



## Lesson Plan

<b>Class:</b> 3B	<b>Grade:</b> 14-16 years old	<b>Time:</b> 2 x 45 minutes
<b>Teacher:</b> Urszula Utnicka		<b>Date:</b> December 2017
<b>Country:</b> Poland		<b>Subject:</b> Mathematics
<b>Topic :</b> Star Wars with Maths		
<b>Aims:</b> 1. Practicing calculating volume and area of solids of revolution 2. Increasing pupils motivation in Maths. 3. Enhancing pupils' skills in working in groups 4. Widening creativity and		
<b>Aids:</b> interactive whiteboard, worksheets, paper, markers, calculators		
<b>Description:</b> 1 <sup>st</sup> lesson for practising formulas and calculations related to circumference, volume and area of surface of solids of revolution: ball, hemisphere and cylinder. Pupils aged 15. In the lesson will be used robots from Star Wars, as examples of solids of revolution. Additionally pupils will learn/know deeper elements of the pop culture and a phenomenon of the Star Wars film. Exercises in the lesson requires spatial imagination, proper reading data in the technical drawings and descriptions. There are also some Maths skills from previous lessons needed: calculating decimals, rounding, converting units. Links and a worksheet are attached. Students present and compare results of calculation In 2 <sup>nd</sup> lesson students invent and draw a robot for doing a homework. They present results of their work, rest of class vote for the best robot. If there is enough time a short discussion "Will robots replace humans?"		
<b>Outcomes</b> Knowledge: Know how to calculate volume and area of solids and what are Star Wars. Application: Calculate area and volume of real solids in concrete situation Analysis: Understand relation between circumference of a ball (3D) and passed distance (2D). Synthesis: Join knowledge in robots in the film, solids of revolution and spatial imagination into a project of the robot. Evaluation: Pupils go beyond known environment. Imagine world of XXII century and place there the invented robot. Affective learning outcomes: Pupils can work in a group, respect its rules, take a role in a group and responsibility.		
<b>Procedure:</b>		
<b>Lesson 1</b> <b>Read Watch Listen</b> 10 minutes 22 students Tutor is available Intro: Star Wars trailer + worksheet (page 3) A teacher presents Star Wars trailer to pupils. Discussion on the film and the characters. Pupils are divided into four similar groups, a teacher share worksheets, pupils can cut them or ask for more copies; every group can use calculators.		

**Collaborate** 20 minutes 4-6 students Tutor is not available

Each group must:

1. Share responsibilities and tasks, including presenting results of common work.
2. Solve three problems presented in a worksheet.

**Practice** 15 minutes 4-6 students Tutor is not available

Pupils in the group: practice formulas and do proper calculations on a paper (1 exercise=1 page).

**Produce** 10 minutes 22 students Tutor is not available

Each group shows the work done to the class - pupils compare the results and chose the most interesting robot.

## **Lesson 2**

**Read Watch Listen** 10 minutes 22 students Tutor is available

Examples of robots which replace humans (surgeons, workers in factories, soldiers, lorry drivers etc.) and/or short video in this topic.

**Collaborate** 20 minutes 4-6 students Tutor is not available

Each group must invent a robot to help with homework in the future. One of its parts must be a ball.

**Practice** 10 minutes 4-6 students Tutor is not available

Pupils in the group: draw and/or describe the robot.

**Produce** 20 minutes 22 students Tutor is not available

Each group shows the work done to the class - pupils compare and vote the most interesting robot.

**Discuss** 10 minutes 22 students Tutor is available

Summary of the lesson. Evaluation. If there is enough time - a short video on R2-D2. Discussion "Will robots replace humans?"

At the beginning of the assignment, students are given a rubric to assess whole group or group members and self-assessment check-list.

Star Wars 8 trailer <https://www.youtube.com/watch?v=QOCbN8sfihY>

### **Homework:**

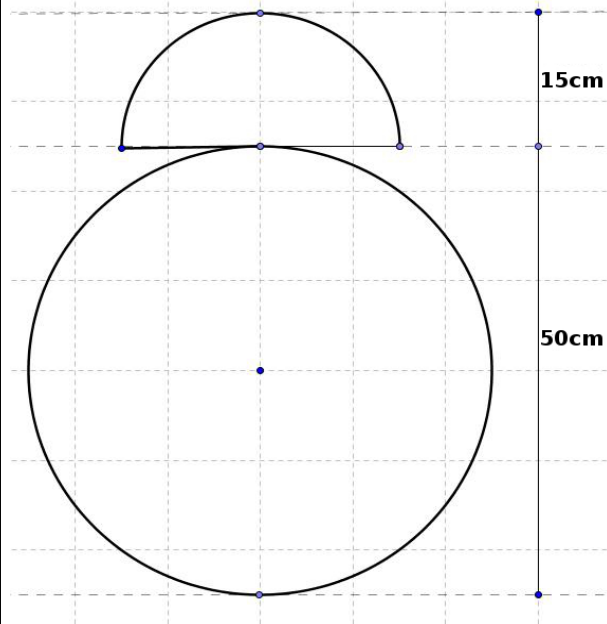
Students watch at home StarWars films or trailers. They have to calculate volume of a thing at home with shape of a ball (more difficult) or a cylinder (easier).

### **Evaluation:**

- Students assess teammates in - the teacher add results and gives notes for group work.
- Teacher's assessment of the worksheets with solved excercises.



### Droid BB-8



1. Calculate area of surface of a droid BB-8. Use the approximate dimensions in a simplified drawing on the right. Write a result in  $\text{cm}^2$ .
2. How many whole turns will do the ball of the droid BB-8 in a distance of 2 miles (1 mila = 1609,344 m),  $\pi=3,1$ .

### Droid R2-D2



3. A droid R2-D2 consists of many parts, but the main (body) was created by joining a cylinder and a hemisphere with a diameter 46 cm. The whole 'body' has a height of 73 cm.

Calculate approximate volume of the droid R2-D2. Write an answer in litres and round to the whole,  $\pi=3,1$ .