Exploratory Plumbing - Grade 9

Content Area: **CTE**
Course(s):
Time Period: **September**
Length: **1 MP (45 Days)**
Status: **Published**

Unit Title:

Exploratory Plumbing

Unit Overview:

The Exploratory Plumbing 1 MP 45-day 9-week course introduces 9th-grade students to the fundamental concepts and practices of the plumbing trade. Designed to inspire interest in pursuing a career in plumbing, this introductory course emphasizes career pathways, safety protocols, and the use of essential tools and materials. By engaging in hands-on activities, real-world applications, and theoretical instruction, students will acquire foundational skills critical for success in the trade. Additionally, this course prepares students to advance to the next stage of the Plumbing Program, **Intermediate Plumbing**, a comprehensive, full-year class that builds on the knowledge and skills gained in this foundational course.

Essential Questions:

1. What career opportunities are available within the plumbing trade?

2. How do plumbing professionals contribute to society and infrastructure?

3. What safety practices are essential for working in the plumbing trade?

4. How can understanding and correctly using plumbing tools and materials enhance efficiency and safety?

5. Why is it important to recognize workplace hazards and follow safety protocols?

Enduring Understandings:

1. Plumbing is a critical trade with diverse career opportunities that require specialized skills and knowledge.

2. Safety practices, including the use of PPE and recognition of hazard signs, are vital to prevent workplace accidents.

3. The proper use and maintenance of plumbing tools and materials are essential for ensuring quality and efficiency in the trade.

4. Understanding the role and responsibilities of plumbing professionals provides a foundation for career development.

5. Early exposure to plumbing careers and hands-on practice builds a strong interest and foundation for success in the industry.

Standards/Indicators/Student Learning Objectives (SLOs):

9.3.12.AC	Architecture & Construction
9.3.12.AC-CST	Construction
9.3.12.AC-CST.5	Apply practices and procedures required to maintain jobsite safety.
9.3.12.AC-CST.6	Manage relationships with internal and external parties to successfully complete construction projects.
9.3.12.AC-DES	Design/Pre-Construction
9.3.12.AC-MO	Maintenance/Operations
ARCH.9-12.1	Design/Pre-Construction
ARCH.9-12.2	Construction
ARCH.9-12.3	Maintenance and Operations

Lesson Titles:

Career Exploration and Pathways

1. Discovering Plumbing: The Cornerstone of Modern Infrastructure
2. Exploring Career Opportunities in Plumbing: From Apprentice to Master
3. Plumbing Specializations: Residential, Commercial, and Beyond

Safety Practices and Protocols

1. Workplace Safety in Plumbing: Identifying and Preventing Hazards
2. The Essentials of PPE: Protecting Yourself and Your Team
3. Safety Symbols and Signs: Understanding Worksite Communication

Tools and Materials in Plumbing

1. Introduction to Plumbing Tools: What Every Plumber Needs to Know
2. Hands-On Tool Usage: Assembling Basic Plumbing Components
3. Plumbing Materials and Their Applications: Pipes, Fittings, and More

Capstone and Reflection

1. Preparing for Intermediate Plumbing: Skills Review and Reflection

Career Readiness, Life Literacies, & Key Skills:

9.3.12.AC	Architecture & Construction
9.3.12.AC-CST	Construction
9.3.12.AC-DES	Design/Pre-Construction
9.3.12.AC-MO	Maintenance/Operations
WRK.9.2.12.CAP.6	Identify transferable skills in career choices and design alternative career plans based on those skills.
WRK.9.2.12.CAP.7	Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.
WRK.9.2.12.CAP.8	Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.
WRK.9.2.12.CAP.9	Locate information on working papers, what is required to obtain them, and who must sign them.
ARCH.9-12.1	Design/Pre-Construction
ARCH.9-12.2	Construction
ARCH.9-12.3	Maintenance and Operations

Inter-Disciplinary Connections:

Math

- **Measurement and Calculations:** Applying geometry and algebra to measure pipe lengths, calculate angles for fittings, and determine water flow rates.
- **Conversions:** Using unit conversions (e.g., feet to inches, gallons to liters) when working with plumbing specifications.
- **Problem Solving:** Analyzing word problems to troubleshoot plumbing scenarios.

Science

- **Physics:** Understanding water pressure, flow dynamics, and gravity's role in plumbing systems.
- **Chemistry:** Learning about material properties, such as corrosion resistance and chemical compatibility with various plumbing materials.
- **Environmental Science:** Exploring water conservation techniques and the environmental impact of plumbing practices.

English/Language Arts

- **Technical Reading:** Interpreting safety manuals, technical documents, and plumbing codes.
- **Writing Skills:** Composing reflection journals, completing job estimates, and documenting safety inspections.
- **Communication:** Practicing effective verbal communication during teamwork and presentations.

Technology

- **Tool Proficiency:** Using advanced tools and understanding their technological applications.
- **Blueprint Reading:** Interpreting technical drawings and diagrams.
- **Emerging Technologies:** Exploring innovations in plumbing, such as smart fixtures and eco-friendly systems.

History/Social Studies

- **History of Plumbing:** Learning about the evolution of plumbing systems and their impact on civilizations.
- **Workplace Ethics:** Exploring labor laws, workplace diversity, and the ethical responsibilities of plumbing professionals.

Career and Technical Education (CTE)

- **Workplace Skills:** Developing employability skills such as teamwork, punctuality, and professionalism.
- **Safety Standards:** Applying OSHA regulations and other industry standards to ensure a safe working environment.
- **Career Exploration:** Identifying pathways and certifications required for various plumbing careers.

These interdisciplinary connections help students see the relevance of plumbing skills in broader academic and real-world contexts.

Summative Assessment:

High-Stakes Assessments:

- Comprehensive Exams: Final exams covering a broad range of course material can assess students' understanding of key concepts and principles.
- Capstone Project Presentations: Formal presentations showcase students' project management skills, decision-making, and

communication abilities.

Performance-Based Assessments:

- Project Portfolio Reviews: A portfolio compiled throughout the program can demonstrate a student's growth, technical skills, and problem-solving abilities in various areas of the plumbing trade.
- Simulated Project Management Tasks: Students could be presented with a realistic construction scenario where they must apply their knowledge and skills to develop solutions or make critical decisions.

Industry-Standard Certifications:

- Encouraging students to pursue industry certifications relevant to plumbing can demonstrate their commitment to the field and mastery of specific skills.

Considerations for Choosing Summative Assessments:

- Alignment with Learning Outcomes: Ensure the chosen assessments directly measure the program's overall learning objectives and desired competencies.
- Depth vs. Breadth: Balance the need to assess a broad range of knowledge with in-depth exploration of critical skills.
- Authenticity: Choose assessments that reflect real-world scenarios and tasks a plumber encounters.
- Multiple Measures: Utilize a combination of assessments to provide a holistic picture of student learning.
- Faculty Collaboration: Ensure consistency and fairness in assessments across different courses within the program.

Additional Tips:

- Develop clear rubrics outlining specific criteria for evaluating performance on each summative assessment.
- Provide students ample opportunities to practice and refine their skills before summative assessments.
- Offer feedback on summative assessments to help students identify areas for improvement and guide their future learning.

- Alternate Assessment
- Benchmark
- Group Project Assessment
- Individual Project Assessment
- Marking Period Assessment
- Module Section Assessment

Resources & Materials:

Plumbing Level 1 Book NCCER Fifth Edition

Google Classroom

Promethean Board

Canva

Kahoot

https://www.youtube.com/

CBS Plumbing Trade

https://www.cbsnews.com/video/plying-their-trades/#

Run Time 7:20

Toilet

How The Toilet Changed History

Run Time 7:15

Toilet Parts: What They Are and Common Fixes (DIY) | Family Handyman.

Workplace Hazards Video Run Time

Top 6 Workplace Hazards Identified

Run Time 8:11

PPE Video

PPE - Safety Training Video Course - SafetyInfo.com

Run Time 10:49

NJ Master Plumbers Information

New Jersey Plumbing License Requirements

NJ Plumbing Wages

Plumber salary in New Jersey

Plumbing Trade Video

6 Lessons I Learned as a Plumbing Apprentice

Time 9:03

Plumbing Trade Video

Plumbers Can SPECIALISE In Many Area... Here Are The Different Types!

Run Time 8:23

Mike Rowe On The Trades

https://youtu.be/3h_pp8CHEQ0

Run Time 8:25

PPE

Plumbing PPE Plumbers Must NEVER Work Without!

Run Time 9:04

FATAL Plumbing Mistakes EVERY Plumber Needs To Know About!

Run Time 8:09

NJ One Call

New Jersey One Call

Power Tools

Let's learn about a couple of plumbing power tools - Plumbing Power Tools

Run Time 12:34

Types Of Hot/Cold Water Pipes And Fittings

PEX vs COPPER vs CPVC plumbing pipes

Run Time 16:55

Plastic Pipe

Gluing PVC Pipe & ABS Pipe [How To]

Run Time 8:16

Plastic Pipe

10 MISTAKES When Working With Plastic Pipes (PVC, CPVC & ABS) | GOT2LEARN

Run Time 8:26

IPS

When to Use Pipe dope, Teflon Tape, Neither or Both for Threaded Connection

Run Time 3:54

IPS

How to Use a Pipe Wrench

Run Time 4:31

IPS

RIDGID 300 Compact Threading Machine

Run Time 18:26

OSHA

Top OSHA 10 OSHA Violations of 2023 | And how to prevent similar citations.

Run Time 8:51

Ladder Safety

Run Time 4:33

Personal Protective Equipment Milwaukee

Old vs. new growth trees and the wood products they make

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK:

Instructional Strategies

1. Hands-On Demonstrations
    - Show students how to use plumbing tools and install basic fixtures.
    - Bloom's Level: Apply | DOK Level: 2
2. Guided Practice
    - Provide step-by-step guidance for students practicing pipe fitting or safety inspections.
    - Bloom's Level: Apply | DOK Level: 2
3. Problem-Based Learning (PBL)
    - Assign real-world scenarios, such as identifying safety hazards in a mock plumbing workspace.
    - Bloom's Level: Analyze | DOK Level: 3

Learning Activities

1. Tool Identification and Practice
    - Activity: Students label plumbing tools and demonstrate their proper usage.
    - Bloom's Level: Remember, Apply | DOK Level: 1–2
2. Safety Drills

    - Activity: Conduct mock safety inspections and practice using PPE.
    - Bloom's Level: Apply | DOK Level: 2

3. Hazard Recognition Challenge

    - Activity: Analyze a simulated plumbing workspace to identify and document potential hazards.
    - Bloom's Level: Analyze | DOK Level: 3

Levels of Bloom’s Taxonomy and DOK

1. Apply (DOK 2): Practice safe tool usage and assemble basic plumbing systems.
2. Analyze (DOK 3): Evaluate workplace hazards and troubleshoot plumbing issues.
3. Evaluate (DOK 3): Reflect on learning and assess the quality of a plumbing installation or safety plan.

Formative Assessment:

In-Class Activities:

- Quick Quizzes: Short, unannounced quizzes at the beginning or end of class can assess comprehension of key concepts from previous lessons or gauge readiness for new material..
- Think-Pair-Share: Encourage individual reflection followed by partnered discussions and sharing key takeaways with the class. This promotes active learning and identifies common misconceptions.
- Minute Papers: Have students write a one-minute summary of the main points learned or lingering questions they have. This helps identify areas needing clarification.

Classroom Discussions & Activities:

- Open-ended Questions: Encourage students to think critically and elaborate on their understanding by posing open-ended questions throughout lessons.
- Case Studies & Problem-solving: Present real-world plumbing scenarios or problems for students to analyze and propose solutions. This assesses critical thinking and application of knowledge.
- Role-playing Activities: Simulate real-world situations like project meetings or client interactions to practice communication, negotiation, and problem-solving skills.

Peer-Based Assessment:

- Peer Reviews: Students can review each other's work, providing constructive feedback on project plans, presentations, or technical drawings. This fosters collaboration and self-assessment skills.
- Group Work & Discussions: Collaborative activities encourage students to explain concepts to one another, solidifying their understanding and identifying areas where they can learn from peers.

Technology-assisted Assessments:

- Online Quizzes & Polls: Utilize online platforms for short quizzes, polls, or concept checks to gauge student understanding in real-time and adjust instruction accordingly.
- Self-assessment Tools: Provide online quizzes or exercises where students can assess their own

understanding of key concepts and identify areas for self-directed learning.

Benefits of Formative Assessment:

- Improved Student Learning: Provide ongoing feedback that helps students identify strengths, weaknesses, and adjust their learning strategies.
- Informed Instruction: Instructors gain valuable insights into student understanding, allowing them to adapt teaching methods and address misconceptions promptly.
- Increased Student Engagement: Active participation in formative assessments keeps students engaged and invested in the learning process.
- Promotes Self-reflection: Encourage students to reflect on their learning journey, identify areas for improvement, and take ownership of their learning.

- Anticipatory Set
- Exit Tickets
- Hands-On Activities (Individual & Groups)
- Hands-on Observations (Individual & Groups)
- Questioning, Scenarios, and Problem-Solving (Open Ended and Multiple Choice)
- Warm-Up

Modifications

G&T Modifications:

- Alternate assignments/enrichment assignments
- Enrichment projects
- Extension activities
- Higher-level cooperative learning activities
- Pairing direct instruction with coaching to promote self-directed learning
- Provide higher-order questioning and discussion opportunities
- Provide texts at a higher reading level
- Tiered assignments
- Tiered centers

ELL Modifications:

- Choice of test format (multiple-choice, essay, true-false)
- Continue practicing vocabulary
- Provide study guides prior to tests

- Read directions to the student
- Read test passages aloud (for comprehension assessment)
- Vary test formats

At Risk Modifications

The possible list of modifications/accommodations identified for Special Education students can be utilized for At-Risk students. Teachers should utilize ongoing methods to provide instruction, assess student needs, and utilize modifications specific to the needs of individual students. In addition, the following may be considered:

- Additional time for assignments
- Adjusted assignment timelines
- Agenda book and checklists
- Answers to be dictated
- Assistance in maintaining uncluttered space
- Books on tape
- Concrete examples
- Extra visual and verbal cues and prompts
- Follow a routine/schedule
- Graphic organizers
- Have students restate information
- No penalty for spelling errors or sloppy handwriting
- Peer or scribe note-taking
- Personalized examples
- Preferential seating
- Provision of notes or outlines
- Reduction of distractions
- Review of directions
- Review sessions
- Space for movement or breaks
- Support auditory presentations with visuals
- Teach time management skills
- Use of a study carrel
- Use of mnemonics
- Varied reinforcement procedures
- Work in progress check

IEP & 504 Modifications:

*All teachers of students with special needs must review each student's IEP. Teachers must then select the appropriate modifications and/or accommodations necessary to enable the student to appropriately progress in

the general curriculum.

Possible Modifications/Accommodations: (See listed items below):

- Allow for redos/retakes
- Assign fewer problems at one time (e.g., assign only odds or evens)
- Differentiated center-based small group instruction
- Extra time on assessments
- Highlight key directions
- If a manipulative is used during instruction, allow its use on a test
- Opportunities for cooperative partner work
- Provide reteach pages if necessary
- Provide several ways to solve a problem if possible
- Provide visual aids and anchor charts
- Test in alternative site
- Tiered lessons and assignments
- Use of a graphic organizer
- Use of concrete materials and objects (manipulatives)
- Use of word processor

Technology Materials and Standards

Promethean Board

Google For Educators

Google Classroom

MagicSchool

Canva

Kahoot!

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.1.12.C	Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.