Scope and Sequence for Robotics: Grade 3

Programming and Building

Unit: At-Your-Service Bots

Students use wheel rotations and sensors for navigation and build arms to give their NXT robots the ability to serve food in a restaurant and assist the Forest Service in the dangerous job of fighting fires.

GRADE 3	LEARNER'S PERMIT	OPERATOR'S LICENSE	MISSION POINTS	ROBOTICS ENGINEER
At-Your-Service Bots!	**Programming concepts:** • Distance can be measured to the nearest tenth or hundredth of a rotation. • Turns can be described as clock times (i.e., 3:00 and 9:00 for 90° turns; 6:00 for 180°. • A 1:00 turn takes .4 rotations. **Tasks to complete:** • 2-5 step programs with one or more turns.	**Programming concepts:**. • Sensors allow the robot to respond to different conditions (i.e., light or dark, touch sensor in or out). • Sensors are wait for commands; they must be used with a move command set for "unlimited." • The sensor sequence must tell the robot what to do when the condition is met (i.e., stop). • The "stop" setting on the move command stops the power to the motors. **Building concepts:** • The NXT light sensor measures reflected light. • The touch sensor has two states – in and out. **Tasks to complete:** • Programs with light, touch, and ultrasonic sensor control.	**Programming concepts:** • A loop repeats commands. • A loop can be set for different conditions. • A program can have two strings for simultaneous non-conflicting actions. **Building concepts:** • Engineers design to meet criteria. • Arms should be light, sturdy, and make the best use of parts. **Tasks to complete:** • Build arms and use sensors to navigate into position to wait tables and serve pizza and soup.	**Independent programming and engineering challenges:** • Design and build attachments to help assist the Forest Service in the dangerous job of fighting fires. • Program a fast and accurate route to meet the challenges.

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Academic Content, Deep Learning Proficiencies, and Ed Tech Standards

The eight-week Robotics unit provides students with the opportunity to apply STEM (Science, Technology, Engineering and Math) concepts and skills and develop and practice CFSD's Deep Learning Proficiencies required of 21st Century learners. Students work collaboratively and think critically and creatively in planning, testing, and refining programs; solving problems; and accomplishing engineering tasks.

GRADE 3	MATHEMATICS	SCIENCE	DEEP LEARNING PROFICIENCIES	EDUCATIONAL TECHNOLOGY
At-Your-Service Bots!	**Number and Operations - Fractions:** • 3.NF.1. Understand a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by *a* parts of size 1/*b*. • 3.NF.2. Understand a fraction as a number on the number line; represent fractions on a number line diagram. **Measurement and Data:** • 3.MD.4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters. **Mathematical Practices:** • 2.MP.5. Use appropriate tools strategically. • 2.MP.6. Attend to precision.	**Scientific Inquiry:** • SC3.1d.2 Solves problems using appropriate tools and units of measure. **Interaction of Science and Society:** • SC3.2. Describes the development and use of different technologies in response to resources, needs, and values.	**Collaboration**: ▪ Fulfills various basic roles and responsibilities in order to complete a task. ▪ Uses strategies to respectfully resolve conflicts with another team member. ▪ Completes individual action items to achieve the team goals. ▪ Submits products that meet the specifications for the group tasks. ▪ Acts upon feedback that suggests changes or revisions to work, based upon provided criteria for success. **Critical Thinking and Problem Solving:** • Uses established criteria to identify errors in the thinking or problem-solving process. **Creativity and Innovation:** • Discards ideas or solutions if viability is not confirmed; modifies an idea or solution in response to constructive criticism or failure. • Integrates ideas from others with own ideas in order to address the problem or task. • Selects materials that are appropriate to the product or	**Technology Operations and Concepts:** • ET3.6.14 Transfers understanding of current input/output devices and symbols and icons to learning new technologies.

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GRADE 3	MATHEMATICS	SCIENCE	DEEP LEARNING PROFICIENCIES	EDUCATIONAL TECHNOLOGY
			solution. • Creates and follows a general plan to meet the specification of the product or solution. • Assesses the quality of the performance and creative process in response to feedback and/or established criteria.	