

Laboratory Assistant

Study Guide

Assessments:

8201 Laboratory Assistant

8202 Clinical Laboratory Assistant



Overview

This study guide is designed to help students prepare for the Laboratory Assistant assessments. It includes information about the assessments, the skills standards upon which the assessments are based, resources that can be used to prepare for the assessments, and test taking strategies.

Each of the four sections in this guide provides useful information for students preparing for the Laboratory Assistant assessments.

- CareerTech and Competency-Based Education: A Winning Combination
- Laboratory Assistant assessments
 - ▶ Assessment Information
 - ▶ Standards and Test Content
 - ▶ Symbols and Acronyms
- Strategies for Test Taking Success
- Notes

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CareerTech and Competency-Based Education: A Winning Combination

Competency-based education uses learning outcomes that emphasize both the application and creation of knowledge and the mastery of skills critical for success. In a competency-based education system, students advance upon mastery of competencies, which are measurable, transferable outcomes that empower students.

Career and technology education uses industry professionals and certification standards to identify the knowledge and skills needed to master an occupation. This input provides the foundation for development of curriculum, assessments, and other instructional materials needed to prepare students for wealth-generating occupations and produce comprehensively trained, highly skilled employees demanded by the workforce.

Tools for Success

CareerTech education relies on three basic instructional components to deliver competency-based instruction: skills standards, curriculum materials, and competency assessments.

Skills standards provide the foundation for competency-based instruction and outline the knowledge and skills that must be mastered in order to perform related jobs within an industry. Skills standards are aligned with national skills standards and/or industry certification requirements; therefore, a student trained to the skills standards is equally employable in local, state, and national job markets.

Curriculum materials and textbooks contain information and activities that teach students the knowledge and skills outlined in the skills standards. In addition to complementing classroom instruction, curriculum resources include supplemental activities that enhance learning by providing opportunities to apply knowledge and demonstrate skills.

Certification assessments test the student over material outlined in the skills standards and taught using the curriculum materials and textbooks. When used with classroom performance evaluations, certification assessments provide a means of measuring occupational readiness.

Each of these components satisfies a unique purpose in competency-based education and reinforces the knowledge and skills students need to gain employment and succeed on the job.

Measuring Success

Evaluation is an important component of competency-based education. Pre-training assessments measure the student's existing knowledge prior to receiving instruction and ensure the student's training builds upon this knowledge base. Formative assessments administered throughout the training process provide a means of continuously monitoring the student's progress towards mastery.

Certification assessments provide a means of evaluating the student's mastery of knowledge and skills. Coaching reports communicate assessment scores to students and provide a breakdown of assessment results by standard area. The coaching report also shows how well the student has mastered skills needed to perform major job functions and identifies areas of job responsibility that may require additional instruction and/or training.

Laboratory Assistant Assessment Information

What are the Laboratory Assistant assessments?

The Laboratory Assistant assessments are end-of-program assessments for students in Laboratory Assistant programs. These assessments provide an indication of student mastery of knowledge and concepts necessary for success in careers in this area.

How were the assessments developed?

The assessments were developed by CareerTech Testing Center. Items were created and reviewed by a committee of subject matter experts.

The committee assigned frequency and criticality ratings to each skill, which determines the significance of each task for test development:

Frequency: represents how often the task is performed on the job. Frequency rating scales vary for different occupations. The rating scale used in this publication is presented below:

1 = less than once a week 2 = at least once a week 3 = once or more a day

Criticality: denotes the level of consequence associated with performing a task incorrectly. The rating scale used in this publication is presented below:

1 = slight 2 = moderate 3 = extreme

What do the assessments cover?

Specifically, the tests include multiple-choice test items over the following areas:

Laboratory Assistant (65 questions)

General Laboratory Safety	12%
Scientific Mathematics	18%
Professional Support Skills	5%
Lab Glassware and Equipment	3%

Laboratory Techniques I	19%
General and Inorganic Chemistry . .	31%
Organic Chemistry	12%

Laboratory Assistant (55 questions)

General Laboratory Safety	25%
Scientific Mathematics	25%
Professional Support Skills	9%

Laboratory Tools and Techniques . .	35%
General and Inorganic Chemistry . .	6%

What are the benefits of using these assessments?

Students receive a certificate for each assessment they pass. This certificate is included in the student's portfolio and used to communicate their mastery of the subject matter to potential employers.

When should the assessment be taken?

The CareerTech Testing Center recommends that students take this assessment as soon as possible after receiving all standards-related instruction, rather than waiting until the end of the school year.

Is the assessment timed?

No. However, most students finish the assessment within one hour.

What resources can students use on these assessments?

Students are allowed to use calculators and scratch paper on CTTC assessments; however, these items must be provided by the testing proctor and returned to the proctor before the student's exam is submitted for scoring. Calculator apps on cell phones and other devices may not be used on these assessments.

What accommodations can be made for students with Individualized Education Plans (IEPs)?

Accommodations are allowed for students with an Individualized Education Plan. Examples of allowable accommodations include:

- **Extended time** — These assessments are not timed; therefore, students may take as much time as needed to finish. The assessment must be completed in one testing session.
- **Readers** — A reader may be used to read the assessment to a student who has been identified as needing this accommodation.
- **Enlarged text** — Students needing this accommodation can activate this feature by clicking the AA icon in the upper right corner of the screen.

What can students expect on Test Day?

All CTTC assessments are web-based and delivered exclusively by a proctor in the school's assessment center. The proctor **cannot** be an instructor or anyone who was involved with the student during instruction.

Assessments are delivered in a question-by-question format. When a question is presented, the student can select a response or leave the question unanswered and advance to the next question. Students may also flag questions to revisit before the test is scored. All questions must be answered before the test can be submitted for scoring.

After the assessment is scored, the student will receive a score report that shows the student's score on the assessment and how the student performed in each standard area.

Can students retake the test?

Students may retake the test unless their school or state testing policies prohibit retesting. Students who can retest must wait at least three days between test attempts.

Standards and Test Content 820I Laboratory Assistant

Duty A: General Laboratory Safety (12 questions)

CODE	TASK	F	C
A.01	Describe the proper dish washing technique for chemical glassware.	3	3
A.02	List the errors that may be caused by unclean glassware.	3	3
A.03	Describe the disposal of laboratory clean-up materials and tools.	3	3
A.04	Identify the need for various safety equipment.	3	3
A.05	Identify the use of safety equipment.	3	3
A.06	Demonstrate the operation of laboratory safety equipment.	3	3
A.07	Define the chemical hazard communication program for laboratories.	3	3
A.08	Define the various labeling programs and their focus. • NFPA, HMIS, DOT, ANSI	3	3
A.09	Identify the parts and uses of a SDS.	3	3
A.10	Demonstrate the proper storage, handling and disposal of various chemicals. • Inorganic, organic, chlorinated chemicals, flammable, corrosive	3	3
A.11	Describe clean-up procedures used for flammable, corrosive and organic materials.	3	3
A.12	Define the appropriate industrial hygiene practices for a chemical based on its SDS.	2	3
A.13	Describe the major physical hazards in the lab.	3	3
A.14	Use appropriate safety equipment for protection from physical safety hazards.	3	3
A.15	Explain the expected safety behavior for carrying chemicals or climbing in the lab.	3	3

Duty B: Scientific Mathematics (12 questions)

CODE	TASK	F	C
B.01	Perform basic addition, subtraction, multiplication, and division operations.	3	3
B.02	Manipulate whole numbers, fractions, and decimals.	2	3
B.03	Apply problem-solving techniques to word problems.	2	3
B.04	Simplify basic algebraic equations to solve for x.	2	3
B.05	Solve problems involving ratio and proportion.	2	3
B.06	Express numbers in scientific notation.	3	2
B.07	Manipulate numbers expressed in scientific notation back to simple numbers.	2	2
B.08	Determine the correct number of significant figures in given values.	1	2
B.09	Manipulate values expressing the results in the correct significant figures.	2	1
B.10	Define and demonstrate the relative size of units in the metric system.	2	1
B.11	Measure distance, area, volume, and weight in English and metric units.	2	3
B.12	Manipulate data between the English and metric systems.	1	1
B.13	Manipulate data within the metric system.	2	3

CODE	TASK	F	C
B.14	Convert temperature units between different temperature systems.	2	3
B.15	Set up and solve mathematical problems involving percent and proportions.	2	3
B.16	Perform calculations on parts per million and similar concentrations.	3	3
B.17	Manipulate values between various types of concentrations.	3	3
B.18	Describe the units involved in concentrations of molarity, normality, ppm, and ppb.	3	3
B.19	Describe the factors necessary to perform statistical calculations on sample data.	2	3
B.20	Perform standard statistical calculations on sets of data.	3	3
B.21	Describe the use of values generally calculated from statistical sample data.	1	2
B.22	Identify the probable sources of data sets generated in the laboratory.	1	1
B.23	Describe the use of statistics and control charts in the workplace.	1	1
B.24	Identify outliers and hypothesize their causes and corrective action.	2	1
B.25	Identify the probable sources of data sets generated in the laboratory.	1	1
B.26	Define the differences in qualitative and quantitative measurements.	2	1
B.27	Define the differences in precision, accuracy, and random data.	1	1

Duty C: Professional Support Skills (3 questions)

CODE	TASK	F	C
C.01	Understand the purpose and structure of a laboratory data book.	2	3
C.02	Understand the purpose and structure of a chain of custody.	3	3
C.03	Define the basics of technical writing skills.	2	3
C.04	Demonstrate the use of reality checks on data and results.	2	3
C.05	Interpret graphs and trends in data.	3	3
C.06	Develop standard curves and evaluate using equation for a line.	2	3

Duty D: Lab Glassware and Equipment (2 questions)

CODE	TASK	F	C
D.01	Explain the sensitivity and care of equipment and glassware.	3	3
D.02	Demonstrate the proper use of balances.	3	3
D.03	Demonstrate reading volume in glassware.	3	3
D.04	Identify and use the proper glassware to deliver and contain specific volumes.	3	3
D.05	Identify common glassware and utensils used in the laboratory.	1	1
D.06	Describe the use of laboratory glassware and utensils.	1	2
D.07	Identify the meaning of the abbreviations on labware.	1	1
D.08	List the analysis with which each piece of equipment may be associated.	2	1
D.09	Identify the common electrical heating equipment used in the laboratory.	1	1
D.10	Demonstrate the use of common heating equipment.	1	1
D.11	Describe the safety and procedures involved in the use of flame.	1	3

Duty E: Laboratory Techniques I (12 questions)

CODE	TASK	F	C
E.01	Record the weight of chemical powders and liquids.	3	3
E.02	Demonstrate volumetric dilution of solutions.	3	3
E.03	Calculate percent and ppm concentrations of solutions.	3	3
E.04	Demonstrate the use of significant figures in volumetric dilutions.	2	2
E.05	Describe math and use of simple centrifugation.	1	2
E.06	Describe math and use of simple filtration.	1	2
E.07	Describe math and use of simple evaporation.	1	2
E.08	Analyze and evaluate the results for statistics and error.	2	3
E.09	Demonstrate the use of viscosity equipment.	1	2
E.10	Demonstrate the use of conductivity meters.	1	2
E.11	Demonstrate the use of turbidity meters.	1	2
E.12	Perform calculations associated with small lab equipment.	2	3
E.13	Demonstrate proper use of magnetic stirrers and hot plates.	3	2
E.14	Explain the operation of a colorimeter.	1	3
E.15	Construct a standard curve from colorimeter data.	1	3
E.16	Determine unknown sample results from a standard curve and the equation for a line.	1	3

Duty F: General and Inorganic Chemistry (20 questions)

CODE	TASK	F	C
F.01	Differentiate between physical and chemical properties of matter.	1	2
F.02	Identify the symbols for the common elements.	3	3
F.03	Identify elements, compounds, and mixtures by their properties.	3	3
F.04	Describe the structure of the atom and its effect on molecular formulas.	3	3
F.05	Describe the order and use of the Periodic Table.	2	3
F.06	Identify different chemical reactions.	2	3
F.07	Write and balance chemical equations for simple reactions.	2	3
F.08	Name and write formulas for binary and polyatomic inorganic compounds.	2	3
F.09	Name and write formulas for binary molecular compounds.	2	3
F.10	Identify between ionic and molecular compounds.	2	3
F.11	Use the mole concept to convert between moles and grams.	2	3
F.12	Calculate and use formula weights and molecular weights.	2	3
F.13	Define the pH scale.	3	3
F.14	Describe the different techniques for measuring pH.	3	3
F.15	Describe the operation of a pH meter.	3	3
F.16	Explain the use of indicators.	1	2

CODE	TASK	F	C
F.17	Properly read a buret.	1	3
F.18	Describe how manual acid/base titration is performed.	1	2
F.19	Calculate molarity using the standard titration calculation.	2	2

Duty G: Organic Chemistry (8 questions)

CODE	TASK	F	C
G.01	Describe the importance of carbon as the basis for organic chemistry.	2	3
G.02	Draw the structural formulas for the simplest carbon compounds: alkane, alkene, and alkyne.	3	3
G.03	Draw the most common functional groups.	3	3
G.04	Define IUPAC (International Union of Pure and Applied Chemistry).	2	1
G.05	Identify the organic chemical names from their structural formulas using IUPAC.	2	3
G.06	Identify the structural formulas of organic chemicals from their IUPAC names.	2	3
G.07	Identify non-IUPAC naming conventions.	1	2
G.08	Describe the industry operations that refine aliphatic hydrocarbons.	1	1
G.09	Define "fossil fuel."	1	1



Standards and Test Content 8202 Clinical Lab Assistant

Duty A: General Laboratory Safety (14 questions)

CODE	TASK	F	C
A.01	Describe the proper dish washing technique for chemical glassware.	2	3
A.02	List the errors that may be caused by unclean glassware.	2	2
A.03	Describe the disposal of laboratory clean-up materials and tools.	2	3
A.04	Identify the need for various safety equipment.	3	2
A.05	Identify the use of safety equipment.	3	3
A.06	Demonstrate the operation of laboratory safety equipment.	2	3
A.07	Define the chemical hazard communication program for laboratories.	2	3
A.08	Define the various labeling programs and their focus. • NFPA	2	3
A.09	Identify the parts and uses of an SDS.	2	2
A.10	Demonstrate the proper storage, handling, and disposal of various chemicals. • Inorganic, organic, chlorinated chemicals, flammable, corrosive	2	3
A.11	Define clean-up procedures used for flammable, corrosive, and organic materials.	2	3
A.12	Define the appropriate industrial hygiene practices for a chemical based on its SDS.	2	3
A.13	Describe the major physical hazards in the lab.	3	3
A.14	Use the appropriate safety equipment for protection from physical safety hazards.	2	3
A.15	Explain the expected safety behavior for carrying chemicals or climbing in the lab.	2	2
A.16	Identify modes of transmission for infection.	2	3
A.17	Demonstrate the proper use of magnetic stirrers and hot plates.	1	2

Duty B: Scientific Mathematics (14 questions)

CODE	TASK	F	C
B.01	Perform basic addition, subtraction, multiplication, and division operations.	3	3
B.02	Manipulate whole numbers, fractions, and decimals.	2	2
B.03	Apply problem-solving techniques to word problems.	2	2
B.04	Simplify basic algebraic equations to solve for x.	2	2
B.05	Solve problems involving ratio and proportions.	2	2
B.06	Express numbers in scientific notation.	1	2
B.07	Manipulate numbers expressed in scientific notation back to simple numbers.	1	1
B.08	Determine the correct number of significant figures in given values.	1	2
B.09	Manipulate values expressing the results in the correct significant figures.	1	2

CODE	TASK	F	C
B.10	Define and demonstrate the relative size of units in the metric system.	2	2
B.11	Measure distance, area, volume, and weight in metric units.	3	3
B.12	Manipulate data in the metric system.	3	3
B.13	Set up and solve mathematical problems involving percent and proportions.	3	2
B.14	Manipulate values between various types of concentrations.	2	3
B.15	Describe the units involved in concentrations of molarity and normality.	2	3
B.16	Describe the factors necessary to perform statistical calculations on sample data.	2	2
B.17	Perform descriptive statistical calculations on sets of data.	2	2
B.18	Describe the use of values generally calculated from statistical sample data.	2	2
B.19	Identify the probable sources of data sets generated in the laboratory.	2	2
B.20	Identify outliers and hypothesize their causes and corrective action.	2	2
B.21	Define the differences in qualitative and quantitative measurements.	2	2
B.22	Define the differences in precision, accuracy, and random data.	1	2

Duty C: Professional Support Skills (5 questions)

CODE	TASK	F	C
C.01	Understand the purpose and structure of a laboratory data book.	2	3
C.02	Understand the purpose and structure of a chain of custody.	2	3
C.03	Define the basics of technical writing skills.	2	2
C.04	Demonstrate the use of reality checks on data and results.	2	2
C.05	Interpret graphs and the trends in data.	3	3
C.06	Develop standard curves and evaluate using equation for a line.	2	2

Duty D: Laboratory Tools and Techniques (19 questions)

CODE	TASK	F	C
D.01	Explain the sensitivity and care of equipment and glassware.	2	2
D.02	Demonstrate the proper use of balances.	2	2
D.03	Demonstrate reading volume in glassware.	2	3
D.04	Identify and use the proper glassware to deliver and contain specific volumes.	2	3
D.05	Identify common glassware and utensils used in the laboratory.	2	2
D.06	Describe the use of laboratory glassware and utensils.	2	2
D.07	Identify the meaning of the abbreviations on labware.	2	2
D.08	List the analysis with which each piece of equipment may be associated.	2	2
D.09	Identify the common electrical heating equipment used in the laboratory.	2	2
D.10	Demonstrate the use of common heating equipment.	2	2
D.11	Describe the safety and procedures involved in the use of flame.	2	3

Duty D: Laboratory Tools and Techniques (continued)

CODE	TASK	F	C
D.12	Record the weight of chemical powders and liquids.	2	3
D.13	Demonstrate volumetric dilution of solutions.	2	2
D.14	Calculate the percent, concentration, and molarity of solutions.	2	2
D.15	Demonstrate the use of significant figures in volumetric dilutions.	1	2
D.16	Analyze and evaluate the results for statistics and error.	2	2
D.17	Construct a standard curve from data.	2	2
D.18	Determine unknown sample results from a standard curve and the equation for a line.	2	2
D.19	Identify classifications of pathogens such as bacteria, fungi, parasites, protozoa, and viruses.	2	2
D.20	Demonstrate the use and purpose of the following equipment: <ul style="list-style-type: none">• conductivity meter• pH meter• fume hood• incubator• balances• biosafety cabinet• autoclave• water bath• electronic balance• centrifuge• colorimeter• vortexers	3	3
D.21	Demonstrate the use and purpose of electrophoresis chambers.	2	3
D.22	Demonstrate the use and purpose of a spectrophotometer.	2	2
D.23	Demonstrate the use and purpose of a PCR system/thermocycler.	2	3
D.24	Demonstrate the use and purpose of a microscope.	2	2
D.25	Demonstrate the use and purpose of micropipettes and serological pipettes.	3	3

Duty E: General and Inorganic Chemistry (3 questions)

CODE	TASK	F	C
E.01	Identify the symbols for the common elements.	2	3
E.02	Identify elements, compounds, and mixtures by their properties.	1	2
E.03	Calculate and use formula weights and molecular weights.	1	2
E.04	Define the pH scale.	2	2
E.05	Describe the different techniques for measuring pH.	2	2
E.06	Describe the operation of a pH meter.	2	2
E.07	Explain the use of indicators.	2	2



Symbols and Acronyms

Symbols

%	Percent
C	Celsius
cm	Centimeter
dm	Decimeter
F	Fahrenheit
g	Gram
kg	Kilogram
km	Kilometer
L	Liter
m	Meter
M	Molarity
µg	Microgram
mg	Milligram
mL	Milliliter
nm	Nanometer
oz	Ounce
pH	Phenyl
ppm	parts per million

Acronyms

ABS	Acrylonitrile butadiene styrene
ASTM	American Society for Testing and Materials
CRC (Handbook)	Handbook of Chemistry and Physics
EPA	Environmental Protection Agency
HEPA	High-efficiency particulate arrestance
IUPAC	International Union of Pure and Applied Chemistry
NFPA	National Fire Protection Association
PPE	Personal Protective Equipment
PDR	Physicians Desk Reference
SDS	Safety Data Sheet
TDS	Total Dissolved Solids
TSS	Total Suspended Solids

Test Taking Strategies

This section of the study guide contains valuable information for testing success and provides a common-sense approach for preparing for and performing well on any test.

General Testing Advice

1. Get a good night's rest the night before the test – eight hours of sleep is recommended.
2. Avoid junk food and “eat right” several days before the test.
3. Do not drink a lot or eat a large meal prior to testing.
4. Be confident in your knowledge and skills!
5. Relax and try to ignore distractions during the test.
6. Focus on the task at hand — taking the test and doing your best!
7. Listen carefully to the instructions provided by the exam proctor. If the instructions are not clear, ask for clarification.

Testing Tips

1. Read the entire question before attempting to answer it.
2. Try to answer the question before reading the choices. Then, read the choices to determine if one matches, or is similar to your answer.
3. Do not change your answer unless you misread the question or are certain that your first answer is incorrect.
4. Answer questions you know first, so you can spend additional time on the more difficult questions.
5. Check to make sure you have answered every question before you submit the assessment for scoring — unanswered questions are marked incorrect.



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