



LEARNING THROUGH THE ARTS

Air and its Movements

Creator This lesson is based on an original idea by Brigitte Lachance.

Grade 6

Subject Science

Topic The movement of air and the objects found in air.

Description

This lesson explores the properties of air, such as its nature, its composition, air pressure, air volume, heat and aerodynamics. The influences of its mass and of gravity are discussed along with specific shapes of objects carried by the air.

Material

- Sheets of paper 8 ½ by 11
- Crayons or pens
- Balloons and plastic bags
- A bench
- A hair dryer

Space required

Classroom with desks placed against the wall or a gym to permit the movements of dance.

Warmup

- Discuss the air that surrounds the earth. Ask students if the air is empty or if there are objects in the air. Have the students list things that would be found in the air: dust, paper, leaves, birds, insects, planes, helicopters, balloons, water vapour, clouds, drops of water, snow, fog, etc.

Ask the students what objects that go into the air would be able to stay in the air? Light and heavy objects that have a surface and a shape that permit them to be carried by the wind.

- Do a warm - up exercise on the concept of near and far. Have the students find parts of the body that are far from each other: thumb and foot; shoulders, hips; wrist and calf; stomach and spine. Repeat the process with the concept of near: wrist and hand; toe and foot; nose and mouth; index finger and thumb.
- Ask the students to move a pair of parts of the body according to your instructions: For example: move the wrist and a part of the body far from the wrist. Or, move the hand and a part of the body close to the hand.



LEARNING THROUGH THE ARTS

- Ask students to name a small part of the body and to move it with small movements. Do the same with a large part of the body. And move it with large movements.
- Ask students move as if they are very heavy.
- They continue to be heavy, but this time they are filled with liquid. How do they move? By undulating like waves in the ocean.

Ask them to do the same thing while imagining they are very light. Note what the students are doing. Some will make the movement of leaves carried by the wind. Ask them to express in words the movements and gestures they are doing. For example, « I am the leaf of an oak tree carried by the wind ».

- Ask them to spend a half second in the air, how would they do it? They can jump. Why do they fall back so quickly? Have a discussion on gravity.

Development

The environment of flying objects: air, mass, gravity, movements

- Have a discussion with the students on the qualities of hot air: it disperses, becomes lighter (fewer molecules in the same space, therefore lighter). Air pressure increases with heat in a closed vessel or rigid container because the molecules move more quickly and hit the sides of the container harder. The volume of expandable containers increases because the molecules of air expand as they move more quickly and increase the pressure on the flexible walls of the container.
- Inflate a balloon with hot air using a hair dryer. Also try using a plastic bag and close it immediately after inflating it. After tying it, release it and let it fly. It flies because it contains hot air that is lighter than the air in the classroom.

Discuss the concepts of mass and gravity. The mass of a body represents the quantity of matter, its weight. Gravity is related to the attraction of the earth on all bodies that have mass and that are within its zone of influence, i.e. not too distant.

- Ask the students to make a list of objects that fall under the influence of the earth's gravity, near and far: stones, rain, falling objects, trees and plants that grow vertically, planes that fly without falling, the water in the oceans, lakes, rivers, (that flow toward the bottom, not toward the top), puddles of water (still water), avalanches, an arrow launched by a bow, a rocket that tries to leave the earth's atmosphere, a coin dropped from the hand, a basket ball thrown into the hoop, the moon, man made satellites, météorites, etc.
- Many of the objects listed above cannot stay in the air without some form of propulsion (the subject of another lesson). They fall toward the earth as they travel through the air.



LEARNING THROUGH THE ARTS

Application

- Do some dance exercises on the following subject: you are an oxygen molecule, and the temperature is rising. The students must increase the speed of their movements with the increase in temperature. The temperature lowers, and the students slow down their movements.
- For example, a series of 4 steps could represent the movement of a molecule of air. At 16 steps, ask the students to accelerate the tempo.
- Do an exercise of increasing the heat in a closed space: the students in groups of 4 move in a small square space outlined on the floor while they increase their speed, and while colliding with the boundaries of the space and with each other, without going beyond the limits of the space. This represents the increase in pressure in a space. (Heat increases the speed of the molecules in the air and the pressure in a closed space).
- Do an exercise of increasing the heat in an expandable space that can increase in volume: as the speed of the molecules increases, the 4 students get further apart from each other, and go beyond the boundaries of their space: the volume increases, but the pressure stays the same.
- Dance exercises while counting to 16 : get taller, expand their volume up to 8 and then progressively reduce to 16. This represents the increase and decrease of heat.
- Put a bench on the floor, the students use it in their dance exercise to show that when they leave the bench, they do not float in the air, but fall to the floor.

Aerodynamics

- Explain that an aerodynamic object can move with little air resistance. Have them discover the characteristics: pointed shape, rounded, straight, something that cuts through the air.
- Ask the students to give examples of objects that have an aerodynamic shape: arrows, planes, rockets, ships, autos, fish, birds, cycling helmets, skiers in a tuck position to reduce air resistance in order to gain speed.
- Explain the concept of the movement of a leaf through the air carried by the wind: it flies and moves because the leaf is light and has a large surface in relation to its volume. Demonstrate with a leaf in front of a fan.
- Ask the students to adopt an aerodynamic shape and to move across the floor with it. Ask them to explain why their shape is aerodynamic: Pointed, head between the arms, elongated body, egg shape skier position, allowing them to go faster.

Ask the students to take a non-aerodynamic shape: arms and legs spread wide, to offer as much air resistance as possible. Have them move across the floor, they should move less quickly than they did with the aerodynamic shape.



LEARNING THROUGH THE ARTS

Have the students alternate between aero and non-aerodynamic shapes when you give them a signal.

- Ask the students to put into movement the concept of flight : they can extend their arms at their sides move them like the wings of a bird, and move across the floor with graceful movements.

Conclusion

- Discuss and make notes on the ideas they have learned.
- Have the students discuss objects that fly in the air: leaves, dust, insects. Ask them to imagine movements that could represent the movement of these objects.