

1. Feel the force



35
mins

The children are introduced to the concept of air resistance as a force by running in playground with sheets of paper.

OBJECTIVES

- Appreciate that air can exert a force.
- Appreciate that a force can both assist or resist movement.
- Appreciate that the surface area of an object can create more, or less, air resistance.

RESOURCES

(Per group of 4 children)

- Activity sheet 1
- 1 sheet of A4 and/or A3 card (per child or pair)
- A roll of wallpaper and cello tape (optional)
- A few cycling helmets (for whole class discussion/display)
- Pictures of lorries with and without cab 'streamlined' fairings
- Pictures of streamlined objects e.g. aircraft, racing cars (optional)

INTRODUCING THE ACTIVITY (10 minutes)

Read the letter from the transport firm (Activity sheet 1) to introduce the problem. A new company is setting up its transport division, and is going to buy a fleet of lorries. The manager has noticed that many lorries have attachments fastened to the top of the cab, although many do not. He wants to know why there are attachments to the cabs, which he thinks have something to do with wind resistance. If he buys some he would like to know what effect they could have, and which sort might be the best. Can the children produce some information and data to help him make his decisions.

Brainstorm some ideas of types of force (pull, push and twist) and decide which ones might apply to this problem. Use cycling helmets and photographs of streamlined vehicles to ask why they have their particular shapes. If the answers given suggest that it is 'to make them go faster' ask how the shape will make them go faster? Establish that the wind (air) can give a *push force*, which can either oppose movement, or help it. Can they suggest some experiments to help them feel this force?

MAIN ACTIVITY (15 minutes)

Stress that **they** need to feel the force, so they will need to hold something that the wind (air) can resist. Give each child, or pair, a sheet of A4 and/or A3 card to hold at arm's length in front of them, as they run around the playground or school hall. (Larger sheets can be tried, by taping A3 card together, or cutting pieces of wallpaper.) On a windy day, children can experience running into the wind with their card.

After noting or discussing what they can feel, they try the same activity, but this time with the card held at an angle in front of them. Finally, they repeat the experiments with the card held above their head at arms length.

PLENARY (10 minutes)

Back in the classroom, the children discuss their findings. To focus on the main effects, the following questions can be posed:

- *What did they feel when they ran with the card held out in front of them?*
Something pushing against the card.
- *What did they feel when they ran with the card held above their head? Did the force feel different?*
The pushing force may have felt greater, because their arms were above their head, and it exerted greater leverage.
- *When the card was tilted at an angle, did they find any difference in the feel of the force? Did it feel less, more or the same?*
The force probably felt less.
- *Did the force have any effect on the speed at which they ran?*
They may have found it harder to run at the same speed as before.
- *How do their findings relate to the firm's problem?*
The lorries must experience the same pushing force against their movement, and would also need to work harder to run at the same speed.