
Written and Performance Exam General Overview

- The intent of this exam is to assess your ability to teach the skills found in the Massachusetts Technical Education Framework.
- This exam is aligned to the frameworks which can be accessed [here](#).
- Many questions and tasks require a synthesis of knowledge based on experience in the field and may not be found in any book.
- Candidates are encouraged to prepare for their exam by reviewing textbooks and reference material which has been listed as part of this exam outline. These resources can be found using online search tools, online vendors, and websites.
- Contact the Technical Teacher Testing Office if you need further assistance in locating resources listed in the exam outline.
- Use this exam outline and the Massachusetts Technical Education Framework to focus your preparation for the exam.

Written Exam

- Number of Questions: 100
- Administration Time: 3 hours
- Administration Method: Remote Proctoring Online Session

Written Exam Content Coverage

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- 10% Health and Safety**
 - Fundamentals
 - Safety in the Biotechnology Laboratory
 - 5% Basic Biotechnology Knowledge and Skills**
 - Biotechnology Industry Fundamentals
 - Knowledge of Regulatory Affairs
 - Basic Lab Management Skills
 - 5% Biomanufacturing Fundamentals**
 - Manufacturing Process Management Techniques
 - 20% Solution Preparation**
 - Perform Calculations
 - Prepare Solutions

- 40% Instrumentation and Lab Assays**
- Measurement Instrumentation
 - Microscopes
 - Standard Lab Assays/Techniques
 - Separation Techniques

- 20% Cell Techniques**
- Aseptic Techniques
 - Microorganism Maintenance
 - Transform Cells
 - Maintain Animal Cells in Tissue Culture
 - Clone Plants
 - Determine the Viability of Cells in Culture

Written Exam Reference Materials (Reference Current Edition)

- **Biotechnology: Science for the New Millennium** by Ellyn Daugherty (Paradigm Publishing)
- **Biotechnology Lab Manual** by Ellyn Daugherty (Paradigm Publishing)
- **Biotechnology: A Laboratory Skill Course** by Kirk Brown (Bio-Rad Laboratories)

Materials Needed for the Written Exam

- A four-function calculator is included in the online testing system. No other calculators are permitted.
- Scrap paper and pencil/pen are permitted.

Written Exam Sample Items

Each question on the exam consists of one incomplete sentence or question followed by four choices. Some items reference an image or diagram. A few sample items are included below; the correct answer is designated with an asterisk (*).

Cells grown in an incubator are not dividing as fast as they normally would. The first step in troubleshooting would be to:

- a. order new cells.
- b. add water to the incubator.
- c. replace CO₂ tank.
- *d. check temperature of the incubator.

An inverted microscope differs from a standard microscope because the:

- a. objectives are located beneath the stage.
- b. light source is located above the specimen.
- c. microscope slide cannot be observed with a standard microscope.
- *d. both A and B.

Performance Exam

- Administration Time: 4 hours
- Administration Method: Onsite at an approved Teacher Testing Location

Performance Exam Content Coverage

9% Perform Isolation Cell Techniques

- Label, Streak, and Incubate Colonies
- Isolate Bacterial Colonies and Transfer to Broth Culture

23% Prepare and Examine Biological Specimens

- Prepare Slide for Gram Staining
- Perform Gram Stain Slide
- Use Compound Microscope
- Describe the Morphology and Gram Status of Biological Specimens

27% Prepare Solutions and Instrumentation Use

- Prepare a Solution and Adjust pH
- Perform a Two Point pH Meter Calibration
- Sterilize a Solution by Filtration and Autoclave

14% Separate Compounds from Mixtures

- Perform Sephadex Chromatography to Separate Compounds

27% Demonstrate Safety Procedures

- Follow and Apply OSHA, CDC, CLA and Industry-Safe Standards

Note: Failure to follow safety protocols will result in the candidate being prevented from completing the performance exam. Safety and following aseptic techniques are critical components in the evaluation of candidate performance and is included in the assessment of each subtest. Candidates are responsible for their own safety.

Materials Required for the Performance Exam (Candidate Must Supply)

Uniform: Safety is paramount in the laboratory setting and this includes industry-accepted uniforms. Candidates are expected to dress in a professional manner and no open-toed shoes will be allowed. Safety equipment must be worn at all times. A lab coat is mandatory and must be work closed and fastened during testing.

- Face mask (cotton face covering or respirator which fully cover the nose and mouth)
- Eye Protection
- Disposable Gloves
- Lab Coat (must be worn closed and fastened)
- Closed-toed shoes (slippers, sandals, and open-backed shoes will not be allowed)

Equipment Provided by Testing Site

- pH Meter *
- Autoclave *
- Column Chromatography (SEC) *
- Spectrophotometer
- Microscope
- Glassware

*Protocols for use will be provided.

Note: Additional lab equipment/supplies will be provided. Candidates who have an allergy to latex or nitrile gloves, MUST bring their own gloves. No books or notes will be allowed. Cell phones are prohibited during the exam administration.

Onsite Performance Exam Requirements

- Candidate must practice social distancing and wear the appropriate face covering that covers the nose and mouth while at the exam site.
- Testing sites may have individual requirements based on location and the current guidance from the Center for Disease Control and Prevention (CDC).

Performance Exam Reference Materials (Reference Current Edition)

- **Safety Orientation** by NCCER (Pearson Prentice Hall) www.crafttraining.com
- **OSHA Regulations** www.osha.gov
 - [1910.1200 - Hazard Communication](#)
 - [1910 Subpart I - Personal Protective Equipment](#)