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STEM Project

Chapter 2: Rocks and minerals

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Can erosion be helpful?

In nature, rocks can be eroded by wind, rain and the trampling feet of animals rubbing across their surfaces over and over. This slow, abrasive erosion can create all sorts of interesting shapes and patterns.



Manufacturing engineers use the idea of abrasive erosion (the repeated rubbing of a surface to wear it away) to create shapes that are useful to us.

In this task, you are going to explore this idea of using abrasive erosion to make something useful!

Can you make a perfect sphere?

Spheres are useful in wheel bearings, mechanical joints and even as sculptures or decorations. In this project, your job will be to explore what type of rocks suit the manufacture of a sphere using the concept of erosion.

A ball-bearing manufacturer, Ball Bearings R Us, wants to install a giant rock sculpture of a sphere outside their headquarters. They will be using abrasive erosion by sanding to create their sphere and they have asked you to tell them what type of rock they should use.

They want a sphere that is smooth, shiny, perfectly round and does not take too long to manufacture.

You and your group will use everyday materials to simulate different rock traits and investigate which traits are best suited to the requirements. You will apply your knowledge of mineral traits to investigate which ones erode most favourably for the purpose of manufacturing a sphere.

Step 1: Collect your ‘rocks’

Collect a range of materials to test out which traits make a good sphere. Some suggestions are:

- a block of balsa wood
- polystyrene packing
- a bar of soap
- actual rocks
- a block of hardened clay

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- an eraser
- any other materials you think might create a good sphere.

Step 2: Describe your 'rocks'

Use your understanding of the properties of the minerals in rocks to describe your materials as though they were rocks.

- Do they have a fine grain, medium grain or coarse grain?
- Do they have layers?
- How would you describe their lustre, streak, hardness and cleavage?

Material	Description (grain, layers, lustre, streak, hardness, cleavage etc.)
Polystyrene	Course grain, no layers, dull lustre, low streak, quite soft, low cleavage

Step 3: Start eroding

Now start eroding your materials using sandpaper to investigate which one creates the best sphere. Use the following steps of a scientific experiment to guide you through your investigation.

Aim: To investigate how each of the materials responds to erosion by finding which material creates the best sphere.

Hypothesis: Make a prediction! Which material from your list do you think will make the best sphere?

Materials: your collection of materials, sandpaper, safety gloves, newspaper

Method:

- 1 Lay out the newspaper to collect any messy sediment that is created by your sanding.
- 2 Divide the materials between members of your group.
- 3 Wearing safety gloves, use the sandpaper to try to erode the materials you have collected into the shape of a sphere.

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Data and results

As you sand each material, make observations about how your materials are responding to the erosion. Your observations could include the answers to questions such as:

- Is it breaking apart?
- Is the surface becoming smooth or rough?
- Is the erosion fast or slow?
- Does the sanding require a lot of effort?
- Are you able to attain a sphere shape?

Material	Observations

In what other ways could the concept of abrasive erosion be useful to people?