YOUR MISSION: Planet You Go, Gravity You Find

Mass is the amount of matter an object is made of. It is always the same, but its weight changes depending where or on which planet it is. You will perform the same exercise with balls of different weights, as if you were in different gravitational conditions. You will play with medicine balls to strengthen your arm and torso muscles and improve your coordination. As a space explorer of the future, you will be prepared to deal with different gravity environments in our galaxy! You will record observations about improvements in this training in your Mission Journal.

Strong abdominal and back muscles, or core muscles, protect your spine, maintain proper posture, and transfer energy through your body for powerful movements such as swinging and throwing. These muscles are engaged as you sit, turn your body, or even just stand still. Strong arm muscles allow you to lift weights easily, without feeling pain and are useful in most sports.

MISSION QUESTION:
How can you perform a physical activity that will improve your coordination, core and arm muscles?

MISSION ASSIGNMENT: Medicine Ball Training

- ◯ To perform the exercise, you will need to be in a gym equipped with:
  - 3 balls (medicine, etc.) with different weights:
    e.g. 1 kg – 1.5 kg– 2.5 kg (2 lbs – 3lbs- 6lbs)
- ◯ Jumping:
  - Squat with the ball in your hands.
  - Jump extending your body and lifting the ball above your head.
  - Squat again.
  - Cover a length of 3 meters while jumping with the ball in your hands.
  - Pass the ball to your friend.
- ◯ Balls in a circle:
  - Form a circle with about 9 classmates (10 children total).
  - Stand with your legs shoulder width apart.
  - Make the ball roll on the ground towards your classmate. The ball must stay on the floor and not be thrown!
  - If the ball passes through your legs, you are out of the circle. If not, throw it again.
- ◯ Redo the two exercises with the heavier balls.

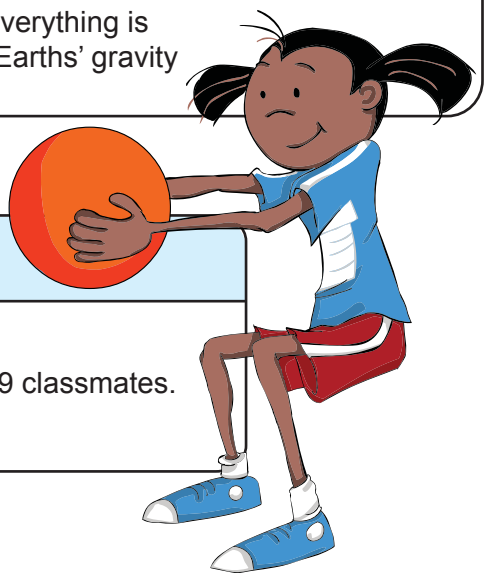
◯ Record observations before and after this physical experience in your Mission Journal.

Follow these instructions to train like an astronaut.

Medicine balls are commonly used to increase core strength and body coordination. By improving the strength of your core muscles, you will find it easier to stabilize your body, maintain proper posture, and prevent injury. With stronger core muscles, you may find that you have better posture, can balance extra weight easier, or that you might have more power for explosive movements while playing sports.

It's a Space Fact

When you jump into the air, you automatically land back on the ground. Apples and leaves fall from trees, and when you drop glass it breaks on the floor. Everything is pulled to the Earth due to the force of gravity. The force of gravity is also present on the Moon. Because the Moons gravity is 1/6 of the Earth's gravity, the Moon's gravitational pull is not as great as that of the Earth. This is the reason why an astronaut jumping on the surface of the Moon is automatically a long-jump champion. Astronauts can jump further than 10 meters! On Mars, gravity is less than half the gravity here on Earth but on Jupiter it is more than double. This means that on Jupiter's surface you would have a hard time to climb the stairs because the gravity on Jupiter would pull you to the ground much more than the Earth does. Astronauts will not walk on other planets in the near future but still their training takes into account the influence of gravity because during their mission they will be in a free-fall microgravity environment. When astronauts are back on Earth after a six-month stay on the International Space Station, they feel tired, as if everything is extremely heavy. Astronauts need to train to get acquainted again with Earths' gravity and do that using medicine balls to strengthen their muscles.



Fitness Acceleration

- ◯ Jump a 4 meters distance.
- ◯ Do a circle with the entire class, instead of just 9 classmates.
- ◯ Do the circle facing each other's back.

Core muscles:
The muscles that stabilize, align, and move the trunk of the body; the abdominal and back muscles.

Coordination:
Using your muscles together to move your body.

Muscular strength:
The ability to use your muscles to move or lift things, and yourself.

Medicine ball:
A medicine ball (also known as an exercise ball, a med ball, or a fitness ball) is a weighted ball. Often used for rehabilitation and strength training, it serves an important role in the field of sports medicine.

Think Safety!

Scientists and Astronaut Strength, Conditioning & Rehabilitation (ASCR) Specialists working with the astronauts must make sure they have a safe environment in which to practice, so that the astronauts can't get injured.

- A warming-up and cooling-down period is always recommended.
- Avoid obstacles, hazards, and uneven surfaces.
- Exercise in a gym with enough space for throwing balls and jumping and appropriate heating conditions (neither too cold nor too hot).
- Wear appropriate attire that allow you to move freely and comfortably.
- Chose adequate weight (not too heavy).

Mission Explorations

- ◯ Find different types of balls: e.g. basketball, volleyball, football, tennis ball, etc. Why are they different? Do they weigh differently and why?
- ◯ Determine the gravitational pull of Each planet in our solar system relative to Earth's gravitational pull. How many Earth years does it take for each planet to make a complete revolution around the Sun. Calculate your weight and age on each planet in our solar system as you jump from one planet to the next.

Status Check: Have you updated your Mission Journal?