Lesson C3–5

Installing Patios, Walks, and Decks

Unit C. Nursery, Landscaping, and Gardening

Problem Area 3. Landscape Installation

Lesson 5. Installing Patios, Walks, and Decks

New Mexico Content Standard:

Pathway Strand: Power, Structural and Technical Systems

Standard: **VIII:** Plan, implement, manage, and/or provide support services to facility design and construction; equipment design, manufacture, repair, and service; and agricultural technology.

Benchmark: **VIII-B:** Follow architectural and mechanical plans to construct building and facilities.

Performance Standard: **1.** Identify and select appropriate building materials. **3.** Construct with wood and metal. **4.** Install electrical wiring components and fixtures. **5.** Paint or protect with coatings. **9.** Construct with concrete, stone, and brick.

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Describe the types of materials used in paving.
2. Explain how to select patio materials.
3. Describe how to install a walkway or patio.
4. Discuss proper deck installation procedures.

List of Resources. The following resources may be useful in teaching this lesson:

Recommended Resources. One of the following resources should be selected to accompany the lesson:

Biondo, Ronald J. and Charles B. Schroeder. *Introduction to Landscaping: Design, Construction, and Maintenance,* Second Edition. Danville, Illinois: Interstate Publishers, Inc., 2003.

Sauter, David. *Landscape Construction*. Albany, New York: Delmar Publishers, 2000.

List of Equipment, Tools, Supplies, and Facilities

Writing surface
Overhead projector
Transparencies from attached masters

Terms The following terms are presented in this lesson (shown in bold italics):

Cubic yard
Curing
Decks
Exposed aggregate
Forms
Hard paving
Patio
Paving
Screed
Soft paving

Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Ask students how many of them like to spend time outside when the weather is nice. Chances are, a large number of students will raise their hands. Ask for a show of hands for how many have a patio at home. On a writing surface, have students generate a list of all the different kinds of uses there are for patios. Help students to realize that hard surfacing expands the outdoor uses of a yard many fold.

Summary of Content and Teaching Strategies

Objective 1: Describe the types of materials used in paving.

Anticipated Problem: What materials are used in paving?

I. Covering soil with a hard surfacing material to prevent soil erosion, soil compaction from traffic, and to improve walking ease, is called ***paving.***

   A. There are many kinds of paving materials available depending on the use of the future site. Choosing the right one depends on cost, availability, and suitability.

      1. ***Hard paving*** materials have a definite form and are solid underfoot. Hard paving has advantages which include durability, strength, and low maintenance. Negatives include price (which can be significant) and installation (which often needs to be accomplished by professionals). Some hard paving materials have additional liabilities like being slippery when wet or getting too hot during the middle of the day. Hard paving materials include concrete, brick, pavers, and flagstone.
      2. ***Soft paving*** materials lack a solid form but still provide soil coverage. While soft paving can be very durable, it usually needs more maintenance to keep it looking good. Soft paving is the best choice for anywhere that children will be playing, or in areas that receive little traffic. It can also be used as a temporary soil covering until a more permanent treatment is installed. Soft paving materials can range from wood or bark chips, to gravel, to ground-up rubber.
      3. Walkways should be a minimum of three feet wide for entrances or other major traffic areas. Secondary paths should be at least two feet wide.

Ask students to identify what type of paving is used around the school campus. Why are these used for the location they are in? Use the notes above to help supplement the answers provided by the students. Have students read the appropriate sections of Introduction to Landscaping. Use TM: C3–5A to show visuals of the different types of paving available.

Objective 2: Explain how to select patio materials.

Anticipated Problem: What materials should be used in constructing a patio?

II. ***Patios*** are an extension of the indoor spaces of a house, for cooking, entertainment, and play. Patios can be made of both hard-paving or soft-paving materials and also wooden decking.

   A. For ease-of-use, most homeowners choose hard paving for a patio. Hard paving is easier to walk on, easier to clean, and easier to upkeep. Price, use, shape of patio, durability, and grade of site can all affect the choice of surfacing materials. A frequent choice for patios is concrete. It is very durable and easy to upkeep but it is not very attractive. It is possible to tint concrete to improve it's appearance. Gravel and wood are the most inex-

pensive surfaces. Brick or flagstone on a concrete base are the most pricey options, but they are very durable and attractive. Hard paving tends to require much more site preparation as well as a more involved and time-consuming installation.

B. Soft paving may be a good choice where an informal look is desired or where monetary issues limit other alternatives. Fine grades of gravel or other granular material are frequently chosen as they provide good ease of use as well as a great deal of design flexibility.

C. Wood decking may also be selected to create a patio. Wood has the benefits of flexibility, ease of construction, moderate price, and attractive appearance. However wood decks need regular maintenance and have a limited life span.

Divide students into small groups. Have the groups each generate a table showing the benefits and negatives of the different kinds of paving and decking available to the landscaper. Post these tables in the classroom. Ask students why a homeowner might select a less durable alternative? Why might the landscaper encourage a different choice other than the one selected by the homeowner? Discuss their answers to these questions.

Objective 3: Describe how to install a walkway or patio.

Anticipated Problem: How can a walkway or patio be properly installed?

III. Not all landscapers will install a patio or walkway, preferring to subcontract to a business which specializes in doing such work. Concrete and asphalt work is frequently bid out due to its laborious installation process. Proper installation of a hard paving surface requires knowledge and experience.

A. Concrete walks and patios are the most popular due to their ease of installation, ease of use, and ability to have any desired shape. Concrete is composed of cement (which acts as a "glue"), gravel, and sand.

1. The first step in pouring concrete is to remove turf and to excavate to a depth of six inches. A two inch base of crushed gravel or rock dust is added, then compacted, to form a solid underfooting for the concrete.

2. The next step is placing the forms. ***Forms*** are the wooden boards or plastic molds that are used to hold the liquid concrete until it sets. Most forms are 2×4 boards or flexible Masonite set so that the top edge of the material is at the proper height for the final surface (usually 3½" to 4" deep). Steel or wood stakes are used to hold the forms in place.

3. Most towns have ready mixed concrete available from a construction provider.

a. Concrete is ordered by the number of cubic yards needed. A ***cubic yard*** is a volume 3 feet wide by 3 feet long by 3 feet high. To find the number of cubic yards needed for a patio, multiply the length × the width to get the square feet. Then divide the answer by 80 square feet (a constant which represents the depth required for most installations).

b. Ready-mixed concrete comes in different blends depending on the future use of the concrete and its exposure to the elements. When ordering, be sure to know the answers to 'how much', 'what use', and 'what exposure' your patio or walk will receive.

c. Concrete has a tendency to crack. To work around this problem, many contractors will add either steel reinforcing mesh (for concrete 4" or more in thickness) or polypropylene fibers to the mix. Also, joints should be cut into the concrete to "guide" the cracking process.

4. Ready-mixed concrete will be delivered to the site by a cement truck. Use shovels to move the poured concrete and to fill the forms. The concrete will need to be leveled using a ***screed*** (a leveling process in which a straight-edge is dragged across the concrete surface while resting on the edges of the forms.) Screeding will pull the concrete from high spots to low spots.

5. Once the concrete begins to harden, a bull float is used to work the aggregate down into the cement and to smooth the surface. A broom is dragged over the concrete to create a rougher surface, which makes the concrete less slick when wet. The concrete should be scored to create joints. Usually a finisher is also used at this time, to create a smooth edge on the outside, next to the forms.

   Sometimes, the desired finished appearance is a more rustic look. This can be accomplished by hosing off the top layer of concrete leaving the ***exposed aggregate,*** stones showing on the surface of the patio or walkway.

6. ***Curing*** is the process of concrete hardening or setting. The slower the curing process, the stronger the concrete. Concrete is often covered with plastic sheeting or burlap, or is sprayed with a retarder to slow down the curing process. Many smaller installations are sprayed with Cure and Seal™, a type of plasticized spray which works like plastic sheeting. Concrete goes through three stages of curing, the first taking just a few hours. The second curing takes two to seven days, depending on temperature and humidity, after which the concrete can handle light traffic. A full 28 days is needed for concrete to reach its maximum strength.

B. Pavers also make excellent deck or walkway surfacing. Paver and brick installation share some commonalities with concrete installation.

1. Remove turf, then excavate to a depth of 7 inches. A 2½ inch base of crushed gravel or rock dust is added, then compacted, to form a solid under-footing for the concrete. Sometimes a layer of landscape fabric is placed on top of the gravel to reduce frost heaving.

2. Edge restraints (made of aluminum, plastic, railroad ties, or landscape timbers) are very important to proper paver or brick installation since they prevent shifting or movement. They should be installed before the sand layer.

3. A two inch layer of sand is laid, then leveled with a screed.

4. Pavers are laid starting in a corner. Pavers should be leveled carefully with a pitch of 2° away from buildings. If cutting of pavers is necessary, a masonry saw or brick chisel can be used.

5. Fill joints with coarse sand. Use a plate compactor, moving in several passes over the pavers, to settle the sand between the joints. Sweep more dry sand into the cracks. Repeat. Rinse off excess sand with a gentle spray from a garden hose to finish.

Use a variety of techniques to help students master this objective. Students should use text materials to help understand the construction process. Introduction to Landscaping and Landscape Construction are recommended. Dig a hole alongside an existing sidewalk to examine the layers of concrete, gravel, and compacted subsoil. Ask students to identify the layers that they observe. Discuss the importance of the layers below the actual concrete.

Objective 4: Discuss proper deck installation procedures.

Anticipated Problem: How is a deck installed?

I. ***Decks*** are patios with a wooden surface, raised above ground level. Decks are extremely flexible in arrangement, hence they are used for all sorts of irregular installations such as on hillsides or slopes, around mature trees, or to accommodate level changes between house and yard.

A. Wood choice is important when building a deck. Woods such as cedar, redwood and bald cypress are naturally resistant to decay; they are however expensive and ecologically sensitive choices. Alternatives include pine which has been Wolmanized™ or treated with chemicals to make it more rot resistant. Treated lumber is available in a green finish or a more expensive brown finish. If treated lumber is selected, it must be handled following certain safety precautions since it can be hazardous to human health when cut and handled.

B. Site preparation of a deck begins by removing turf and putting the support posts in place. Support posts, usually 4" × 4" or 6" × 6" treated lumber, are placed in deep holes (at least 48", below the local frost line). The posts are checked for plumb and the hole is then filled with dry premixed concrete and allowed to set.

C. Beams (2" × 8" or 2" × 12" boards) are used to connect the support posts together and to hold the deck joists in place. They are connected using lag bolts. Joists will run at a right angle to the beams. They are on a 16" center unless local zoning or use of the deck indicates otherwise.

D. Deck boards will create the floor of the patio. They cover the joists. Most deck boards are 2" × 6" or 1¼" × 6" in size and often have eased edges for a more attractive appearance. Deck boards are attached using 16d (16 “penny”) deck nails or bugle head screws. The boards should be spaced 1/8" to ¼" apart to allow for weather changes in the wood and to facilitate water drainage. Board ends should be staggered for strength and visual appeal. Once installed, the lumber should be trimmed along the outside edge to neaten up the appearance.

E. Posts need to be installed for a railing if the support posts are not being used for the job. Most railings are installed at a height of 36" above the deck surface. Vertical pieces of

wood, called balusters, are added between the top and bottom rails. Most balusters are placed on 6" centers but other widths can be used for more a dramatic effect.

Use a variety of techniques to help students master this objective. Students should use text materials to help understand the construction process. Introduction to Landscaping and Landscape Construction are recommended.

Review/Summary. Hard surfaces, whether concrete, pavers, gravel, or decking, provide a durable surface for high traffic areas around a home or building. A good paving job, well installed, will add visual interest to a landscape as well as provide a long-wearing surface. Patios have become a way of life for many in America. They allow the indoors to be extended outside for a more comfortable outdoor experience. Many homeowners choose concrete for their patio, but wooden decks are becoming more and more popular.

Application. Have students design and install a small walkway, deck or patio on the school's property. Alternatively, take a walk around the school campus or neighborhood and observe decks, patios and walkways. Ask students to see if they can identify why a particular material was used (Durability? Ease of installation? Appearance? Price?). Have students generate a list of their favorite materials or sites. Was there any one project which everyone in the class liked? Discuss why they chose these particular installations.

Evaluation. Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is attached.

Answers to Sample Test:

Part One: Matching

1=a, 2=c, 3=d, 4=f, 5=b, 6=e

Part Two: Completion

1. Soft paving
2. three
3. deck
4. Hard paving

Part Three: Short Answer

1. Pros: durability, can take almost any shape, can be colored or tinted, easy to walk on, easy to clean, easy maintenance/upkeep

   Cons: may be slippery when wet, moderately expensive, fairly elaborate installation process, takes about a month to cure to full hardness, can heat up excessively in a sunny climate

2. Soft paving includes cocoa hulls, shredded bark, bark nuggets, gravel, wood chips, ground-up rubber, coconut husks, ground-up oyster shells, sand, etc.

   Hard paving includes concrete, exposed aggregate concrete, wooden decking, pavers, bricks, flagstones, cut stone, adobe, etc.

Sample Test Name_____

Test

Lesson C3–5: Installing Patios, Walks, and Decks

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

a. cubic yard	b. curing	c. exposed aggregate
d. forms	e. patio	f. screed

_____ 1. The amount of material needed to fill a cube 3" × 3"× 3" in size.

_____ 2. A concrete application in which the stones used to provide strength to the cement mix are brought to the surface.

_____ 3. The wooden boards or plastic molds which are used to hold the liquid concrete in place until it sets up.

_____ 4. When a straightedge (usually a board) is used to level off concrete or gravel.

_____ 5. The hardening process of concrete.

_____ 6. An extension of the indoor living space into the outdoors for cooking, entertainment, or play.

Part Two: Completion

Instructions. Provide the word or words to complete the following statements.

1. _____is when materials lacking a solid form are used to cover the soil.
2. Walkways to entrances to buildings should be a minimum of_____ feet in width.
3. A_____ is a patio made of wood.
4. _____ is when materials with a definite form, which are solid underfoot, are used to create a patio or walkway.

Part Three: Short Answer

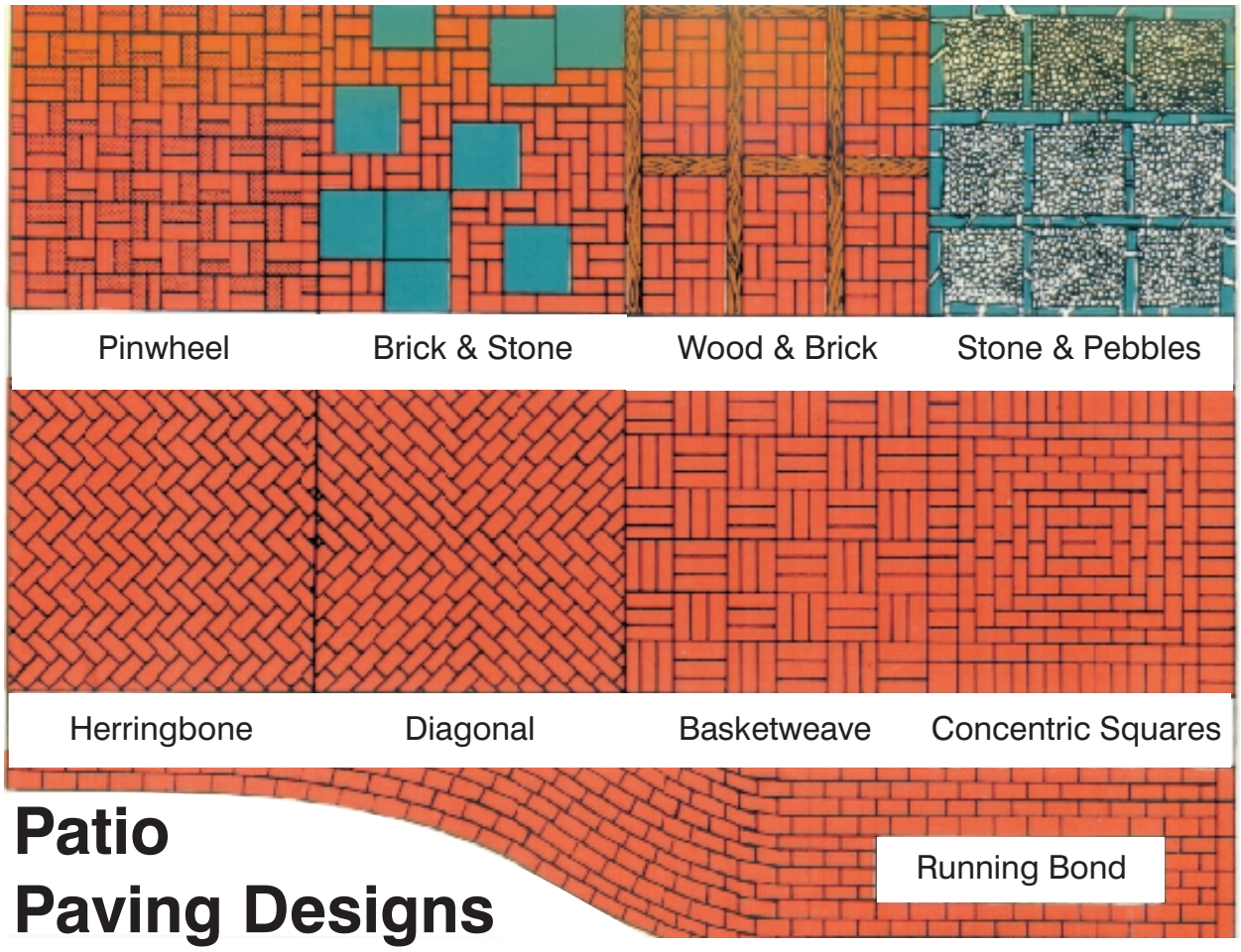
Instructions. Provide information to answer the following questions.

1. Discuss the pros and cons to building a patio out of concrete.

2. Give two examples each of soft paving materials and hard paving materials.

TM: C3–5A

TYPES OF MATERIALS USED FOR PAVING



(Courtesy, Interstate Publishers, Inc.)