# 2014 Student Program Lesson Plan

For step-by-step help in completing this document, please see the accompanying guide.

| Date:          | July 29, 2014 | Class:          | LEGO-Robotics & Astronomy Project. Lesson 5 “Creating LEGO-robot which can solve target goal of team project” |

## Definition and Guiding Question

### LESSON

For the purpose of this STARTALK template a **lesson** is defined as a single learning experience lasting no more than ninety minutes. Learning experiences occur both in the classroom and/or in other settings. Longer blocks of time will involve several learning episodes and lesson plans.

### LEARNING EPISODE

For the purpose of this STARTALK template a **learning episode** is defined as a learning experience that addresses a specific aspect of a learning target or can-do statement. Learning episodes typically provide a limited amount of input with time allowed for guided and independent practice. The amount of time allotted for a learning episode is approximately equivalent to the age of the learner and will rarely be more than twenty minutes.

## Questions to Consider Before and During Lesson Planning

**Do the activities in the lesson**

- provide sufficient opportunities for understanding new words **before** expecting production?
- provide multiple, varied opportunities for students to hear new words/expressions used in highly visualized contexts that make meaning transparent?
- provide students with an authentic purpose for using words and phrases?
- engage all students (as opposed to just one or two students at a time)?
- give students a reason for needing to/wanting to pay attention and be on task?
- vary in the level of intensity and the amount of physical movement required?
- take an appropriate amount of time considering the age of the learner?
- make the learner, not the teacher, the active participant?

**STAGE 1: What will learners be able to do with what they know by the end of this lesson?**

<table>
<thead>
<tr>
<th><strong>DO</strong></th>
<th><strong>KNOW</strong></th>
</tr>
</thead>
</table>
| *What are the learning targets for this lesson?* | *What vocabulary, grammatical structures, language chunks, cultural knowledge, and content information do learners need to accomplish the lesson can-do?*

**Interpretive Listening**
The students can understand teacher’s presentation with some unexpected details on topics related to Physics&Math&Astronomy. **Int. H.**

Terms related to Astronomy, Physics, Math:

*Physics terms:* плотность, ускорение, расстояние, время, сила тяжести, сила реакции, период, масса;

*Astronomy terms:* планета, атмосфера, поверхность, радиус, окружность, сфера, сфероид, Марс, Земля, динамические характеристики, траектория, орбита, оборот, сутки, год;

*Math terms:* объем, формула, длина окружности, эллипс, фокус, эксцентриситет.

**Interpersonal Communication**
The students can get and discuss factual information from articles and teacher’s presentation. **Adv.M.**

The students work in groups. The students ask and answer each other’s questions on Astronomy topics and do research on existing problems in Mars exploration

*The main stages of research:* поставить задачу, сделать исторический обзор, провести исследование, провести эксперимент, наблюдение, опыт, сделать обзор литературы, сделать выводы, проанализировать полученный результат;

*Planetary science:* поставить задачу, определить условия существования, определить начальные и конечные условия, температура поверхности, рельеф, период обращения, состав, гора, равнина, каньон, кратер.
### Interpretive Listening

The students can ask for, follow, and give directions in the process of coding robotics program and in some complicated situations during math problem solving **Int. H.**

The students solve math and computer science problem and exchange their findings during the astronomy research project.

**Math terms:** длина окружности, радиус колеса, пройденное расстояние, угол поворот, число, значение, отношение, уравнение, множество, переменная, функция, радиус, диаметр, длина окружности;

**Engineering terms:** устройство, управление, зарядка, технические характеристики, меню управления, сенсоры, мотор, соединительный кабель, детали, шестеренки;

**Terms related to Computer Science:** цикл, если…то…, пока… делать…, повторить, переменная, константа, связи, блок, подпрограмма, язык программирования, отладка, скачат, запустить, окно, проект.

*Understanding the structure of a math problem genre (“body”-narration and a question):* Определите расстояние; нанесите полученные данные на график, найдите отношение (наклон, угол), постройте график зависимости скорости от времени, заполните таблицу данных для нескольких испытаний, найдите среднее значение.

---

### STAGE 2: How will learners demonstrate what they can do with what they know by the end of the lesson?

<table>
<thead>
<tr>
<th>What will learners do (learning tasks/activities/formative assessments) to demonstrate they can meet the lesson can-do?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study of the physical and dynamical characteristics of Mars related to chosen research project theme.</td>
</tr>
<tr>
<td>LEGO robotics research: Building and programming LEGO robots which can solve target goals of the team project.</td>
</tr>
</tbody>
</table>

---

### STAGE 3: What will prepare learners to demonstrate what they can do with what they know?

**How will you facilitate the learning?**

What activities will be used to ensure learners accomplish the lesson can do? What will the teacher be doing? What will the students be doing?

---

### Opening Activity

Teacher sets the main goal of the lesson for the students by briefly discussing “Comparing the two space objects: Mars and the Earth. What is similar and what is different”

**Time:** 10 min
<table>
<thead>
<tr>
<th>Learning Episode</th>
<th>Time: 15 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>The students read and understand articles about the different physical characteristics of Mars and the Earth. The students then discuss the characteristics and fill out rubrics.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning Episode</th>
<th>Time: 25 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>The students study write code on manipulating the EV3 software: continue study the simple programming options such as forward, backward, and turning robot movements</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning Episode</th>
<th>Time: 30 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>The students discuss design of their LEGO robot which can solve target goals of the team project. The students turn their base robot into a challenge model.</td>
<td></td>
</tr>
</tbody>
</table>

### Materials needed for this lesson

- PowerPoint Presentation about the main characteristic of Mars and the Earth
- LEGO EV3 educational software
- LEGO EV3 educational kit

### Reflection/Notes to Self