Pulse

Summary

Age category
9 - 12 years
Topic
Data & Statistics
Total duration
535 minutes

Students explore the pulse in different situations. They create a measurement tool to measure their pulse. They investigate differences between students.

Problem to be tackled:

How can we measure the pulse in different situations?

Real context

Real world motivation

Maria and Peter are outside a Tivoli. They are very excited. Soon it is their time to ride the ghost train. Peter says to Maria can you hear my heartbeat, my heart goes beat, beat... Maria puts her hand on Peters hand and feels his pulse.

During gym lessons students become aware of their pulse, because of physical efforts. When students take exams they can be nervous and feel their heart beating in their chest.

Goals

Skills

Domain-general:

- Solving problems in familiar situations.
- Thinking of and describing approaches.
- Reading and creating tables and diagrams to categorize and report data.
- Comparing the own results with those of others and applying simple reasoning about similarities and differences and what these may be related to, and also contributing to making proposals that can improve the study.
- Documenting studies using different forms of expression (text and pictures) and using documentation from discussions and dialogues.
- Contributing to formulating and choosing action alternatives that lead to improvements.
- Drawing up simple documentation of work using sketches, models or texts.

Mathematics:

- Choosing and using basic functional mathematical methods.
- Applying and following mathematical reasoning.
- Measuring time.
- Counting the resting pulse and the effort pulse during a certain time
- Calculating the class average rate

stem4math

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

- Writing and using charts

Science:

- Talking about some parts of the human body and discussing some factors affecting people's health.
- Executing simple studies dealing with the human body.
- Reasoning about health, sickness and connecting this to some relationships in the human body.

Technology - Engineering:

- Describing and giving examples of simple technical solutions in everyday life.
- Carrying out simple work on technology and designing by testing possible ideas for solutions, as well as designing simple physical models.

Knowledge

Mathematics:

- Time.
- Statistics. Tables, charts and diagrams. Average.

Science:

- Human body. Pulse. How pulse effects health.

Technology - Engineering:

- Timer.

Methodology

Part	Description	Timing
1	**Introduction: class discussion** The teacher discusses the context with the students. They talk about the heartbeat and if someone has experienced a similar situation.	15'
2	**Pulse in different situations: group work - class discussion** The students work with the engage part in the worksheet. The students present what they have written in smaller groups and then have a discussion with the whole class.	30'
3	**My pulse: individual work** The students watch short films/clips from YouTube about pulse: https://www.youtube.com/watch?v=-hD9fzf6PGM https://www.youtube.com/watch?v=2xHFl5PPC6I https://www.youtube.com/watch?v=W5K_HR6hxMY The students try to find their pulse on their body.	10'

4	**Investigating pulse: group work** ***The teacher divides the class in smaller groups (three or four).*** The students work with the 'Investigate part' in the worksheet: How can we find answers about pulse in different situations? How can we measure time? The students discuss with the whole class which measurement tools that exist.	20'
5	**Measurement tool: group work** The students think of how they can create a measurement tool. They use the 'Plan part' in the worksheet. The students with special needs can use the 'Create part' if necessary. The students use their own sketch from the 'Plan part' in the worksheet to create a timer. They create their timer, try it and optimize it, until they are satisfied. Note! As a teacher you have to guide your students in how much time is relevant to measure with (e.g. They can create a timer that measures 15 seconds instead of one minute and they can multiple 15 seconds by four). Take into account that the measurement tool is calibrated correctly, e.g. sand runs through in 15 seconds... Every group has to work on this and they have to estimate these 15 seconds. So, in the end every group needs to have a timer with the same calibration.	240'
6	**Filling in the charts: group work** The students use the 'Conclude part' in the worksheet. They fill in the charts. The students discuss and draw conclusions of their results.	100'
7	**Presentation of research and tool: class event** Each group presents their measurement tool and their conclusions. The tools and conclusions are discussed in class.	80'
8	**Final assessment: group work** The students discuss the 'Report part' in the worksheet. They reflect and evaluate the 'Pulse project'.	40'

Organization

Materials

Per group:

- Computer and internet
- Books
- Ruler, pen, notebook
- Suggestions of materials that can be used for the measurement tool: plastic bottles, duct tape, sand, glue gun, stopwatch, measuring cup, measuring tape, sugar, grit, water, ...

Printables

- Worksheet Pulse
- Optional manual Create a measurement tool

Grouping

Groups should be organized considering students' abilities, math and manual skills. Mix girls and boys and divide them in groups of four or five.

Coaching

Useful questions

Regarding pulse in general:

- Discuss "scared" pulse or another kind of emotional pulse. In which situations you have you experienced your pulse is different? Make a list.
- How is your pulse when you are in love?
- When you are nervous?
- When you are happy?
- Continue measure your pulse in other kind of situations. Measure it before and after your emotional storm.
- How is heartbeat and pulse connected?

Regarding the measurement tool:

- What's happening? What do you see?
- What's the problem with the timer?
- What have you used? Why?
- Why doesn't it work?
- What do you think you should change?

Adaptations

Problems creating the timer?

- Give the students an already prepared sketch of a timer, which they can use for building their own (see printable; create a measurement tool).
- Let them use a stopwatch and not create a timer.
- You can create the timer together with the pupils.

The students can use computers/tablets/... for collecting their data and writing down their results.

Assessment

Teacher's assessment:

Assessment takes place in a formative way, especially regarding:

- Problem-solving (e.g. the students ability to create a measurement tool)
- Planning (e.g. planning the construction of the measurement tool)
- Analysing & interpreting data (e.g. conclusions of the charts)
- Reflecting (e.g. rethinking the process of creating the measurement tool)
- Students' motivation and participation
- Group collaboration
- Presentation of project

Student's assessment:

At the end of the activity:

- If you would start over, what would you do differently?
- Did you use mathematics? When? Examples?
- What were the greatest difficulties?
- How did your team overcome those difficulties?
- How would you evaluate the group work?