

# Pump it up!

## Setting the context

It's no use, Francine decided. Igor was great fun, but sometimes she needed a real helping hand. Unfortunately, Igor only had paws and assistants cost money, which was why, one windy morning, she set out from Castle Clutz to buy a few very special pieces of equipment. However, when Francine arrived at the

Inventors R Us store, she realised that the blueprints for her 'Robo Arm' had been blown out of her pocket. It's to phone a friend. Can you help?

## The problem

**How do you make a working model of an arm?**

## Objectives

To learn that humans and some animals have skeletons and muscles to support and protect them and help their bodies move.

To make links between exercise, a good diet and healthy growth.

## Background information

There are around 630 muscles in our body: smooth muscles, cardiac muscles that make up the heart, and skeletal muscles that give our body shape and enable us to move.

Smooth and cardiac muscles are involuntary: we can't consciously control them. Skeletal muscles are voluntary. Skeletal muscles are attached to bones by 'elastic' tissue called tendons. When we contract a muscle, the tendon is pulled up and moves the bone. Muscles can only pull, so for arms to have a full range of movement, they must work in pairs. In the model, the **biceps** attached to the **humerus**, pull the arm up, allowing us to lift. The **triceps** attached to the **ulna** and **radius**, pull down, allowing us to push.

## You will need

A selection of soft bean bags; some heavy books.

Per pair: piece of thin cardboard, sticky tape, string, two balloons, ruler, sharp pencil, scissors; string, bicycle pump (optional).

## Preparation

It may be necessary to prepare certain parts of the Robo Arm prior to the lesson, dependent upon the age and ability of the children.

## Discussion and research

- Begin by asking the children to lift and carry the heavy books, then throw the bean bags to one another. Ask them to note, carefully, the way their arms move each time.
- When they lift objects up, can they feel the muscles at the back of their arms working? Which muscles 'work' when they throw or push?
- Discuss the way in which our muscles work with bones to create movement, and the fact that muscles can only pull.

