SCIENCE

Lesson 4

Prep

Topic: Investigating movement of objects

Exploring bouncing and rolling

Lesson concepts

- A The way objects move depends on a variety of factors, including their size and shape
- O Science involves exploring and observing the world using the senses
- A Questions can obtain responses
- O Observations can be made using the senses
- A Observations can be discussed and ideas can be represented
- A Observations and ideas can be shared

Learning alerts

Be aware of:

- students exploring but not making scientific observations.

Suggested next steps for learning:

- Ask questions that help to focus observation and encourage the use of scientific language and explanation.

Today students will:

► understand why some objects roll and/or bounce, and do so better than others.

Resources

Digital

Video — Music to move to! Audio track 3 (Dance zone) (1:27)

Find and prepare

Sheet — Investigating rolling and bouncing

Sheet — Rolling and bouncing observation recording sheet

Word cards (from previous lesson)

Bouncing and rolling objects — for example: spheres of various sizes and types (both bouncy and non-bouncy); cylinders (for example: wooden blocks, tennis ball can, plastic bottles of various sizes with lids and some half-filled with water, cardboard tubes and tube sections, rolled up magazines secured with sticky tape); toy cars

Music player

Exercise book

Practical information

Before the lesson, select a space to set up ramps. Ramps can be made from stiff box cardboard, easel sides, old shelving or small pin boards resting on a chair, small cardboard box, wooden box or storage container. Ideally, ramps should be at least 1 m in length, not too narrow and set up at a height of around 35 cm. If too steep, the movement happens too quickly and is difficult to observe. Place the towel/material near the ramp for students to arrange in place. If conducted outside on grass, a towel may not be required, as the grass should slow the objects down enough.

Key terms

observe, properties, senses

For definitions and explanations of terms, please see the Glossary.

Lesson

Note

- It is recommended that this lesson be taught in a space that allows students to explore games freely and without hazards such as furniture or being in close proximity to others (for example: in an outdoor area).
- If outside, ensure students wear personal protective equipment during activities (for example: sun-safe clothing).

Note

This lesson involves an investigation. Ideas for objects and ramps for this investigation can be found in **Sheet —** Investigating rolling and bouncing.

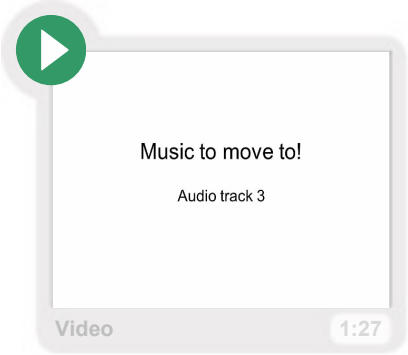
Music is required for this lesson. An audio track is provided but any lively music is suitable.

Sort rolling and bouncing objects

Say to students

> In science today, we are going to observe objects that roll and bounce. I have a selection of objects for you to choose from. Pick an object and sit on the ground facing a wall. Explore how you can move the object to the beat of the music by either rolling or bouncing it gently against the wall.

1. Provide the rolling and bouncing objects and play the music using **Video — Music to move to! Audio track 3 (Dance zone)**.



   a. Regroup and display the word card ‘roll’.

roll

Focus questions

Q: *This is how we write the word ‘roll’. How good was your object at rolling?*
A: Personal response required.

Q: *If we were trying to explain rolling to someone who had never seen rolling, how would we describe what rolling is?*
A: For example: When something goes round and round.

Say to students

So, we will agree that rolling means when an object or parts of an object move by turning over and over or around and around. (Use hand gestures to reinforce.)

b. Display and read the word card 'bounce'.

bounce

Focus questions

Q: *How good was your object at bouncing?*
A: For example: Not very good; it bounces once or twice but goes off to the side and then stops.

Q: *What things bounce really well?*
A: For example: rubber balls, me on the trampoline.

Q: *If we were trying to explain bouncing to someone who had never seen bouncing, how would we describe what bouncing is?*
A: For example: When something goes up and down, hits the ground and comes back up to you.

Say to students

So, we will agree that bouncing means when an object springs back after it has hit something. An object that bounces well is one that does this a number of times by itself. Many things will bounce a little when dropped on the ground but don't keep bouncing a number of times by themselves.

Focus question

Q: *Can the object you chose do both well — can it bounce and roll?*
A: Personal response required.

Say to students

Some objects are good at rolling (for example: a toy car) and some are good at bouncing (for example: a pogo stick) and there are those that are good at both. We are now going to predict which of the objects will roll or bounce well and which we think will do both.

c. Arrange the sorting placemats on a clear flat space with the word cards ‘roll’, ‘bounce’ and ‘roll and bounce’.

d. Provide the selection of objects from the beginning of the lesson.

Say to students

“Sort each object into the group that you think it is best suited to — good at rolling only, good at bouncing only, good at both. There may be objects that are not good at either rolling or bouncing. Put them aside together.”

e. Allow time for student to sort objects.

Note

If there were no objects to sort that bounced well, students can be supported to name some. Things like a pogo stick, a trampoline, a baby’s bouncing chair or swing, a toy tied onto a piece of elastic.

Say to students

“Let’s have a look at the objects in each of the groups. What do you notice?”

f. Share ideas about features in common with the objects in each group.

Say to students

“The features that help an object move in a certain way are also called its **properties**. An object will have lots of other properties too, like colour and size and what it’s made from. **Properties** are all the things that make an object what it is. We use properties to describe objects to other people and to sort and use objects in our lives. If we collect red marbles, then we use the property of colour as well as being a marble, but being red will not help the marble roll any better.”

Focus questions

Q: *What properties do you think actually help an object to be a good roller?*
A: Answers should refer to the object's shape (round) and possibly smoothness.

Q: *What about the object's colour? Is that a property that will help it roll or bounce?*
A: For example: No.

Q: *What properties do you think actually help an object to be a good bouncer?*
A: For example: have a spring, made of springy material, rubbery.

Q: *What do you think an object that is good at both rolling and bouncing must be like?*
A: For example: It has the properties of good rollers and good bouncers.

Investigate rolling and bouncing

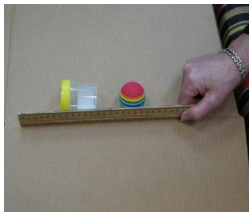
Say to students

"We are now going to investigate why and how some objects roll and bounce better than others. To test the objects fairly, we are going to use a 'letting go' method rather than pushing the objects in some way. This way we know that it is the properties of the object that are affecting how it moves.

As with all science investigations, it is very important that we make detailed and accurate observations using our senses. This way we will be correct in our thinking.

I am going to show you how to do the letting go method for this investigation using an empty plastic water bottle."

2. Model how to let go for rolling:
   a. Set up a ramp at about a 45˚ angle (not too steep and not too shallow).
   b. Place a towel or similar across the entire bottom of the ramp about 10 cm from the bottom edge to stop the objects from rolling away.
   c. Hold the plastic bottle on its side in position at the top with a ruler.
   d. Explain the need to carefully watch the way the object is moving.
   e. Lift the ruler and let the object go.
   f. Emphasise that no pushing is used; the object is just allowed to roll by itself.
   g. Remind students to make observations of how and where the object moves down the ramp, not just how quickly it moves.



3. Model how to let go for bouncing using the same plastic bottle.

Say to students

"Letting go for bouncing also uses no pushing action. Just stand with your arm stretched out straight in front, holding the object in your fingers gently. When you are ready to make observations, let the object fall from your fingertips. Do not push the object in any way towards the ground."

   a. Repeat with the plastic bottle and discuss what can be observed.

Say to students

"Now it is your chance to investigate different objects using the letting go method. You can try rolling and bouncing the same object and you can compare different objects."

   b. Allow student time to investigate.

4. Record student responses to the following questions on the **Sheet —** Rolling and bouncing observation recording sheet.
   a. Name one object you investigated.
   b. What did you observe when you rolled/bounced the object?
   c. Why do you think the object is good/bad at rolling/bouncing?
   d. How did your object roll/bounce compared to the plastic water bottle that I used earlier in the lesson? Why do you think this is?

Say to students

"From your investigation, you can see that there are some properties that really affect the movement of an object and some others that don't. Things like shape and the material it is made from can affect if an object is a good roller or bouncer. Things like colour do not."

Say to students

"In this science lesson, we have investigated rolling and bouncing using the let go method. We know that how an object rolls and bounces depends a lot on some of its properties."