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# **Biotechnology**

## General Assessment Information

### Blueprint Contents

|   |                                    |
|---|------------------------------------|
| General Assessment Information            | Sample Written Items               |
| Written Assessment Information            | Performance Assessment Information |
| Specific Competencies Covered in the Test | Sample Performance Job             |

**Test Type:** The Biotechnology assessment is included in NOCTI's Teacher assessment battery. Teacher assessments measure an individual's technical knowledge and skills in a proctored proficiency examination format. These assessments are used in a large number of states as part of the teacher licensing and/or certification process, assessing competency in all aspects of a particular industry. NOCTI Teacher tests typically offer both a written and performance component that must be administered at a NOCTI-approved Area Test Center. Teacher assessments can be delivered in an online or paper/pencil format.

**Revision Team:** The assessment content is based on input from subject matter experts representing the state of Pennsylvania.



41.0101- Biotechnician/Biotechnology  
Laboratory Technician



Career Cluster 8 - Health Science



43-91111.01  
Bioinformatics Technicians

## Written Assessment

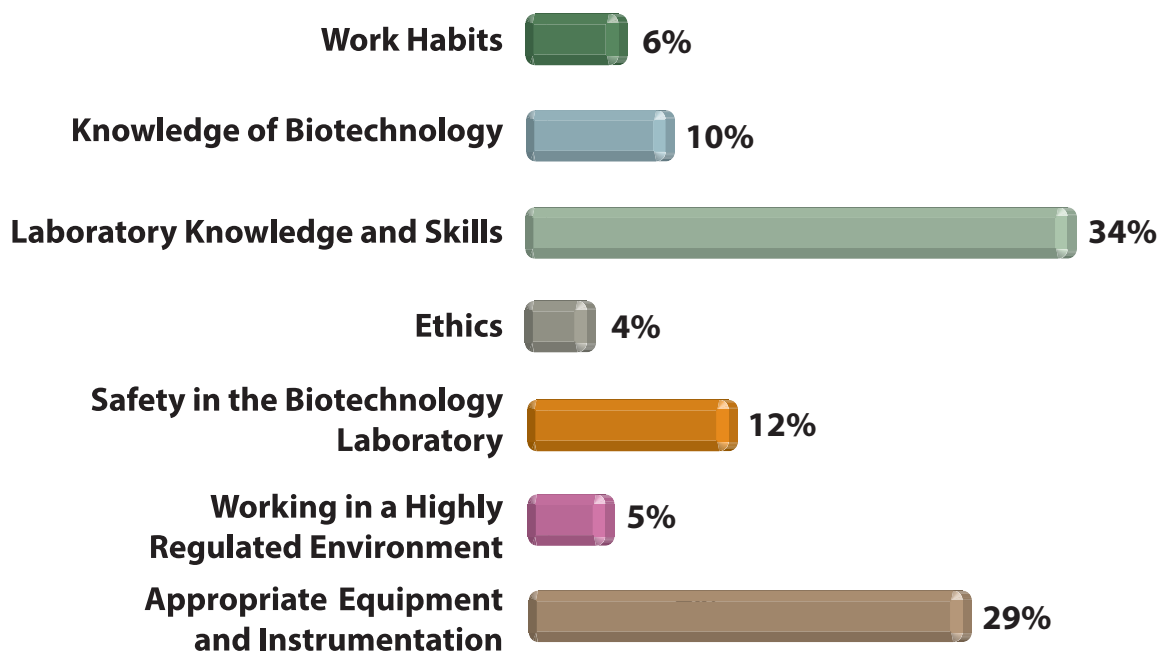
NOCTI written assessments consist of questions to measure an individual's factual theoretical knowledge.

**Administration Time:** 3 hours

**Number of Questions:** 191

**Number of Sessions:** This assessment may be administered in one, two, or three sessions.

### Areas Covered



## Specific Standards and Competencies Included in this Assessment

### Work Habits

- Demonstrate professional work habits
- Demonstrate the ability to organize, implement, and troubleshoot specific tasks
- Demonstrate the ability to work in teams and as an individual

### Knowledge of Biotechnology

- Define biotechnology and its role
- Demonstrate knowledge of the history of biotechnology
- Describe the life cycle of biotechnology product development
- Identify the application of the biotechnology industry
- Describe careers in biotechnology



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## Specific Standards and Competencies (continued)

### Laboratory Knowledge and Skills

- Demonstrate competency in validating and using laboratory equipment
- Demonstrate competency in using computer office applications
- Perform basic laboratory math skills
- Apply statistical analysis to interpret data
- Demonstrate the ability to use the scientific method
- Properly prepare buffers and solutions
- Demonstrate the concepts of recombinant technology
- Demonstrate the principles of DNA isolation
- Perform Polymerase Chain Reaction (PCR)
- Perform electrophoresis
- Perform separation techniques
- Explain and perform aseptic technique
- Demonstrate the concepts of microbial culture
- Demonstrate the concept of mammalian cell culture
- Demonstrate the concept of laboratory automation
- Perform basic spectrophotometer assays

### Ethics

- Demonstrate the knowledge of bioethics
- Demonstrate the knowledge of professional ethics

### Safety in the Biotechnology Laboratory

- Demonstrate general requirements for laboratory safety
- Identify and use personal protective equipment (PPE)
- Demonstrate ability to implement safety protocols
- Follow SDS guidelines for handling, storage, and disposal of hazardous material
- Demonstrate knowledge of safety regulatory agencies, such as OSHA

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## Specific Standards and Competencies (continued)

### Working in a Highly Regulated Environment

- Perform documentation according to regulatory agency standards
- Demonstrate an ability to maintain records in accordance with Intellectual Property Law
- Document lab activities and findings according to guidelines

### Appropriate Use of Equipment and Instrumentation

- Use laboratory glassware
- Use volumetric equipment
- Use electrophoresis equipment
- Use a spectrophotometer
- Use balances
- Demonstrate knowledge of autoclaves
- Use centrifuges
- Use pH meters
- Demonstrate knowledge of thermocyclers
- Use microscopes
- Demonstrate knowledge of laboratory hoods for worker protection
- Demonstrate knowledge of temperature regulating devices (e.g., water baths, incubators)
- Demonstrate knowledge of chromatographic equipment



## Sample Questions

**The central dogma of biotechnology is**

- A. protein to DNA to RNA to trait
- B. RNA to DNA to protein to trait
- C. RNA to protein to DNA to trait
- D. DNA to RNA to protein to trait

**A program designed to copy itself onto other software, and to spread through multiple computers when the software is used, is called a**

- A. bacteria
- B. bug
- C. germ
- D. virus

**The study of the conduct that governs the behavior of a person or profession is called**

- A. ethics
- B. morals
- C. values
- D. principles

**The federal agency responsible for promoting public health through regulation and supervision of food, cosmetics, and drug products is the**

- A. EPA
- B. OSHA
- C. FDA
- D. USDA

**When dispensing the liquid from a micropipette, a lab technician must always**

- A. push plunger to the second stop
- B. push plunger to the first stop
- C. push the tip ejector button
- D. draw the plunger up

## Performance Assessment

NOCTI performance assessments allow individuals to demonstrate their acquired skills by completing actual jobs using the tools, materials, machines, and equipment related to the technical area.

**Administration Time:** 2 hours, 5 minutes

**Number of Jobs:** 6

### Areas Covered:

#### **27% Colony Isolation and Streaking Bacteria**

Participant will wear PPE, prepare workstation with disinfectant or lab mat, label plates, use inoculating loop, maintain sterile technique, and demonstrate good laboratory practice.

#### **17% Using Volumetric Equipment: Using Micropipettes**

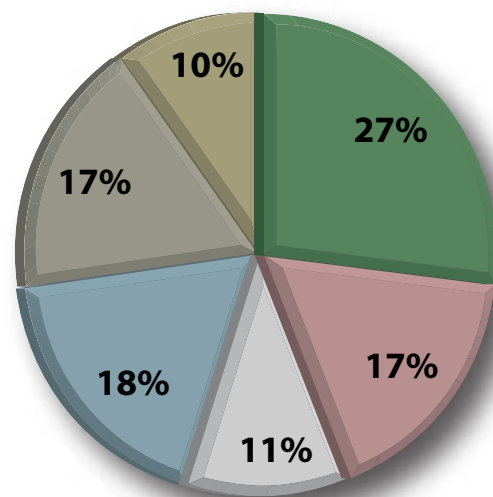
Participant will set micropipettes, choose the P1000 micropipette, and demonstrate good laboratory practice.

#### **11% Using Volumetric Equipment: Serological Pipettes**

Participant will measure volume in tubes to 5.0 ml, record color and volume data, and demonstrate good laboratory practice.

#### **18% Making a Molar Solution**

Participant will calculate, massing NaCl, prepare and store salt solution, and demonstrate good laboratory practice.



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### *Areas Covered (continued)*

**17% Making a Dilution and Using a Spectrophotometer**

Participant will wear proper PPE, prepare dilution, use a spectrophotometer, and demonstrate good laboratory practice.

**10% Generating and Utilizing a Standard Curve**

Participant will generate a standard curve and determine concentrations.

## Sample Job

### Colony Isolation and Streaking Bacteria

**Maximum Time:** 15 minutes

**Participant Activity:** Using the equipment provided, the participant will streak bacteria for single colony isolation from the liquid broth culture on to one agar plate.

