STRETCHLEARN · WORKBOOK

Concrete & Masonry Basics — Workbook

This workbook turns the course into jobsite practice. Each section pairs with a course module and gives you material calculations, mixing drills, repair diagnoses, and laying checklists to run on real projects. Work through it with bagged material and tools in hand, and keep the templates open so your pours and walls start from correct quantities and ratios instead of guesses.

Materials, Mixing, and Safety

Practice identifying the right product, mixing to the correct water ratio, and gearing up against the chemical hazards of wet cement.

Exercise: Match the Bag to the Job

For each of the projects below, write down which bagged product you would buy (standard concrete, fast-setting concrete, sand mix, or Type N/S/M mortar) and the reason. Then walk a hardware store aisle or website and find a real branded bag for each, noting its stated yield or coverage.

• A 4-inch backyard patio slab: which mix, and how many cubic feet does one 80 lb bag yield?

• Setting a 4x4 fence post: which product, and what is its set time?

• Laying a low above-grade brick planter: which mortar type and what is its approximate psi?

• A below-grade retaining wall: which mortar type, and why not Type N?

Worksheet: Water Ratio and Slump Log

Mix three small test batches from the same bag, varying only the water. Record the water added, the slump behavior on the trowel-tilt test, and how the cured sample looks after a few days. Use this to find the feel of a correct mix.

Batch number

Dry mix amount used

Water added (quarts or liters)

Trowel-tilt result (runs off / holds ridge / crumbles)

Slump estimate (too wet / correct / too dry)

Cured surface after 3 days (smooth / dusty / crumbly)

Adjustment for next batch

Checklist: Wet-Cement PPE and Safety Setup

[ ] Waterproof or nitrile gloves on, covering the wrists
[ ] Safety glasses or goggles worn for all mixing and pouring
[ ] N95 or better dust mask on when handling dry powder
[ ] Waterproof boots and knee protection to stay out of the mix
[ ] Long sleeves and pants, cuffs out of the splash zone
[ ] Clean water and a rag staged on site for rinsing skin and tools
[ ] Bags squeezed and checked for hardness before opening

Pouring and Finishing a Concrete Slab

Plan, form, pour, and cure a small slab, calculating quantities and following the float-then-finish-then-cure sequence.

Worksheet: Slab Planning Sheet

Plan a real small slab (a pad, step landing, or short walkway). Measure and record the dimensions, then work out the base excavation depth, control-joint spacing, and how many bags you need. Leave the calculated quantity cells blank until you have done the math, then fill them in.

Slab length (ft)

Slab width (ft)

Slab thickness (in)

Base material depth (in)

Total excavation depth (in)

Slab area (sq ft)

Slab volume (cubic ft)

Bags needed (at 0.6 cu ft per 80 lb bag)

Slope direction and amount (in per ft)

Control-joint spacing (ft)

Exercise: Screed, Float, and Broom on a Practice Pad

Form and pour a small practice pad, then run the full finishing sequence. Note the timing between steps, because the waiting periods are where beginners go wrong.

• How long after pouring did bleed water appear, and how long until the sheen disappeared?

• Did your screed reveal low spots, and how did you fill and re-screed them?

• At what surface firmness did the broom leave a clean texture without tearing?

• What slope did you build in, and did water actually run off when you tested with a hose?

Checklist: Pour-Day Sequence

[ ] Base compacted in lifts and graded to slope
[ ] Forms braced with stakes every 2 to 3 feet and set to finished height
[ ] Reinforcement (mesh or rebar) set on chairs in the middle third
[ ] All tools and helpers staged before water is added
[ ] Concrete placed from the far end, slightly proud of forms
[ ] Screeded flush, low spots filled and re-screeded
[ ] Floated, then edged and grooved after bleed water cleared
[ ] Broom finish applied, then curing started the same day

Repairing Cracks, Steps, and Spalled Concrete

Diagnose crack and surface failures, then match and execute the right repair so it lasts through the next freeze.

Worksheet: Crack Diagnosis and Repair Log

Survey the concrete around your home and log each crack or defect you find. For each, record the width, whether it is moving, and the repair product and method you will use. Use the tape-and-date test to determine if a crack is active before you choose a rigid or flexible repair.

Location

Crack width (in)

Vertical displacement (yes/no)

Active or dormant (tape-test result)

Repair product chosen

Bonding agent or backer rod needed (yes/no)

Method (seal / pack mortar / resurface / vertical patch)

Exercise: Rebuild a Broken Step Corner

Find or create a broken concrete edge or step corner and repair it with vertical patching mortar and a form. Document each step so you internalize the bond-and-cure rules that make edge patches last.

• How did you clean the area back to sound concrete, and did you add pins or screws to anchor it?

• What bonding agent or slurry did you use before packing the mortar?

• How did you form the missing edge, and did the form hold a crisp profile?

• How did you cure the patch, and for how long did you keep traffic off it?

Checklist: Repair Bond-and-Cure Checklist

[ ] All loose and crumbling material removed back to sound concrete
[ ] Surface roughened or undercut so the patch keys in
[ ] Dust vacuumed and surface dampened or primed with bonding agent
[ ] Flexible sealant used for active cracks, rigid mortar only for dormant ones
[ ] Vertical and overhead repairs use patching mortar, never plain concrete mix
[ ] Patch packed in lifts for depth, with no voids
[ ] Patch kept moist and covered for several days
[ ] Traffic kept off for the product's stated time

Laying Brick and Block: Walls, Planters, and Walkways

Lay units on a sound base to a tight line, keep every course level and plumb, and finish with weather-tight tooled joints.

Worksheet: Unit and Mortar Estimate

Plan a real brick or block project (a planter, low wall, or border). Record the wall dimensions and unit size, then estimate the unit count and mortar bags. Leave the calculated totals blank until you compute them, then enter your figures.

Wall length (ft)

Wall height (number of courses)

Unit type and nominal size

Bond pattern (running / stack / other)

Wall face area (sq ft)

Units per square foot (from manufacturer)

Total units needed

Waste allowance added (%)

Bags of mortar needed (from coverage rate)

Exercise: Build a Lead and Lay to the Line

Lay up a short section of wall the mason's way: build each end as a lead, run a tight mason line, and fill the field to the line. Focus on a consistent 3/8-inch joint and constant level and plumb checks.

• How many courses did you build the leads before running the line?

• Did you check both level and plumb on each lead, and what did you correct?

• How did you keep your joints at 3/8 inch, and where did they drift?

• Did any unit push the line and bow it, and how did you avoid that?

Checklist: Laying and Jointing Checklist

[ ] Base or footing level and, for true walls, below frost line
[ ] First course dry-laid to plan the bond and place cuts away from corners
[ ] Full mortar bed laid and head joints fully buttered
[ ] Each unit leveled, plumbed, and aligned to the line before mortar stiffens
[ ] Gauge rod used to keep course heights consistent
[ ] Joints tooled concave at thumbprint hardness, heads before beds
[ ] Burrs knocked off and wall brushed clean when dry
[ ] Efflorescence brushed off after drying, acid reserved as a last resort

Your Action Plan

1. Pick one small starter project (a 4-inch pad, a step repair, or a low planter) and commit to finishing it end to end.
2. Buy the correct bagged product for that project using the Match-the-Bag exercise, and check each bag for hardness before use.
3. Mix three test batches and dial in the correct water ratio and slump before mixing for the real pour.
4. Assemble the core tool kit and full PPE, with clean water staged on site for rinsing.
5. For a slab: excavate, compact the base in lifts, brace forms to the finished slope, and set reinforcement.
6. Pour, screed, float, edge, groove, and broom-finish, respecting the bleed-water waiting periods.
7. Cure the work by keeping it moist and covered for at least 3 to 7 days before loading it.
8. For a repair: diagnose active versus dormant, clean to sound concrete, prime, patch with the matched product, and cure.
9. For masonry: prepare the base, dry-lay the first course, build leads, lay to a tight line, and tool concave joints.
10. Inspect the finished work after one freeze-thaw cycle and log what held and what you would do differently.