Co-funded by the Erasmus+ Programme of the European Union

Erasmus+

Learning Scientific Skills Outside the Classroom

Scientific Skills

Predicting	Measuring	Recording
Country of Origin	Suggested Age Range	Suggested Theme
Spain	9 - 10	Animals including Humans

Location outside the classroom	Benefits of using this location
On the playground	They have room to exercise and don't have to worry about spillages
Learning Objectives – Scientific Skills	**Learning Objectives – Knowledge**
To measure their heart rate by counting their pulse To predict how many bottles of blood they have in their body To measure and record how much blood they think they have in their body	To discover how hard and efficiently our heart muscles work

Key Vocabulary

Scientific skills vocabulary – predict, predicting, measure, measuring, record, recording, accurate, minute
Knowledge vocabulary – heart, blood vessels, pump, heartbeats, pulse, oxygen, carbon dioxide, nutrients

Resources / Equipment

- Equipment for counting heartbeats – heart rate chart, pencil
- Equipment for how much blood do you have – prediction chart and the following per pair of children: 2 large containers, 1 x 0.5L bottle, a small beaker, stopwatch, funnel, syringe

Teaching Activities

Discuss - Children will have previously learnt about the heart and found out some characteristics about this organ. Discuss this knowledge including the size of the heart, its location in the body, heartbeats and the reason why it never stops. Share this video of heartbeats with them and remind them how to find their heartbeat: https://www.youtube.com/watch?v=gJpT_wHZeF8

Activity 1: Counting heartbeats

Explain – They will be counting their heartbeat in order to measure their heart rate. They are going to do this when resting and again after skipping.

Measure and record – Children measure their heart rates when resting and after skipping. They will count the beats for one minute, write the numbers and compare their results.

Discuss – Did their heartbeat stay the same after exercise or did it change? How did it change? An adult heart rate is on average 70 beats per minute. How does your heart rate compare? Why do you think your heart rate increases after exercise?

Activity 2: How much blood do you have in your body?

Explain – They are going to investigate the research question, 'How much blood do you have in your body?' and think about how many 0.5L bottles of blood they have in their body.

Predict – Show children a 0.5L bottle and ask them to predict how many bottles of blood they have in their body. Children write a prediction on their prediction charts: I predict I have _ bottles of blood in my body.

Demonstrate – Show children a small cup or beaker with the exact amount of liquid (60ml) our heart pumps in just one beat. Explain that this volume represents how much blood is pumped each time their heart beats.

Explain – They are going to be given a range of materials that can be used to investigate the research question, 'How much blood do you have in your body?' They will need to think about how many heart beats they measured in the last activity and take this into account when calculating the amount of blood they have.

Activity – In pairs, children use a 0.5L bottle of water, a plastic container, a funnel and the small cup /beaker, to calculate how much blood they have in their body. If children are struggling to understand what to do, explain that they need to count and pour the correct amount of liquid for each of their heart beats per minute into the bottle and then into the container.

Measure and record– Children record the amount of liquid they pour into the container and add it up to calculate a total amount.

Discuss – How did their results compare to their prediction? A child has approximately 2.5L of blood in their body, that is 5 x 0.5L bottles, how accurate were your results compared to this?

Activity 3: Pumping blood

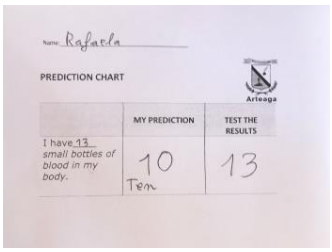
Explain – They are going to be challenged to try to work as fast as their own hearts by pumping all the "blood" (represented by water) in the container with a syringe into an empty container in just one minute.

Activity – In pairs, one child will measure 1 minute accurately using a stopwatch while the other child attempts to pump and pass the blood (represented by water) from one container to the other using only a syringe.

Discuss – What did you find out? Did anyone manage to work as hard as their own heart? What does this tell us about how hard our heart muscles work and how efficient it is? It takes our body about 72 beats to move 2.5L of blood through our body in one minute and takes less than 60 seconds to pump blood to every cell in our body.

N.B. You could discuss how the amount of blood in our body depends on our size but also on various other factors such as altitude.

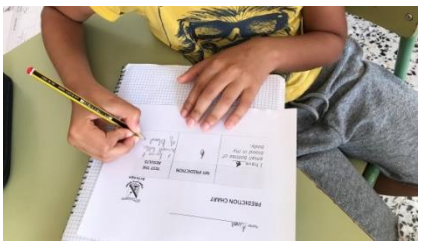
Examples of children's work and teacher comments from country of origin


Name Rafaela

PREDICTION CHART

Arleaga

	MY PREDICTION	TEST THE RESULTS
I have 13 small bottles of blood in my body.	10 Ten	13



We asked the children to explain their observations using their own words and language rather than encouraging them to speak in English as is usual in science lessons. This was because of the complexity of the topic. We would recommend doing this when the weather is not too warm. It is an excellent activity for children to see and understand that the heart is an amazingly strong and efficient muscle.