

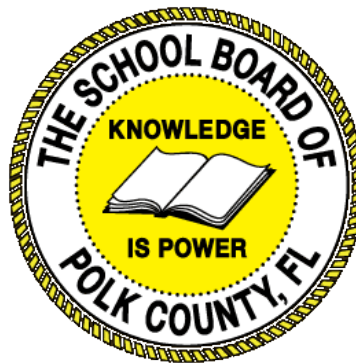
# Individual Test Item Specifications

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9400110- Principles of Scientific Visualization

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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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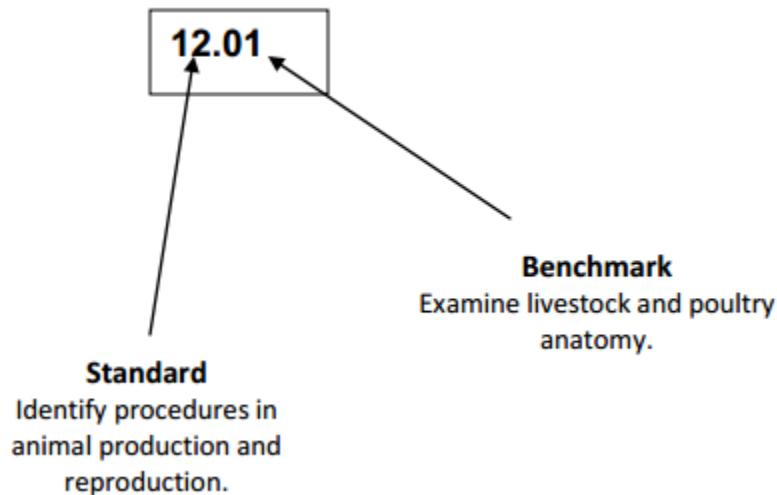
## I. Guide to the Individual Benchmark Specifications

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.

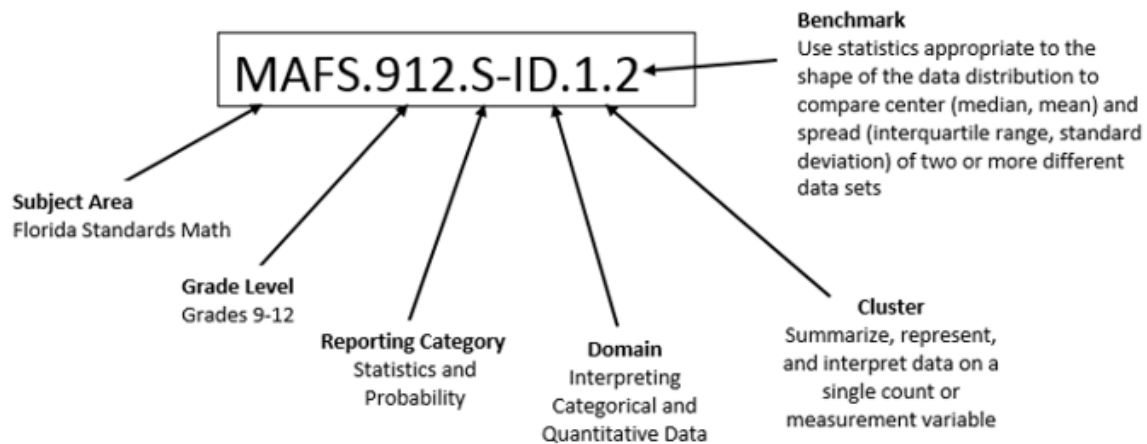
An example, from Agritechnology 1:



*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.

<b>Reporting Category</b>	is a grouping of related benchmarks that can be used to summarize and report achievement.
<b>Standard</b>	refers to the standard statement presented in the Florida Standards.
<b>Benchmark</b>	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.
<b>Item Types</b>	are used to assess the benchmark or group of benchmark.
<b>Cognitive Complexity</b>	ideal level at which item should be assessed.
<b>Benchmark Clarifications</b>	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.
<b>Content Limits</b>	define the range of content knowledge and that should be assessed in the items for the benchmark.
<b>Stimulus Attributes</b>	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.
<b>Response Attributes</b>	define the characteristics of the answers that a student must choose or provide.
<b>Content Focus</b>	addresses the broad key terms and concepts associated with the examples found in the standards, benchmarks, or benchmark clarifications.
<b>Sample Items</b>	are provided for each type of question assessed. The correct answer for all sample items is provided.

## II. Individual Benchmark Specifications

<b>Standard</b>	28.0 Describe scientific & technical visualization. – The student will be able to:
<b>Benchmark</b>	28.01 Define scientific and technical visualization and provide examples of each.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will define both technical and scientific visualization, identify and provide examples of each.
<b>Content Focus</b>	Computer graphics, Computer science, Scientific visualization
<b>Content Limits</b>	Content is limited to definitions, examples and comparisons of technical and Scientific visualization
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Worksheets, Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What is the term for graphically illustrating scientific data?</p> <ul style="list-style-type: none"> <li>a. computer graphics</li> <li>b. computer science</li> <li>c. scientific visualization * Correct</li> <li>d. rendering</li> </ul>

<b>Standard</b>	29.0 Describe the historical significance of scientific & technical visualization. – The student will be able to:
<b>Benchmark</b>	29.02 Define and describe the elements contained on various types of maps (e.g., road, topographic, aeronautical, weather, concept, and gene).
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will experience the elements contained in various types of maps, and be able to describe and define those elements.
<b>Content Focus</b>	Legend, title, scale, topographic, satellite
<b>Content Limits</b>	Content is limited to the definitions and descriptions of elements contained in various types of maps.
<b>Stimulus Attributes</b>	Example images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Worksheets, Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	What map element contains references to map symbols? a. legend * Correct b. map scale c. neat lines d. title

<b>Standard</b>	30.0 Describe the technological advancements of scientific & technical visualization. – The student will be able to:
<b>Benchmark</b>	30.07 Define virtual reality and relate it to simulations and holograms.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	The student will define virtual reality, holograms and the relationships between the two.
<b>Content Focus</b>	Holograms, virtual reality, oculus rift, google, glass
<b>Content Limits</b>	Content is limited to the definition of virtual reality and how it relates to simulations and holographic images. Examples and common titles may be used.
<b>Stimulus Attributes</b>	Hands on assignments, simulations, example images may be used, Worksheets
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What is the term for a computer-generated simulation of a three-dimensional image or environment that can be interacted with in a seemingly real or physical way?</p> <ol style="list-style-type: none"> <li>augmented reality</li> <li>holographic reality</li> <li>technical reality</li> <li>virtual reality * Correct</li> </ol>



<b>Standard</b>	33.0 Describe design fundamentals relative to visualization.
<b>Benchmark</b>	33.04 Define and describe the six elements of design (lines, shapes, color, texture, space, and size)
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	The student will define the six elements of design, and be able to identify and provide examples of each.
<b>Content Focus</b>	Line, shap, color, intensity, hue, space, texture, size
<b>Content Limits</b>	Question content is limited to the six elements and their definitions.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What is the name of the design element which has the properties: hue, value, and intensity?</p> <ol style="list-style-type: none"> <li>color * Correct</li> <li>shape</li> <li>texture</li> <li>space</li> </ol>

<b>Standard</b>	35.0 Discuss vector and bitmap images. – The student will be able to:
<b>Benchmark</b>	35.01 Define the characteristics of vector images.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will know the characteristics, definition and examples of vector images and their file formats and extensions.
<b>Content Focus</b>	vector, bitmap, extensions .ai, .eps, .pdf, .svg
<b>Content Limits</b>	Question content is limited to the definition of vector image characteristics and their common file extensions.
<b>Stimulus Attributes</b>	Images and images extensions may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	What type of graphics is based on mathematical expressions? a. bitmap b. raster c. pixel d. vector * Correct

<b>Standard</b>	35.0 Discuss vector and bitmap images. – The student will be able to:
<b>Benchmark</b>	35.02 Describe the advantages of vector images over raster images.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will describe advantages of vector images, and when they would be used over raster images.
<b>Content Focus</b>	Resolution, bitmap, vector, raster, quality.
<b>Content Limits</b>	Content is limited to identifying and providing examples of the advantages vector images have over raster images.
<b>Stimulus Attributes</b>	Images and images extensions may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	A vector images has an advantage over a raster image in that it can be resized without losing its quality. Which file format is an example of a vector image? a. eps * Correct b. gif c. jpg d. png

<b>Standard</b>	35.0 Discuss vector and bitmap images. – The student will be able to:
<b>Benchmark</b>	35.03 Describe the disadvantages of vector images compared to raster images.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will be able select and list the disadvantages of vector images
<b>Content Focus</b>	Vector, bitmap, math, formula, vectors
<b>Content Limits</b>	Content is limited to the disadvantages of vector images.
<b>Stimulus Attributes</b>	Images and images extensions may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	Which of the following is a disadvantage of vector graphics? a. The image file size is very large b. The images does not scale well c. The images take more processing power * Correct d. The images are more up of individual pixels

<b>Standard</b>	35.0 Discuss vector and bitmap images. – The student will be able to:
<b>Benchmark</b>	35.05 Identify the native file format for common software used to create vector images (Corel Draw, Adobe Illustrator, and Adobe Photoshop).
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	The student will identify native file formats for common software programs.
<b>Content Focus</b>	EPS, AI, PDF, SVG, DXF, JPEG, TIFF, BMP, GIF, PNG
<b>Content Limits</b>	Content is limited to vector image file formats
<b>Stimulus Attributes</b>	Images and images extensions may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	What is the native file format for CorelDRAW? a. ai b. cdr *Correct c. eps d. fvg

<b>Standard</b>	35.0 Discuss vector and bitmap images. – The student will be able to:
<b>Benchmark</b>	35.06 Define the characteristics of raster (bitmap) images.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	The student will identify native file formats for common software programs.
<b>Content Focus</b>	EPS, AI, PDF, SVG, DXF, JPEG, TIFF, BMP, GIF, PNG
<b>Content Limits</b>	Content is limited to raster image formats
<b>Stimulus Attributes</b>	Images and images extensions may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	In computer graphics what type of image is a dot matrix data structure representing a grid of pixels, or points of color? a. drawing exchange b. post script c. raster * Correct d. vector

<b>Standard</b>	35.0 Discuss vector and bitmap images. – The student will be able to:
<b>Benchmark</b>	35.07 Describe the advantages of raster images over vector images.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	The student will identify disadvantages of the vector file format and provide examples.
<b>Content Focus</b>	JPEG, TIFF, BMP, GIF, PNG EPS, AI, PDF, SVG, DXF
<b>Content Limits</b>	Content is limited to the advantages of raster over vector formats
<b>Stimulus Attributes</b>	Images and images extensions may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	Which of the following and advantage of a raster file format? a. based on mathematical formula b. continuous tones * Correct c. fast to edit d. small file size

<b>Standard</b>	35.0 Discuss vector and bitmap images. – The student will be able to:
<b>Benchmark</b>	35.08 Describe the disadvantages of vector images compared to raster images.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	The student will identify disadvantages of the vector file format and provide examples.
<b>Content Focus</b>	JPEG, TIFF, BMP, GIF, PNG EPS, AI, PDF, SVG, DXF
<b>Content Limits</b>	Content is limited to disadvantages or vector over raster.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	Which of the following is a disadvantage of a vector images? a. based on mathematical formula b. large file size c. low color depth * Correct d. unable to scale up in size



<b>Standard</b>	37.0 Describe 2D software applications and their basic functions. – The student will be able to:
<b>Benchmark</b>	37.01 Identify and describe the purpose of the various tools used in a basic 2D graphics application (select, knife, magnify/zoom, text, fill, pan, eyedropper, gradient blend, and crop).
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will identify 2D graphic tools from there graphic and description. Students will also know the purpose of each tool
<b>Content Focus</b>	Selection, symbol, drawing, painting, graph, slicing, moving, text, fill, pan, eyedropper, gradient, blend
<b>Content Limits</b>	Content is limited to the tool descriptions, and their purpose
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	Which tool skews objects around a fixed point? a. reflect b. rotate c. scale d. shear * Correct

<b>Standard</b>	37.0 Describe 2D software applications and their basic functions. – The student will be able to:
<b>Benchmark</b>	37.02 Identify and describe various drawing techniques used in 2D representations, to include Bezier curves, closed and open splines, control points, layering, welding, grouping, desktop, grids and snaps, brushes and brush effects, line thickness,
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will identify, describe and provide examples of 2D drawing techniques from examples, descriptions and there icons.
<b>Content Focus</b>	Bezier curves, closed and open splines, control points, layering, welding, grouping, desktop, grids and snaps, brushes and brush effects, line thickness, rotation, transparency, and printing 37.0 Describe 2D software applications and their basic functions. – The student will be able to:
<b>Content Limits</b>	Content is limited to the drawing techniques their descriptions, purpose and icons.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	What is the term used to describe the different levels at which you can place an object or image file. a. layers * Correct b. outlines c. paths d. profiles

<b>Standard</b>	39.0 Evaluate methods for displaying data using charts and graphs. – The student will be able to:
<b>Benchmark</b>	39.01 Recognize different types of charts and their uses and advantages.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Student will identify different chart types, there definitions and uses.
<b>Content Focus</b>	Bar chart, venn, histogram, donut chart, flow chart, column, line, pie, scatter, bubble, radar
<b>Content Limits</b>	Content is limited to the identificaiton, definitions and uses of charts.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What type of chart represents percentages of a whole?</p> <ul style="list-style-type: none"> <li>a. area</li> <li>b. bar</li> <li>c. pie * Correct</li> <li>d. scatter</li> </ul>

<b>Standard</b>	39.0 Evaluate methods for displaying data using charts and graphs. – The student will be able to:
<b>Benchmark</b>	39.02 Describe the characteristics and uses of bar charts.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will identify the uses and characteristics of bar charts from examples, and illustrations.
<b>Content Focus</b>	Bar chart, response axis, frame, response variable
<b>Content Limits</b>	Content is limited to bar charts, and the terms, definitions and uses of bar charts.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What type of chart groups data with rectangular bars with lengths proportional to the values that they represent?</p> <ol style="list-style-type: none"> <li>area chart</li> <li>bar chart *Correct</li> <li>scatter chart</li> <li>spline chart</li> </ol>

<b>Standard</b>	39.0 Evaluate methods for displaying data using charts and graphs. – The student will be able to:
<b>Benchmark</b>	39.04 Describe the characteristics and uses of a line (x-y) graph.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will identify, xy graphs and examples of their proper uses.
<b>Content Focus</b>	Data table, intervals, xy graph
<b>Content Limits</b>	Content is limited to X-Y graph, and the terms and definitions used to describe pie charts.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	Which type is used to track changes over short and long periods of time? a. area chart b. donut c. line X-Y graph *Correct d. pie chart

<b>Standard</b>	39.0 Evaluate methods for displaying data using charts and graphs. – The student will be able to:
<b>Benchmark</b>	39.05 Describe the characteristics and uses of a pie chart.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will identify, pie chart and examples of their proper uses.
<b>Content Focus</b>	Pie chart, donut, radial, slice, statistic, legend, variable
<b>Content Limits</b>	Content is limited to pie charts, and the terms and definitions used to describe pie charts.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What is a type of graph in which a circle is divided into sectors that each represent a proportion of the whole?</p> <ol style="list-style-type: none"> <li>area chart</li> <li>pie chart * Correct</li> <li>scatter chart</li> <li>spline chart</li> </ol>

<b>Standard</b>	39.0 Evaluate methods for displaying data using charts and graphs. – The student will be able to:
<b>Benchmark</b>	39.06 Describe the characteristics and uses of a scatter plot.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will identify, scatter plots and examples of their proper uses.
<b>Content Focus</b>	Scatter plot, bivariate data, outliers, distribution
<b>Content Limits</b>	Content is limited to the uses and definition of scatter plots.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	What type of chart consists of series of dots on an X and Y axis? a. bar b. histogram c. line d. scatterplot * Correct

<b>Standard</b>	39.0 Evaluate methods for displaying data using charts and graphs. – The student will be able to:
<b>Benchmark</b>	39.07 Describe the characteristics and uses of a histogram.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will identify, histograms and examples of their proper uses..
<b>Content Focus</b>	Histogram, bar chart, distribution, data
<b>Content Limits</b>	Content is limited to histograms, and the terms and definitions used to describe histograms.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What is the name of a vertical bar chart that depicts the distribution of a set of data?</p> <ol style="list-style-type: none"> <li>histogram * Correct</li> <li>infographic</li> <li>process chart</li> <li>scatter plot</li> </ol>



<b>Standard</b>	39.0 Evaluate methods for displaying data using charts and graphs. – The student will be able to:
<b>Benchmark</b>	39.08 Identify and describe the different parts of a chart (axis, title, legend, labels).
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	The student will identify, define, and provide examples of the parts of a chart.
<b>Content Focus</b>	Title, labels, chart area, data marker, data series, axis, tick mark, plot area, gridlines, legend
<b>Content Limits</b>	Content is limited to the basic parts of a chart and their definitions and uses.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What is the name of a symbol on a chart that represents a single value in the worksheet?</p> <ol style="list-style-type: none"> <li>data marker * Correct</li> <li>data series</li> <li>legend</li> <li>tick mark</li> </ol>

<b>Standard</b>	41.0 Describe various organizational and diagramming tools. The student will be able to:
<b>Benchmark</b>	41.02 Identify and describe the basic flowcharting shapes.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will identify, describe and translate basic flowcharting shapes.
<b>Content Focus</b>	Start, action, decision, connector, delay, merge, collate, sort, subroutine, sort, manual loop, loop limit.
<b>Content Limits</b>	Content is limited to the basic flowcharting shapes, there definitions and uses.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	Inn flowcharting what best represents the shape of the terminator or start/end symbol? a. cirle b. diamond c. oval * Correct d. rectangle

<b>Standard</b>	44.0 Recognize digital image formats. – The student will be able to:
<b>Benchmark</b>	44.03 Describe the characteristics, advantages, disadvantages, and uses of various image file formats (TIFF, JPEG, GIF, and BMP).
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will identify and provide examples of the advantages and disadvantages of various image file formats.
<b>Content Focus</b>	GIF, EPS, AI, PDF, SVG, DXF, JPG, PNG, BMP, TIFF
<b>Content Limits</b>	Content is limited to the characteristics and advantages and disadvantages of image file formats.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What is the major disadvantage of the TIFF image format?</p> <ol style="list-style-type: none"> <li>does not scale well</li> <li>large file size * Correct</li> <li>lossy format, discards data</li> <li>low resolution</li> </ol>

<b>Standard</b>	45.0 Summarize basic 3D modeling concepts. – The student will be able to:
<b>Benchmark</b>	44.04 Describe the characteristics, advantages, disadvantages, and uses of various audio and video file formats (WAV, AVI, MPEG, MP3, SWF).
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will identify and provide examples of the advantages and disadvantages of various audio and video file formats.
<b>Content Focus</b>	WAV, AVI, MPEG, MP3, SWF, AIFF, SND, MOV
<b>Content Limits</b>	Content is limited to the characteristic advantages and disadvantages of audio and video formats.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What is the common format used for sharing video files on the internet which uses separate compression for the audio and video track?</p> <ol style="list-style-type: none"> <li>3GPP multimedia file (.3pg)</li> <li>Audio video interactive (.avi)</li> <li>MPEG-4 (.mp4)</li> <li>Windows media video file (.wmv)</li> </ol>

<b>Standard</b>	45.0 Summarize basic 3D modeling concepts. – The student will be able to:
<b>Benchmark</b>	45.03 Describe basic geometric shapes available in 3D modeling software (sphere, cube, cylinder, torus, cone, plane).
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will identify the geometric shapes in 3D modeling software, by sight and description.
<b>Content Focus</b>	Sphere, cube, cylinder, torus, cone, plane
<b>Content Limits</b>	Content is limited to the geometric shapes found in 3D modeling programs.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	Which of the following is defined by a surface revolution generated by revolving a circle in three-dimensional space? a. cone b. cylinder c. torus * Correct d. sphere

<b>Standard</b>	45.0 Summarize basic 3D modeling concepts. – The student will be able to:
<b>Benchmark</b>	45.04 Describe basic shapes available in 2D modeling software (arcs, ellipses, circles, curve, freehand curves, polygons, splines).
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will describe the shapes in 2D modeling software by sight and description.
<b>Content Focus</b>	Arcs, ellipses, circles, curve, freehand curves, polygons, splines
<b>Content Limits</b>	Content is limited to the shapes found in 2D modeling software
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	What consist entirely of smooth curves that connects two or more specific points? a. cone b. cube c. torus d. spline * Correct

<b>Standard</b>	45.0 Summarize basic 3D modeling concepts. – The student will be able to:
<b>Benchmark</b>	45.07 Describe how extrusion or sweeping techniques transform 2D objects into 3D objects.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will explain how 2D images are transformed into 3D images using extrusion and sweeping techniques.
<b>Content Focus</b>	Extrusion, sweeping, transformation
<b>Content Limits</b>	Content is limited to extrusion and sweeping techniques
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	What is the command allows you to create a solid object from circles, polygons, and objects, that have closed paths? a. extrude *Correct b. loft c. scale d. sweep

<b>Standard</b>	45.0 Summarize basic 3D modeling concepts. – The student will be able to:
<b>Benchmark</b>	45.10 Describe the scale, rotate, and move actions that comprise the transformation technique for animating a 3D object.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will describe the scale, rotate, and move actions, by icon description and example.
<b>Content Focus</b>	Scale, rotate, move
<b>Content Limits</b>	Content is limited to descriptions, examples and images of the scale, rotate and move actions.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	What command encompasses moving, rotating, reflecting, scaling, and shearing objects? a. grouping b. setting c. transparency d. transforming * Correct



<b>Standard</b>	45.0 Summarize basic 3D modeling concepts. – The student will be able to:
<b>Benchmark</b>	45.16 Define plug-in and describe how it extends the capability of the modeling program.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will define plugin, examples of its uses and characteristics.
<b>Content Focus</b>	Plugin, extension, add in, libraries
<b>Content Limits</b>	Content is limited to the definition of plugins, characteristics of plugins, and their used.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations.
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	What is the name for a software component that adds a specific feature to an existing software application? a. extension b. plugin * Correct c. script d. skin

<b>Standard</b>	46.0 Recognize basic rendering techniques. – The student will be able to:
<b>Benchmark</b>	46.01 Define rendering and describe its role in 3D modeling.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will define rendering, its characteristics and uses.
<b>Content Focus</b>	Rendering, shading, coloring
<b>Content Limits</b>	Content is limited to the definition and characteristics of rendering.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What is the name for the process of generating an image from a 2D or 3D model?</p> <ol style="list-style-type: none"> <li>casting</li> <li>rendering * Correct</li> <li>shading</li> <li>tracing</li> </ol>

<b>Standard</b>	46.0 Recognize basic rendering techniques. – The student will be able to:
<b>Benchmark</b>	46.02 Define texture mapping and describe its role in 2D and 3D modeling.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will define texture mapping, its characteristics and uses.
<b>Content Focus</b>	Texture mapping, vertex shaders, multitexturing, texels
<b>Content Limits</b>	Content is limited to the definition and characteristics of texture mapping.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What is the method for adding detail, surface texture, or color to a computer-generated 3D model?</p> <ol style="list-style-type: none"> <li>dymaxion map</li> <li>parallax mapping</li> <li>texture mapping * Correct</li> <li>UV mapping</li> </ol>

<b>Standard</b>	46.0 Recognize basic rendering techniques. – The student will be able to:
<b>Benchmark</b>	46.03 Define UV mapping and describe its role in rendering visualizations.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	
<b>Benchmark Clarification</b>	Students will define bump mapping, its characteristics and uses.
<b>Content Focus</b>	UV mapping, models, 2D, 3D
<b>Content Limits</b>	Content is limited to the definition and characteristics of UV mapping.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What is the process of making a 2D image representation of a 3D model's surface?</p> <ol style="list-style-type: none"> <li>bump mapping</li> <li>dymaxion map</li> <li>parallax mapping</li> <li>UV mapping * Correct</li> </ol>

<b>Standard</b>	46.0 Recognize basic rendering techniques. – The student will be able to:
<b>Benchmark</b>	46.04 Define bump mapping and describe its role in rendering visualizations.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	
<b>Benchmark Clarification</b>	Students will define bump mapping, its characteristics and uses
<b>Content Focus</b>	polygons, yz space, checkering, vertex
<b>Content Limits</b>	Content is limited to the definition and characteristics of bump mapping.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What is the name of the technique used in graphics programs to produce the appearance of textured surfaces?</p> <ol style="list-style-type: none"> <li>bump mapping * correct</li> <li>dymaxion mapping</li> <li>normal mapping</li> <li>parallax mapping</li> </ol>

<b>Standard</b>	47.0 Summarize basic animation techniques. – The student will be able to:
<b>Benchmark</b>	47.02 Identify the NTSC frame rate.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will know the NTSC frame rate and understand the terms, and characteristics.
<b>Content Focus</b>	NTSC, PAL, frame rate
<b>Content Limits</b>	Content is limited to the definition and characteristics of NTSC.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What is the standard video field rate per second for NTSC?</p> <ol style="list-style-type: none"> <li>24p</li> <li>30p</li> <li>50i</li> <li>60i *Correct</li> </ol>

<b>Standard</b>	47.0 Summarize basic animation techniques. – The student will be able to:
<b>Benchmark</b>	47.03 Identify the PAL frame rate.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)=X (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will know the PAL frame rate and understand the terms, and characteristics.
<b>Content Focus</b>	PAL, frame rate, NTSC
<b>Content Limits</b>	Content is limited to the definition and characteristics of PAL.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What is the standard video field rate per second for PAL?</p> <ul style="list-style-type: none"> <li>a. 24p</li> <li>b. 30p</li> <li>c. 50i *Correct</li> <li>d. 60i</li> </ul>

<b>Standard</b>	47.0 Summarize basic animation techniques. – The student will be able to:
<b>Benchmark</b>	47.04 Identify the standard frame rate for motion pictures.
<b>Item Types</b> (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
<b>Cognitive Complexity Level</b>	Low, Moderate
<b>Benchmark Clarification</b>	Students will know the standard frame rates for motion pictures, and their characteristics.
<b>Content Focus</b>	Frames per second, NTSC, PAL, frame rate
<b>Content Limits</b>	Content is limited to the definition and characteristics of motion picture frame rates.
<b>Stimulus Attributes</b>	Images may be used, Worksheets, hands on assignments, simulations
<b>Response Attributes</b>	Projects, experiments, checklists, simulations, examples.
<b>Sample Item</b>	<p>What is the industry standard frame rates for film and projection formats?</p> <ol style="list-style-type: none"> <li>15 frames per second</li> <li>24 frames per second * Correct</li> <li>30 frames per second</li> <li>50 frames per second</li> </ol>