

Laborers Cement Mason
Construction Math Syllabus

Time: 40 hours

Recommended Class Size: 12

Prerequisites: None

Course Description: This course is designed to introduce the participant to the basic math skills needed to be successful in the construction industry. Math and calculations are the foundation of the construction industry. Basic mathematical calculations and measurement systems are often used on the construction site. Therefore, it is very important for the apprentice, Laborers Cement Mason and Construction Craft Laborer to master these tools. To advance in the Cement Mason Industry you must be able to convert decimals, calculate quality take-offs, shoot elevations, operate a level laser, use percentages, slope ratios, read blue prints, understand squaring principals, install batter boards and calculate concrete quantities. This course covers some of the mathematical procedures that must be mastered and gives examples of how they might apply to work in the construction industry.

Goals/Objectives/Student Learning Outcomes:

- Use basic math processes to solve problems involving fractions and decimals.
- Use standard math formulas to solve problems involving area and volume and common construction materials.
- Use common construction measuring equipment to identify units of measure in the US Standard System and the decimal system.
- Measure a variety of objects to within $\pm 1/8"$ using common construction measuring equipment.
- Convert measurements between the US Standard System and the decimal system.
- Identify, set up and use horizontal and vertical measuring equipment to perform basic layout, squaring and grade measurements.
- Define the terms: Bench mark, horizontal, level, offset, percent of grade, plumb, rate per foot, station, and vertical.
- Describe the use of common construction referencing methods to locate objects such as manholes or utilities and given reference points for an object, locate the object to within .25'.
- Describe how stationing systems are used to locate distance measurements within the project for features such as hydrants or manholes.
- Given a grade sheet with a set of elevations, calculate elevations and elevation changes using a rate per foot or percentage of slope.

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Goals/Objectives/Student Learning Outcomes continued:

- Demonstrate the correct set-up of a level transit, and given a set of elevation hubs, calculate each elevation to within +/- .02'.
- Calculate volume quantities for regular and irregular shapes to within +/- two hundredths of a cubic yard.
- Calculate the amount of concrete needed for concrete forms of certain dimensions with the yield amount included.

Standards

This 40-hour course complies with all OSHA and Cal/OSHA safety standards.

Classroom Rules and Procedures

- All classes begin at 6:30 am and end at 3:00 pm
- Upon entering classroom, all participants must sign in and be seated by 6:30 am
- Class will consist of a combination of lecture, video, demonstration, coached group exercises, individual exercises and assessment.
- Students are required to report to class ready to work and maintain the provided PPE

Textbooks/Readings/Materials

- *Basic Construction Math*-LIUNA Training (Instructor & Participant Guides)
- *Estimating Concrete Quantities*-LIUNA Training (Instructor & Participant Guides)
- *Construction Math for Pipelayers*-LIUNA Training (Instructor & Participant Guides)
- Basic Math Review Handouts (10 pages)
- Laborers Concrete Specialists Math Skills Review Worksheets-4 pages
- Reading a Rule Handouts/Worksheets -4 pages
- Converting Decimals Handouts/Worksheets-7 pages
- Converting Decimals Clock Method Handouts
- Plan Sheets-12 pages
- Percentage, Slope Expression, Ratios packet
- Reference Stake Handouts
- Cutting Stairs Packet

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Tools/Equipment/Other Materials:

- 1-Laser level
- 1 tripod
- 1-grade rod 10th and 100th
- 10-calculators
- 10-Builder's level
- 10-Engineers' ruler
- 10-Reference Stakes
- 4-Batter boards

Personal Protective Equipment

- 12 pairs of gloves
- 12 pairs of safety glasses
- 20 pairs of ear plugs
- 12 hard hats
- 12 pairs of rubber boots

Course Requirements

To receive credit for the course, participants must:

- Be present for full forty hours
- Participate in all classroom exercises
- Pass a written exam
- Pass hands-on exams

Course Policies

- Participants must be on-time and ready to work.
- Participants must return from breaks on-time.
- Participants must participate in each exercise and assignment
- Participants who are on "light duty" are not allowed to take this course due to the physically demanding requirements.

Laborers Training School

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Assessment and Grading

Participants will be assessed on the following:

- All written exams must be passed with a score of 80% or above.
- All hands-on exercises are graded on performance and participation. They are pass/fail and must be passed with a score of 80% or above.

Safety

Failure to maintain and use PPE may result in dismissal from the course.