# Build a Wall Mockup

## Description

All walls in a house must be built to correct specifications and size in order to meet building code requirements. In this Activity Plan, students will build mock wall sections, with 48" (1200 mm) top and bottom plates and four 24" (600 mm) studs.

The purpose of this activity is to have students practise measuring, cutting, and nailing by building a small mock wall section. This lesson will be followed by the layout and construction of a full-sized wall using the skills gained.

## Lesson Outcomes

The student will be able to:

* Identify the parts of a wall
* Lay out a mini mock wall according to specifications
* Install wall components in appropriate locations
* Demonstrate safe use of hand and power tools
* Demonstrate correct nailing techniques for a wall section

## Assumptions

The student will:

* Be familiar with the safe use of mitre saws and portable circular saws
* Have had the opportunity to use basic measurement and layout tools
* Be familiar with extracting information from drawings

## Terminology

**Base plate (also called *floor plate* or *bottom plate*)**: a horizontal structural member to which the wall studs are through nailed and which forms the base of the wall when assembled.

**Double top plate**: a second set of plates added after the walls are raised to position. These plates continue past the point of intersection between side and end walls and are nailed down through the top in order to lock the walls into a solid unit.

**End nail technique**: to install a stud or joist by nailing through the plates or rim joist into the end of the stud or joist (typically two nails at each end of a stud are used).

**Exterior wall**: a framed wall used on the outside of a structure that contains insulation, typically framed with 2 × 6" material.

**Flush**: a term used in construction to indicate that two meeting surfaces are aligned on the same plane.



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**Interior walls**: a framed wall used on the inside of a structure that does not contain insulation and is typically framed with 2 × 4” material.

**Level**: a term used in construction to refer to a horizontal surface.

**On Centre (OC)**: This term implies that the measurement from the centre of one stud or joist to the centre of the next identical component will be exactly the distance specified.

**Plumb**: a term used in construction to refer to a vertical surface.

**Square**: a term used in construction to refer to a 90° angle.

**Toenail technique**: to install a stud in a wall by nailing through the side edge of the stud at about a 60° angle down into the plate. The nails need to be driven into the plate so that approximately half of the length of the nail is in the plate.

**Top plate**: a horizontal structural member to which the wall studs are through nailed and which forms the top of the wall when assembled.

**Wall stud**: a vertical member in light frame wall construction, usually spaced at 16" or 24" centre to centre.

## Estimated Time

1.5–2 hours

Time for this activity depends on the familiarity of students with tools and access to tools—the number of mitre and portable circular saws available, etc.

## Recommended Number of Students

20, based on the *British Columbia Technology Educators’ Best Practice Guide*. The ideal is

1. Students will work in groups of two or individually, depending on class numbers and space available.

## Facilities

Technology education shop facility required. A secure space to work outside is advantageous as well as open floor area in which to build the mock walls.

## Tools

* + Mitre saw
  + Portable circular saw
  + Extension cord
  + Tape measures
  + Hammers and nail pullers
  + Nail gun and compressor (optional)
  + Combination or speed square
* Level
* Aprons
* Hard hats
* Eye protection

## Materials

* 2 × 4"s or 2 × 6"s for wall plates and studs
* 3" common nails

## Resources

Graphic/photo of finished exterior wall, crosssection of finished exterior wall. Figures 1 and 2 show examples that could be used. Drawings of a variety of walls could be provided and typical methods of construction could be discussed.

### Studs are spaced 16" on centre Cripple studs are

16" on centre

Top plate

Header

Jack studs are the height of your rough openings

Kings go to the outsides of the jack studs

Treated lumber for bottom plate in basement

**Figure 1—**The main features of a typical full height wall with a framed-in door section

Wall section (8') Top plate (`regular´ 2" × 4")

16"

16" O.C.

Floor to joist height (less ½")\*\*

Bottom plate (treated 2" × 4")

\*\*Leave ½" of space to allow you to tip the wall into place.

**Figure 2—**Typical interior wall showing correct spacing for wall studs. Note that the second stud is located 16" from the outside of the first stud to the centre of the second stud. Each remaining stud will be 16" OC.

# Activity

1. Review terminology and safe practices.
2. Determine the lengths of the wall plates, stud spacing, size, and positioning. **Note:** 16" (406 mm) outside to centre spacing. Recommended measurements for the mock wall are 48" (1200 mm) top and base plates with four 24" (600 mm) studs.
3. Generate a material list.
4. Cut the top and base plates to length (two pieces at 48" or 1220 mm) using a compound mitre saw (Figure 3) or portable circular saw.



**Figure 3—**Typical compound mitre saw used to cut plates and studs to length

1. Lay out the top and base plates by marking the correct locations of studs using a tape measure and combination square (or speed square). Mark the location of the studs by marking an X on the correct side of a measured pencil line. Note that the second stud must be located 16" from the outside of the first stud to the centre of the second stud. All remaining studs will be located 16" OC.
2. When laying out walls, a tape measure is hooked on the end of plates (or on floors, on the rim joists). Layout on both 16" OC or 24" OC is started by running the tape measure along the plate. Marks are then made ⅜" short of the 16" marks on the tape (15¼", 31¼", 47¼", etc.). An X is then placed to the right of each mark to indicate the side on which the stud or joist is placed. The end result will be studs on joist being 16" OC. This same process is used for 24" OC (i.e., 23¼", 47¼", 71¼").
3. Cut the wall stud components to length (four pieces at 12" or 300 mm) using a compound mitre saw or portable circular saw.
4. Assemble the wall framing components with a hammer and nails (two 3" common nails through the top plate, and two 3" common nails through the base plate). Note that students will have more success working together on this part of the activity, as they can assist in holding components in the correct position.



**Figure 4—**Typical nailing procedure for a wall

1. **Note**: The nailing process should be completed while the material is on a flat horizontal surface, in order to facilitate easy nailing (Figure 4).
2. Students need to check the mock wall to ensure that the structure is square and that studs are flush with plates. (Wall only needs to be squared if it is to be sheathed on the floor.)

## Evaluation Guidelines

* All framing components are flush.
* Layout is correct (e.g., stud spacing).
* Components are cut to correct length.
* Walls are square.
* Safe work practices are followed.
* The work environment is tidy, with tools and materials stored properly and waste material removed.

## Optional Activities

* The teacher could demonstrate the assembly of part of the mock wall by using a pneumatic nail gun, if available.
* The teacher could also demonstrate toenailing techniques, and students could practise toenailing one stud in the wall.