Massachusetts Technical Teacher Testing Program
Environmental Science and Technology Content Outline

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

5% ***Fundamentals of Health and Safety***

- Safety Regulations
- Health and Safety Practices
- Safety Health Knowledge and Skills

15% ***Environmental Systems***

- Hydrosphere
- Atmosphere
- Geosphere
- Biosphere

18% ***Natural Resource Management***

- Aquatic Ecosystems
- Meteorology
- Soil Science
- Wildlife Biology
- Forestry

5% ***Mapping and Geospatial Analysis***

- Topographic Maps

5% ***Environmental Science and Technology Mathematics***

5% ***HAZWOPER Certification***

5% ***Environmental Sampling***

- Field Samplings

5% ***Energy Technologies and Sustainability***

12% ***Environmental Site Management***

- Hazardous Waste Site Assessment and Remediation
- Solid Waste Management

15% ***Applied Water Technologies***

- Wastewater and Drinking Water Treatment

6% ***Ecology***

4% ***Forest Conservation***

- Botany
- Forestry

Written Exam Reference Materials (Reference Current Edition)

- **Environmental Science, Working with the Earth** by G. Tyler Miller Jr. (Wadworth Publishing Company)
- **The Rivers Curriculum Guide – Earth Science** by William Donato (Dale Seymour Productions)
- **The Rivers Curriculum Guide – Geography** by Bob Ashley (Dale Seymour Productions)
- **Envirothon Manual**
- **Field Manual for Water Quality Monitoring: An Environmental Education Program For Schools** by Mark K. Mitchell and William B. Stapp (Thomson-Shore, Inc.)
- **Safety and Health – Basic Foundation Series 719** (Schoolcraft Publishing)
- **Groundwater** by R. Allen Freeze and John A. Cherry (Prentice-Hall, Inc.)
- **Oceans and Atmosphere – Science Workshop Series** by Seymour Rosen (Globe Fearon)
- **The State of Our Environment** (Commonwealth of Massachusetts Executive Office of Environmental Affairs)
- **Environmental Science** by Karen Arms (Holt, Rinehart and Winston)
- **Operation of Wastewater Treatment Plants, Vol. I** (USEPA Office of Water Programs)
- **Operation of Wastewater Treatment Plants, Vol. II** (USEPA Office of Water Programs)
- **Water Treatment, Grade 1** (American Water Works Association)
- **Keller's Hazardous Waste Operations and Emergency Response Compliance Manual**

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 (*).

Which of the following is most characteristic of a confined aquifer?

a. It has high porosity.
*b. It has a low permeability layer on top of it.
c. It has a high permeability layer on top of it.
d. It has a low permeability layer beneath it.

Which piece of laboratory equipment would be used to most accurately measure 7 ml of a sample?

a. 5 ml graduated cylinder
*b. 10 ml graduated pipette
c. 50 ml graduated cylinder
d. 10 ml volumetric pipette

Performance Exam

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

Performance Exam Content Coverage

Biological Science Option

11% ***Describe Resources and Concepts Related to Aquaculture and Marine Science***

- Measure Water-Quality Parameters Using Field Test Kits

23% ***Describe Resources for and Concepts Related to Land Use Planning and Watershed Management***

- Create a Contour Map Using Individual Data Points on the Map
- Identify Trees Using a Dichotomous Key

23% ***Laboratory and Field Sampling and Testing***

- Calibrate pH Meter
- Prepare Solutions of Specific Concentrations

15% ***Select and Use the Appropriate Laboratory Tools to Determine Environmental Science and Technology Measurement***

- Use Common Lab Equipment to Take Scientific Measurements

11% ***Limnology***

- Determine Water-Quality Index Using Macroinvertebrates

11% ***Wildlife Biology***

- Calculate Population Density and Total Population

6% ***Safety***

- Use Appropriate PPE
- Demonstrate Safe Practices
- Safe Use of Tools According to Manufacturer's Specifications
- Use and Dispose of Chemical and Biohazardous Materials According to Industry and OSHA Standards
- Clean Work Area According to Industry and OSHA Standards

Physical Science Option

13% ***Describe Resources and Concepts Related to Aquaculture and Marine Science***

- Measure Water-Quality Parameters Using Field Test Kits

13% ***Describe Resources for and Concepts Related to Land Use Planning and Watershed Management***

- Create a Contour Map Using Individual Data Points on the Map
- Identify Trees Using a Dichotomous Key

26% ***Laboratory and Field Sampling and Testing***

- Calibrate pH Meter
- Prepare Solutions of Specific Concentrations

17% ***Select and Use the Appropriate Laboratory Tools to Perform a Given Task***

- Use Common Lab Equipment to Take Scientific Measurements

13% ***Mapping Technologies***

- Use a Map and a Compass to Interpret Information from a Topographic Map

13% ***Hydrogeology***

- Determine Groundwater Elevation Using Electronic Water-Level Meter

6% ***Safety***

- Use Appropriate PPE
- Demonstrate Safe Practices
- Safe Use of Tools According to Manufacturer's Specifications
- Use and Dispose of Chemical and Biohazardous Materials According to Industry and OSHA Standards
- Clean Work Area According to Industry and OSHA Standards

Materials Required for the Performance Exam (Candidate Must Supply)

- Face mask (cotton face covering or respirator which fully cover the nose and mouth)
- Personal Protective Safety Glasses
- Disposable Gloves

Note: Additional lab equipment/supplies will be provided by the testing site. 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)

- **Environmental Science, Working with the Earth** by G. Tyler Miller Jr. (Wadworth Publishing Company)
- **The Rivers Curriculum Guide – Earth Science** by William Donato (Dale Seymour Productions)
- **The Rivers Curriculum Guide – Geography** by Bob Ashley (Dale Seymour Productions)
- **Envirothon Manual**
- **Field Manual for Water Quality Monitoring: An Environmental Education Program For Schools** by Mark K. Mitchell and William B. Stapp (Thomson-Shore, Inc.)
- **Safety and Health – Basic Foundation Series 719** (Schoolcraft Publishing)
- **Groundwater** by R. Allen Freeze and John A. Cherry (Prentice-Hall, Inc.)
- **Oceans and Atmosphere – Science Workshop Series** by Seymour Rosen (Globe Fearon)
- **The State of Our Environment** (Commonwealth of Massachusetts Executive Office of Environmental Affairs)
- **Environmental Science** by Karen Arms (Holt, Rinehart and Winston)
- **Operation of Wastewater Treatment Plants, Vol. I** (USEPA Office of Water Programs)
- **Operation of Wastewater Treatment Plants, Vol. II** (USEPA Office of Water Programs)
- **Water Treatment, Grade 1** (American Water Works Association)
- **Keller's Hazardous Waste Operations and Emergency Response Compliance Manual**