Central Florida Assessment Collaborative

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| Individual Test Item Specifications |
| Exploring Technology |
| 2014 |

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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.





**Definitions of Benchmark Specifications**

The *Individual Benchmark Specifications* provides standard-specific guidance for assessment item development for CFAC item banks. For each benchmark assessed, the following information is provided.

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| **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 NGSSS or in the Florida Standards. |
| **Benchmark****Also Assesses** | refers to the benchmark statement presented in the NGSSS or standard statement in the Florida Standards. In some cases, two or more related benchmarks are grouped together because the assessment of one benchmark addresses another benchmark. Such groupings are indicated in the Also Assesses statement.refers to the benchmarks that are closely related to the benchmark (see description above) |
| **Item Types****Cognitive****Complexity** | are used to assess the benchmark or group of benchmark.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****Content Focus** | define the characteristics of the answers that a student must choose or provide.defines the content measured by each test item. Content focus addresses the broad content and skills 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**

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| **Benchmark Number** | 01.02 |
| **Standard** | 1. Demonstrate an understanding of the characteristics and scope of technology.
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| **Benchmark** | The student will be able to describe the development of technology as a human activity that is the result of individual or collective needs and the ability to be creative. |
| **Also Assesses** | Not Applicable  |
| **Knowledge/****Performance/Both** | Knowledge |
| **Item Types** | Selected Response, Short Answer |
| **Cognitive Complexity** | Low, Moderate |
| **Benchmark Clarification**  | The student will be able to identify a technology that meets a specific human need by understanding innovative inventions in the 21st century. |
| **Content Limits** | Questions should focus on inventions and innovations developed from the later half of the 20th century into the 21st century. |
| **Stimulus Attributes** | Items may be set in real-world contexts. |
| **Response Attributes** | Responses will include the student being able to describe and identify the required information.Responses can include selected response, short answer. |
| **Content Focus** | Technology systems that solve human needs. |

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| **Sample Item** | Beginning in the 20th century, businesses created computer networks that transmitted data electronically. Explain how the creation of these networks allowed humans to communicate on not only a global level, but also allowed that communication to be more efficient.Sample Student Response:The internet, invented during the late part of the 20th century, allowed individuals to access a vast amount of information compiled from all over the world. Since this information travelled electronically, communication between individuals became almost instantaneous.2 Point Rubric2pts - Student demonstrates a thorough understanding of the Internet as an invention and understand that the internet allowed for almost instantaneous communication between individuals anywhere in the world.1pt - Student demonstrates a partial understanding of the Internet as an invention or understands that the internet allowed for almost instantaneous communication between individuals anywhere in the world.0pt - Student does not respond to the prompt with any understanding of the Internet as an invention nor understands that the internet allowed for almost instantaneous communication between individuals anywhere in the world. |

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| **Benchmark Number** | 02.10 |
| **Standard** | 1. Demonstrate an understanding of the core concepts of technology.
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| **Benchmark** | The student will be able to utilize controls and mechanisms or particular steps that people perform using information about the system that causes systems to change. |
| **Also Assesses** | Not Applicable  |
| **Knowledge/****Performance/Both** | Knowledge |
| **Item Types** | Selected Response |
| **Cognitive Complexity** | Moderate |
| **Benchmark Clarification**  | The student will be able to understand the various systems that are found in every home or automobile and the terms that are associated with those systems such as heating, AC, brake and cruise control. |
| **Content Limits** | Questions should focus on systems related to the home (i.e., heating and air conditioning, sprinkler systems) or an automobile (i.e., anti-lock brakes, cruise control). |
| **Stimulus Attributes** | Items may be set in real world. |
| **Response Attributes** | Responses will include the student being able to identify the required information Responses can include selected response |
| **Content Focus** | Input, output, process, feedback |
| **Sample Item** | A thermostat in a home heating/air conditioning system regulates which of the following?1. if the fan runs on high or low
2. the desired temperature in the home
3. how much coolant is used in the system
4. when the air filter needs to be changed

Correct Answer: B |

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| **Benchmark Number** | 03.03 |
| **Standard** | 1. Demonstrate an understanding of the relationships among technologies and the connection between technology and other fields of study.
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| **Benchmark** | The student will be able to explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems. |
| **Also Assesses** | Not Applicable  |
| **Knowledge/****Performance/Both** | Knowledge |
| **Item Types** | Short Answer |
| **Cognitive Complexity** | Moderate, High |
| **Benchmark Clarification**  | The student will demonstrate and explain how technology has created various new products from different fields. |
| **Content Limits** | Questions should focus on how advancements in robotics have had an impact on medical procedures. |
| **Stimulus Attributes** | Items may be set in real world settings. |
| **Response Attributes** | Responses will include the student being able to explain the required information. Responses can include short answer. |
| **Content Focus** | Control system, process, feedback |

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| **Sample Item** | Explain how robotic technology has advanced and how that advancement has an impact on medical procedures.Sample Student Response:Robotics has progressed from machines that performed simple pre-programmed tasks to complex systems that can be controlled by an operator. The development of these types of systems in the medical field allow for microscopic surgeries which are minimally invasive and allow patients to heal at a much faster rate. 2 Point Rubric2pts - Student demonstrates a thorough understanding of how robotic technology advanced and how that advancement has an impact on medicine.1pt - Student demonstrates a partial understanding of how robotic technology advanced or how that advancement has an impact on medicine.  0pt - Student does not respond to the prompt with any understanding of how robotic technology has advanced nor how that advancement has had an impact on medicine. |

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| **Benchmark Number** | 06.01  |
| **Standard** | 06.0 Demonstrate an understanding of the role of society in the development and use of technology. |
| **Benchmark** | The student will be able to describe the development of technologies that has resulted from the demands, values, and interests of individuals, businesses, industries, and societies. |
| **Also Assesses** | Not Applicable |
| **Knowledge/****Performance/Both** | Knowledge |
| **Item Types** | Selected Response, Short Answer |
| **Cognitive Complexity** | Questions should focus on communication or information systems invented from the 1900s to the present. |
| **Benchmark Clarification**  | The student will be able to explain and describe different technologies and how it has positively impacted businesses, people and societies through emerging industries, supply and demand. |
| **Content Limits** | Questions should focus on communication or information systems invented from the 1900s to the present. |
| **Stimulus Attributes** | Items may be set in real world settings. |
| **Response Attributes** | Responses will include the student being able to describe and identify the required information.Responses can include selected response, short answer. |
| **Content Focus** | Computer Revolution, Information Age |
| **Sample Item** | Telephones were originally designed solely for voice communication. Which of the following is the **best** choice for the reason that cameras and web browsers have been added to the telephone? A. Cameras became smaller. B. The internet was invented. C. Screens were added to the telephone. D. The public started to use these devices more. Correct Answer: D |

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| **Benchmark Number** | 06.02  |
| **Standard** | 06.0 Demonstrate an understanding of the role of society in the development and use of technology. |
| **Benchmark** | The student will be able to describe changes in society and the creation of new needs and wants caused by the use of inventions and innovations. |
| **Also Assesses** | Not Applicable  |
| **Knowledge/****Performance/Both** | Knowledge |
| **Item Types** | Selected Response |
| **Cognitive Complexity** | Moderate |
| **Benchmark Clarification**  | The student will be able to identify technologies that are a result of advancements in agricultural technologies through various engineering improvements and how it has created new industrial jobs and food development.  |
| **Content Limits** | Questions should focus on bio-related technologies, genetic engineering, bio-engineering. |
| **Stimulus Attributes** | Items may be set in real world settings. |
| **Response Attributes** | Responses will include the student being able to describe the required information. Responses can include selected response. |
| **Content Focus** | organic, inorganic, bio-engineering, genetic engineering |
| **Sample Item** | Genetically altered seeds allow for pest resistant varieties of crops.Which of the following farmers would **not** use these seeds?A. inorganic farmers B. organic farmersC. tomato farmersD. watermelon farmers Correct Answer: B |

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| **Benchmark Number** | 06.03 |
| **Standard** | 06.0 Demonstrate an understanding of the role of society in the development and use of technology. |
| **Benchmark** | The student will be able to describe social and cultural priorities and values that are reflected in technological devices. |
| **Also Assesses** | Not Applicable |
| **Knowledge/****Performance/Both** | Knowledge |
| **Item Types** | Selected Response, Short Answer |
| **Cognitive Complexity** | Low, Moderate |
| **Benchmark Clarification**  | The student will be able to have an understanding of the development of technology and how people value technology in their everyday lives both socially and culturally. |
| **Content Limits** | Questions should focus on issues related to ***EITHER*** agricultural technologies ***OR*** computer revolution/information age technologies. |
| **Stimulus Attributes** | Items may be set in real-world settings. |
| **Response Attributes** | Responses will include the student being able to describe and identify the required information.Responses can include selected response, short answer. |
| **Content Focus** | Bio-related technologies, genetic engineering, bio-engineeringdigital citizenship, social media, cyber bullying |
| **Sample Item** | Why are some groups and individuals opposed to genetically altered food?A. Most people believe it tastes bad.B. Evidence clearly shows that genetically altered food is  harmful to humans.C. There is no opposition to genetically altered food. It is grown  side-by-side with more natural food.D. Some individuals believe that genetically altered food has not  had sufficient testing to ensure it is not harmful to humans.Correct Answer: D |

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| **Benchmark Number** | 07.02 |
| **Standard** | Demonstrate an understanding of the influence of history on technology. |
| **Benchmark** | The student will be able to explain how the specialization of function has been at the heart of many technological improvements. |
| **Also Assesses** | Not Applicable  |
| **Knowledge/****Performance/Both** | Knowledge |
| **Item Types** | Short Answer |
| **Cognitive Complexity** | Low, Moderate |
| **Benchmark Clarification**  | The student will be able to explain and robotics, control systems in the Information Age and identify various types of technologies, such as agricultural, biomedical, aerospace, computer. |
| **Content Limits** | Questions should focus on robotics or control system technologies, Information Age (i.e., digitized records, email, internet research) Agricultural, Biomedical, Aerospace, Computer technologies. |
| **Stimulus Attributes** | Items may be set in real world settings. |
| **Response Attributes** | Responses will include the student being able to discuss and explain the required information. Responses can include short answer. |
| **Content Focus** | robotics, manufacturing , medical technologies, Information Age , agricultural technology, genetically engineered  |

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| **Sample Item** | Joanne has to do a research paper on the effects of technological waste on the environment. Describe how developments from the Information Age have made it easier for her gather the necessary information and what she should take into consideration when doing that research.Sample Student Response:The Internet is one of the most widely used advancements of the Information Age. Instead of having to do research in a library at school, Joanne get the information she needs by researching the internet and being diligent about the reliability of the sites she uses for that information. 2 Point Rubric2pts - Student demonstrates a thorough understands that the Internet makes it easier to get information and that the researcher must be diligent to use reliable sources from the Internet.1pt - Student demonstrates a partial understanding that the Internet makes it easier to get information or that the researcher must be diligent to use reliable sources from the internet0pt - Student does not respond to the prompt with any understand the Internet makes it easier to get information and that the researcher must be diligent to use reliable sources from the Internet |

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| **Benchmark Number** | 08.02 |
| **Standard** | 08.0 Demonstrate an understanding of the attributes of design.  |
| **Benchmark** | The student will be able to explain why there is no perfect design |
| **Also Assesses** | Not Applicable  |
| **Knowledge/****Performance/Both** | Knowledge |
| **Item Types** | Short Answer |
| **Cognitive Complexity** | Low, Moderate |
| **Benchmark Clarification**  | The student will be able to explain that technological designs are repeatedly being improved and changed. |
| **Content Limits** | Questions should focus on technological designs of computers and wireless devices (i.e., cellphones, smart phones, tablets). |
| **Stimulus Attributes** | Items will be set in real-world settings. |
| **Response Attributes** | Responses will include the student being able to explain the required information. Responses can include short answer. |
| **Content Focus** | Specific design, features (camera, internet access, apps. etc.), data network speed, screen size, screen resolution, battery life, weight, colors |

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| **Sample Item** | Apple Computer introduces a re-designed iPhone about once every other year. Name one design attribute that has changed and discuss why the change took place.Sample Student Response:Apple re-designed the iPhone to replace a glass back panel with a non-breakable one. Many consumers dropped the phone and the glass would break. This would cause the phone to not only look bad, but in some cases, it would cause the phone to malfunction.2 Point Rubric2pts - Student demonstrates a thorough understanding of a design change made to an iPhone and why that change was necessary.1pt - Student demonstrates a partial understanding of a design change made to an iPhone or why that change was necessary.0pt - Student does not respond to the prompt with any understanding of a design change made to an iPhone nor why that change was necessary. |

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| **Benchmark Number** | 09.03  |
| **Standard** | 09.0 Demonstrate an understanding of engineering design. |
| **Benchmark** | The student will be able to model, test, evaluate, and modify designs to transform ideas into practical solutions. |
| **Also Assesses** | Not Applicable  |
| **Knowledge/****Performance/Both** | Performance |
| **Item Types** | Performance Task |
| **Cognitive Complexity** | Moderate, High |
| **Benchmark Clarification**  | The student will be able to model, test, evaluate, and modify designs to create projects in a computer lab with various engineering software such as CAD. |
| **Content Limits** | Questions should focus on various projects that can be demonstrated and or designed in computer labs. |
| **Stimulus Attributes** | Stimulus will include rubrics and specific documents. |
| **Response Attributes** | Projects should include directions, materials necessary for construction, and relate to a specific area of technology such as transportation, aeronautics, energy etc. Responses will include the student being able demonstrate the required information. Responses can include performance tasks. |
| **Content Focus** | drafting supplies, CAD software program, robotics, control systems equipment, Bridge Model |

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| **Sample Item** | Research various bridge structures and choose one specific type of bridge design. Using that information, create a design for a bridge that can hold up to five pounds of weight. Using craft sticks and craft glue, build the bridge and test whether or not it will hold five pounds of weight.Once tested, review your design and see what changes are necessary to make the bridge stronger. If your bridge could hold five pounds, keep adding weight until the bridge breaks. Review the design and see what changes are needed to strengthen the bridge. Make those changes and then test your bridge again to see if the bridge will withstand the greater weight.Performance Task Rubric:

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| **Points**  |  **Description of Requirement** |
| 4 | - The bridge model indicates that the student has a thorough understanding of the concept embodied in the task.  - The student has provided a design that is accurate, complete, and fulfills all the requirements of the task.  - Necessary drawing examples are included, and the information is clearly research-based |
| 3 | - The bridge model indicates that the student has an understanding of the concept embodied in the task.  - The student built a design that is accurate and fulfills all the requirements of the task.  - The required support and/or details are not complete or clearly research-based. |
| 2 | - The bridge model indicates that the student has a partial understanding of the concept embodied in the task.  - The student has provided a design that includes information that is essentially correct and research-based, but the bridge could not withstand the weight. There was an attempt to correct the design flaws, but those failed as well. - Some of the support and/or examples and requirements of the task may be incomplete or omitted. |
| 1 |  - The bridge model indicates that the student has a very limited understanding of the concept embodied in the task.  - The model is incomplete, may exhibit many flaws, and may not address all requirements of the task. |
| 0 | - The response has insufficient amount of information to determine the student’s understanding of the task or the student has failed to respond to the task. |

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| **Benchmark Number** | 10.01 |
| **Standard** | 10.0 Demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.  |
| **Benchmark** | The student will be able to use troubleshooting as a problem-solving method used to identify the cause of a malfunction in a technological system. |
| **Also Assesses** | Not Applicable  |
| **Knowledge/****Performance/Both** | Both |
| **Item Types** | Selected Response, Performance Task |
| **Cognitive Complexity** | Low, Moderate |
| **Benchmark Clarification**  | The student will be able to utilize robotic or control system technologies to identify and perform a series of automated actions such as trouble shoot, problem solve and identify malfunctions.  |
| **Content Limits** | Questions should focused on robotics or control systems technology. |
| **Stimulus Attributes** | Stimulus will include rubrics and specific documents. |
| **Response Attributes** | Projects should include directions, materials necessary for construction, and relate to a specific area of technology, such as aeronautics, energy, information, transportation technology.Responses will include the student being able to demonstrate and identify the required information. Responses can include selected response, performance tasks. |
| **Content Focus** | VEX, Robotics, Dynamic, Kinematics |
| **Sample Item** | What problem solving method do you use first when a technical system is not working correctly? A. design processB. look at the processing C. look at the schematicsD. troubleshoot the systemCorrect Answer: D |

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| **Benchmark Number** | 10.03 |
| **Standard** | 10.0 Demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving. |
| **Benchmark** | The student will be able to identify technological problems that are best solved through experimentation. |
| **Also Assesses** | Not Applicable  |
| **Knowledge/****Performance/Both** | Both |
| **Item Types** | Selected Response, Performance Task |
| **Cognitive Complexity** | Low, Moderate |
| **Benchmark Clarification**  | The student will be able to use experimentation to demonstrate problem solving through troubleshooting of a design in a particular technology solution. |
| **Content Limits** | Questions should focus on robot technology, CAD/CAM systems, and CNC machines. |
| **Stimulus Attributes** | Stimulus may include rubrics and specific documents. |
| **Response Attributes** | Projects should include directions, materials necessary for construction, and relate to a specific area of technology i.e.; transportation, aeronautics, energy, etc. Each project would have its own rubric.Responses will include the student being able to demonstrate and identify the required information. Responses can include selected response, performance tasks. |
| **Content Focus** | Robot technology, CAM, CAD, CNC |

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| **Sample Item** | You just finished your project and tested it, but it is not working like you want. What do you do now? A. create a new projectB. create a new working drawingC. leave it aloneD. modify the design Correct Answer: D |

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| **Benchmark Number** | 11.04  |
| **Standard** | 11.0 Demonstrate the abilities to apply the design process. |
| **Benchmark** | The student will be able to test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed. |
| **Also Assesses** | Not Applicable |
| **Knowledge/****Performance/Both** | Performance |
| **Item Types** | Performance Task |
| **Cognitive Complexity** | Moderate, High |
| **Benchmark Clarification**  | The student will be able to utilize equipment specialized for a particular lab.The student will be able to test and evaluate a project design in relation to pre-established requirements, such as criteria and constraints, and refine as needed. |
| **Content Limits** | Questions should focus on various projects available in specific laboratories. *All general labs:*Students will be given a set of real-world needs and utilizing the specific equipment in the lab, they will create a project to meet those needs*Computer labs:*Projects will be limited to graphic design, computer animation, web page design or CAD programs*Wood, metal, and plastic shops*:Projects will focus on the creation of a particular object that is standard for that lab. The use of CAD programs may or may not be required for this task depending upon the availability of CAD software. |
| **Stimulus Attributes** | Stimulus will include rubrics and specific documents. |
| **Response Attributes** | Projects should include directions, materials necessary for construction, and relate to a specific area of technology such as aeronautics, energy, information, transportationResponses can include performance tasks. |

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| **Content Focus** | Graphic design, project design, software associated with projects. |
| **Sample Item** | You work in the research and development department of a large company. You’ve been tasked to invent a gadget that will appeal to a very large target market. There are four phases to this task:1. ***Brainstorm*** a list of needs that the gadget will address

 2. ***Choose*** one of the ideas and use the design process to come up with 8-10 features of this gadget 3. ***Create*** rough-draft and final drafts of the design either by hand or using a computer drawing program. The designs will represent an orthographic view of the finished product 4. ***Design*** a marketing program that includes the following:* Target audience of the gadget (school age children, college students, adults)
* Pricing (what will the price be and why did you choose to price it that way)
* Create a print ad that will go in a specialty magazine that reaches your target market (size will be 8.5”x11”)
* Design a website home page that will incent prospective buyers to purchase your product

Performance Task Rubric:

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| **Points**  | **Description of Requirement**  |
| 4 | - The project indicates that the student has a thorough understanding of the concept embodied in the task.  - The student has provided a design that is accurate, complete, and fulfills all the requirements of the task.  - Necessary drawing examples are included; all phases of the task are complete. |
| 3 |  - The project indicates that the student has an understanding of the concept embodied in the task.  - The student built a design that is accurate and fulfills all the requirements of the task.  - The required support and/or details are not complete |
| 2 | - The project indicates that the student has a partial understanding of the concept embodied in the task.  - The student has provided a design that includes information that is essentially correct and complete, but the project was not fully complete. There was an attempt to correct the design flaws, but those failed as well. - Some of the support and/or examples and requirements of the task may be incomplete or omitted. |
| 1 |  - The project indicates that the student has a very limited understanding of the concept embodied in the task.  - The project is incomplete, may exhibit many flaws, and may not address all requirements of the task  |
| 0 | - The project indicates that the student does not demonstrate an understanding of the concept embodied in the task as well as insufficient amount of information to determine the student’s understanding of the task |

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| **Benchmark Number** | 12.02  |
| **Standard** | 12.0 Demonstrate the abilities to use and maintain technological products and systems. |
| **Benchmark** | The student will be able to use tools, materials, and machines safely to diagnose, adjust, and repair systems. |
| **Also Assesses** | Not Applicable |
| **Knowledge/****Performance/Both** | Performance |
| **Item Types** | Performance Task |
| **Cognitive Complexity** | Moderate |
| **Benchmark Clarification**  | The student will be able to use tools, materials, and machines safely to diagnose, adjust, and repair systems related specifically to ***either*** Robotics/Control Systems ***or*** Computer Systems setup. |
| **Content Limits** | Questions should focus on performance tasks for robotics or control systems technologies, Central Processing Unit (CPU) computer assembly. |
| **Stimulus Attributes** | Stimulus will include rubrics and specific documents. |
| **Response Attributes** | Projects should include directions, materials necessary for construction, and relate to a specific area of technology, i.e. transportation, aeronautics, energy, etc. Responses should include performance tasks. |
| **Content Focus** | List of tools, machines, materials found in technology and robotics for project creation. |

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| **Sample Item** | Using a robotics system such as VEX, build a robot that completes a series of three maneuvers.Performance Task Rubric:

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| **Points**  | **Description of Requirement**  |
| 4 | - The project indicates that the student has a thorough understanding of the concept embodied in the task.  - The student has provided a design that is accurate, complete, and fulfills all the requirements of the task.  - Necessary drawing examples are included; all phases of the task are complete. |
| 3 |   - The project indicates that the student has an understanding of the concept embodied in the task.  - The student built a design that is accurate and fulfills all the requirements of the task.  - The required support and/or details are not complete. |
| 2 |  - The project indicates that the student has a partial understanding of the concept embodied in the task.  - The student has provided a design that includes information that is essentially correct and complete, but the project was not fully complete. There was an attempt to correct the design flaws, but those failed as well. - Some of the support and/or examples and requirements of the task may be incomplete or omitted. |
| 1 | - The project indicates that the student has a very limited understanding of the concept embodied in the task.  - The project is incomplete, may exhibit many flaws, and may not address all requirements of the task. |
| 0 |  - The project indicates that the student does not demonstrate an understanding of the concept embodied in the task.  - The student designed a project that did not contain correct or complete aspects of the project.  - The response has insufficient amount of information to determine the student’s understanding of the task or the student failed to respond to the task |

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| **Benchmark Number** | 16.05 |
| **Standard** | 16.0 Demonstrate an understanding of and be able to select and use energy and power technologies.  |
| **Benchmark** | The student will be able to explain how much of the energy used in our environment is not used efficiently. |
| **Also Assesses** | Not Applicable  |
| **Knowledge/****Performance/Both** | Knowledge |
| **Item Types** | Selected Response |
| **Cognitive Complexity** | Moderate |
| **Benchmark Clarification**  | The student will be able to determine how much energy is used in our environment and whether it is used efficiently by identifying different types of power source. |
| **Content Limits** | Questions should focus on energy, usage, watts, environment impacts and efficiency. |
| **Stimulus Attributes** | Items will be set in real-world settings. Use of a diagram of items that lose some of the energy to heat or noise (fans, refrigerators, and computers) should be used when appropriate. |
| **Response Attributes** | Responses will include the student being able to demonstrate and identify the required information. Responses can include selected response. |
| **Content Focus** | Solar energy, nuclear energy, history of lighting, pros and cons of different types of energy, fuels, and natural resources. |
| **Sample Item** | What percentage of energy is wasted per unit of coal burned?A. 10%B. 30%C. 50%D. 70%Correct Answer: D |

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| **Benchmark Number** | 18.01 |
| **Standard** | 18.0 Demonstrate an understanding of and be able to select and use transportation technologies. |
| **Benchmark** | The student will be able to describe how transporting people and goods involve a combination of individuals and vehicles. |
| **Also Assesses** | Not Applicable  |
| **Knowledge/****Performance/Both** | Knowledge |
| **Item Types** | Selected Response, Short Answer |
| **Cognitive Complexity** | Moderate |
| **Benchmark Clarification**  | The student will be able to describe and select different transportation technologies such as public and private methods in air, land and sea. |
| **Content Limits** | Questions should focus on different methods of transportation, innovative technologies, and environmental impact of transportation. |
| **Stimulus Attributes** | Items will be set in real-world settings. |
| **Response Attributes** | Responses will include the student being able to demonstrate and identify the required information. Responses can include selected response, short answer. |
| **Content Focus** | Trains, planes, automobiles, boats, energy and fuel associated with transportation, impact of natural resources.  |
| **Sample Item** | Transporting people and goods involve which of the following?1. individuals
2. individuals and vehicles
3. transportation
4. vehicles

Correct Answer: B |

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| **Benchmark Number** | 19.03  |
| **Standard** | 19.0 Demonstrate an understanding of and be able to select and use manufacturing technologies. |
| **Benchmark** | The student will be able to employ the manufacturing process including the designing, development, making, and servicing of products and systems. |
| **Also Assesses** | Not Applicable  |
| **Knowledge/****Performance/Both** | Knowledge |
| **Item Types** | Selected Response |
| **Cognitive Complexity** | Moderate, High |
| **Benchmark Clarification**  | The student will demonstrate and identify the processes associated with manufacturing technologies.  |
| **Content Limits** | Systems will be limited to CAD/CAM or CNC.Questions should focus on Cartesian Coordinate system, CAD/CAM processes that computerize design drawings, Computer Numerical Control (CNC) machines including mills and lathes. |
| **Stimulus Attributes** | Items will be set in real-world settings. |
| **Response Attributes** | Responses will include the student being able to demonstrate the required information. Responses can include selected response. |
| **Content Focus** | Manufacturing terminology, designing, development products and services. |

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| **Sample Item** | Which manufacturing process comes after the design and development of the product? A. shipping to clientB. making the productC. servicing the productD. making and servicing the productCorrect Answer: D |

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| **Benchmark Number** | 21.03 |
| **Standard** | 21.0 Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. |
| **Benchmark** | The student will be able to conduct laboratory activities and equipment operations in a safe manner. |
| **Also Assesses** | Not Applicable  |
| **Knowledge/****Performance/Both** | Performance |
| **Item Types** | Performance Task |
| **Cognitive Complexity** | Moderate, High |
| **Benchmark Clarification**  | The student will be able to identify tools, job designation of the tool, tool usage, and demonstrate tool storage as well as a general knowledge of a computer set-up and not particular software programs. |
| **Content Limits** | Questions should focus on various projects for student to perform and be available in specific laboratories. *All general labs:* - name the tools, safety gear, equipment necessary to complete lab activities, demonstrate safety procedures while working with tools - power on and off all equipment - understand proper storage of tools and equipment*In computer labs*: - identify network cables, USB ports, power charging ports, headphone and microphone jacks*In machine/metal/wood shops:* - identify hammers, saws, drill presses, screwdrivers, cutting guards, vice, etc. |
| **Stimulus Attributes** | Items will be set in real-world settings. |
| **Response Attributes** | Responses will include the student being able to identify the required information. Responses can include performance tasks. |
| **Content Focus** | Lists of tools in technology, equipment and materials found in labs and shops. |
| **Sample Item** | Demonstrate the proper way to assemble a computer system by doing the following: - Identify all equipment necessary to assemble a computer system including CPU, monitor, keyboard, mouse,  - Connect any USB ports to the proper devices (i.e., keyboard, mouse, printer, or auxiliary equipment) - Connect the monitor to the CPU using the proper cables and connecting to the appropriate port - Connect any audio equipment such (i.e., headphones or headphone/microphone) to the appropriate jack - Connect the system to the lab network  - Connect all power cables to the monitor, CPU, and if available, any auxiliary devices such as a printer or scanner. - Connect all equipment to appropriate power source - Power on all part of the computer system and log in with the appropriate user name and password - Log off and shut down the computer system Performance Task Rubric:

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| **Points**  | **Description of Requirement**  |
| 4 | - Identifies all equipment necessary including types of cables, ports, and jacks - Connects the monitor to the CPU correctly- Connects all auxiliary devices correctly- Connects the system to the lab network and power sources correctly- Powers on all equipment, logs on to the system, and then logout and shuts down the system |
| 3 | - Connects the monitor to the CPU correctly- Connects all auxiliary devices correctly- Connects the system to the lab network and power sources correctly- Powers on all equipment, logs on to the system, and then logs out and shuts down the system |
| 2 | - Connects all auxiliary devices correctly- Connects the system to the lab network and power sources correctly- Powers on all equipment, logs on to the system, and then logs out and shuts down the system |
| 1 | - Identifies all equipment necessary including types of - Connects the system to the lab network and power sources correctly- Powers on all equipment, logs on to the system, and then logs out and shuts down the system |
| 0 | - Does not perform any of the necessary steps in the task |

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| **Benchmark Number** | 21.05 |
| **Standard** | 21.0 Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. |
| **Benchmark** | The student will be able to select appropriate tools, machines, and equipment to accomplish a given task. |
| **Also Assesses** | Not Applicable  |
| **Knowledge/****Performance/Both** | Knowledge  |
| **Item Types** | Selected Response |
| **Cognitive Complexity** | Low, Moderate |
| **Benchmark Clarification**  | The student will be able to identify tools in machine/metal/wood shops, job designation of the tool, tool usage, and tool storage and demonstrate general knowledge of a computer set-up and not particular software programs. |
| **Content Limits** | Questions should focus on identifying shop tools, safety gear, equipment, storage, network cables, power chargers, and various computer peripheral equipment. |
| **Stimulus Attributes** | Items will be set in real-world settings. |
| **Response Attributes** | A diagram of various tools used in the laboratory to be labeled or identified by the student and matched to appropriate task or job.Responses will include the student being able to identify the required information. Responses can include selected response. |
| **Content Focus** | Lists of tools in technology, equipment and materials found in labs and shops. |

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| **Sample Item** | In order to make a design on a block of wood, which tool would you need to use? A. band sawB. drill pressC. jig sawD. sander, vise gripCorrect Answer: C |

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| **Benchmark Number** | 21.06  |
| **Standard** | 21.0 Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials. |
| **Benchmark** | The student will be able to demonstrate safe and correct use of tools, machines, and equipment. |
| **Also Assesses** | Not Applicable  |
| **Knowledge/****Performance/Both** | Performance |
| **Item Types** | Performance Task |
| **Cognitive Complexity** | Low |
| **Benchmark Clarification**  | The student will be able to identify, clarify with the focus to be limited to equipment available in a particular lab (i.e., computer and communications labs will have computer based performance tasks and shop labs will have items written based on that particular shop). |
| **Content Limits** | Questions should focus on various performance tasks available in specific laboratories. *All general labs:* - Identify on/off switches, emergency stop buttons, eye protection, power cables - Name the tools, safety gear, and equipment necessary to complete lab activities - Power on and off all equipment - Understand proper storage of tools and equipment*In computer labs*: - Identify network cables, USB ports, power charging ports, headphone and microphone jacks*In machine/metal/wood shops:* - Identify hammers, saws, drill presses, screwdrivers, cutting guards, vice, etc. |
| **Stimulus Attributes** | Items will be set in real-world settings. |

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| **Response Attributes** | A diagram of various tools used in the laboratory to be labeled or identified by the student and matched to appropriate task or job.Responses will include the student being able to identify the required information. Responses can include performance tasks. |
| **Content Focus** | Lists of tools in technology, equipment and materials found in labs and shops. |

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| **Sample Item** | Utilizing a computer system set up in the lab, identify the power button, power cable, network cables, USB ports, power charging port (if applicable) headphone jack and microphone jack.After identifying each of those items, power on the computer and any auxiliary devices that are utilized at that workstation. Log into the computer system with the appropriate login procedures. Once successfully logged in, start up the appropriate software program. Once the program has successfully loaded, exit out of that program, log out, and then power down the computer.Performance Task Rubric:

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| **Points**  | **Description of Requirement**  |
| 4 | The student is able to successfully perform ALL of the following tasks:  - identify all of the specific parts of the computer system - power on the computer and log in to the computer  - launch the appropriate software program  - exit the appropriate software program - shut down the computer system |
| 3 | The student is able to successfully perform FOUR of the following tasks:  - identify all of the specific parts of the computer system - power on the computer and log in to the computer  - launch the appropriate software program  - exit the appropriate software program - shut down the computer system |
| 2 | – The student is able to successfully perform THREE of the following tasks:  - identify all of the specific parts of the computer system - power on the computer and log in to the computer  - launch the appropriate software program  - exit the appropriate software program - shut down the computer system shuts down the system |
| 1 | – The student is able to successfully perform TWO of the following tasks:  - identify all of the specific parts of the computer system - power on the computer and log in to the computer  - launch the appropriate software program  - exit the appropriate software program - shut down the computer systemand shuts down the system |
| 0 | The student is able to not successfully perform only any of the tasks |

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| **Benchmark Number** | 21.08 |
| **Standard** | 21.0 Demonstrate proper & safe procedures while working with technological tools, apparatus, equipment, systems, & materials. |
| **Benchmark** | The student will be able to explain fire prevention and safety precautions and practices for extinguishing fires. |
| **Also Assesses** | Not Applicable |
| **Knowledge/****Performance/Both** | Knowledge |
| **Item Types** | Selected Response, Short Answer |
| **Cognitive Complexity** | Low, Moderate |
| **Benchmark Clarification**  | The student will be able to demonstrate and identify tools, equipment and materials found in shops and computer labs. Students will also be familiar with safety procedures in both environments. |
| **Content Limits** | Questions should focus on various safety procedures while working with tools, equipment and materials. Short responses should focus on removal of waste, safety and extinguishing flammable liquids such as paint, and storage. Proper positioning of computer lab, safety with electrical plugs, power cables, vents and surge protectors. |
| **Stimulus Attributes** | Items will be set in real-world settings. |
| **Response Attributes** | Responses will include the student being explain able and identify the required information. Responses can include selected response, short answer. |
| **Content Focus** | Lists of tools in technology, equipment and materials found in labs and shops. |

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| **Sample Item** | You notice your friend next to you is starting to cut a section of pvc pipe. As you observe him, you look down and see that the plug is starting to smoke. What should you do? A. alert others in the classB. point out safety precautionsC. pull the fire alarmD. pull the plug from the wallCorrect Answer: B |