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<sup>1</sup>Journal of Conceptual and Applied STEM Education

October 1, 2020

**Suggested Time: 60 Minutes**

### ***Overview:***

A safety circuit is an automatic protection system that is active in emergency situations. It can detect potential dangers and take the necessary measures to reduce risks, but this doesn't mean it's perfect. An example of a safety protection circuit is an elevator that is prevented from falling if one cable breaks or there is some other fault.

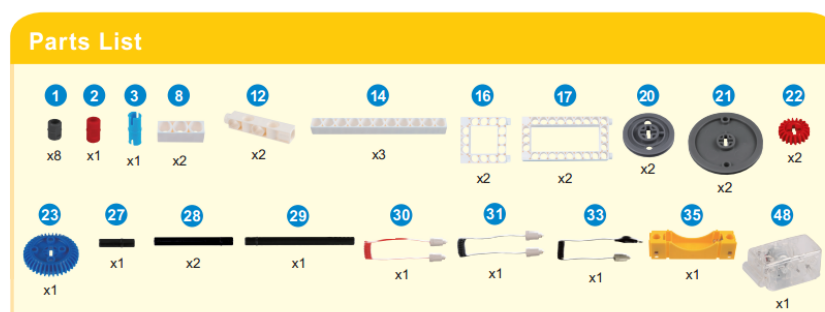
### ***Vocabulary:***

- Electric Circuits
- Automatic breakers
- Modeling
- Pullies and Gears motion
- Wire connector
- Wire clip
- Electric motor

### ***Objectives:***

After completing this model, the students will learn about the importance of automatic braking system in vehicles to reduce accidents. Also, to design a safety vehicle braking system with less human attention in the driving.

*Required Project Materials:*





- Internet devices and individual laptops, tablets or smart phones etc.
- STEM Kit Model (Electricity and Circuits) as shown below.

### *Multimedia resources*

This will be used by the students to prepare a short presentation about the model and the process they followed.

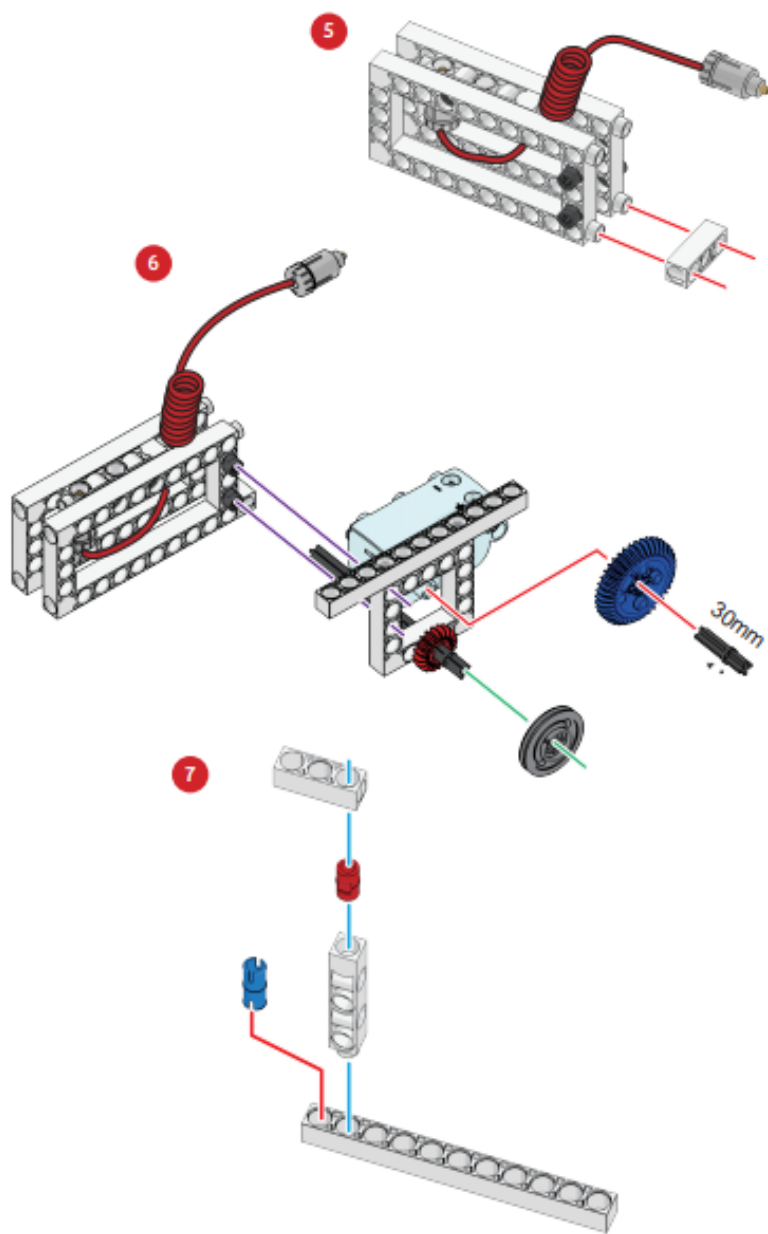
### *Background Information before starting the lesson (5 Minutes):*

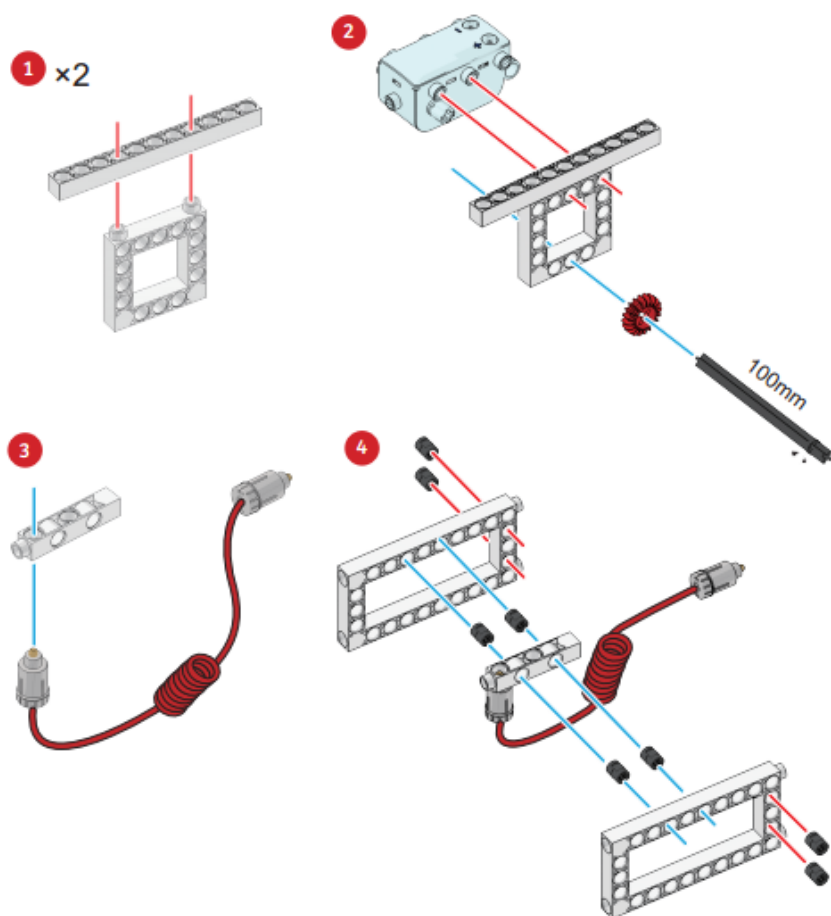
The STEM certified instructor needs to give some basic information about the use of the STEM kits, so that students can use it in a smooth way.

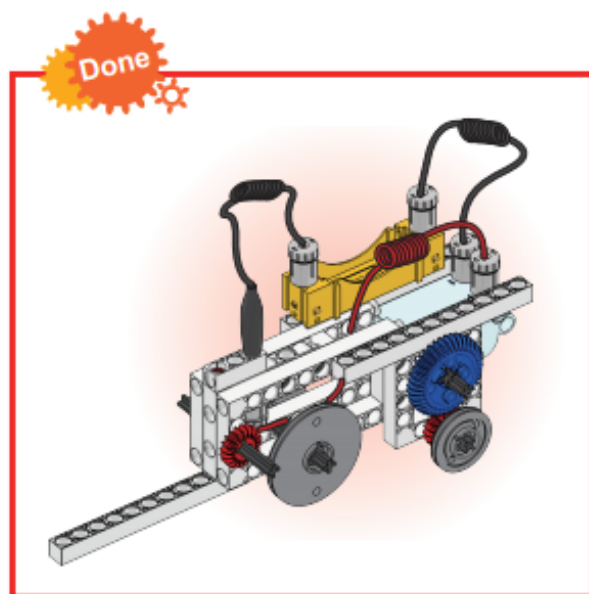
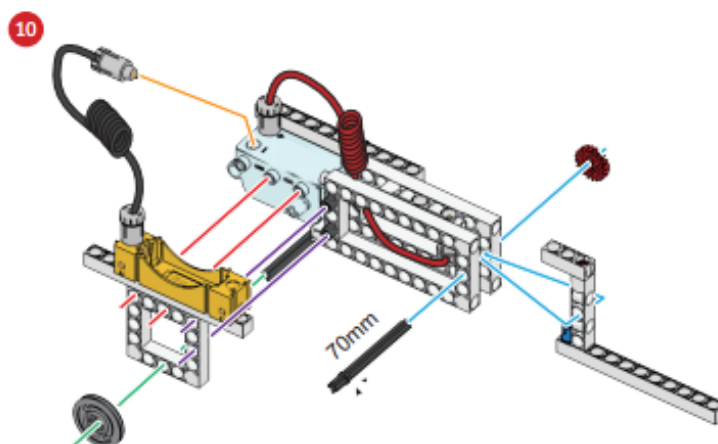
## ***Part 01: The Lesson (40 Minutes)***

### ***Challenge: To Design Automatic Brakes Car***

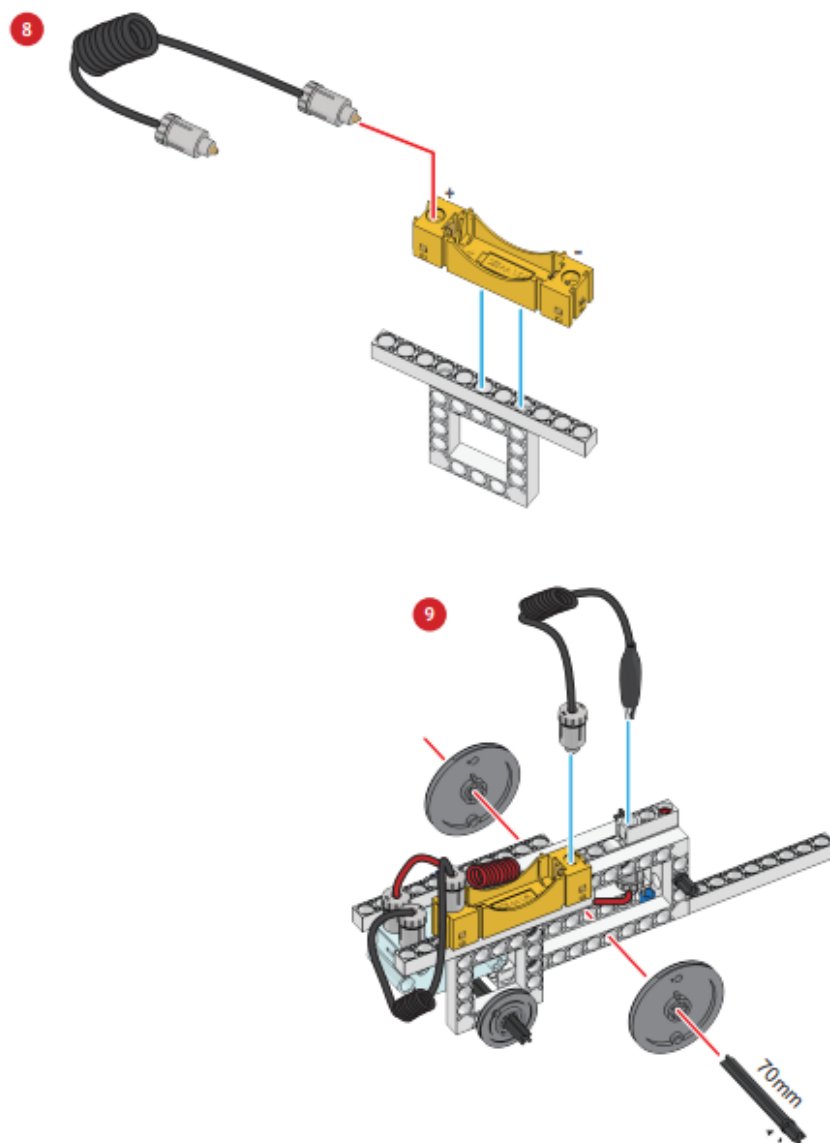
1. Ask the students to define and understand the automatic electric circuits, and try to understand different concepts related to such like automatic protection system.
2. Based on 4C's the learner will start to explore automatic circuit and its functions first.
3. The learners will then write down main points or any possible model about the automatic circuits.
4. The learners need to pick one specific route and need to summarize it to the rest of his class mates.
5. From the specific route which the learners picked, now they will start the designing of the model, like for example learners picked "Electricity and Circuits" as an automatic brake in the vehicle, hence for this purpose Electricity and Circuit manual is given below.







Model Operation  
Video



The learners will be following the 4C's to design this project through Engineer design Process as shown above.

## ***Part 02: Model Presentation (15 Minutes)***

1. After completing the model place it on a table or plane surface for presentations.
2. Here the learners should give at least about 10-15 minutes for the audience to ask the questions about the model they designed.
3. Finally, the judges/STEM instructor will visit the models and will decide the positions among different groups.

## Check List of STEM Lesson

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**Aligned to Grade-Level Standard** The lesson is aligned to appropriate state and/or national math, science, technology, and engineering standards.

**Yes**, this is aligned with Grade 10 curriculum

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**Multidisciplinary** A true STEM lesson must integrate science, technology, engineering, and mathematics.

**Yes**, the lesson is multidisciplinary i.e. learners will get some concepts related to Electricity and Circuits (Science), will deal with some equations (Mathematics), will Create products/models that solve the problem or real-world challenge and can improve the human life (technology), the learner will use some tools to design the project (Engineering).

**Addresses Authentic Challenges** the lesson presents students with real-world challenges or problems with practical and meaningful implications.

**Yes**, the lesson is related to real world problem i.e. to reduce accidents through automatic braking system because when the people driving especially at night, it results more accidents due to person feeling drowsy.

**Integrates 21st Century Skills** the lesson encourages students to develop creativity, critical thinking, problem solving, and teamwork.

**Yes**, the student will need to work according to the 21<sup>st</sup> century learning skills i.e. Critical thinking through information gathered from internet and friends, need to create of find out some possible ways to solve the challenge, then need to collaborate with their friends and then communicate to others about the project.

**More Than One Solution** The lesson includes problems or challenges that have more than one possible solution.

**Yes**, the lesson has more than one solution i.e. automatic brakes system, Sensor detection of objects etc.

**Uses the Engineering Design Process** any design, construction, or prototyping follows the steps of the engineering design process.

**Yes**, the first part of the lesson is designed in such a way that the learners need to follow “engineering designing process” to fulfill the challenge.

**Hands-On** the lesson encourages hands-on manipulation of technology or materials to solve a problem or engineer a design.

**Yes**, the lesson is based on hands-on activity, this is clear from the lesson

**Integrates Technology** The lesson incorporates technology in a way that is seemly and appropriate, simplifying rather than complicating the lesson.

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**Yes**, the project given through this lesson is engaging, interesting and challenging for learners.

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**The End**