

# Science in the Making: sledge investigation

This resource was developed by teachers within the Royal Society Schools Network



Armitage sledge party, 31 March 1902. From The Royal Society, NAE/6/693

## Curriculum key words

Material  
Rough  
Smooth

## Curriculum links

### Working Scientifically:

- Using their observations and ideas to suggest answers to questions.
- Performing simple tests.

### Uses of everyday materials (Y2):

- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.

## Equipment needed

- small cardboard boxes or plastic tubs;
- surface to represent bumpy terrain (such as bubble wrap, corrugated card, carpet tile) and a board;
- a range of materials to be tested (cloth, plastic, card, tin foil, etc);
- sticky tack and long rulers.

## KS1

### Introduction

This lesson uses the context of the 1902 research expedition to the Antarctic, led by Robert Falcon Scott, to investigate the best material for runners on a sledge.

Students will create a model sledge, complete with cargo, then attach different materials onto the base to simulate different runners.

### Learning objectives:

Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular use, in this case, a sled runner.

### Success criteria (SC):

- SC1: I can make observations from photographs.
- SC2: I can make sensible guesses as to where and when a photo was taken.
- SC3: I can carry out a simple experiment to find out how slippery different materials are.
- SC4: I can use my results to decide which materials are best for a sled runner.

# Science in the Making: sledge investigation

## Starter activity

(Approximately 10 – 15 minutes) [SC1, SC2]

Show students a photograph of Robert Falcon Scott's 1902 Antarctic expedition in which the crew are using sledges ([Armitage sledge party](https://making-science.royalsociety.org/s/rs/items/NAE_6_693) [https://making-science.royalsociety.org/s/rs/items/NAE\\_6\\_693](https://making-science.royalsociety.org/s/rs/items/NAE_6_693)).

Discuss what can be seen in the photo, letting the students' observations and interests guide the discussion. You could ask:

- Where do you think this picture was taken?
- When do you think the picture was taken?
- Who do you think these people are?
- What do you notice about the people in the picture?
- What do you think the sledges are being used for?

Encourage students to ask their own questions about the picture, and to explain their reasoning when they answer a question, for example asking, "What clues are there to tell you this is a cold place?" or, "Why do you think this photo must have been taken long ago?"

## Activity A: context

(Approximately 5 – 10 mins)

Tell students that this photo was taken in 1902 and it shows some of the crew on an expedition to the Antarctic led by Robert Falcon Scott. You may want to show the students where the Antarctic is on a globe or using an online map.

Explain that the men on the expedition had to work in very hard conditions, and often had to travel across great distances on foot, carrying heavy equipment or provisions on sledges.

Discuss why sledges would help the explorers to transport things over the snow, linking it to any experience students may have had riding on sledges themselves, or pulling along friends on a sledge.

## Activity B: investigation

(approximately 20 – 30 mins) [SC3]

Tell students that we are going to investigate the best material for making the runners on a sledge.

Using the images of sledges from Science in the Making (see resource appendix), show students what we mean by the runners (the very bottom parts of the sledge, that come into contact with the ground).

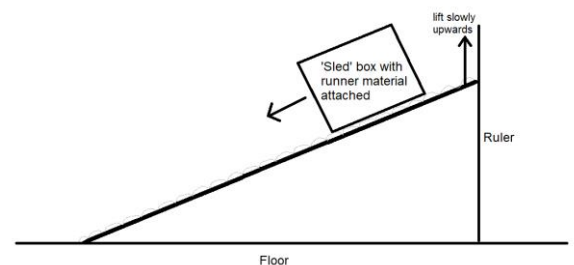
Discuss what we mean by the 'best' material, and support students in understanding that the best material will be the one that makes it easiest for the scientists to move it over the ground.

Show them the materials for testing and encourage them to predict which will be the best, explaining the reasoning behind their choice. Materials to test could include paper, card, wood (lolly sticks), thin plastic (from bottles and packaging), metal (tin foil) or fabric. To represent the sledges, we will use small cardboard boxes or plastic tubs (reuse food packaging containers).

Remind students that the sledges were used to carry heavy loads, so before testing they should fill up their sledge with some cargo. This could be any small objects gathered from around the classroom, or small weights to really make the sledges heavy.

Look again at some images of sledges from Science in the Making and highlight the fact that the snow and ice being travelled over is not perfectly smooth, so we need a similarly bumpy surface to represent our snow. This could be bubble wrap, thick carpet or corrugated card.

To find out which material is best, students must attach each different kind to the bottom of their sledge in turn (sticky tack will work well for this), place it on one end of a board that has been covered with their bumpy surface then slowly lift the end to see at what point the sledge starts to move down the slope. This could be measured by measuring the distance between the floor and the end of the board when it has reached a point where the sledge moves.



Model carrying out this process and ensure students are aware of what they need to do to test each material and what information they need to record (the material and the height the board needed to be lifted to make the sledge move).

Allow students to carry out their investigation in pairs or small groups, ensuring they are collecting data on each of the different materials as they go along, and supporting with the accurate use of a ruler or metre stick to take measurements.

### Activity C: coming to conclusions

(Approximately 5 mins) [SC4]

When the students have finished carrying out their investigation, bring everyone together to discuss findings and ask them to come to a conclusion about which would be the best material for the sledge runners. It may be necessary to remind them that plastic had not yet been invented when this expedition took place, so this couldn't be used for making skis or any other equipment they would have taken.

## Assessment

Students will have partially met the learning objective, 'Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses if they can talk about the suitability of a range of different materials for the sledge runners, for example,

"I think the plastic would be a good material for the runners because it was smooth and the sledge moved when the board had only been lifted up a little bit."

or

"The fabric would be a bad material to use because it is quite rough and the sledge didn't move at all when we lifted the board."

**Resource: Suggested images**

Below are images (with links) that would be appropriate for this lesson.

Sounding sledge [https://makingscience.royalsociety.org/s/rs/items/NAE\\_2\\_227](https://makingscience.royalsociety.org/s/rs/items/NAE_2_227)

Sounding sledge, 1901-1904. From The Royal Society, NAE/2/227



Armitage sledge party [https://makingscience.royalsociety.org/s/rs/items/NAE\\_6\\_693](https://makingscience.royalsociety.org/s/rs/items/NAE_6_693)

Armitage sledge party, 31 March 1902. From The Royal Society, NAE/6/693



Royds, Barrier sledge party [https://making-science.royalsociety.org/s/rs/items/NAE\\_2\\_204](https://making-science.royalsociety.org/s/rs/items/NAE_2_204)

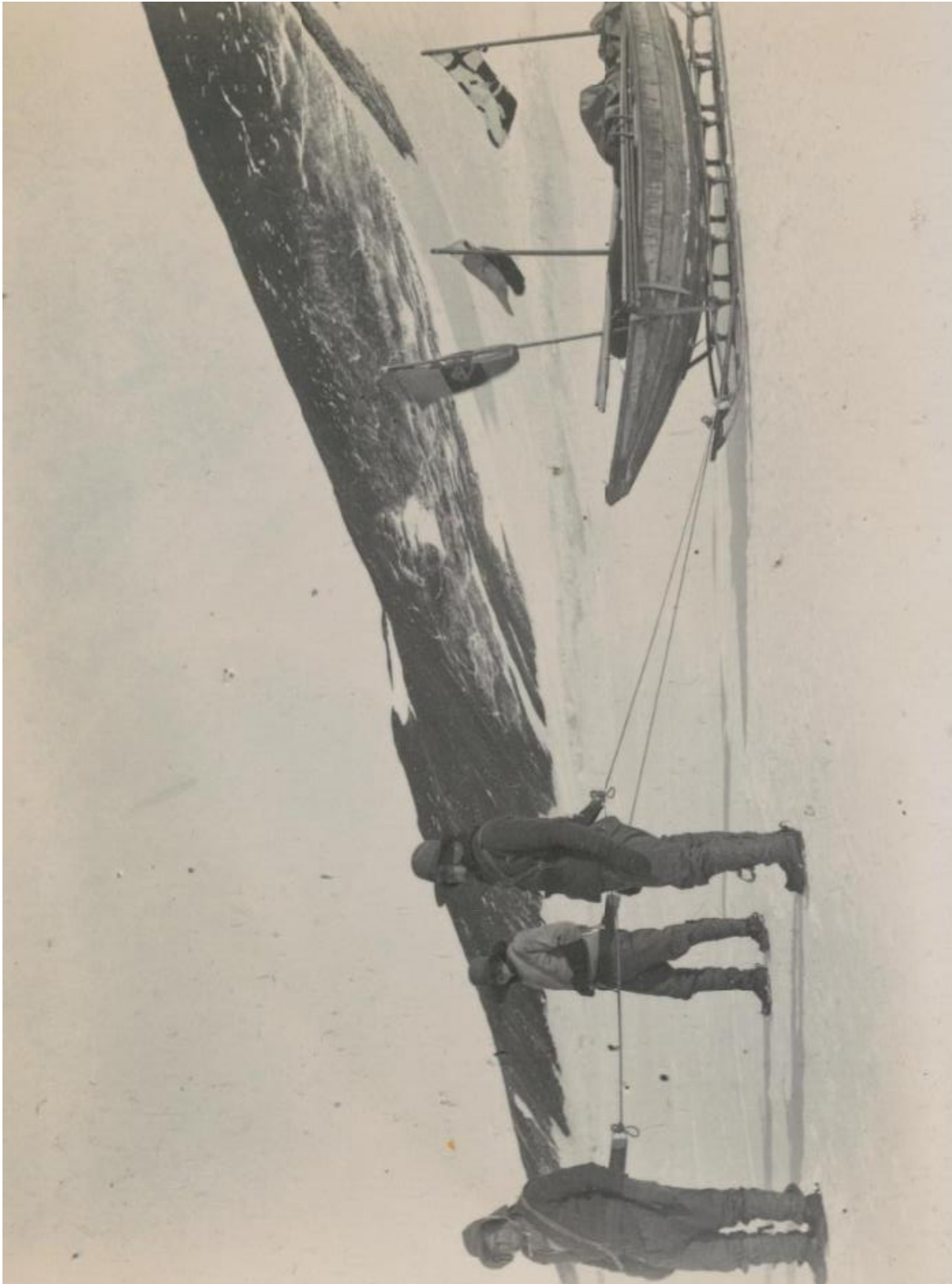
Royds, Barrier sledge party, November 1903. From The Royal Society, NAE/2/204





Sledge party to Island [https://makingscience.royalsociety.org/s/rs/items/NAE\\_5\\_683](https://makingscience.royalsociety.org/s/rs/items/NAE_5_683)

Sledge party to Island, 19 February 1902. From The Royal Society, NAE/5/683





Packing sledges with ice [https://makingscience.royalsociety.org/s/rs/items/NAE\\_2\\_174](https://makingscience.royalsociety.org/s/rs/items/NAE_2_174)

Packing sledges with ice, January 1903. From The Royal Society, NAE/2/174

