THE POWER OF FORCES

HOW WELL CAN AN OBJECT SLIDE ON DIFFERENT MATERIALS?

Key vocabulary:

push, force, material, surface

Resources:

Heavy objects such as photocopier paper or book, boards for ramps (such as mini whiteboards), rulers, object to slide on ramp, such as 100g weight, materials to cover ramps, such as felt, foam, fabric (perhaps jeans or a cotton apron), sandpaper, tin foil, plastic, carpet, rubber matting, large open space, such as a hallway or garden/patio.

Health and safety:

Do not ask children to carry the heavy object to the space. This should be done by an adult.

This has been adapted from what we would be teaching at school. You can pick out what you think is appropriate for your child to do. They may be able to complete this with a sibling. You don't have to write it down. Just have a go and have fun exploring different surfaces.

SUMMARY:

In this lesson children will develop their understanding of how objects move on different surfaces. By the end of the lesson they will be able to demonstrate how the material affects the way an object moves across it.

National curriculum links:

Compare how things move on different surfaces

Learning intention:

To explore how objects move on different materials

Scientific enquiry type:

Comparative and fair tests

Working scientifically links:

Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions

Success criteria:

- I can decide how to carry out a comparative test.
- I can compare how an object moves on different surfaces.
- I can talk about how the surface affected the movement of the object across it.

EXPLORE:

What is friction? Here is a little video clip to help you to understand.
https://www.bbc.co.uk/bitesize/topics/zsxxsbk/articles/zxqrdxs

If you have a slide you can do this outside and try this for real. There are lots of slide clips on the internet – here's one to look at https://www.youtube.com/watch?v=JvSClZ3vHOI

Ask: *Why does a child slow down so quickly at the bottom of a slide?* There are two reasons: the slide is now horizontal and also there is a change in surface.

ENQUIRE:

Explain that today their challenge will be to explore how different materials affect how an object slides. In each case they will make a prediction about how a surface will affect how easily something will slide.

Challenge 1: Children explore how objects move over different surfaces

This challenge will need adult supervision. Go into a large space. Show your child a heavy object, e.g. a pack of photocopier paper or a big book. Ask them to move it without picking it up. Ask them to consider how they will do this safely. Ask them to think about different surfaces that they can test by moving the heavy object on. They may suggest the carpet, wooden floor, stone floor outside, grass or any areas covered in tiles or lino. Ask them first to put them in order according to how easy it will be to test the heavy object on. Record these predictions. Ask the children to try out each of the surfaces and compare how hard they need to pull or push to move their heavy object.

They could use – Very easy, easy, difficult, very difficult.

Ask: *Is it easier or harder to move your heavy object on that surface? Which surface was the easiest/hardest to move your heavy object on? Why do you think this is?*

Challenge 2: investigate the effect of different materials on the way an object slides down a ramp

Show the children how a ramp can be lifted in order to make an object slide. Explain that they need to collect materials to put on the ramp to see how this affects how easily the object slide

Ask them first to put them in order according to whether they will make an object slide down the ramp more or less easily. Encourage them to give reasons for their decisions. Provide them with two identical objects so that they can make a direct comparison between two materials. Show them how to raise the ramp slowly until one of the objects starts to slide.

Ask: *What do your results tell you? Does your evidence support your prediction?*

Challenge 3: Children investigate the effect of different surfaces on the way an object slides down a ramp

Show the children how a ramp can be lifted in order to make an object slide. Explain that they are to explore how different materials or surfaces affect how easily the object slides. Provide them with the samples of materials to look at and feel. Ask them to make predictions as to which surface will make an object slide down the ramp more or less easily. Ask them to think about what they can measure and record in order to compare how the object moves on the different surfaces. They should work out that they will need to raise the ramp slowly and measure the height at which the object starts sliding.

Ask: *What do your results tell you? Does your evidence support your prediction?*

REFLECT AND REVIEW:

Ask them to think back to when they were making their predictions. Ask them to share some of their reasons for their predictions. When they tested the surfaces, did their evidence match their predictions? Were there any results that surprised them?

Ask: *If I wanted to go down a slide really quickly, what material would you suggest I sit on? What if I wanted to go down more slowly?*

As a round-up activity, question: If I am making a bath mat, which material do you think I should use on the underside? Encourage them to explain what they want to avoid, such as the bath mat slipping, and how the material that they choose helps this aim.