

# Carpenter Level 2

## Carpenter

**Unit:** A1.3 Concrete and Concrete Products

**Level:** Two

**Duration:** 10 hours

Theory: 10 hours

Practical: 0 hours

### Overview:

This unit of instruction introduces the theoretical grounding required to identify/describe concrete products, preparation, and applications.

### Objectives and Content:

	<b>Percentage of Unit Mark (%)</b>
<b>1. Identify cast-in-place concrete products.</b>	<b>30%</b>
a. Beams and girders	
b. Footings	
c. Grade beams	
d. Pavers	
e. Piles/pile caps	
f. Slab-on-grade	
g. Suspended slabs	
h. Walls	
<b>2. Describe precast components.</b>	<b>20%</b>
a. Beams	
b. Floors (core floor/hollow-core)	
c. Joists	
d. Lift slabs	
e. Piles	
f. Septic tanks	
g. Stairs	
h. Traffic barriers	
i. Utility vaults	
j. Walls	
<b>3. Describe procedure for installing precast-concrete structural components.</b>	<b>50%</b>
a. Anchoring	
b. Caulking	
c. Grouting	
d. Pick-up points	
e. Lifting methods	

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## Carpenter

**Unit:** A1.4 Concrete Theory

**Level:** Two

**Duration:** 10 hours

Theory: 10 hours

Practical: 0 hours

### Overview:

This unit of instruction introduces the theoretical grounding required to identify/describe the mixing, testing, placement, finishing, and curing of concrete.

### Objectives and Content:

### Percentage of Unit Mark (%)

- |                                  |            |
|----------------------------------|------------|
| <b>1. Describe mixing.</b>       | <b>20%</b> |
| a. Admixtures                    |            |
| b. Aggregates                    |            |
| c. Batch-plant mixing            |            |
| d. Cements                       |            |
| e. Fibre-reinforcement           |            |
| f. Hardeners                     |            |
| g. Lightweight concrete          |            |
| h. On-site mixing                |            |
| i. Strengths                     |            |
| j. Water/cement ratio            |            |
| <b>2. Describe testing.</b>      | <b>15%</b> |
| a. Air entrainment               |            |
| b. Compression                   |            |
| c. Durability                    |            |
| d. Permeability                  |            |
| e. Slump                         |            |
| f. Wear-resistance               |            |
| <b>3. Describe placement</b>     | <b>45%</b> |
| a. Consolidation                 |            |
| b. Drop-chutes (elephant trunks) |            |
| c. Maximum drop                  |            |
| d. Rate of placement             |            |
| e. Sequence                      |            |
| f. Tremmies                      |            |
| <b>4. Describe finishing.</b>    | <b>10%</b> |
| a. Architectural finishes        |            |
| b. Edge                          |            |
| c. Finish elevation              |            |
| d. Float                         |            |
| e. Joint                         |            |

- f. Screeding
- g. Strike-off
- h. Trowel

**5. Describe curing procedures.**

**10%**

- a. Cold-/hot-weather curing
- b. Curing agents
- c. Hardeners
- d. Impact of early/late stripping
- e. Ponding
- f. Soaking

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## Carpenter

**Unit:** A1.5 Concrete Practical

**Level:** Two

**Duration:** 5 hours

Theory: 0 hours

Practical: 5 hours

**Overview:**

This unit of instruction is designed to provide practical experience in preparing, testing, placing, hardening, finishing, and curing concrete.

**Objectives and Content:**

**Percentage of  
Unit Mark (%)**

- |  |            |
|--|------------|
| <b>1. Mix concrete.</b><br>a. Aggregate<br>b. Cement<br>c. Water                             | <b>85%</b> |
| <b>2. Perform slump/compressive test.</b><br>a. Compressive test<br>b. Slump-cone procedures | <b>5%</b>  |
| <b>3. Place concrete.</b><br>a. Curing<br>b. Delivery<br>c. Finishing<br>d. Vibrating        | <b>10%</b> |

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## **Carpenter**

**Unit:** A1.7 Building Envelope

**Level:** Two

**Duration:** 10 hours

Theory: 10 hours

Practical: 0 hours

### **Overview:**

This unit of instruction is designed to provide the theoretical grounding needed to identify special products used for regulating the impact of atmospheric conditions on built structures, and to describe the use/installation of these products.

### **Objectives and Content:**

### **Percentage of Unit Mark (%)**

- |  |            |
|--|------------|
| <b>1. Identify air-/moisture-control products.</b>                     | <b>20%</b> |
| a. Air barriers  |            |
| b. Building papers   |            |
| c. Moisture barriers   |            |
| d. Vapour barriers   |            |
| <b>2. Identify insulation materials.</b>                               | <b>20%</b> |
| a. Air gap   |            |
| b. Batt insulation   |            |
| c. Foil insulation   |            |
| d. In-place foam   |            |
| e. Loose insulation  |            |
| f. Rigid insulation  |            |
| <b>3. Describe the installation of air-/moisture-control products.</b> | <b>30%</b> |
| a. Air barriers  |            |
| b. Building papers   |            |
| c. Moisture barriers   |            |
| d. Vapour barriers   |            |
| <b>4. Describe the installation of insulation products</b>             | <b>30%</b> |
| a. Batt insulation   |            |
| b. Foil insulation   |            |
| c. In-place foam   |            |
| d. Loose insulation  |            |
| e. Rigid insulation  |            |

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## **Carpenter**

**Unit: A4.1 Construction Documents**

**Level: Two**

**Duration: 55 hours**

Theory: 55 hours

Practical: 0 hours

### **Overview:**

This unit of instruction is designed to provide the theoretical grounding required to interpret construction drawings, specifications, regulations, and codes.

### **Objectives and Content:**

### **Percentage of Unit Mark (%)**

- |   |            |
|---|------------|
| <b>1. Identify construction drawings.</b><br>a. Blueprints<br>b. Manufacturer drawings<br>c. Shop drawings  | <b>10%</b> |
| <b>2. Identify construction specifications.</b><br>a. Engineering specifications<br>b. General specifications<br>c. Manufacturer specifications   | <b>10%</b> |
| <b>3. Identify construction regulations and codes.</b><br>a. Building codes<br>b. Regulations, legislation, and bylaws<br>c. Standards  | <b>10%</b> |
| <b>4. Use communication techniques.</b><br>a. Alphabet of lines<br>b. Computer estimating-software<br>c. Computer spreadsheets<br>d. Computer-assisted drawings<br>e. Document hierarchy<br>f. Drawing components<br>g. Drawing symbols/conventions | <b>15%</b> |
| <b>5. Interpret construction drawings.</b><br>a. Architectural<br>b. Shop/technical<br>c. Site/landscape<br>d. Structural   | <b>25%</b> |
| <b>6. Interpret specifications.</b><br>a. Engineering specifications<br>b. General specifications   | <b>15%</b> |

- c. Manufacturer specifications
- d. Written field-instructions

**7. Interpret regulations and codes.**

**15%**

- a. Bylaws/legislation
- b. Permits
- c. Regulations
- d. Standards

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## **Carpenter**

**Unit: A5.1 Building science Principles**

**Level: Two**

**Duration: 12 hours**

Theory: 12 hours

Practical: 0 hours

### **Overview:**

This unit of instruction is designed to provide the theoretical grounding required to describe Building Science principles.

### **Objectives and Content:**

### **Percentage of Unit Mark (%)**

**1. Describe methods of heat transmission.**

**20%**

- a. Conduction
- b. Convection
- c. Radiation
- d. R-values/RSI-value
- e. Thermal bridging

**2. Describe methods of air-flow.**

**20%**

- a. Air quality
  - radon gas
  - off-gassing
  - carbon monoxide
  - formaldehyde
  - nitrogen
  - particulates
- b. Air-changes per hour (ACH)
- c. Combustion air
- d. Flue effect
- e. Infiltration/exfiltration
- f. Pressure differentials
- g. Stack effect
- h. Ventilation (natural/mechanical)

**3. Describe methods of moisture-flow.**

**30%**

- a. Air-flow
- b. Capillary action
- c. Condensation/dewpoint
- d. Gravity flow
- e. Phases of water (solid/liquid/vapour)
- f. Relative humidity
- g. Vapour diffusion

- 4. Describe forces that act upon the building envelope** **20%**
- a. Atmospheric pressure
  - b. Compression
  - c. Tension
  - d. Torsion
  - e. Gravity
  - f. Hydrostatic forces
  - g. Low/high pressure
  - h. Occupants
  - i. Shear force
  - j. Uplift
  - k. Weather conditions (e.g., wind, rain)
- 5. Describe sound-transmission** **10%**
- a. Airborne
  - b. Absorbed/reflected
  - c. Decibels
  - d. Gaseous, fluid, and solid media
  - e. Reverberation
  - f. Sound Transmission Class (STC)
  - g. Structure-borne
  - h. Vibration

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## Carpenter

**Unit:** A5.2 Building Science Techniques

**Level:** Two

**Duration:** 16 hours

Theory: 0 hours

Practical: 16 hours

### Overview:

This unit of instruction is designed to provide the theoretical grounding required to apply Building Science principles.

### Objectives and Content:

### Percentage of Unit Mark (%)

- |  |            |
|--|------------|
| <b>1. Control heat-flow.</b>                       | <b>15%</b> |
| a. Caulking  |            |
| b. Double-wall construction                        |            |
| c. Insulation (batt; expanding foam; loose; rigid) |            |
| d. Passive solar design                            |            |
| e. R-2000  |            |
| f. Radiant barrier                                 |            |
| g. Stand-off wall construction                     |            |
| h. Stressed-skin panel construction                |            |
| i. Ventilation                                     |            |
| <b>2. Control air-flow.</b>                        | <b>10%</b> |
| a. Acoustical sealants/caulks                      |            |
| b. Air barriers (interior/exterior)                |            |
| c. Expanding foam                                  |            |
| d. Paint   |            |
| e. Positive/negative pressures                     |            |
| f. Sill gaskets                                    |            |
| g. Tape (sealing tape)                             |            |
| <b>3. Control moisture-flow.</b>                   | <b>40%</b> |
| a. Barrier (water/vapour)                          |            |
| b. Building papers                                 |            |
| c. Drainage  |            |
| d. Eavestroughing                                  |            |
| e. Flashings                                       |            |
| f. Landscaping (grade)                             |            |
| g. Mechanical ventilation                          |            |
| h. Membrane (damp-/water-proofing)                 |            |
| i. Paint products                                  |            |
| j. Sealants  |            |
| k. Vapour-diffusion retarder                       |            |

4. **Control interior and exterior forces.** **30%**
- a. Bracing
  - b. Connectors/fasteners
  - c. Control joints
  - d. Rain-screen
  - e. Sheathing methods
  - f. Structural integrity
  - g. Sub-slab ventilation/drainage
  - h. Water tables
5. **Control sound-transmission.** **5%**
- a. Acoustical materials (cork; lead; plaster; tiles)
  - b. Acoustical sealant
  - c. Double-ply gypsum wallboard
  - d. Resilient channel
  - e. Staggered stud/party walls

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## Carpenter

**Unit:** A 6.1 Site Layout Theory

**Level:** One

**Duration:** 15 hours

Theory: 15 hours

Practical: 0 hours

### Overview:

This unit of instruction is designed to provide the theoretical grounding required to identify precision instruments, describe construction-related layout methods, and perform necessary calculations.

### Objectives and Content:

	<b><u>Percentage of Unit Mark (%)</u></b>
<b>1. Identify precision instruments.</b> a. Global Position Station (GPS) b. Laser instruments c. Levels d. Transits e. Survey instruments f. Theodolites g. Total Station	<b>10%</b>
<b>2. Describe the layout process.</b> a. Establishing lines b. Leveling c. References	<b>45%</b>
<b>3. Calculate elevations and distances between lines.</b> a. Decimals b. Differential leveling c. Fractions d. Fraction/decimal conversion e. Logbook entry	<b>15%</b>
<b>4. Calculate angles and distances between points.</b> a. Pythagorean Theorem b. Supplementary/complementary angles c. Sine/cosine/tangent	<b>15%</b>
<b>5. Calculate arcs, chords, segments, and tangents.</b> a. Circumference b. Diameter c. Radius d. Radians	<b>5%</b>

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## Carpenter

**Unit: A6.2 Site Layout: Application**

**Level:** Two

**Duration:** 14 hours

Theory: 0 hours

Practical: 14 hours

### Overview:

This unit of instruction proves apprentices with an opportunity to acquire practical experience setting up precision instruments, and establishing lines and elevations.

### Objectives and Content:

	<b>Percentage of Unit Mark (%)</b>
<b>1. Set up precision instruments.</b> a. Laser levels b. Levels c. Transits d. Theodolites	20%
<b>2. Establish building lines.</b> a. Batter-board b. Batter-line c. Corner points d. Hub stakes e. Lot lines f. Setback g. Vernier	30%
<b>3. Use instruments.</b> a. Establish/transfer elevations b. Field books/recording c. Layout of angles/curves d. Measure angles e. Measure distances f. Set grades	30%
<b>4. Construct batter-boards.</b> a. Batter-line b. Braces c. Continuous d. Independent e. Ledgers f. Offsets g. Stakes h. Weighted	20%

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# **Apprenticeship s** Manitoba

## **Carpenter**

**Unit:** B1.1 Footing, slab-on-grade, and Grade Beam Forms

**Level:** Two

**Duration:** 8 hours

Theory: 8 hours

Practical: 0 hours

### **Overview:**

This unit of instruction is designed to provide the theoretical grounding required to describe the construction and installation of grade-beam forms, footing forms, and formwork for slabs-on-grade.

### **Objectives and Content:**

	<b>Percentage of Unit Mark (%)</b>
<b>1. Describe formwork for footings, slabs-on-grade, and grade-beams.</b> a. Column b. Pilaster c. Footing d. Stepped e. Strip f. Tapered	<b>20%</b>
<b>2. Describe the construction of formwork for footings, slabs-on-grade, and grade beams.</b> a. Alignment (staking; bracing) b. Dismantling procedures c. Elevation/location d. Form ties e. Joints f. Level forms g. Reconditioning h. Square forms	<b>50%</b>
<b>3. Calculate materials.</b> a. Contact area b. Sheet goods c. Stakes and braces d. Studs and walers e. Ties and wedges	<b>20%</b>
<b>4. Calculate concrete quantities.</b> a. Centreline lengths b. Height c. Width	<b>10%</b>

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## Carpenter

**Unit:** B1.2 Wall, Column, Pier and Pile Forms

**Level:** Two

**Duration:** 5 hours

Theory: 5 hours

Practical: 0 hours

### Overview:

This unit of instruction is designed to provide the theoretical grounding required to describe the construction and installation of formwork for walls, columns, piers, and piles.

### Objectives and Content:

### Percentage of Unit Mark (%)

- |   |            |
|---|------------|
| <b>1. Describe formwork for walls, columns, piers, and piles.</b>                     | <b>50%</b> |
| a. Architectural  |            |
| b. Battered   |            |
| c. Composite  |            |
| d. Expanded polystyrene (EPS)   |            |
| e. Fibre  |            |
| f. Insulated  |            |
| g. Pilaster   |            |
| h. Slip   |            |
| i. Steel  |            |
| j. Tilt-up  |            |
| k. Wood (stick and gang)  |            |
| <b>2. Describe the construction of formwork for walls, columns, piers, and piles.</b> | <b>50%</b> |
| a. Access scaffold  |            |
| b. Alignment and bracing  |            |
| c. Blockouts (bucks; sleeves; inserts)  |            |
| d. Dismantling  |            |
| e. Elevation/location   |            |
| f. Joints   |            |
| g. Lifting mechanisms   |            |
| h. Plates and collars   |            |
| i. Pour strips  |            |
| j. Reconditioning   |            |
| k. Sheathing  |            |
| l. Ties   |            |
| m. Verticals  |            |
| n. Walers and strongbacks   |            |

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## Carpenter

**Unit:** B2.1 Practicum: Footing, Slab-on-Grade, and Grade-Beams

**Level:** Two

**Duration:** 12 hours

Theory: 0 hours

Practical: 12 hours

### Overview:

This unit of instruction is designed to provide practical experience in the concrete-forming of footings, slabs-on-grade, and grade beams.

### Objectives and Content:

	<b>Percentage of Unit Mark (%)</b>
<b>1. Check elevation and location.</b>	<b>50%</b>
a. Benchmark	
b. Builder's level	
c. Elevation view	
d. Plot plan	
e. Site plans	
<b>2. Construct forms.</b>	<b>50%</b>
a. Alignment	
b. Anchors	
c. Bracing	
d. Chamfer-strips	
e. Dismantling	
f. Layout	
g. Miscellaneous inserts	
h. Spreaders	
i. Templates	
j. Ties	

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## Carpenter

**Unit:** B2.2 Practicum: Walls, Columns, and Pier Forms

**Level:** Two

**Duration:** 15 hours

Theory: 0 hours

Practical: 15 hours

### Overview:

This unit of instruction provides practical experience in the concrete-forming of walls, columns, and piers.

### Objectives and Content:

**Percentage of  
Unit Mark (%)**

**1. Construct wall forms.**

**33%**

- a. Alignment
- b. Anchors
- c. Blockouts, bucks, sleeve, etc.
- d. Bracing
- e. Closed form
- f. Elevation
- g. Form dismantling
- h. Layout
- i. Place wall forms
- j. Reinforcement
- k. Side One/Two
- l. Templates
- m. Miscellaneous inserts
- n. Ties

**2. Construct column forms.**

**34%**

- a. Access scaffolding
- b. Alignment
- c. Anchors
- d. Chamfer strips
- e. Clamps
- f. Bracing
- Collars
- g. Column sides
- h. Elevation
- i. Form dismantling
- j. Kicker
- k. Layout
- l. Miscellaneous inserts
- m. Place column forms
- n. Reinforcement
- o. Templates
- p. Ties

**3. Construct pier forms.**

**33%**

- a. Alignment
- b. Anchors bracing
- c. Chamfer strips
- d. Clamps
- e. Collars
- f. Elevation
- g. Form dismantling
- h. Kickers
- i. Layout
- j. Miscellaneous inserts
- k. Pier sides
- l. Place pier forms
- m. Reinforcing
- n. Templates
- o. Ties

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## Carpenter

**Unit:** C1.1 Beam and Support Framing

**Level:** Two

**Duration:** 4 hours

Theory: 4 hours

Practical: 0 hours

### Overview:

This unit of instruction is designed to provide the theoretical grounding required to describe the use of beams and beam-supports in structural framing, and to calculate materials associated with this component of built structures.

### Objectives and Content:

	<b><u>Percentage of Unit Mark (%)</u></b>
<b>1. Describe beam supports.</b>	<b>10%</b>
a. Adjustable metal columns	
b. Beam-end bearing	
c. Concrete	
d. Lally columns	
e. Metal saddles	
f. Wooden posts (built-up; solid; engineered)	
<b>2. Describe the use of steel beams.</b>	<b>10%</b>
a. Fire protection	
b. Joist attachment	
c. Shop priming	
d. Shrinkage space (See National Building Code)	
e. Types	
<b>3. Define terms associated with beam design.</b>	<b>20%</b>
a. Box beams	
b. Built-up beams	
c. Camber	
d. Clear span	
e. Compression	
f. Deflection	
g. Design tables	
h. End bearing	
i. Flush beam	
j. Loading (allowable; design; dead/live; static)	
k. Neutral axis	
l. Point load	
m. Quarter points	
n. Shear	
o. Steel beam (I-, H-, and C-section profiles)	
p. Supported joist-length	
q. Tension	
r. Torsion	

- 3. Use National Building Code tables to determine beam size, span, and column-spacing. 30%**
- a. Beam length
  - b. Required joint-locations and length of members
  - c. Point-load locations
  - d. Spans between desired column-locations
  - e. Species, grade, size, and number of members
  - f. Supported joist-length
- 4. Describe procedure for preparing built-up beams. 15%**
- a. Crowns
  - b. Laminations
  - c. Material selection
  - d. Nailing/fastening procedures
  - e. National Building Code requirements
  - f. Post-centres and quarterpoints
  - g. Straightening procedures
- 5. Identify/describe engineered beams. 15%**
- a. Types
  - b. Relative merits (aesthetics; allowable span; stability; uniformity; versatility)

## Carpenter

**Unit:** C1.2 Floor Framing

**Level:** Two

**Duration:** 4 hours

Theory: 4 hours

Practical: 0 hours

### Overview:

This unit of instruction is designed to provide the theoretical grounding required to describe the structural framing of floors, including the application of sheathing and the calculation of necessary materials.

### Objectives and Content:

<b>Objectives and Content:</b>	<b>Percentage of Unit Mark (%)</b>
<b>1. Identify the distinguishing features of floor-framing methods.</b> a. Balloon framing b. Platform framing	<b>5%</b>
<b>2. Define floor-framing members in terms of their function.</b> a. Adhesives b. Blocking (partition; point-load; skew; solid) c. Cross-bridging (herringbone) d. Joists (cantilever; floor; header; rim; tail; trimmer) e. Joist hangers f. Ledgers g. Partition blocking h. Point-load blocking i. Sill plate j. Strapping (wood/metal)	<b>5%</b>
<b>3. Select floor-joist material.</b> a. Design load b. Drawings c. Joist size/spacing required d. Joist-restraint method e. Largest span f. Lumber grade/species required g. Use of National Building Code tables in design	<b>20%</b>
<b>4. Describe procedure for installing platform framing.</b> a. Blocking, strapping, and bridging b. Crown c. Fire cut d. Foundation dimensions e. Header and joist centres f. Joist layout g. Joist nailing methods/schedule	<b>20%</b>

- h. Mechanical systems
- i. National Building Code notch-and-drill specifications
- j. Placement of rough openings (including bay-window location, chases, fireplaces, and floor openings)
- k. Sill plate

- 5. Identify engineered floor systems. 10%**
- a. Design/installation as per manufacturer specifications
  - b. Components (squash-blocks, etc.)
  - c. Cutting/boring
  - d. Laminated
  - e. Open-web truss (composite; metal; wooden)
  - f. Wooden I-joist system
- 6. Describe floor-sheathing and its installation. 10%**
- a. Adhesives
  - b. Board sheathing
  - c. Fastening schedule (National Building Code)
  - d. Layout
  - e. Oriented strandboard (OSB)
  - f. Plywood
  - g. Staggered joints
  - h. Thickness requirement
- 7. Describe energy-efficient floor-framing. 10%**
- a. Cantilever vapour-barrier stops
  - b. Elimination of rim joists (extended end walls)
  - c. Preplacement of vapour barrier
  - d. Recessed header joists
- 8. Calculate floor-framing material requirements using drawings, National Building Code, and other specifications. 10%**
- a. Adhesives (type; quantity)
  - b. Beam/joist sizes
  - c. Beam-component lengths
  - d. Blocking, bridging, and strapping
  - e. Fasteners (size; type; quantity)
  - f. Hangers (size; type; quantity)
  - g. Joist number and lengths (full-length; headers; tails; stub)
  - h. Joist support and lengths
  - i. Placement and size of openings
  - j. Supported-partition supports
- 9. Calculate floor-sheathing requirements using drawings, National Building Code, and other specifications. 10%**
- a. Adhesives (type; quantity)
  - b. Fasteners (size; type; quantity)
  - c. Joint pattern
  - d. Quantity of materials (including number of sheets)
  - e. Sheathing (type; thickness)

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## Carpenter

**Unit:** C1.3 Wall and Partition Framing

**Level:** Two

**Duration:** 15 hours

Theory: 15 hours

Practical: 0 hours

### Overview:

This unit of instruction is designed to provide the theoretical grounding required to describe the structural framing of walls and partitions, including the application of sheathing and the calculation of necessary materials.

### Objectives and Content:

### Percentage of Unit Mark (%)

- |   |            |
|---|------------|
| <b>1. Identify framing systems.</b>                     | <b>3%</b>  |
| a. Balloon  |            |
| b. Heavy-timber   |            |
| c. Post, beam, and plank                                |            |
| d. Platform   |            |
| <b>2. Describe specifications for framing materials</b> | <b>5%</b>  |
| a. National Building Code requirements                  |            |
| b. Lumber grades/species                                |            |
| c. Moisture content                                     |            |
| <b>3. Define the function of wall-framing members</b>   | <b>10%</b> |
| a. Accessory backing                                    |            |
| b. Bearing wall   |            |
| c. Bottom plate (sole plate)                            |            |
| d. Cap plate (double plate)                             |            |
| e. Corner assembly                                      |            |
| f. Cripple  |            |
| g. Exterior wall  |            |
| h. Fire stop  |            |
| i. Fire wall  |            |
| j. Girt   |            |
| k. Header/lintel  |            |
| l. Jack   |            |
| m. Partition backing                                    |            |
| n. Partition  |            |
| o. Party wall   |            |
| p. Ribbons  |            |
| q. Specialty walls (swarf; knee; pony)                  |            |
| r. Stud   |            |
| s. Top plate  |            |
| t. Trimmer  |            |
| u. Describe the sequence of wall framing                |            |
| v. Exterior wall (longest to shortest)                  |            |
| w. Partitions (longest to shortest)                     |            |



- x. Describe wall-layout procedures
- y. Clearance
- z. Doors, windows, and partitions (location)
- aa. Mechanical and electrical considerations
- bb. Plate alignment/locations
- cc. Stud centres
- dd. Top-plate overlap (corners, etc.)
- ee. Wall locations
- ff. Describe assembly procedures
- gg. Cap plate (second top-plate)
- hh. Corner and partition assemblies
- ii. Cripples and rough sills
- jj. Headers
- kk. Let in bracing where required
- ll. National Building Code requirements for lintels
- mm. National Building Code requirements for nailing
- nn. Pre-assemble built-up components
- oo. Proper procedure for special framing (bay windows, point-loads, boxouts, etc.)
- pp. Stud Placement
- qq. Studs (check for crown-out)
- rr. Trimmer assemblies
- ss. Describe sheathing applications
- tt. National Building Code-specified nailing schedule
- uu. Location of openings
- vv. Plate alignment
- ww. Sheathing (types and thickness)
- xx. Square wall
- yy. Staggered joints and providing ventilation between rows
- zz. Stud spacing

- |           |   |            |
|-----------|---|------------|
| <b>4.</b> | <b>Describe erection procedures.</b>  | <b>5%</b>  |
|           | <ul style="list-style-type: none"> <li>a. Bracing</li> <li>b. Lifting</li> <li>c. Nailing</li> <li>d. Preparatory bracing/lifting</li> <li>e. Straightening</li> </ul>  |            |
| <b>5.</b> | <b>Identify backing requirements.</b>   | <b>20%</b> |
|           | <ul style="list-style-type: none"> <li>a. Bath/kitchen fixtures</li> <li>b. Cabinets</li> <li>c. Ceiling backing</li> <li>d. Handrails, curtains, handicapped</li> <li>e. Mechanical (e.g., return air)</li> </ul>  |            |
| <b>6.</b> | <b>Describe installation of steel-stud framing.</b>   | <b>10%</b> |
|           | <ul style="list-style-type: none"> <li>a. Fasteners (crimpers) and anchors</li> <li>b. Loadbearing – heavy gauge (14-20 gauge)</li> <li>c. Non-loadbearing – light gauge (25 gauge)</li> <li>d. Resilient bars</li> <li>e. Stiffeners</li> <li>f. Studs</li> <li>g. Track</li> <li>h. Wood backing</li> </ul> |            |
| <b>7.</b> | <b>Describe installation procedures for steel-stud, non-loadbearing partitions.</b>   | <b>10%</b> |
|           | <ul style="list-style-type: none"> <li>a. Accessories</li> <li>b. Bracing</li> <li>c. Intersections</li> <li>d. Rough openings</li> <li>e. Stud attachment</li> </ul>   |            |

- f. Track layout and securing
- 8. Describe procedures for steel-stud, loadbearing walls. 5%**
- a. Bracing
  - b. National Building Code requirements
  - c. Fastening methods
  - d. Sheathing attachment
  - e. Studs
  - f. Track
- 9. Identify procedures for building engineer-designed, preserved-wood foundations 3%**
- a. Alignment
  - b. Backfilling (lateral pressures; bracing; moisture-proofing; drainage systems)
  - c. Drainage
  - d. Floor systems
  - e. Footings
  - g. Preservatives/sealants
  - h. Sheathing materials
  - i. Stud size/spacing
  - j. Tie floor to wall
  - k. Blocking, anchors, etc.
- 10. Describe energy-efficient wall framing. 4%**
- a. Air barriers
  - b. Avoidance of thermal bridging
  - c. Double wall-frame
  - d. Horizontal strapping
  - e. Manufactured wall systems
  - f. Oversized studs
  - g. Stand-off wall system
- 11. Calculate wall-frame material. 3%**
- a. Backing and girts
  - b. Cripples (number; lengths)
  - c. Fasteners (quantity; sizes)
  - d. Full-length studs
  - e. Lintels (number; size)
  - f. Lintel material
  - g. Openings (number; size)
  - h. Plate material
  - i. Rough-sill lengths
  - j. Specialty hardware (e.g. uplift; earthquake)
  - k. Stud (lengths; sizes)
- 12. Calculate wall-sheathing material (using National Building Code). 3%**
- a. Adhesive(s)
  - b. Fasteners (including length; pattern)
  - c. Number of sheets and/or amount of material
  - d. Sheathing (type; thickness)
- 13. Identify building procedure for engineered, preserved-wood foundations. 5%**
- 14. Describe energy-efficient wall framing. 5%**
- 15. Calculate wall-frame material. 6%**
- 16. Calculate wall-sheathing material. 3%**

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## **Carpenter**

**Unit: C1.4 Roofing Framing 1 – Theory and Practicum**

**Level: Two**

**Duration: 50 hours**

Theory: 20 hours

Practical: 30 hours

### **Overview:**

This unit of instruction introduces Carpenter apprentices to the theoretical and practical capabilities required to design roofs according to the National Building Code, to describe and contribute to the building/installation of roof framework, and to calculate the materials needed to frame and sheath a roof. A companion unit in Level Three broadens roof-framing Technical Training content to include the design and framing of intersecting roofs.

### **Objectives and Content:**

### **Percentage of Unit Mark (%)**

- |   |            |
|---|------------|
| <b>1. Describe ceiling-joint and roof-joint framing.</b>              | <b>7%</b>  |
| a. Access openings  |            |
| b. Chimneys   |            |
| c. Details for flush/dropped beams                                    |            |
| d. Joist end-cuts   |            |
| e. Stub joists for hip roofs  |            |
| f. Lookouts   |            |
| g. Joist size (National Building Code-specified spacing/spans)        |            |
| h. Joists (butting/lapping)   |            |
| i. Parallel partitions  |            |
| j. Strongbacks and ribbons  |            |
| k. Trade terminology  |            |
| <b>2. Describe roof-types.</b>  | <b>5%</b>  |
| a. Butterfly  |            |
| b. Clerestory   |            |
| c. Domed or sphere  |            |
| d. Flat   |            |
| e. Gable  |            |
| g. Gambrel  |            |
| h. Gull   |            |
| i. Hip  |            |
| j. Mansard  |            |
| k. Raker gable  |            |
| l. Sawtooth   |            |
| m. Shed   |            |
| n. Tapered raker  |            |
| <b>3. Describe technical terminology associated with roof design.</b> | <b>10%</b> |
| a. Live/dead loads  |            |
| b. Overhang   |            |

- c. Projection
- d. Rise (unit rise)
- e. Run (unit run)
- f. Slope ratio
- g. Snowload
- h. Span
- i. Windload

**4. Describe procedure for designing/building gable roofs.**

**8%**

- a. Terminology
  - Actual/theoretical length
  - Allowable span-projection
  - Bird's-mouth
  - Collar-tie
  - Common rafter
  - Flush gable (dropped)
  - H-clips
  - Line-length
  - Lookouts
  - Overhang
  - Plancier
  - Plumb-cut
  - Purlin
  - Rafter tables
  - Raked gable
  - Rake-rafter
  - Ribbon
  - Ridge; ridgeboard
  - Rough fascia
  - Seat-cut
  - Shortening of commons
  - Tail-cut
  - Total rise
  - Total run
  - Unit rise/run/length
- b. Calculations for common-rafter length
  - Use of span tables to determine dimensions of rafter materials
  - Establish slope
  - Establish run
  - Establish unit length
  - Calculate theoretical length
  - Calculate overhand
- c. Layout/calculations for gable studs and collar-ties
- d. Rafter layout
- e. Ridge layout
- f. Lookouts and rake-rafter
- g. Rough fascia
- h. Temporary bracing
- i. Application of sheathing

**5. Describe hip roofs.**

**10%**

- a. Line length (unit line-length)
- b. Live/dead loads
- c. Overhang
- d. Projection
- e. Terminology
  - Centreline (working point)
  - Dropping or backing
  - Hip jack rafters

- Hip rafters
  - Hip/slope ratio
  - Single-/double-cheek cuts
  - Tripod
- f. Details found on manufacturer drawings
  - g. Erection procedures
  - h. Bracing (to specifications)
  - i. Partition-fastening procedures
  - j. Truss ties
  - k. Specialty hardware/fasteners
  - l. Load transfer in trusses

**6. Lay out rafter locations. 5%**

- a. Centre-spacing
- b. Common and jack locations
- c. Ridgeboard
- d. Tripod common

**7. Lay out and cut rafters. 35%**

- a. Common (regular; end)
- b. Cripple
- c. Crown
- d. Fascia
- e. Hip-jacks
- f. Hips
- g. Lengths and overhangs
- h. Lookouts
- i. Ridge
- j. Valley-jacks
- k. Valleys

**8. Assemble gable-/hip-roof of equal slope. 20%**

- a. Collar-ties (common rafters)
- b. Common rafter
- c. Commons
- d. Hips
- e. Jacks
- f. Knee-walls
- g. Plates
- h. Purlins
- i. Ribbons
- j. Ridge
- k. Struts
- l. Studs

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## Carpenter

**Unit:** C2.1 Practicum: Frame Floors (Platform)

**Level:** Two

**Duration:** 8 hours

Theory: 0 hours

Practical: 8 hours

### Overview:

This unit of instruction is designed to provide practical experience in the building/installation of floors and ceilings, including the sheathing of floors.

### Objectives and Content:

	<b>Percentage of Unit Mark (%)</b>
<b>1. Build/install beams and beam-support.</b>	<b>15%</b>
a. Assembly	
b. Beam installation	
c. Beam-support erection	
d. Beam-support layout	
e. Material selection	
<b>2. Lay out joist locations.</b>	<b>40%</b>
a. Building size and layout direction	
b. Joist, header, plate, and sill	
c. Locations for openings, partitions, centerlines, and mechanical-system	
d. Components	
<b>3. Select/cut floor frame-members.</b>	<b>15%</b>
a. Blocking and Bridging	
b. Headers	
c. Joists	
d. Rim joists	
e. Tail joists	
f. Trimmer joists	
<b>4. Assemble floor.</b>	<b>30%</b>
a. Blocking, bridging, partition supports, and joist hangers	
b. Crowns	
c. Floor sheathing	
d. Header-location on trimmers and plate	
e. Openings	
f. Verify fastening-schedule as per National Building Code	

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## sCarpenter

**Unit:** C2.2 Practicum: Frame Walls and Partitions

**Level:** Two

**Duration:** 12 hours

Theory: 0 hours

Practical: 12 hours

**Overview:**

This unit of instruction is designed to provide practical experience in the building, installation, and sheathing of steel/wooden walls and partitions.

**Objectives and Content:**

<b>Objectives and Content:</b>	<b>Percentage of Unit Mark (%)</b>
<p><b>1. Lay out plates.</b></p> <ul style="list-style-type: none"> <li>a. Backing</li> <li>b. Openings for intersections, etc.</li> <li>c. Stud locations (on-centre [o.c.] spacing)</li> <li>d. Wall/partition locations</li> </ul>	<b>40%</b>
<p><b>2. Cut/assemble components.</b></p> <ul style="list-style-type: none"> <li>a. Corner-posts, cripples, girts, intersection-backing, lintels, stud-trimmer units</li> <li>b. Full-length studs</li> <li>c. Verify that all nailing conforms to National Building Code-schedules</li> </ul>	<b>20%</b>
<p><b>3. Assemble walls.</b></p> <ul style="list-style-type: none"> <li>a. Crown</li> <li>b. Nailing sequence</li> <li>c. Place components</li> <li>d. Sheathing</li> <li>e. Square wall</li> <li>f. Let in braces (if required)</li> <li>g. Verify that all nailing conforms to National Building Code schedules</li> </ul>	<b>30%</b>
<p><b>4. Erect walls.</b></p> <ul style="list-style-type: none"> <li>a. Block-up</li> <li>b. Erect all walls and partitions in sequence</li> <li>c. Nail bottom-plate</li> <li>d. Plumb and brace</li> <li>e. Straighten wall</li> <li>f. Top-plate tie-ins</li> <li>g. Wall jacks (if required) and tilt-up wall</li> </ul>	<b>19%</b>

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