FLORIDA DEPARTMENT OF
EDUCATION
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Individual Test Item Specifications

8722030- Building Trades & Construction Design Technology 3
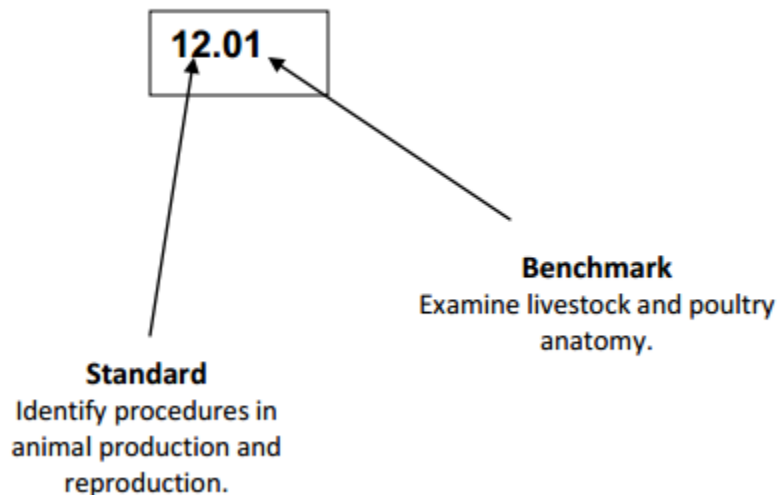
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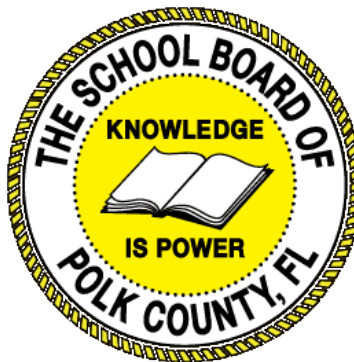
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I. Guide to the Individual Benchmark Specifications

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:

12.01

Benchmark
Examine livestock and poultry anatomy.
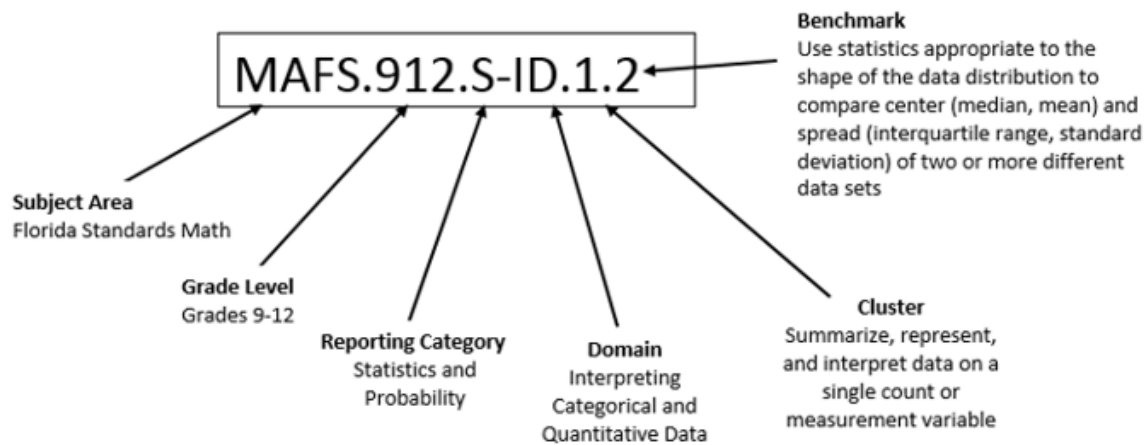
Standard
Identify procedures in animal production and reproduction.

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**.

Benchmark
Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets

MAFS.912.S-ID.1.2

Subject Area
Florida Standards Math

Grade Level
Grades 9-12

Reporting Category
Statistics and Probability

Domain
Interpreting Categorical and Quantitative Data

Cluster
Summarize, represent, and interpret data on a single count or measurement variable

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	16.0 Demonstrate science knowledge and skills.
Benchmark	16.01 Assess molecular action as a result of temperature extremes, chemical reaction and moisture content as it relates to the choice of materials and construction techniques.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or assess molecular action as a result of temperature extremes, chemical reaction and moisture content as it relates to the choice of materials and construction techniques.
Content Focus	Molecular action, temperature extremes, chemical reactions, moisture content, material choices, construction techniques, freeze, thaw, curing, hydration, bonds, reactivity
Content Limits	The content will include, but not be limited to, components of assessing molecular action as a result of temperature extremes, chemical reaction and moisture content as it relates to the choice of materials and construction techniques.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	What is the reason that a foundation must be at least 36" below grade in northern states? A. due to higher elevations B. due to freezing and thawing C. because of high temperatures D. because concrete strength lessens the further north you go Answer: B

Standard	16.0 Demonstrate science knowledge and skills.
Benchmark	16.02 Discuss the role of creativity in constructing scientific questions, methods and explanations.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or discuss the role of creativity in constructing scientific questions, methods and explanations.
Content Focus	Scientific questions, investigable questions, collect data, evaluate data, recommendations, science based findings, scientific recommendations, science in construction, data
Content Limits	The content will include, but not be limited to, components of discussing the role of creativity in constructing scientific questions, methods and explanations.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	When cement is mixed with water, what is the scientific reason that it hardens and produces concrete? A. a chemical reaction occurs which binds the ingredients together B. hardness occurs when extremely hot water is used for mixing C. cement does not harden when mixed with water D. due to the rocks in the cement Answer: A

Standard	16.0 Demonstrate science knowledge and skills.
Benchmark	16.03 Formulate scientifically investigable questions, construct investigations, collect and evaluate data and develop scientific recommendations based on findings.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)=X (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or formulate scientifically investigable questions, construct investigations, collect and evaluate data and develop scientific recommendations based on findings.
Content Focus	Scientific questions, investigable questions, collect data, evaluate data, recommendations, science based findings, scientific recommendations, science in construction, data
Content Limits	The content will include, but not be limited to, components of formulating scientifically investigable questions, constructing investigations, collecting and evaluating data and developing scientific recommendations based on findings.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	What is the scientific explanation why putting water on a slab immediately after completion will help the curing process? A. Water has no benefit to the curing process. B. The added weight from the water helps to keep the slab intact. C. Dehydration or drying out the slab as quickly as possible helps it harden. D. Hydration keeps the slab wet and temperatures moderate to allow for slow curing. Answer: D

Standard	16.0 Demonstrate science knowledge and skills.
Benchmark	16.04 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and demonstrate knowledge of the proper precautions required for handling such materials.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)=X (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and demonstrate knowledge of the proper precautions required for handling such materials.
Content Focus	Chemicals, hazardous materials, precautions, health related problems, exposure, work related chemicals, handling, material storage, MSDS, OSHA
Content Limits	The content will include, but not be limited to, components of identifying health-related problems that may result from exposure to work-related chemicals and hazardous materials, and demonstrating knowledge of the proper precautions required for handling such materials.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	What is the first line of defense to prevent concrete dermatitis from the handling of cement? A. gloves B. long sleeves C. safety goggles D. water washouts Answer: A

Standard	16.0 Demonstrate science knowledge and skills.
Benchmark	16.05 Explain pressure measurement in terms of PSI and inches of mercury.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or explain pressure measurement in terms of PSI and inches of mercury.
Content Focus	Mercury, measurement terms, PSI, pounds per square inch, strength, types of measurement, understanding pressure
Content Limits	The content will include, but not be limited to, components of explaining pressure measurement in terms of PSI and inches of mercury.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	What does the scientific acronym PSI stand for? A. People Science and Industries B. Pollution Services International C. Pounds per Square Inch D. Pressure Squared In Answer: C

Standard	16.0 Demonstrate science knowledge and skills.
Benchmark	16.06 Explore new technology as it applies to the construction industry in terms of materials, processes and the need for continuing education.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or explore new technology as it applies to the construction industry in terms of materials, processes and the need for continuing education.
Content Focus	Technology, construction technology, materials, process, continuing education, licensing, industry certifications, high tech tools, tool technology, safety, GPS
Content Limits	The content will include, but not be limited to, components of exploring new technology as it applies to the construction industry in terms of materials, processes and the need for continuing education.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	What technological advancement helps surveyors provide precise locations of property corners and building locations? A. computers B. internet C. lasers D. satellites Answer: D

Standard	16.0 Demonstrate science knowledge and skills.
Benchmark	16.07 Compare and analyze traditional and digital media to learn how technology has altered opportunities for innovative responses and results.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or compare and analyze traditional and digital media to learn how technology has altered opportunities for innovative responses and results.
Content Focus	Analyze digital media, altered opportunities, innovative responses, media, marketing, LEED, internet, computer technology, digital library, CAD
Content Limits	The content will include, but not be limited to, components of comparing and analyzing traditional and digital media to learn how technology has altered opportunities for innovative responses and results.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	Which acronym refers to the computer program that helps architects and engineers design buildings? A. AEDB B. CAD C. DAP D. MAPC Answer: B

Standard	16.0 Demonstrate science knowledge and skills.
Benchmark	16.08 Investigate the use of technology and other resources to inspire design decisions.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)=X (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or investigate the use of technology and other resources to inspire design decisions.
Content Focus	CAD, BIM, Informational modeling, computer design, design code, technology, resources, design decisions, estimating, architectural design, interior design
Content Limits	The content will include, but not be limited to, components of investigating the use of technology and other resources to inspire design decisions.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	What is the intelligent 3-D modeling process called that assists with design and management of the building process? A. 3DMP B. BIM C. DMBP D. MP3D Answer: B

Standard	17.0 Demonstrate mathematics knowledge and skills.
Benchmark	17.01 Demonstrate knowledge of arithmetic operations.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)=X (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or demonstrate knowledge of arithmetic operations.
Content Focus	Arithmetic, adding, subtracting, multiplying, dividing, fractions, percentages, ratios, formulas
Content Limits	The content will include, but not be limited to, components of and ability to demonstrate knowledge of arithmetic operations.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	What number is 15% of 1000? A. 15 B. 150 C. 985 D. 1015 Answer: B

Standard	17.0 Demonstrate mathematics knowledge and skills.
Benchmark	17.02 Solve job-related problems by adding, subtracting, multiplying and dividing numbers using fractions, decimals and whole numbers.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or solve job-related problems by adding, subtracting, multiplying and dividing numbers using fractions, decimals and whole numbers.
Content Focus	Decimals, whole numbers, arithmetic, adding, subtracting, multiplying, dividing, fractions, percentages, ratios, formulas
Content Limits	The content will include, but not be limited to, components of, and ability to solve job-related problems by adding, subtracting, multiplying and dividing numbers using fractions, decimals and whole numbers.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	You are remodeling an industrial warehouse and you need to redo part of a slab that is broken and cracked. The original slab is 10,000 square feet, and the broken area is 1200 square feet. In square feet, how much of the original concrete is salvageable? A. 1200 sf B. 6800 sf C. 8800 sf D. 11200 sf Answer: C

Standard	17.0 Demonstrate mathematics knowledge and skills.
Benchmark	17.03 Change numbers to percent.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or change numbers to percent.
Content Focus	Fractions, percents, percentages, ratios, decimals, change
Content Limits	The content will include, but not be limited to, components of changing numbers to percent.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	A job is 33% complete. Which number reflects 33 percent of a job? A. .033 B. .33 C. 33 D. 333 Answer: B

Standard	17.0 Demonstrate mathematics knowledge and skills.
Benchmark	17.04 Solve job-related problems using a calculator.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)=X (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or solve job-related problems using a calculator.
Content Focus	Calculator, fractions, change, decimals, whole numbers, arithmetic, adding, subtracting, multiplying, dividing, percentages, ratios, formulas
Content Limits	The content will include, but not be limited to, components of solving job-related problems using a calculator.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	The most common tool that an estimator will use to help determine material quantities and cost on a project is what? A. abacus B. adding machine C. calculator D. computer Answer: C

Standard	17.0 Demonstrate mathematics knowledge and skills.
Benchmark	17.05 Read a ruler and a tape measure.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)=X (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or read a ruler and a tape measure.
Content Focus	Measuring tape, inches, fractions of an inch, one-eighth, one-sixteenth, one-thirty second, one-fourth, one half, whole, foot, centimeter, ruler
Content Limits	The content will include, but not be limited to, components of reading a ruler and a tape measure.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	What is the smallest increment of measurement on a tape measure used in construction? A. 1/16" B. 1/8" C. 1/4" D. 1/2" Answer: A

Standard	17.0 Demonstrate mathematics knowledge and skills.
Benchmark	17.06 Compute feet, inches and yards.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)=X (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or compute feet, inches and yards.
Content Focus	Ruler, yardstick, measuring tape, feet, foot, inch, inches, yard, compute, change, multiply, divide, convert
Content Limits	The content will include, but not be limited to, components of computing feet, inches and yards.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	How many inches are in 100 yards? A. 1000" B. 3600" C. 12,000" D. 36,000" Answer: B

Standard	17.0 Demonstrate mathematics knowledge and skills.
Benchmark	17.07 Change hours and minutes to decimals, fractions and mixed numbers.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or change hours and minutes to decimals, fractions and mixed numbers.
Content Focus	Decimals, fractions, mixed numbers, hours, minutes, time, fractions, whole number, divide, subtract, add, time clock, payroll
Content Limits	The content will include, but not be limited to, components of changing hours and minutes to decimals, fractions and mixed numbers.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	A weekly timesheet report for a laborer indicates they worked 39 hours and 30 minutes in a week. Which number indicates the amount of time worked? A. 39.03 hours B. 39.30 hours C. 39.5 hours D. 40 hours Answer: C

Standard	17.0 Demonstrate mathematics knowledge and skills.
Benchmark	17.08 Construct charts/tables/graphs using functions and data.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)=X (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or construct charts/tables/graphs using functions and data.
Content Focus	Chart, table, graph, data, present, read, functions, analyze, line graph, bar graph, pie chart
Content Limits	The content will include, but not be limited to, components of constructing charts/tables/graphs using functions and data.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	What display is used in figuring out the amount of dead weight that can be applied to floor joists? A. floor diagram B. floor elevation C. item detail D. load chart Answer: D

Standard	17.0 Demonstrate mathematics knowledge and skills.
Benchmark	17.09 Determine ratios and proportions.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or determine ratios and proportions.
Content Focus	Ratio, proportion, fraction, decimal, divide, compare, multiply, convert
Content Limits	The content will include, but not be limited to, components of determining ratios and proportions.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	For every 4 feet in length, a roof pitch increases 1 foot. What is the ratio that indicates the pitch of the roof? A. 2:1 B. 3:1 C. 4:1 D. 12:1 Answer: C

Standard	17.0 Demonstrate mathematics knowledge and skills.
Benchmark	17.10 Convert measurements from the English to the metric system and from the metric to the English system.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or convert measurements from the English to the metric system and from the metric to the English system.
Content Focus	English Conventional measuring system, Metric system, convert, change, formula, ratio, multiply, divide, meter, yard, foot, feet, ruler, yardstick, meter stick, inch, decimals, portions
Content Limits	The content will include, but not be limited to, components of converting measurements from the English to the metric system and from the metric to the English system.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	What is the metric equivalent of 2 feet? A. .305 meter B. .5 meter C. .61 meter D. 1 meter Answer: C

Standard	17.0 Demonstrate mathematics knowledge and skills.
Benchmark	17.11 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares and cylinders.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)=X (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares and cylinders.
Content Focus	Volume, area, weight, circumference, perimeter, measurements, rectangles, squares, cylinders, formula, multiply, divide
Content Limits	The content will include, but not be limited to, components of solving problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares and cylinders.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	If concrete weighs 4000 pounds per yard, how much will a slab of concrete weigh that has 10 yards of concrete in it? A. 400 pounds B. 4,000 pounds C. 40,000 pounds D. 400,000 pounds Answer: C

Standard	17.0 Demonstrate mathematics knowledge and skills.
Benchmark	17.12 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
Content Focus	Horizontal, vertical, surfaces, millimeters, centimeters, feet, inches, measurements, metric, conventional
Content Limits	The content will include, but not be limited to, components of measuring tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	If a building pad finish grade is allowed to be + /- (plus or minus) 1/10 of a foot, how many inches of variation are allowed? A. 1/2 inch B. 1 inch C. 1.2 inches D. 12 inches Answer: C

Standard	17.0 Demonstrate mathematics knowledge and skills.
Benchmark	17.13 Analyze and apply data and measurements to solve problems and interpret documents.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)=X (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or analyze and apply data and measurements to solve problems and interpret documents.
Content Focus	Data, analyze, measurements, solve problems, interpret
Content Limits	The content will include, but not be limited to, components of analyzing and applying data and measurements to solve problems and interpret documents.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	If a monthly pay application has a total billing of $68,000 billed on a $100,000 project, what percentage of the project is complete in terms of money spent? A. .068% B. 10% C. 68 % D. 86% Answer: C

Standard	17.0 Demonstrate mathematics knowledge and skills.
Benchmark	17.14 Calculate work hours and labor costs for a specific job.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)=X (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or calculate work hours and labor costs for a specific job.
Content Focus	Calculator, calculate, labor, payroll, time clock, wages, time spent, in time, out time, subtract, add
Content Limits	The content will include, but not be limited to, components of calculating work hours and labor costs for a specific job.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	If an 8 man crew works 8 hours per day, for 5 days, they each earn $10 per hour. How much money has the entire crew earned? A. $320 B. $800 C. $3200 D. $5000 Answer: C

Standard	18.0 Demonstrate an understanding of the built environment.
Benchmark	18.01 Research the development of construction technology, its impact on the built environment and the impact of growth on the construction industry.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or research the development of construction technology, its impact on the built environment and the impact of growth on the construction industry.
Content Focus	Construction technology, environment, construction industry, CAD, BIM
Content Limits	The content will include, but not be limited to, components of researching the development of construction technology, its impact on the built environment and the impact of growth on the construction industry.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	In terms of the construction industry, what most influences the physical activity of people? A. built environment B. computer technology C. nature D. peers Answer: A

Standard	18.0 Demonstrate an understanding of the built environment.
Benchmark	18.02 Describe and give examples of the benefits of the construction industry on health and safety, communication, transportation and the economy.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or describe and give examples of the benefits of the construction industry on health and safety, communication, transportation and the economy.
Content Focus	Health, safety, transportation, economy
Content Limits	The content will include, but not be limited to, components of describing and giving examples of the benefits of the construction industry on health and safety, communication, transportation and the economy.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	What does constructing sidewalks in a community promote? A. health and safety B. Increased development C. landscaping D. large construction projects Answer: A

Standard	18.0 Demonstrate an understanding of the built environment.
Benchmark	18.03 Examine and compare the relationship between the built environment and the natural environment.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or examine and compare the relationship between the built environment and the natural environment.
Content Focus	Natural environment, built environment, construction industry, developed vs undeveloped
Content Limits	The content will include, but not be limited to, components of examining and comparing the relationship between the built environment and the natural environment.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	A community that promotes walking on a concrete pathway built around a pond in the neighborhood is taking advantage of what? A. pond animals B. water retention C. neighborhood community D. both the built and natural environment Answer: D

Standard	18.0 Demonstrate an understanding of the built environment.
Benchmark	18.04 Compare architectural designs and/or models to understand how technical and utilitarian components impact aesthetic qualities.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or compare architectural designs and/or models to understand how technical and utilitarian components impact aesthetic qualities.
Content Focus	Aesthetic qualities, utilitarian components, architectural designs, various types of design, famous architects, visual models, CAD, BIM, informational models
Content Limits	The content will include, but not be limited to, components of comparing architectural designs and/or models to understand how technical and utilitarian components impact aesthetic qualities.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	Construction of adobe-style residential homes is influenced by which geographical location in the U.S.? A. Pacific Coast B. Northeast C. Southeast D. Southwest Answer: D

Standard	18.0 Demonstrate an understanding of the built environment.
Benchmark	18.05 Analyze changes in architectural styles and construction practices over time.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or analyze changes in architectural styles and construction practices over time.
Content Focus	Changes in architectural styles, construction practices, changes in construction, technology, aesthetic qualities, utilitarian components, architectural designs, various types of design, famous architects, visual models, CAD, BIM, informational models
Content Limits	The content will include, but not be limited to, components of analyzing changes in architectural styles and construction practices over time.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	Which concrete placement tool has recently become the construction practice that allows for faster placing times for large concrete pours? A. bull float B. check rod C. hand screed D. laser screed Answer: D

Standard	18.0 Demonstrate an understanding of the built environment.
Benchmark	18.06 Describe the significance of major architects, engineers or inventors to understand their historical influences.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or describe the significance of major architects, engineers or inventors to understand their historical influences.
Content Focus	Famous architects, famous engineers, famous inventors, historical influences, structural design, architectural design, changes to modern construction, styles of construction, influence traditional construction
Content Limits	The content will include, but not be limited to, components of describing the significance of major architects, engineers or inventors to understand their historical influences.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	Which of the following is a famous architect? A. Fleur Daniel B. Frank Lloyd Wright C. Norm Norcon D. Ron Bechtel Answer: B

Standard	18.0 Demonstrate an understanding of the built environment.
Benchmark	18.07 Research innovative historical architectural and/or engineering works and examine the significance of their legacy for the future.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or research innovative historical architectural and/or engineering works and examine the significance of their legacy for the future.
Content Focus	Impact of innovators, engineering works, future legacy, famous architects, famous engineers, famous inventors, historical influences, structural design, architectural design, changes to modern construction, styles of construction, influence traditional co
Content Limits	The content will include, but not be limited to, components of researching innovative historical architectural and/or engineering works and examining the significance of their legacy for the future.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	Who was the famous engineer who created the Golden Gate Bridge? A. Charles Alton Ellis B. Domingo Francisco C. San Jose Fuentes D. Zane Weber Answer: A

Standard	18.0 Demonstrate an understanding of the built environment.
Benchmark	18.08 Identify transitions in design media, technique and focus to explain how technology has changed design throughout history.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or identify transitions in design media, technique and focus to explain how technology has changed design throughout history.
Content Focus	Design transitions, media, CAD, design changes, technology, BIM, design history, computer modeling, internet, computers, history,
Content Limits	The content will include, but not be limited to, components of identifying transitions in design media, technique and focus to explain how technology has changed design throughout history.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	Which common computer program changed how buildings were designed? A. Aided Design Interface B. Computer Aided Design C. Computer Building Products D. Visual Architecture Answer: B

Standard	19.0 Demonstrate an understanding of the green environment.
Benchmark	19.01 Recognize and analyze the development of the built environment and its impacts on the natural environment such as pollution, deforestation, climate change, health and disease.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or recognize and analyze the development of the built environment and its impacts on the natural environment such as pollution, deforestation, climate change, health and disease.
Content Focus	Built environment, natural environment, pollution, deforestation, climate change, health, disease, waste, LEED, recycle, reuse materials, environmental concerns
Content Limits	The content will include, but not be limited to, components of recognizing and analyzing the development of the built environment and its impacts on the natural environment such as pollution, deforestation, climate change, health and disease.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	Built environments encourage physical activity that contributes to what? A. climate change B. disease prevention C. information modeling D. population densities Answer: B

Standard	19.0 Demonstrate an understanding of the green environment.
Benchmark	19.02 Describe and give examples of how a green built environment creates growth for the construction industry, and the economy such as health and safety, transportation and natural resources.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or describe and give examples of how a green built environment creates growth for the construction industry, and the economy such as health and safety, transportation and natural resources.
Content Focus	Transportation, health and safety, industry, oil industry, pipeline, built environment, natural environment, pollution, deforestation, climate change, health, disease, waste, LEED, recycle, reuse materials, environmental concerns
Content Limits	The content will include, but not be limited to, components of describing and giving examples of how a green built environment creates growth for the construction industry, and the economy such as health and safety, transportation and natural resources.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	How can green built environments improve how people impact natural resources? A. increased electrical use B. increased energy consumption C. less water consumption D. less imported building materials Answer: C

Standard	19.0 Demonstrate an understanding of the green environment.
Benchmark	19.03 Examine and compare the relationship between a green built environment and the natural environment.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or examine and compare the relationship between a green built environment and the natural environment.
Content Focus	Green building, natural environment, walk out basements, natural materials, distance products come from, local building materials, LEED points, code, natural power sources,
Content Limits	The content will include, but not be limited to, components of examining and comparing the relationship between a green built environment and the natural environment.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	How can building roadways be a problem for the natural environment? A. decreased ambient temperatures B. decreased greenhouse gases C. increased pervious land D. decreased pervious land Answer: D

Standard	19.0 Demonstrate an understanding of the green environment.
Benchmark	19.04 Explain the purpose of the United States Green Building Council (USGBC), the Green Building Certification Institute (GBCI) and Leadership for Energy and Environmental Design (LEED) are and how they create growth for the construction industry and the
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)=X (P)= (ER)=
Cognitive Complexity Level	M,H
Benchmark Clarification	The student will demonstrate knowledge, make observations or explain the purpose of the United States Green Building Council (USGBC), the Green Building Certification Institute (GBCI) and Leadership for Energy and Environmental Design (LEED) are and how they create growth for the construction industry and the economy.
Content Focus	USCBC, GBCI, LEED, local codes, growth in construction industry, incentives, points, design criteria, green design, environmentally friendly, environmentally safe, purpose of agencies, roles of agencies, growth contributors, economic impacts of each agenc
Content Limits	The content will include, but not be limited to, components of explaining the purpose of the United States Green Building Council (USGBC), the Green Building Certification Institute (GBCI) and Leadership for Energy and Environmental Design (LEED) are and how they create growth for the construction industry and the economy.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	What does the acronym USGBC stand for? A. United States Green Building Certification B.United States General Building Certifications C. United States Green Beret Coalition D. United States Grids Bridges Charts Answer: A

Standard	19.0 Demonstrate an understanding of the green environment.
Benchmark	19.05 Research sustainable building design and its relationship between health, energy efficiency and money savings for government, businesses and individuals.
Item Types **(MC)-Multiple Choice** **(SA)-Short Answer** **(P)-Performance** **(ER)-Extended Response**	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or research sustainable building design and its relationship between health, energy efficiency and money savings for government, businesses and individuals.
Content Focus	Building designs, health, energy, sustainable building designs, longevity, money saving organizations, incentives, CAD, BIM, environmentally friendly designs, characteristics,
Content Limits	The content will include, but not be limited to, components of researching sustainable building design and its relationship between health, energy efficiency and money savings for government, businesses and individuals.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	Industrial buildings that are designed to use less energy ensure less of all but which of the following? A. environmental degradation B. greenhouse gas emissions C. increased revenue D. pollution Answer: C

Standard	19.0 Demonstrate an understanding of the green environment.
Benchmark	19.06 Research the effects of building science on construction and energy efficiency.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or research the effects of building science on construction and energy efficiency.
Content Focus	Building science, construction science, energy efficiency, insulation, recycled insulation, solar roof vents, solar hot water, solar power, grass roofs, LEED
Content Limits	The content will include, but not be limited to, components of researching the effects of building science on construction and energy efficiency.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	What categorizes a building as "green"? A. a building not designed to last over 25 years B. efficient use of water and energy C. exterior color D. renovation Answer: B

Standard	19.0 Demonstrate an understanding of the green environment.
Benchmark	19.07 Research renewable fuels and energy.
Item Types (MC)-Multiple Choice (SA)-Short Answer (P)-Performance (ER)-Extended Response	(MC)=X (SA)= (P)= (ER)=
Cognitive Complexity Level	M
Benchmark Clarification	The student will demonstrate knowledge, make observations or research renewable fuels and energy.
Content Focus	Energy, renewable energy, coal, natural gas, oil, petroleum products, electricity, solar, wind, hydro power
Content Limits	The content will include, but not be limited to, components of researching renewable fuels and energy.
Stimulus Attributes	Question stem, vocab, video, graphs, diagrams, pictures, performance task, selection, demonstrations and oral explanations via media clips.
Response Attributes	The response may include terms, phrases, sentences, images, diagrams, or charts. Student created written responses or computer generated responses may be used.
Sample Item	Which type of power can be used to heat water in your home? A. biomass energy B. geothermal C. hydropower D. solar power Answer: D