ATIN-1010: APPLIED INSULATORS MATH

Cuyahoga Community College

Viewing: ATIN-1010 : Applied Insulators Math
Board of Trustees:
October 2024

Academic Term:
Spring 2025

Subject Code
ATIN - Applied Industrial Technology - Insulators

Course Number:
1010

Title:
Applied Insulators Math

Catalog Description:
Develop mathematical skills for geometric applications and construction related to commercial and industrial installation and replacement of insulation. Includes tape measure reading, geometric design, fractional applications, material estimation, determining diameter, circumferences, radii, and mathematical conversions. Also covers mathematical skills used for material estimation, including. perimeter, square footage, area of cylinder, and decimal to fraction calculations.

Credit Hour(s):
3

Lecture Hour(s):
3

Requisites

Prerequisite and Corequisite
Departmental approval: admission to Heat and Frost Insulator's apprenticeship program.

Outcomes
Course Outcome(s):
Utilize mathematical formulas in field applications for fabricating and installing insulation materials.

Objective(s):
1. Apply Pythagorean theory to calculate measurements of insulation materials.
2. Utilize Pi to calculate accurate diameters, circumferences, and radii.
3. Apply industry standard formulas to calculate material estimation for job sites.
4. Convert decimals to fractions to determine accurate measurements.
5. Divide fractions into portions.

Course Outcome(s):
Utilize appropriate tools to perform fabrication and installation.

Objective(s):
1. Demonstrate proficient use of tape measure and ability to perform related calculations.
2. Perform accurate settings of calipers and dividers.
3. Demonstrate proper use of framing squares, combination squares, and straight edges.

Course Outcome(s):
Identify and recognize various types of pipes and pipe sizes.

Objective(s):
1. Differentiate between common pipe types.
2. Identify between a schedule 20 pipe and a schedule 40 pipe.
3. Identify standard diameters of pipes.
4. Calculate diameters and circumferences of pipes for new installations of insulation.
5. Calculate diameters and circumferences of pipes for replacement of existing insulation.

Methods of Evaluation:
1. Quizzes from International
2. Tests from International
3. Final exam from International
4. Tape measure skills practice
5. Caliper and Divider skills practice
6. Estimation exercises
7. Homework worksheets
8. Geometric construction projects

Course Content Outline:
1. Tape Measure Reading
   a. Decimal to fraction conversion
   b. Converting feet to inches and inches to feet
   c. Dividing fractions into portions
   d. Identification of lines on tape measure
   e. Distinguishing between measuring devices
2. Pipe Materials
   a. Iron
   b. PVC - Polyvinyl cholride
   c. Copper
   d. PEX – Crosslinked Polyethylene
   e. Steel
   f. Galvanized
   g. Stainless Steel
3. Pipe Sizes
   a. Standardized diameter charts
   b. Inside diameter
   c. Outside diameter
   d. Wall thickness
   e. Total outside diameter including insulation
      i. Radii calculation
      ii. Diameter calculation
      iii. Circumference calculation
4. Geometric construction and application
   a. Drawing geometric shapes
   b. Establishing right angles and baselines
   c. Identifying how to establish parallel and perpendicular lines.
   d. Using dividers to portion out circles and lines
   e. Bisect straight lines into equal parts
   f. Bisect an angle into equal parts and transfer
   g. Triangulation development
   h. Parallel development
   i. Layout vs. stretchout
   j. Radial line development
5. Material estimation

a. Types of materials
b. Perimeter calculation
c. Measurement of total footage runs
d. Calculation of square and rectangular areas.
e. Calculation of area of circles
f. Calculation of area of cylinders
g. Calculate square footage with insulation
h. Determine amounts of material needed

Resources

International Association of Heat and Frost Insulators and Asbestos Workers. . *Applied Insulators Math I*. International Association of Heat and Frost Insulators and Asbestos Workers. , 2020.

International Association of Heat and Frost Insulators and Asbestos Workers. *Applied Insulators Math II*. International Association of Heat and Frost Insulators and Asbestos Workers, 2020.

Heat and Frost Insulators – Local 3 . *First Year Math Manual*. Cleveland, OH: Heat and Frost Insulators – Local 3 , 2019.

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