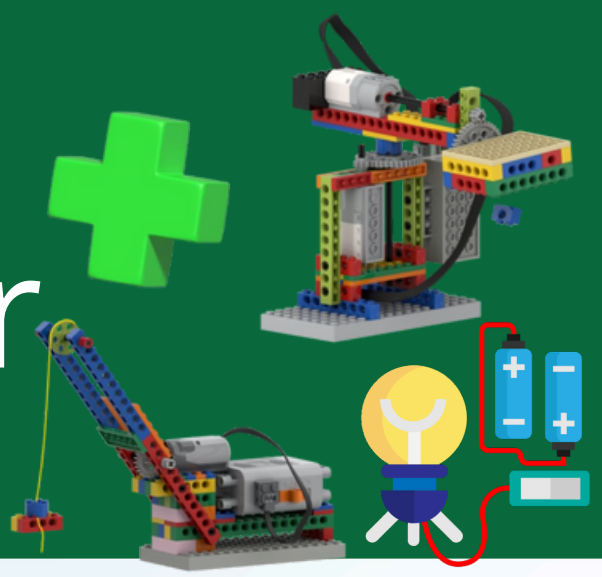
High Ranker

Recommended for Age 7-9



OBJECTIVES

The High Ranker Programme is designed to elevate students' learning experiences by advancing their skills in Science, Maths, Coding, and Design. This programme consists of three interconnected modules: **Robotics STEM, Robotics Coding, and Games and Animation Computing,** each tailored to deepen students' understanding and pro ciency in key areas. In order to broaden students' coding and technology skills we introduced them to three di erent types of coding smart hubs: LEGO® WEDO 2.0, and Spike Prime. This module includes a pivotal transition from icon-based coding to block-based coding, enabling students to grasp more advanced programming concepts and structures. This programme prepares students for future academic pursuits and potential careers in technology and design, equipping them with the necessary skills and knowledge to excel.

SKILL ACQUIRED

- ☑ Fine Motor Skills
- ☑ Visual Spatial Awareness
- ☑ Mathematical Skills
- ☑ Social Skills
- ☑ Problem-Solving
- ☑ Creativity
- ☑ Conceptual Understanding

EDUCATION TOOLS

SOFTWARE

- LEGO® Education WEDO 2.0 App
- LEGO® Education Spike Prime
- MIT Scratch 3.0

STUDENT'S OUTCOME

- ☑ Adaptability to NewTechnologies
- ☑ Boost Creativity
- ☑ Increase con dence
- ☑ Foundation for future learning
- ☑ Improved Science & Mathematics
- ☑ Enhance problem solving
- ☑ Build patience and focus
- ☑ Entreprenuerial skills

LESSON OUTLINE

Theoretical Introduction

- ★ **Robotics STEM:** Introduction to Science, Math and Engineering concepts through LEGO® prototypes.
- ★ **Robotics Coding:** Overview ofcoding principles applied to LEGO® models.
- ★ **Games and Animation:** Learning design concepts for games and animations in computing projects.

Construction & Visual Spatial Perception

- ★ **Visual Spatial Skills:** Learning to identify and assemble 3D LEGO® pieces from 2D instructions
- ★ **Motor Skills:** Developing ne motor strength, precise object manipulation, and coordination.
- ★ **Apply for Robotics Modules only**

Experiments

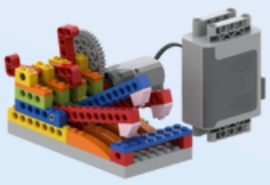
- ★ **Logical Reasoning:** Engaging in logic-based activities aligned with lesson objectives.
- ★ **Project Evaluation:** Analyzing and evaluating projects to meet speci c requirements.

Problem Solving Tasks

- ★ **Progressive Challenges:** Tackling three tasks of increasing di culty.
- ★ **Assessment:** Evaluating problem-solving abilities and creative thinking.

Knowledge Play

- ★ **Fun Facts:** Enhanciggeneral knowledge with science, technology, engineering, and math facts.
- ★ **Quizzes:** Testing conceptual understanding with engaging quizzes on daily topics.



Drum Machine

Fortune Carousel

Garbage Truck

Drop the bricks

Automatics Washing Machine

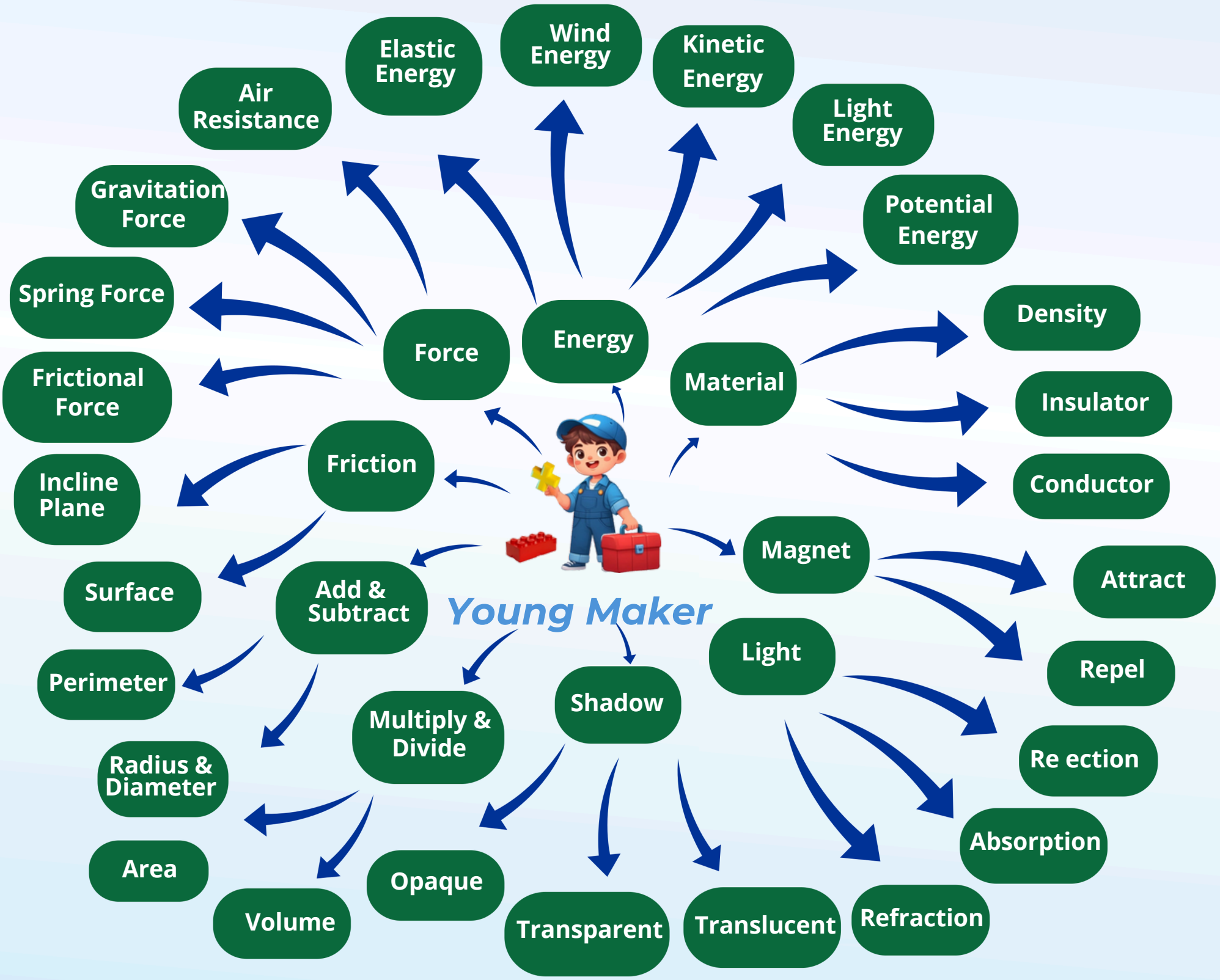
Rhythm Car

Science Topics

- [x] Energy
- [x] Force
- [x] Friction
- [x] Material
- [x] Light
- [x] Shadow
- [x] Magnet

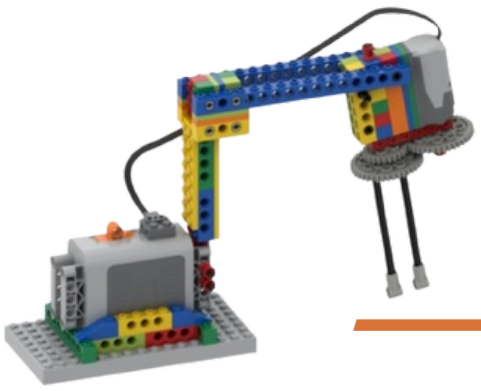
Maths Topics

- [x] Perimeter
- [x] Radius
- [x] Diameter
- [x] Area
- [x] Volume



Instill a love for science and math while developing motor, spatial, problem-solving, and creative skills through building LEGO® models that illustrate real-world principles. This structured program aims to provide an engaging and educational experience, setting students ahead of their peers with an early introduction to primary-level science concepts.

Young Maker



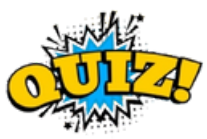
Electric Circuit

An electric circuit is a path through which electricity ows. It consists of a power source (like a battery), a conductor (such as a wire), and a load (like a light bulb or motor) that uses the electricity to do work.

Electric Blender

1. Connect the battery to the wires.
2. Attach the wires to the light bulb or motor.
3. Observe how the light bulb lights up or the motor runs when the circuit is complete.
4. Disconnect one wire to show that breaking the circuit stops the ow of electricity.

1. The rst electric blender was invented in 1922.
2. An electric circuit must be closed for electricity to ow.
3. The speed of a blender's motor can be adjusted by changing the voltage.



1. Electricity ows through a path called a _____. (Ans: circuit)
2. Which part of the electric circuit carries the current? a) Load b) Wire (c) Battery. Ans: b)
3. If a blender takes 2 minutes to blend 500ml, how long will it take to blend 1000ml? a) 4 minutes b) 3 minutes c) 2 minutes. (Ans: a)

Magnet

A magnet is an object that produces a magnetic eld, which attracts certain materials like iron, nickel, and cobalt. Magnets have two poles: north and south. Opposite poles attract each other, while like poles repel each other.

Slow Trekker

1. Attach small magnets to di erent parts of the Slow Trekker.
2. Use another magnet to move the Slow Trekker by attraction and repulsion.
3. Place a piece of paper over a magnet and sprinkle iron lings on top to visualize the magnetic eld.
4. Discuss how the magnets in the Slow Trekker interact to create movement.

1. The Earth itself is a giant magnet with a magnetic eld that protects us from solar radiation.
2. Magnets are used in various technologies, including MRI machines and credit card strips.
3. The strongest magnets are made from rare earth elements like neodymium.

1. A magnet has two poles: _____ and south. (Ans: north)
2. Which of the following materials is attracted to a magnet? a) Plastic b) Iron c) Wood (Ans: b)
3. If the Slow Trekker moves 10 cm when a magnet is 2 cm away, how far does it move when the magnet is 4 cm away, assuming a linear relationship? a) 5 cm b) 10 cm c) 20 cm (Ans: c)

Disclaimers

Please note that this lesson illustration represents only about 30% of the full in-class experience. In addition to the structured content, students also engage in valuable discussions and activities that enhance their learning, which are not fully captured here.

To enhance students' love for coding and technology through engaging and fun activities, building on the foundation established in the Junior Robotics Coder programme. This module introduces intermediate builds and coding using WEDO hardware and accessories. Students will further develop their motor skills, spatial visual skills, and logical reasoning by constructing and programming LEGO® models. The aim is to cultivate problem-solving abilities and inspire creativity, preparing students for more advanced STEM education.

Young Robotics Coder

Military tank

Military tank that can be operated by using a Remote Control, as opposed to manual driven by an operator. A remote control is an electronic device used to control another device. For our lesson, the tablet will serve as a remote control for the military tank

1) Recap on previous lesson on these coding blocks

Coding

2) Introduce the Motor Power coding block and explain what it does.

3) Challenge students what will happen if these coding blocks were to be used

Task 1: Control Motor. Let's use at least all the 5 Motor Blocks in one program.
Task 2: Power Up. Start with 3 di erent power levels.
Task 3: Program the military tank to turn right and left.

Progressive Tasks

Spinning Machine

LEGO® Spinning Machine o ers an exciting hands-on experience that combines fun with learning. It features a fully operational spinning mechanism that demonstrates the controls of motion and rotation via coding and sensors.

1) Demonstrate how to connect the Distance Sensor to the Hub and App.

2) Demonstrate the concept of the motor spinning upon detection of motion

3) Discuss about the bene ts of using distance sensor

Task 1 Make sure the spinning machine can rotate in both directions.
Task 2 - Use distance sensor to detect motion
Task 3 Compare between 2 di erent cases of using distance sensor vs no distance sensor!

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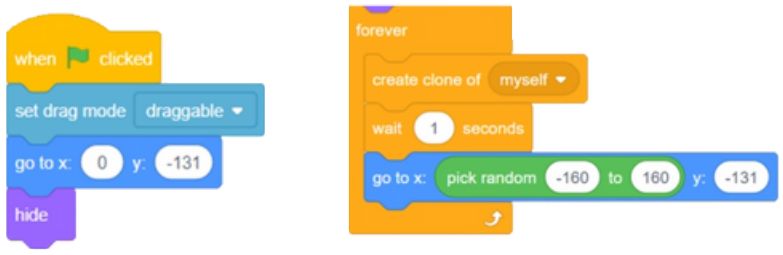
To build on the foundation established in the Junior Computer Scientist programme by furthering students' skills in games, animation, and storytelling design using MIT Scratch 3.0. This intermediate programme continues to develop creativity, logical thinking, and digital literacy. By creating more complex interactive stories and games, students will enhance their problem-solving abilities and communication skills. This programme complements learning in Robotic STEM and Robotics Coding.

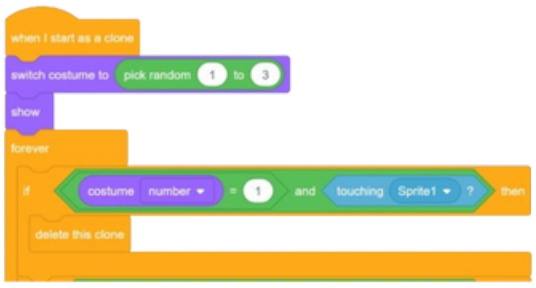
Young Computer Scientist

Sort The Fruits

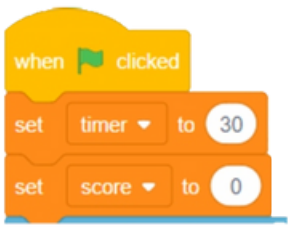
Task 1 - Get students to set the drag mode of the fruit sprite to draggable. Set the position of the sprite and hide it.



Task 2- When the fruit sprite starts as a clone, change the costume to any random fruit. Show the sprite. Use a forever loop to check if the costume is the rst costume and it is touching the rst brown rectangle. Do this for all costumes and rectangle sprites.



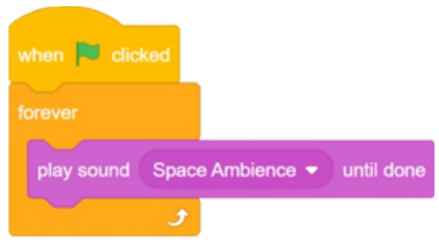
Task 3- Get students to create a variable, Score. Set the Score to 0 at the start. When the fruit sprite is dragged to the correct rectangle, change the score by 1 before deleting the clone.

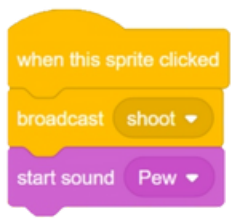


Space Shooters

Task 1 - When left arrow clicked, broadcast 'left'. When right arrow clicked, broadcast 'right'. Under the rocket sprite, when left and right received, move left and right accordingly by changing the x value.

Task 2 Program the rocket to move upwards when it is clicked.





Task 3 Add 3 stars as sprites and make them move across the screen. When the rocket touches the stars, they disappear, make a pop sound, and reappear again after a period of time.

Progressive Tasks

Coding

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