

Grade level: 8

Course Title: Automation & Robotics

Topic/Concept: Intro to Automation & Robotics

Time Allotment: 9 days

Unit Sequence: 1

Major Concepts to be learned:

- Classroom expectations and safety procedures
- Introduction to automation and robotics
- Real-world applications of robots
- Types of robots and automated systems
- Algorithms and sequencing
- Engineering communication and research

Expected Skills to be demonstrated:

- Demonstrate safe classroom/lab behavior
- Explain how automation impacts society
- Identify various types of robots and their uses
- Develop simple algorithms and sequencing instructions
- Conduct research and present findings
- Communicate technical information effectively

PA Standards/Anchors:

Eligible Content:

3.6.7.A	3.6.7.C	Automation systems
3.6.7.D	3.7.7.A	Robotics applications
3.7.7.C	CC1.4.7.A	Algorithms & sequencing
CC.1.5.7.D		Research & technical communication
		Engineering problem solving

Instructional Strategies:

Assessments:

Direct instruction	Google slide presentations	Safety worksheets
Video-based learning	Guided discussion	Homework assignments on automation
Hands-on activities	Cooperative learning	Sandwich algorithm activity
Research-based learning	Student Presentations	Robot research report
		Oral presentation rubric

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Topic/Concept: Mechanisms

Time Allotment: 14 days

Unit Sequence: 2

Major Concepts to be learned:

- Mechanical systems and mechanisms
- Motion transfer
- Gear ratios and mechanical advantage
- Windmill design and construction
- Observation and analysis of mechanisms
- Testing and evaluating mechanical systems

Expected Skills to be demonstrated:

- Identify common mechanisms and their functions
- Analyze gear systems and gear ratios
- Construct and test mechanical models
- Apply engineering problem-solving techniques
- Evaluate the effectiveness of mechanical systems

PA Standards/Anchors:

Eligible Content:

3.4.7.C 3.6.7.A
3.6.7.D 3.6.7.E
3.7.7.B CC.2.1.7.D.1
CC.2.3.7.A.1

Mechanical advantage
Gear systems
Motion & force transfer
Structural design
Engineering testing procedures

Instructional Strategies:

Assessments:

Demonstration Guided practice
Hands-on activities Inquiry-based learning
Engineering challenge Cooperative group work
Visual modeling & diagrams

Activity 2.1 "Observing Mechanisms"
April 6th Activity worksheet
Activity 2.2 "Mechanical Gears"
Mechanical Gears Review worksheet
Windmill construction project
TestBed activity
Teacher observation and participation

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Topic/Concept: Robot Construction & Engineering Design

Time Allotment: 14 days

Unit Sequence: 3

Major Concepts to be learned:

- Robot subsystems and components
- Structural design principles
- VEX robotics parts and systems
- Engineering assembly procedures
- Team-based construction processes

Expected Skills to be demonstrated:

- Identify VEX robot components
- Properly assemble robot structures
- Use engineering diagrams and instructions
- Collaborate during robot construction
- Troubleshoot structural problems

PA Standards/Anchors:

Eligible Content:

3.6.7.D 3.7.7.B
15.4.8.A 15.4.8.B
3.4.7.E

Robot structure subsystems
Engineering assembly
Technical interpretation
Troubleshooting and redesign

Instructional Strategies:

Assessments:

Teacher modeling
Guided assembly
Video tutorials
Collaborative learning
Problem-solving exercises
Hands-on construction

Robot build completion
Participation and teamwork
Teacher observation
Build accuracy and functionality checks

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**Topic/Concept: Robot Behaviors,
Pseudocode, & Programming**

Time Allotment: 10 days

Unit Sequence: 4

Major Concepts to be learned:

- Robot behaviors and automation logic
- Pseudocode development
- Introductory programming concepts
- Motor and sensor configuration
- Programming syntax and commands
- Problem-solving through coding

Expected Skills to be demonstrated:

- Write and interpret pseudocode
- Configure robot motors and switches
- Program robot movement and behaviors
- Debug and troubleshoot code
- Apply programming logic to complete challenges
- Demonstrate computational thinking

PA Standards/Anchors:

Eligible Content:

3.4.7.E 3.6.7.D
15.4.8.C 15.4.8.D
CC.2.2.7.B.3 3.7.7.D

Programming logic
Pseudocode
Robot automation
Sensor and motor control
Troubleshooting and debugging

Instructional Strategies:

Assessments:

Direct instruction
Coding demonstrations
Guided programming practice
Collaborative troubleshooting
Challenge-based learning
Incremental skill development

Activity 3.2 “Robot Behaviors and Pseudocode”
Activity 3.3 “Using ROBOTC”
Programming exercises
Labyrinth challenge performance
Teacher observation
Debugging/problem-solving checks

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**Topic/Concept: Course Wrap-Up &
Lab Procedures**

Time Allotment: 6 days

Unit Sequence: 5

Major Concepts to be learned:

- Proper robot disassembly and storage
- Lab organization and maintenance
- Reflection on engineering and programming concepts

Expected Skills to be demonstrated:

- Properly tear down and organize equipment
- Demonstrate responsibility for lab materials
- Reflect on robotics and engineering learning experiences

PA Standards/Anchors:

Eligible Content:

3.7.7.A
3.7.7.B
3.6.7.E

Programming logic
Pseudocode
Robot automation
Sensor and motor control
Troubleshooting and debugging

Instructional Strategies:

Assessments:

Guided cleanup procedures
Reflection activities
Class discussion

Proper cleanup and robot teardown
Participation
Reflection activities
Teacher observation