

*What to look for:* Children who have not yet moved from thinking that all mixtures become solutions (Jake seems to hold this misconception).

Ella is correct if the layers are oil and water.



**Jake and Ella are looking at the jar that Jake is holding.**

**They have different ideas about what will happen when Jake shakes the jar.**

**Jake says, 'There are two layers in the jar. I'm going to shake the jar really well. I think the layers will mix really well and stay mixed up.'**

**Ella says, 'I think the layers will mix up a little bit, but then go back to how they are now after a little while.'**