



Unit Map 2011-2012
Hampshire Regional School District
Heffernan, John / Technology 5 / Grade 5 (District Elementary School)

Friday, October 21, 2011, 10:00AM



Unit: Robotics Grade 5 (Week 20, 6 Weeks)  

Enduring Understandings	Essential Questions
Robots can move in different ways under the control of a program the students create.	How can you build and program a robot to move in different ways?
Mathematics can be used to help make a engineering task much easier.	How can you use mathematics to make programming a robot easier?
Curriculum Frameworks and Learning Standards	
<p>MA: Mathematics (2011), MA: Pre-K, Mathematical Practice The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.</p> <ul style="list-style-type: none"> • 1. Make sense of problems and persevere in solving them. • 2. Reason abstractly and quantitatively. • 4. Model with mathematics. • 6. Attend to precision. • 7. Look for and make use of structure. • 8. Look for and express regularity in repeated reasoning. 	
<p>MA: Mathematics (2011), MA: Grade 5 , Operations & Algebraic Thinking 5.OA Write and interpret numerical expressions.</p> <ul style="list-style-type: none"> • 2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. 	
<p>MA: Science and Technology/Engineering, MA: Grades 3 - 5 , Physical Sci (Chemistry & Physics) Forms of Energy</p> <ul style="list-style-type: none"> • 4. Identify the basic forms of energy (light, sound, heat, electrical, and magnetic). Recognize that energy is the ability to cause motion or create change. • 5. Give examples of how energy can be transferred from one form to another. <p>Electrical Energy</p> <ul style="list-style-type: none"> • 6. Recognize that electricity in circuits requires a complete loop through which an electrical current can pass, and that electricity can produce light, heat, and sound. • 7. Identify and classify objects and materials that conduct electricity and objects and materials that are insulators of electricity. 	
<p>MA: Science and Technology/Engineering, MA: Grades 3 - 5 , Technology/Engineering 1. Materials and Tools</p> <ul style="list-style-type: none"> • 1.1 Identify materials used to accomplish a design task based on a specific property, 	

i.e., weight, strength, hardness, and flexibility.

- 1.2 Identify and explain the appropriate materials and tools (e.g., hammer, screwdriver, pliers, tape measure, screws, nails, and other mechanical fasteners) to construct a given prototype safely.
- 1.3 Identify and explain the difference between simple and complex machines, e.g., hand can opener that includes multiple gears, wheel, wedge gear, and lever.

2. Engineering Design

- 2.1 Identify a problem that reflects the need for shelter, storage, or convenience.
- 2.3 Identify relevant design features (e.g., size, shape, weight) for building a prototype of a solution to a given problem.

MA: Science and Technology/Engineering, MA: Grades 3 - 5 , Science Inquiry Skills

Skills of Inquiry

- Ask questions and make predictions that can be tested.
- Select and use appropriate tools and technology (e.g., calculators, computers, balances, scales, meter sticks, graduated cylinders) in order to extend observations.
- Keep accurate records while conducting simple investigations or experiments.
- Conduct multiple trials to test a prediction. Compare the result of an investigation or experiment with the prediction.
- Recognize simple patterns in data and use data to create a reasonable explanation for the results of an investigation or experiment.
- Record data and communicate findings to others using graphs, charts, maps, models, and oral and written reports.

MA: Technology Literacy, MA: Grades 3 - 5 , Research, Prob Solv & Comm

Standard 3. Demonstrate the ability to use technology for research, critical thinking, problem solving, decision making, communication, collaboration, creativity, and innovation.

Research (Gathering and Using Information)

- G3-5: 3.4 Use content-specific technology tools (e.g., environmental probes, sensors, measuring devices, simulations) to gather and analyze data.

Problem Solving

- G3-5: 3.6 With teacher direction, use appropriate technology tools (e.g., graphic organizer) to define problems and propose hypotheses.

Content	Skills
<p>Robots can be programmed to move in their environment in different ways.</p> <p>Trial and error can be used to figure out how to turn a robot 90 degrees.</p> <p>Math ratios can be used to make a task easier. Example, if I know the robot takes .5 seconds to go 12 inches, I can multiply to figure out how long it takes to go 120 inches.</p> <p>Visual instructions can be used to build Lego</p>	<p>Build a robot car according to the visual Lego instructions.</p> <p>Program a robot to:</p> <ul style="list-style-type: none"> • Travel a fixed distance • Make a square • Follow a taped path

based robots.

It pays to be careful when building Lego robots since later steps depend on precision and correctness in earlier steps.

In engineering, mistakes, diagnosing mistakes, and fixing mistakes are a part of the engineering process.

Programming blocks can added sequentially to produce complex behaviors.

Assessments

Observation

Formative: Project: Technology

Observe that students complete the required task. Look for examples that they have used math to make the programming task easier.

Quiz

Formative: Other: Quiz

If a robot car travels one tile in .5 seconds, how long will it take to travel 7 tiles? Show your work and your answer below.

Learning Activities

Build a robot car according to the visual Lego instructions.

Program a robot to:

- Travel a fixed distance
- Make a square
- Follow a taped path

Students will complete a checklist as they go along. (See attached)

 [G5LegoL2.pdf](#)

Resources

Lego Education Mindstorms NXT Base Set Laptops with MINDSTORMS NXT installed

 [Kids Engineer Web Site](#)

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