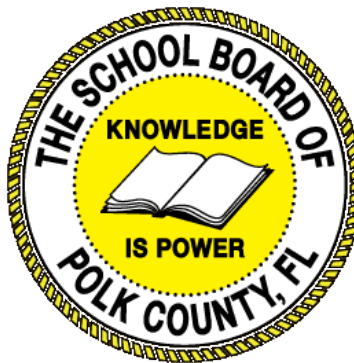


Individual Test Item Specifications

9410110- Foundations of Robotics

2015



The contents of this document were developed under a grant from the United States Department of Education. However, the content does not necessarily represent the policy of the United States Department of Education, and you should not assume endorsement by the federal government.

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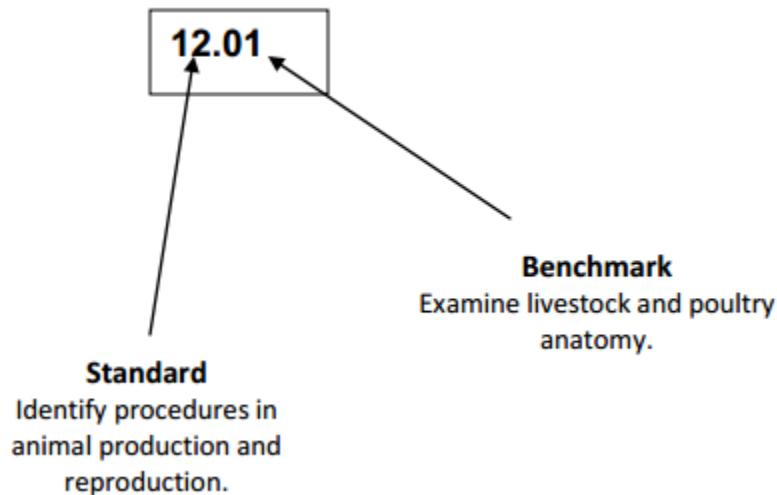
I. Guide to the Individual Benchmark Specifications

Content specific guidelines are given in the *Individual Benchmark Specifications* for each course. The *Specifications* contains specific information about the alignment of items with the Florida Standards. It identifies the manner in which each benchmark is assessed, provides content limits and stimulus attributes for each benchmark, and gives specific information about content, item types, and response attributes.

Benchmark Classification System

- Each Career and Technical Education course has its own set of course standards. The benchmarks are organized numerically, with two numbers separated by a decimal point. The first number is the standard number, and the second number is the benchmark number. You will see these numbers on the Item Specifications for each course.

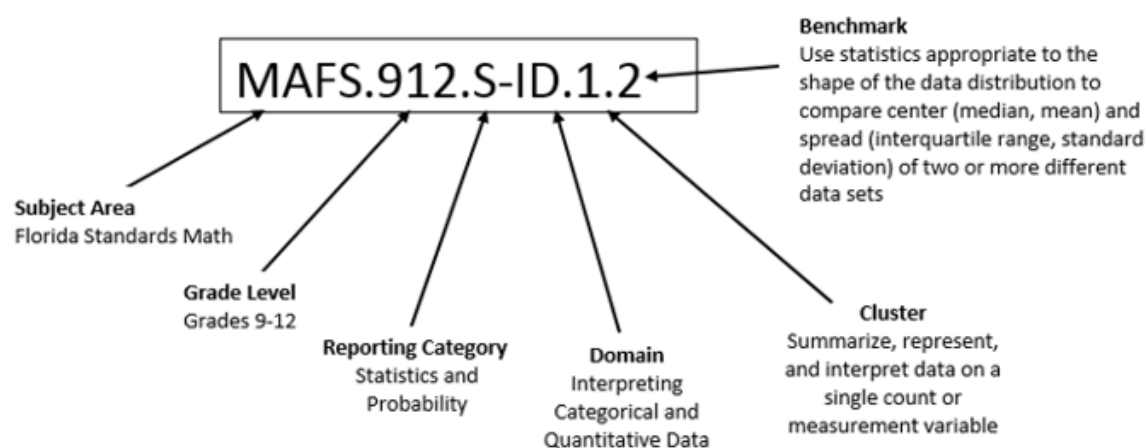
An example, from Agritechnology 1:



The image above describes the components of a Career and Technical Education Standard and Benchmark classification system.

Each MAFS benchmark is labeled with a system of letters and numbers.

- The four letters in the *first position* of the label identify the **Subject**.
- The number(s) in the *second position* represents the **Grade Level**.
- The letter(s) in the *third position* represents the **Category**.
- The number in the fourth position shows the **Domain**.
- The number in the *fifth position* identifies the **Cluster**.
- The number in the last position identifies the specific **Benchmark**.



The image above describes the components of a Florida Standard and Benchmark classification system.

Definitions of Benchmark Specifications

The *Individual Benchmark Specifications* provides standard-specific guidance for assessment item development for the Florida Department of Education Career and Technical Education item banks. For each benchmark assessed, the following information is provided.

Reporting Category	is a grouping of related benchmarks that can be used to summarize and report achievement.
Standard	refers to the standard statement presented in the Florida Standards.
Benchmark	refers to the benchmark statement presented in the Florida Standards. In some cases, two or more related benchmarks are grouped together because the assessment of one benchmark addresses another benchmark.
Item Types	are used to assess the benchmark or group of benchmark.
Cognitive Complexity	ideal level at which item should be assessed.
Benchmark Clarifications	explain how achievement of the benchmark will be demonstrated by students. In other words, the clarification statements explain what the student will do when responding to questions.
Content Limits	define the range of content knowledge and that should be assessed in the items for the benchmark.
Stimulus Attributes	define the types of stimulus materials that should be used in the items, including the appropriate use of graphic materials and item context or content.
Response Attributes	define the characteristics of the answers that a student must choose or provide.
Content Focus	addresses the broad key terms and concepts associated with the examples found in the standards, benchmarks, or benchmark clarifications.
Sample Items	are provided for each type of question assessed. The correct answer for all sample items is provided.

II. Individual Benchmark Specifications

Standard	04.0 Demonstrate an understanding of robotics, its history, applications, and evolution. – The student will be able to:
Benchmark	04.02 Compare and contrast various applications of automation and robotics.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	Moderate, High
Benchmark Clarification	Students will discuss two or more applications of robotics in automation.
Content Focus	Automation
Content Limits	Items will be limited to choosing an automated process from a list or have to discuss no more than two applications of automation in robotics
Stimulus Attributes	Stem will have students distinguish applications of automation.
Response Attributes	Students will choose an automated process from a list or compare and contrast in summary form.
Sample Item	Distinguish the similarities and differences between fixed and programmable automation. Rubric 2 Points- The student distinguishes at least one similarity and one difference. 1 Point- The student distinguishes either one similarity or one difference. 0 Points- The student does not distinguish a similarity or a difference.

Standard	05.0 Describe Artificial Intelligence (AI) and the forms of applied logic. – The student will be able to:
Benchmark	05.01 Describe the fundamental elements that comprise artificial intelligence.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	Low
Benchmark Clarification	Students will understand the vocabulary and basic elements used in artificial intelligence.
Content Focus	Heuristics, mnemonic, schema, algorithms, neural network, fuzzy logic, knowledge representation
Content Limits	Items will be limited to the basic terminology used to describe the elements of artificial intelligence.
Stimulus Attributes	Students will be provided with definitions of artificial intelligence terms to identify.
Response Attributes	Student will identify elements of vocabulary commonly used in the field of artificial intelligence.
Sample Item	Artificial intelligence researchers found what Low level experience is the most difficult to model in a computer? a. heuristic search b. knowledge representation c. common sense reasoning d. algorithms Correct Answer: c

Standard	05.0 Describe Artificial Intelligence (AI) and the forms of applied logic. – The student will be able to:
Benchmark	05.04 Describe Boolean logic, its operations and laws, as used in robotics.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	Low, Moderate
Benchmark Clarification	After reading a prompt or passage, students will solve a Boolean algebra problem.
Content Focus	Boolean Laws, Boolean Functions
Content Limits	Items will be limited to the basic laws needed to solve a simple logic problem. No diagrams will have to be interpreted. No justification of steps in solving will be needed.
Stimulus Attributes	Students will be given a stem that will include the actual expression or equation to solve.
Response Attributes	Students will choose from multiple choice responses.
Sample Item	Using the distributive law, simplify the following Boolean expression: $(A+B)(A+C)$ a. $A + (BC)$ b. $(AB) + C$ c. $AA + AC + AB + BC$ d. $A(A+C) + B(A+C)$ Correct Answer: a

Standard	05.0 Describe Artificial Intelligence (AI) and the forms of applied logic. – The student will be able to:
Benchmark	05.05 Translate data specifications into truth tables and extract logical expressions.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	Moderate, High
Benchmark Clarification	Students will be able to calculate the basic logic gates from their logical Boolean expression, their schematic symbol, and be able to translate them into their truth tables.
Content Focus	AND, OR, NOT, NAND, NOR, XOR, XNOR, Buffer, Boolean, Truth Table
Content Limits	Content is limited to the basic gates and their expression. No Boolean algebra calculations.
Stimulus Attributes	Images may be used
Response Attributes	Students will be able to convert data into truth tables and select the proper truth table from an explanation of the logic gate.
Sample Item	The Boolean expression $X = A + B$ identifies which logic gate? a. AND b. NOT c. NAND d. OR Correct Answer: d

Standard	05.0 Describe Artificial Intelligence (AI) and the forms of applied logic. – The student will be able to:
Benchmark	05.06 Solve simple Boolean algebra problems.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	Low, Moderate
Benchmark Clarification	The student will be able to identify and calculate the basic rules and laws of Boolean algebra. Students will be able to identify basic statements and optimize logic equations.
Content Focus	Boolean, AND, OR, NOT, NAND, XOR, XNOR, Buffer, complementary, associative, De Morgan's theorem
Content Limits	Content only includes simple Boolean algebra problems, and identification of rules.
Stimulus Attributes	Images and use of truth tables may be used
Response Attributes	Students will identify Boolean algebra to illustrate the basic truth tables.
Sample Item	Which of the following illustrates the Boolean identity law? a. $A = A$ b. $A + A = A$ c. $A * 1 = A$ d. $A + B = B + A$ Correct Answer: a

Standard	6.0 Describe the role of sensors in the field of robotics – the student will be able to:
Benchmark	06.03 Describe the types of sensors and ways in which they can be categorized.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)=X (ER)=
Cognitive Complexity Level	Low, Moderate
Benchmark Clarification	Students will be able to identify types of sensors, their characteristics, and proper uses. Students will also identify electronics components that are used as sensors.
Content Focus	Contact sensor, non-contact sensor, photoelectric, limit switch, photo receiver, photo transmitter, proximity, range, tactile, strain gauge, encoder, infra-red, ultrasound
Content Limits	Content will include types of sensor and sample applications. No math or calculations.
Stimulus Attributes	Images may be used.
Response Attributes	Students will identify types of sensors and example applications
Sample Item	Which sensor requires physical contact with an object? a. actuator b. infra-red c. proximity d. switch Correct Answer: a

Standard	6.o Describe the role of sensors in the field of robotics – the student will be able to:
Benchmark	6.o6 Differentiate between active and passive infrared sensors relative to their use in robotics.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	Low, Moderate
Benchmark Clarification	The students will identify a specific infrared sensor as an active infrared sensor or passive infrared sensor.
Content Focus	Infrared (IR) sensor, active IR, passive IR
Content Limits	Sensors for robot functioning can be used. Sensors used for scientific purposes such as probes will not be used.
Stimulus Attributes	Students will be given a stem, written prompt, or Images that will include several examples of infrared sensors. Students will be asked to identify the passive or active infrared sensor from the examples
Response Attributes	Students will be given multiple-choice answers listing the possible sensors that were provided in the stem or prompt. CR – paragraph form differentiating between passive and active infrared sensors and give an example of each.
Sample Item	Robots can use multiple sensors to function with its programmed tasks. Out of the following choices, which one is NOT an active sensor? a. Camera b. Infrared c. Laser d. Ultrasonic Correct Answer: a

Standard	07.0 Demonstrate an understanding of the foundations of electronics. – The student will be able to:
Benchmark	07.01 Define voltage, current, resistance, inductance, and capacitance.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	Low, Moderate
Benchmark Clarification	After reading the definition or context clues from a passage, the student will choose the appropriate vocabulary term.
Content Focus	Voltage, current, resistance, inductance, capacitance
Content Limits	The definition could be given or the prompt will be no higher than a 9th grade reading level.
Stimulus Attributes	The stem could include the definition or the prompt could include one of the terms to define.
Response Attributes	Students must choose the appropriate term or definition.
Sample Item	Identify the correct term for the following definition: In an electric circuit the flow of electric charge and is carried by moving electrons in a wire. a. current b. inductance c. resistance d. voltage Correct Answer: a

Standard	07.0 Demonstrate an understanding of the foundations of electronics. – The student will be able to:
Benchmark	07.03 Identify and describe the operation of common electronic components.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	Low, Moderate
Benchmark Clarification	The student will be able to identify electronic components by picture, electronic schematic, and identify their value. Students will also provide an example or identify their use or need in a circuit.
Content Focus	Resistor, capacitor, inductor, transistor, diode, light emitting diode, transformer, integrated circuit, schematic
Content Limits	Includes identifying component parts from schematics and photos. Does not include specific or calculations for use.
Stimulus Attributes	Images may be used
Response Attributes	Students can identify basic electronic part on site, and form schematic diagrams.
Sample Item	<p>What component may be bad if a scratchy noise is occurring while adjusting the volume on a radio?</p> <ul style="list-style-type: none"> a. capacitor b. photoresistor c. potentiometer d. thermistor <p>Correct Answer: c</p>

Standard	07.0 Demonstrate an understanding of the foundations of electronics. – The student will be able to:
Benchmark	07.04 Compare and contrast series and parallel circuits.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	Low, Moderate
Benchmark Clarification	Students will explain the attributes of series and parallel circuits. This will include how voltage, current, and resistance behave in series and parallel circuits.
Content Focus	Voltage, current, resistance, series, parallel, combination circuits
Content Limits	There are no math calculations in these questions.
Stimulus Attributes	Images may be used
Response Attributes	Students will be able to describe how current and voltage behave in series and parallel circuits,
Sample Item	How many paths does a parallel circuit have for current to flow? a. One b. Two c. Only three d. Two or more Correct Answer: d

Standard	07.0 Demonstrate an understanding of the foundations of electronics. - The student will be able to:
Benchmark	07.05 Define Ohm's Law and Kirchoff's Laws.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	Low, Moderate
Benchmark Clarification	Ohm's Law will need to be defined or applied in series and parallel circuits
Content Focus	Ohm's Law, Kirchoff's Law, resistance, current, voltage
Content Limits	Choosing the correct formula when there are multiple unknowns given. The summation of resistance will not be done prior to calculating voltage or current.
Stimulus Attributes	Stem will have a scenario with unknowns.
Response Attributes	Determine the appropriate Law translation and/or determine a numeric value for unknown.
Sample Item	In a given direct current circuit, the source voltage is 9V and the total resistance is 270 Ohms. Solve for the total current in the circuit. a. 300 A b. 30 A c. 3 A d. 0.03 A Correct Answer: d

Standard	07.0 Demonstrate an understanding of the foundations of electronics. - The student will be able to:
Benchmark	07.08 Describe the characteristics of analog and digital signals.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	Low, Moderate
Benchmark Clarification	The student will compare and contrast analog and digital signals and provide an example for each.
Content Focus	Analog, Digital
Content Limits	Questions include the differences between analog and digital signals. Including be able to identify and provide examples of each.
Stimulus Attributes	may include schematics of series and parallel circuits
Response Attributes	Students will tell the attributes of both analog and digital signals, identifying examples of each
Sample Item	One of the two basic types of signals is analog. What is the other type? a. Digitex b. Digital c. Pulsing d. Sine wave Correct Answer: a

Standard	o8.o Describe the operation of basic electronic devices used in robotics. – The student will be able to:
Benchmark	o8.o1 Describe how DC motors are used in robotics.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	Moderate, High
Benchmark Clarification	Students will describe the types and used of DC motors in robotics. This will include the attributes and the advantages and disadvantages of each type. Students will also demonstrate knowledge of the parts of common DC motors.
Content Focus	DC motor, Servo Motor, brushless motor, armature, brushes, field winding, comutatoro
Content Limits	Questions include basic definitions, uses and types of motors. No math calculations or gear ratios are presented.
Stimulus Attributes	Images may be used
Response Attributes	Students will identify type of DC motors, uses in robotics and their basic internal parts.
Sample Item	<p>What type of motor moves a few degrees then stops when power is applied?</p> <ul style="list-style-type: none"> a. brushed DC motor b. brushless DC motor c. servo motor d. stepper motor <p>Correct Answer: d</p>

Standard	o8.o Describe the operation of basic electronic devices used in robotics. – The student will be able to:
Benchmark	o8.o2 Describe how speed and torque are controlled in DC motors.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	Low
Benchmark Clarification	Students will know the effects that changing voltage and current have on torque and speed in a DC motor. Students will understand how gear ratios effect the speed and torque of a system.
Content Focus	Torque, force, angle, velocity
Content Limits	Questions include how torque is used, no math or calculations are used.
Stimulus Attributes	Questions include terms and definitions relating to servo and DC motors.
Response Attributes	students will understand how different motors control speed and torque.
Sample Item	If torque was linear what would it be called? a. energy b. mass c. momentum d. force Correct Answer: d

Standard	o8.o Describe the operation of basic electronic devices used in robotics. – The student will be able to:
Benchmark	o8.o3 Describe how servos are used in robotics (e.g., robot arms, legs, steering, et al).
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	Low
Benchmark Clarification	A description will need to be given or selected for the appropriate use of a servo.
Content Focus	Servo
Content Limits	Items will be limited to robotic motion that uses servos. Servo limitations will not be assessed.
Stimulus Attributes	Stem or writing prompt will describe several forms of robotic motion.
Response Attributes	Choose or provide a response that chooses the correct robotic motion that uses a servo.
Sample Item	Servos are a form of motor that allows robots to move with certain degrees of freedom. Which robotic motion described below uses a servo? a. forward motion b. point turns c. swing turns d. wrist motion Correct Answer: d

Standard	o8.o Describe the operation of basic electronic devices used in robotics. – The student will be able to:
Benchmark	o8.o4 Describe how angle and torque are controlled in a servo motor.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	Moderate, High
Benchmark Clarification	The student will explain pulse width modification and how it determines the position angle of the motor. Also, that unlike a standard DC motor, servos contain gears that increase motor torque.
Content Focus	Servo, gears, potentiometer, control circuit, pulse width modification
Content Limits	Questions include the mechanics and electronic components used to control angle and torque. No calculations are required.
Stimulus Attributes	Questions may include Images and examples of gear ratios
Response Attributes	Students will understand how servos control torque, and the effects of gear ratios
Sample Item	<p>What is the maximum amount of force that a servo motor can exert called?</p> <ol style="list-style-type: none"> current rating torque rating pulse force pulse modification <p>Correct Answer: b</p>

Standard	o8.o Describe the operation of basic electronic devices used in robotics. – The student will be able to:
Benchmark	o8.05 Compare and contrast open and closed loop feedback/control systems.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	Moderate, High
Benchmark Clarification	The student will identify examples of closed loop and open loop systems. Students will know the definitions of terms related to closed loop and open loop systems.
Content Focus	Open loop, closed loop, set point, feedback, regulator, servo
Content Limits	Questions are limited to open and closed feedback systems.
Stimulus Attributes	Questions include examples of feedback systems bot open and closed loop.
Response Attributes	Student identify open loop and closed loop systems
Sample Item	<p>What feature does a closed loop system have the an open loop system does not</p> <ol style="list-style-type: none"> actuators control variables feedback D.forward path <p>Correct Answer: c</p>

Standard	09.0 Demonstrate an understanding of engineering principles. – The student will be able to:
Benchmark	09.02 Create basic schematic drawings of electronic circuitry.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)= (SA)= (P)=X (ER)=
Cognitive Complexity Level	Moderate/High
Benchmark Clarification	Students will draw a diagram of a simple circuit with one or more resistors.
Content Focus	Direct current, Series circuit, parallel circuit, resistors, voltage, battery, source, current
Content Limits	Circuit drawn will be limited to a direct current simple circuit. No complex or combined circuits will be tested.
Stimulus Attributes	Stimulus may include the resistor(s) and/or voltage values
Response Attributes	Must include appropriate symbols for the source, resistors, current pathway.
Sample Item	<p>Using appropriate symbols. Draw a direct current series circuit with a source voltage of 9V and 3 resistors. The resistor values are 10 ohms, 20 ohms, 30 ohms. Use appropriate schematic diagram symbols and fill in all values.</p> <p>Rubric</p> <p>2 Points – The student draws a correct schematic diagram with correct values. 1 Point- The student draws an incomplete schematic diagram with values. 0 Points- The student does not draw a correct schematic diagram with values.</p>

Standard	09.0 Demonstrate an understanding of engineering principles. – The student will be able to:
Benchmark	09.03 Name the six simple machines (i.e., lever, inclined plane, wheel and axle, screw, wedge, and pulley) and describe their application to robotics.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	Low, Moderate
Benchmark Clarification	The student will identify the six simple machines and provide and identify examples of each.
Content Focus	Wheel, axle, lever, pulley, screw, inclined plane, wedge, fulcrum
Content Limits	Questions include identifying by site and description the six simple machines
Stimulus Attributes	may include Images
Response Attributes	Students will describe and identify the simple machines by example and by site.
Sample Item	A shovel is an example of which simple machine? a. Inclined plane b. Lever c. Pulley d. Wedge Correct Answer: d

Standard	09.0 Demonstrate an understanding of engineering principles. – The student will be able to:
Benchmark	09.04 Explain and demonstrate how gear ratios are used for increasing or decreasing power or speed.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	Moderate, High
Benchmark Clarification	The student will identify gear arrangements that increase speed or torque. The student will also identify the use of different types of gears such as but not limited to folLower, crown, driver, idler.
Content Focus	FolLower, crown, driver, idler, gear ratio, pitch, root, bevel, rack and pinion, worm, RPM
Content Limits	Questions are limited to gear ratios and the simple math to caclulate the ratio.
Stimulus Attributes	May include Images
Response Attributes	Students will be able to undestad gear ratio's and calculate them from Images and descriptions.
Sample Item	A large drive gear turning a small folLower, results in the folLower spinning faster than the driver, what is this called? a. gearing down b. gear ratio c. gear lock d. gearing up Correct Answer: d

Standard	11.0 Demonstrate the safe and proper use of electronic and other lab equipment, tools, and materials. – The student will be able to:
Benchmark	11.01 Use a Volt-Ohm Meter (VOM)/multimeter to obtain accurate measurements of voltage, current, and resistance.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)=X (ER)=
Cognitive Complexity Level	Moderate, High
Benchmark Clarification	Students will understand how to set up a meter to take voltage, current and resistance readings. Students will need to know the basic quantities of electronics and their units of measure (voltage, current, resistance). Student may also require the knowle
Content Focus	Voltage, volts, current, amperes, resistance, ohms, mill, micro, mega, kilo
Content Limits	Questions are limited to voltage, current and resistance
Stimulus Attributes	Images may be used to describe and illustrate how meter are connected.
Response Attributes	Students will identify how to operate and connect a meter to measure voltage current and resistance.
Sample Item	A meter should be at what setting in order to measure current? a. Amperes b. Ohms c. Voltage d. Wattage Correct Answer: a

Standard	11.0 Demonstrate the safe and proper use of electronic and other lab equipment, tools, and materials. – The student will be able to:
Benchmark	11.04 Use testers to determine the condition of electronic components.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)=X (ER)=
Cognitive Complexity Level	Moderate, High
Benchmark Clarification	Students will use a meter to determine if components are good or no good. Questions may include testing batteries, fuses, diodes, and resistors.
Content Focus	Battery, switch, diode, resistor, fuse, voltage, volts, current, amperes, resistance, ohms
Content Limits	Using testers is limited to deciding if a component is good or no good.
Stimulus Attributes	Pictures may be used to illustrate circuits. Students will have general knowledge fuses, batteries, and switches
Response Attributes	students will decide if components are good or not good. Including fuses, batteries and diodes.
Sample Item	The black test lead should be connected to which jack on a meter? a. Amps b. Common c. Ohms d. Volts Correct Answer: b

Standard	11.0 Demonstrate the safe and proper use of electronic and other lab equipment, tools, and materials. – The student will be able to:
Benchmark	11.09 Identify color-coding safety standards.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	Low
Benchmark Clarification	Students will identify the safety color coding from the OSHA (Occupational Safety and Health Administration)
Content Focus	Emergency, warning, caution, safety equipment, safety information, radiation.
Content Limits	Questions are limited to the colors on the original OSHA safety chart. www.OSHA.gov
Stimulus Attributes	Students will be provided with descriptions and graphics of OSHA standards.
Response Attributes	Students will identify proper safety standards from descriptions and photos.
Sample Item	What color is used for identification of safety information used on informational signs? a. Blue b. Green c. Orange d. Yellow Correct Answer: a

Standard	11.0 Demonstrate the safe and proper use of electronic and other lab equipment, tools, and materials. – The student will be able to:
Benchmark	11.10 Explain fire prevention and safety precautions and practices for extinguishing fires.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	Low
Benchmark Clarification	Students will identify the proper class of fire extinguisher and its use.
Content Focus	Current, flammable liquids, fire extinguisher classes, carbon dioxide, halogen
Content Limits	Items will be limited to proper fire extinguisher classes, and safety precautions
Stimulus Attributes	May include Images
Response Attributes	Students will identify the proper safety precautions and types of fire extinguishers to use on specific classes of fires.
Sample Item	An extinguisher with a D rating is designed for which type of fire? a. combustible metals b. energized electrical equipment c. flammable liquids d. ordinary combustible materials Correct Answer: a

Standard	12.0 Build, program, and configure a robot to perform predefined tasks. – The student will be able to:
Benchmark	12.03 Create a flow chart that visually describes a basic robotic task. (LAFS.910.W.1.2)
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)= (SA)= (P)=X (ER)=
Cognitive Complexity Level	Moderate, High
Benchmark Clarification	Students will construct a flowchart for one basic task. Students will read a basic task flowchart and determine the robot action.
Content Focus	Task, flowchart, movement, swing turn, point turn
Content Limits	Any motion tasks using timing could be assessed. Encoders will not be used and specific numeric motor limits will not be needed.
Stimulus Attributes	A flowchart could be given. Students will be prompted with a description of a basic robot movement.
Response Attributes	Student will choose an appropriate basic motion or will create a flowchart.
Sample Item	Given the following flowchart (insert flowchart for simple forward movement for 3000 milliseconds), which is the appropriate robotic movement? a. forward for 0.3 seconds and stops b. forward for 3 seconds and stops c. backward for 0.3 seconds and stops d. backward for 3 seconds and stops Correct Answer: b