This module is the third volume in a series of instructional materials on landscape management. The materials are designed to help teachers train students in the job skills they will need in landscape occupations. The module contains six instructional units that cover the following topics: orientation; basic landscape design principles; irrigation design and installation; landscape plant materials; turf management; and landscape construction. Each instructional unit follows a standard format that includes some or all of these eight basic components: performance objectives, suggested activities for teachers and students, information sheets, assignment sheets, job sheets, visual aids, tests, and answers to tests and assignment sheets. All of the unit components focus on measurable and observable learning outcomes and are designed to be used for more than one lesson or class period. Instructional task analyses and 31 references are also included. (Kc)
# LANDSCAPE MANAGEMENT: FIELD SUPERVISOR

## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Unit</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit I</td>
<td>Orientation</td>
<td>1</td>
</tr>
<tr>
<td>Unit II</td>
<td>Basic Landscape Design Principles</td>
<td>57</td>
</tr>
<tr>
<td>Unit III</td>
<td>Irrigation Design and Installation</td>
<td>115</td>
</tr>
<tr>
<td>Unit IV</td>
<td>Landscape Plant Materials</td>
<td>159</td>
</tr>
<tr>
<td>Unit V</td>
<td>Turf Management</td>
<td>219</td>
</tr>
<tr>
<td>Unit VI</td>
<td>Landscape Construction</td>
<td>243</td>
</tr>
</tbody>
</table>
FOREWORD

Landscape Management: Field Supervisor is the third in a series of instructional materials produced by the Mid-America Vocational Curriculum Consortium. The other publications are entitled Landscape Management: Field Operator and Landscape Management: Field Specialist.

The success of this publication is due, in large part, to the capabilities of the personnel who worked with its development. The technical writers have numerous years of industry as well as teaching and writing experience. Assisting them in their efforts were committee representatives who brought with them technical expertise and experience related to the classroom and to the trade. To assure that the materials would parallel the industry environment and be accepted as a transportable basic teaching tool, other organizations and industry representatives were involved in the developmental phases of the manual. Appreciation is extended to them for their valuable contributions to the manual.

This publication is designed to assist teachers in improving instruction. As this publication is used, it is hoped that the student performance will improve and that students will be better able to assume a role in their chosen occupation. Every effort has been made to make this publication readable, and by all means, usable. Three vital parts of instruction have been intentionally omitted from these publications: motivation, personalization, and localization. Those areas are left to the individual instructors and the instructors should capitalize on them. Only then will this publication really become a vital part of the teaching-learning process.

It is the sincere belief of the MAVCC staff and all those members who served on the committee that this publication will allow the students to become better prepared and more effective members of the work force. If there is anything that we can do to help this publication become more useful to you, please let us know.

Ron Mehrer, Chairman
Board of Directors
Mid-America Vocational Curriculum Consortium

Greg Pierce
Executive Director
Mid-America Vocational Curriculum Consortium
ACKNOWLEDGEMENTS

Appreciation is extended to those individuals who contributed their time and talent to the development of *Landscape Management: Field Supervisor*.

The contents of this publication were planned and reviewed by the following members of the Mid-America Vocational Curriculum Consortium landscape management committee:

Representing education

- Rick Buus
  - Southeast Vocational Technical Institute
  - Sioux Falls, SD
- Nick Christians
  - Iowa State University, Department of Horticulture
  - Ames, IA
- Linda Corley
  - Coronado High School
  - El Paso, TX
- Lee Griffith
  - Department of Vocational Agriculture Education
  - Little Rock, AR
- Wayne Hefley
  - Iowa State University, Department of Horticulture
  - Ames, IA
- Gary Jones
  - Peabody High School
  - Peabody, KS
- Jim MacLean
  - Columbia Career Center
  - Columbia, MO
- Carole Smith
  - Oklahoma State University, Department of Horticulture and Landscape Architecture, Stillwater, OK
- Shirley Stephens
  - Chickasha High School
  - Chickasha, OK
- Paul Vitale
  - Slidell Vo-Tech School
  - Slidell, LA
- James Yeisley
  - Department of Vo-Tech Education, Agriculture
  - Stillwater, OK

Representing Industry

- Mike Burnett
  - Oklahoma State University, Physical Plant Services
  - Stillwater, OK
- Reed Clifton
  - Landscape Enterprises
  - Oklahoma City, OK
- Ross Flood
  - Tierra Vista, Inc.
  - Tulsa, OK
- C.B. “Buck” Haas
  - Taylor Nursery
  - Taylor, ND
- Roger Jones
  - Department of Vo-Tech Education, Groundskeeping
  - Stillwater, OK
- Harold Neal
  - Tulsa Country Club
  - Tulsa, OK
- Steve Tanner
  - Autumn Gold Landscapes
  - Denver, CO
Special appreciation is extended to Nancy Hilley for the original artwork and pasteup of this book and to the employees of the Graphics Division of the Oklahoma State Department of Vocational Technical Education for the phototypesetting and printing of this text.

Thanks are also extended to Mary Kellum, MAVCC Curriculum Specialist, for her assistance with the editing of this book, as well as the coordination of the entire project.
USE OF THIS PUBLICATION

Instructional Units

*Landscape Management: Field Supervisor* contains six units of instruction. Each instructional unit includes some or all of the basic components of a unit of instruction: performance objectives, suggested activities for teachers and students, information sheets, assignment sheets, job sheets, visual aids, tests, and answers to the tests. Units are planned for more than one lesson or class period of instruction.

Careful study of each instructional unit by the teacher will help to determine:

A. The amount of material that can be covered in each class period
B. The skills which must be demonstrated
   1. Supplies needed
   2. Equipment needed
   3. Amount of practice needed
   4. Amount of class time needed for demonstrations
C. Supplementary materials such as pamphlets or filmstrips that must be ordered
D. Resource people who must be contacted

Objectives

Each unit of instruction is based on performance objectives. These objectives state the goals of the course, thus providing a sense of direction and accomplishment for the student.

Performance objectives are stated in two forms: unit objectives, stating the subject matter to be covered in a unit of instruction; and specific objectives, stating the student performance necessary to reach the unit objective.

Since the objectives of the unit provide direction for the teaching-learning process, it is important for the teacher and students to have a common understanding of the intent of the objectives. A limited number of performance terms have been used in the objectives for this curriculum to assist in promoting the effectiveness of the communication among all individuals using the materials.

Reading of the objectives by the student should be followed by a class discussion to answer any questions concerning performance requirements for each instructional unit.

Teachers should feel free to add objectives which will fit the material to the needs of the students and community. When teachers add objectives, they should remember to supply the needed information, assignment and/or job sheets, and classroom tests.
Suggested Activities for the Instructor

Each unit of instruction has a suggested activities sheet outlining steps to follow in accomplishing specific objectives. Duties of instructors will vary according to the particular unit; however, for best use of the material they should include the following: provide students with objective sheet, information sheet, assignment sheets, and job sheets; preview filmstrips, make transparencies, and arrange for resource materials and people; discuss unit and specific objectives and information sheet; give test. Teachers are encouraged to use any additional instructional activities and teaching methods to aid students in accomplishing the objectives.

Information Sheets

Information sheets provide content essential for meeting the cognitive (knowledge) objectives in the unit. The teacher will find that the information sheets serve as an excellent guide for presenting the background knowledge necessary to develop the skill specified in the unit objective.

Students should read the information sheets before the information is discussed in class. Students may take additional notes on the information sheets.

Transparency Masters

Transparency masters provide information in a special way. The students may see as well as hear the material being presented, thus reinforcing the learning process. Transparencies may present new information or they may reinforce information presented in the information sheets. They are particularly effective when identification is necessary.

Transparencies should be made and placed in the notebook where they will be immediately available for use. Transparencies direct the class's attention to the topic of discussion. They should be left on the screen only when topics shown are under discussion.

Assignment Sheets

Assignment sheets give direction to study and furnish practice for paper and pencil activities to develop the knowledge which is a necessary prerequisite to skill development. These may be given to the student for completion in class or used for homework assignments. Answer sheets are provided which may be used by the student and/or teacher for checking student progress.

Job Sheets

Job sheets are an important segment of each unit. The instructor should be able to demonstrate the skills outlined in the job sheets. Procedures outlined in the job sheets give direction to the skill being taught and allow both student and teacher to check student progress toward the accomplishment of the skill. Job sheets provide a ready outline for students to follow if they have missed a demonstration. Job sheets also furnish potential employers with a picture of the skills being taught and the performances which might reasonably be expected from a person who has had this training.
Test and Evaluation

Paper-pencil and performance tests have been constructed to measure student achievement of each objective listed in the unit of instruction. Individual test items may be pulled out and used as a short test to determine student achievement of a particular objective. This kind of testing may be used as a daily quiz and will help the teacher spot difficulties being encountered by students in their efforts to accomplish the unit objective. Test items for objectives added by the teacher should be constructed and added to the test.

Test Answers

Test answers are provided for each unit. These may be used by the teacher and/or student for checking student achievement of the objectives.
LANDSCAPE MANAGEMENT: FIELD SUPERVISOR

INSTRUCTIONAL / TASK ANALYSIS

RELATED INFORMATION: What the Worker Should Know (Cognitive)  
JOB TRAINING: What the Worker Should Be Able to Do (Psychomotor)

UNIT I: ORIENTATION

1. Definition of a field supervisor
2. Basic divisions of the landscape and horticultural industry where a supervisor may work
3. Characteristics of a good supervisor
4. Types of records used in a landscape or horticulture business
5. Steps in supervising a job
6. Items included in a company policy manual
7. Working with employees
8. Oral and written communication skills a good supervisor should have
9. Dealing with the customer and general public
10. Determining cost
11. Determining pricing

12. Complete record keeping forms
13. Discuss possible solutions to personnel and public relations problems
UNIT II: BASIC LANDSCAPE DESIGN PRINCIPLES

1. Terms and definitions
2. Guiding principles of landscape design
3. Elements in a landscape design
4. Basic principles of landscape design
5. General objectives for developing a landscape plan
6. Advantages of having a landscape plan
7. Best times to develop a landscape plan
8. Main areas to be developed in a landscape plan
9. Basic planting groups found in the public area
10. Common mistakes made in foundation plantings
11. Basic drafting tools used in making a landscape plan
12. Using a scale
13. Common symbols used on landscape plans
14. Good drafting habits
15. Steps in drawing a landscape plan
16. Read a landscape blueprint
17. Calculate lawn square footage
18. Calculate cubic measurements of soil
19. Draw a landscape plan
RELATED INFORMATION: What the Worker Should Know (Cognitive)

JOB TRAINING: What the Worker Should Be Able to Do (Psychomotor)

UNIT III: IRRIGATION DESIGN AND INSTALLATION

1. Terms and definitions
2. Types of drainage systems which may be needed in a landscape
3. Basic methods for controlling surface drainage
4. Factors affecting types of subsurface drainage systems
5. Types of subsurface drainage systems
6. Parts of a subsurface drain
7. Soil textures and their water intake and holding rates
8. Factors affecting irrigation scheduling
9. Fundamentals of good irrigation design
10. Common sprinkler head spacing patterns
11. Design a simple irrigation system
12. Wire a controller and valve
13. Use a flow gauge
14. Install an irrigation system

UNIT IV: LANDSCAPE PLANT MATERIALS

1. Terms and definitions
2. Parts of a plant's botanical name
3. Meanings of common botanical names
4. Shade trees
RELATED INFORMATION: What the Worker Should Know (Cognitive)

5. Ornamental trees
6. Deciduous shrubs
7. Broadleaf evergreens
8. Conifers
9. Vines and ground covers
10. Nursery plant selection criteria for trees
11. Nursery plant selection criteria for shrubs and groundcovers

JOB TRAINING: What the Worker Should Be Able to Do (Psychomotor)

12. Collect plant samples
13. Evaluate nursery plant materials
14. Select appropriate plants
15. Recommend plants for various situations

UNIT V: TURF MANAGEMENT

1. Definition of turf management
2. Tasks involved in turf management
3. Types of turf management calendars
4. Factors to consider when developing a turf management calendar
5. Purpose of a soil test
6. Major and minor nutrients essential to turfgrasses
7. Quickly-available and slow-release nitrogen sources
RELATED INFORMATION: What the Worker Should Know (Cognitive)

8. Amounts of nutrients in fertilizers
9. Fertilizer ratios
10. Budget considerations

JOB TRAINING: What the Worker Should Be Able to Do (Psychomotor)

11. Answer questions using a turf management calendar
12. Develop a turf management calendar for a local landscape

UNIT VI: LANDSCAPE CONSTRUCTION

1. Definition of turf management
2. Common landscape construction items
3. Common materials used in landscape construction
4. Types of woods commonly used in landscaping
5. Concrete and mortar mix ratios
6. Concrete quantities
7. Common brick patterns
8. Materials used for retaining walls, planters, flower boxes, and raised beds
9. Materials used for paved areas
10. Considerations when designing contained planting areas
11. Types of edgings
12. Considerations when designing berms
RELATED INFORMATION: What the Worker Should Know (Cognitive)

13. Supplementary skills useful in landscape construction
14. Common landscape construction tools
15. Common carpentry fasteners

JOB TRAINING: What the Worker Should Be Able to Do (Psychomotor)

16. Build a landscape timber or railroad tie planter box
17. Install edging for a circular area
18. Build concrete forms
19. Mix and pour concrete
20. Build a paver sidewalk


J. Iowa State University Cooperative Extension Service, Ames, IA.
   1. *Turfgrass Renovation*
   2. *Thatch Control in the Home Lawn*
   3. *Mowing Your Lawn*
   4. *Turfgrass Management Calendar: Kentucky Bluegrass Lawns*
   5. *Lawn Weed Control*
   6. *Insecticides and Miticides Labeled for Turfgrass Pests*


N. Oklahoma State University Cooperative Extension Service, Stillwater, OK.

1. The Beginning of a Landscape Plan
2. Landscape Plant and Herbarium Card Reference 4-H Leader's Guide
3. Maintenance Calendar for Bentgrass Putting Greens
4. Turf Maintenance Calendar for Bermudagrass Fairways, Tees, and Clubhouse Grounds and Other Recreational Areas


ORIENTATION
UNIT I

UNIT OBJECTIVE

After completion of this unit, the student should be able to identify the principles of record
keeping, personnel management, communication skills, public relations, and purchasing
practices required of a field supervisor. Competencies will be demonstrated by completing the
assignment sheets and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Define a field supervisor.
2. Name the basic divisions of the landscape and horticultural industry where a
   supervisor may work.
3. Name characteristics of a good supervisor.
4. Identify types of records used in a landscape or horticulture business.
5. Arrange in order the steps in supervising a job.
7. Select true statements concerning working with employees.
8. Name oral and written communication skills a good supervisor should have.
9. Select true statements on dealing with the customer and general public.
OBJECTIVE SHEET

10. Name factors to consider when determining cost.

11. Name factors to consider when determining pricing.

12. Complete record keeping forms. (Assignment Sheet #1)

13. Discuss possible solutions to personnel and public relations problems. (Assignment Sheet #2)
ORIENTATION
UNIT I

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to class to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to the teaching of this unit.)

B. Make transparencies from the transparency masters included with this unit.

C. Provide students with objective sheet.

D. Discuss unit and specific objectives.

E. Provide students with information and assignment sheets.

F. Discuss information and assignment sheets.

(NOTE: Use the transparencies to enhance the information as needed.)

G. Integrate the following activities throughout the teaching of this unit:

1. Develop situations involving principles discussed in this unit and solutions to these situations by using role play in the classroom.

2. Have a speaker discuss the responsibilities of a supervisor.

3. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

H. Give test.

I. Evaluate test.

J. Reteach if necessary.

RESOURCES USED IN DEVELOPING THIS UNIT


Suggested Supplemental Resources

A. AAN brochures, pamphlets, and guides
   1. Competitive Landscape Bidding, N-2-502
   2. Interviewing and Hiring Employees, G-2-514
   4. Landscape Foreman Training Manual, N-2-512
   5. Landscape Business Forms, N-2-504

   Available at member and nonmember prices from:

   American Association of Nurserymen
   1250 I Street, N.W., Suite 500
   Washington, D.C. 20005
   202/789-2900

B. Computer software for Apple II family or IBM-PC—Agri-Quiz: Nursery/Landscape

   Available from:

   Teaching Aids Incorporated
   711 West 17th Street
   Building E, Units 1 & 2
   Costa Mesa, CA 92627
   714/548-9321

C. Computer software

   1. Mathematics for Horticulture (Apple II series)
   2. Landscape Maintenance (Apple or IBM)

   Available from:

   AAVIM
   120 Driftmier Center
   Athens, GA 30602
   404/542-2586
SUGGESTED SUPPLEMENTAL RESOURCES

D. Careers in Landscape Management (Series of four filmstrips, cassettes, and scripts)

1. "Introduction to Careers in Landscape Management"
2. "Entry Level & Supervisory Careers"
3. "Specialized Careers"
4. "Sales and Estimation Careers"

Series available from:
Vocational Education Productions
California Polytechnic State University
San Luis Obispo, CA 93407
I. Definition of a field supervisor — A person responsible for managing materials, machinery, and people (customers and employees) effectively and efficiently in order to complete jobs successfully in the landscape and horticultural industry.

II. Divisions of the landscape and horticultural industry where a supervisor may work
   A. Nursery stock growing operations
   B. Garden store operations
   C. Landscaping operations
   D. Landscape maintenance
   E. Golf course maintenance

III. Characteristics of a good supervisor
   A. Can combine materials, machinery, and manpower in order to successfully complete a job efficiently and effectively
   B. Follows instructions
   C. Communicates with others well
      (NOTE: Verbal communication involves both speaking and listening.)
   D. Reads and understands well
   E. Organizes activities efficiently
   F. Writes neatly and fills out forms correctly
   G. Learns quickly
   H. Deals with pressures, people, and problems effectively without “flying off the handle”
   I. Supports company policies and government regulations and laws
IV. Types of records used in a landscape or horticulture business (Transparencies 1-9)

(NOTE: Many kinds of records are kept by companies. This helps them to monitor costs by being able to identify the least expensive ways of getting the job done.)

A. Pesticide — Pesticide records must be kept fairly extensively due to many state regulations. This includes what chemicals have been bought (inventory), where they were used, at what rate, and when they were used (dates and time of day).

B. Fertilizer use — A record of when fertilizer was used and at what locations.

C. Equipment maintenance — This is a record of when equipment has been repaired or serviced for oil and filter change and tune ups. This can also include records on how much the equipment is being used—when and on what job and the amount of down time.

D. Accident report — A supervisor has the added responsibility of filling out any report of an employee working under them that may have been hurt or injured on the job.

E. Individual records of crew members — The supervisor must be sure that time cards, time use records for machinery, and other forms such as mileage logs are filled out by or for each crew member.

F. Performance evaluation and discontinuance forms — Confidential files kept on each employee which are updated periodically, such as quarterly. May be used to cite evidence of outstanding work for merit raises or deficient work for termination. Discontinuance forms state time and reasons for firing or laying off employees.

G. Material request forms — Forms used to request materials or services from suppliers or other departments.

V. Steps in supervising a job

A. Study and plan the best way to begin the job.

B. Assemble needed materials, tools, and personnel.

C. Explain the job to the crew.

D. Give individual assignments to crew members.

E. While crew is working,
   1. Observe and give suggestions to crew members.
   2. Check on job quality.
INFORMATION SHEET

3. Make sure all safety rules are followed at all times.

F. Finish job and clean up and load.

G. Tell customer what has been accomplished.

H. Return to shop and clean up and service tools and equipment.

I. Complete job records.

J. Review the day's work and decide what you could have done better. Then plan for the next job.

VI. Items included in a company policy manual

(NOTE: Each company's policy manual will vary but each should include the following areas.)

A. Benefits
   1. Vacation
   2. Sick leave
   3. Military leave
   4. Administrative leave (family funeral, jury duty)
   5. Holidays
   6. Insurance

B. Policies and procedures
   1. Grounds for termination
   2. Absenteeism
   3. Tardiness
   4. Dress codes
   5. Image (behavior, language, conduct)
   6. Care (or abuse) of company equipment
INFORMATION SHEET

VII. Working with employees (subordinates)

A. NEVER criticize, reprimand, or accuse an employee in front of others.
B. Praise employees for a job well done. Avoid negative reinforcement whenever possible.
C. Use caution in socializing with subordinates.
   (NOTE: If you are "friends" with your employees after hours, it may be difficult to be their "boss" during working hours.)
D. Earn the respect of your employees by treating them the way you expect to be treated—fairly and honestly.
E. Motivate employees to do their tasks willingly, enthusiastically, and with pride.
F. Enforce rules fairly.
G. Treat your employees as humans and recognize their needs.
H. Get employees involved with the job. Make them a part of the task, not just workers.
I. Don't order people around. Ask or suggest that they do whatever is needed.
J. Utilize knowledge of more experienced employees.
K. Be flexible with employees. A happy employee gets more accomplished than one who is "badgered."
L. Act enthusiastic, even when you dislike a task your crew has to do.
M. Have self-confidence. Employees won't have confidence in you if you don't.
N. Encourage friendly competition. Work gets done quicker and employees create their own enjoyment.

VIII. Communication skills of a supervisor

A. Oral communication
   1. Don’t interrupt.
   2. Maintain eye contact with listener.
   3. Be an interested listener.
   4. Have "presentation" organized. Don't ramble.
   5. Know when to end a conversation. Sometimes enough is enough.
INFORMATION SHEET

B. Written communication (documentation)
   1. Understand forms to be completed and complete them accurately.
   2. Write legibly.
   3. Complete forms when required.
   4. Submit forms promptly upon completion.
   5. Retain copies for personal file when needed.

IX. Dealing with the customer and general public (public relations)
   A. Present yourself as a professional.
   B. Be neat and courteous.
   C. Use proper grammar.
   D. Appeal to the client's natural tendency to be "self-centered."
      Examples:  "This is what my company can do for you."
                 "How may we help you?"
                 "Which of the three trees that I suggested would you prefer?"
   E. Keep the job site neat while the work is in progress.
   F. Don't leave tools at job site after completion. It costs you money and gives
      an unprofessional impression.
   G. Remove all "construction debris" from site when finished. Don't leave any
      messes for customer to clean up.
   H. Listen to the customer's comments or complaints. If you can't "fix" a prob-
      lem, get someone who can.
   I. You can never win an argument with a client; even if you win, you lose.
   J. Don't argue with the customer, but remember, "A customer is NOT always
      right." You are the professional, you have more knowledge, and you need to
      convince customers that the better way is their "idea."
   K. Be enthusiastic about the job you are performing. Show the customer you
      care about the job, and that it is important to you that he is happy. After all,
      he is paying your salary.
INFORMATION SHEET

X. Factors to consider when determining cost

(NOTE: These may be determined by the owner or salesman in larger companies.)

A. Size — Is the material of the correct size?
B. Quality — Is the material of the quality needed for the job?
C. Quantity — Have you determined correct quantity of the material needed?
D. Substitutions — Can substitutions be made? (Different variety, quantity, or size)
E. Availability — Can source supply all materials needed?

XI. Factors to consider when determining pricing (job estimating)

A. Labor
B. Material cost (cost of goods sold)
C. Overhead
   1. Rent
   2. Administrative costs
   3. Secretarial costs
   4. Insurance
   5. Utilities
   6. Advertising
   7. Other
D. Profit percent

(NOTE: When you are determining pricing, you must also consider the competitor’s pricing. Can you add the above items together and still remain competitive with other businesses)
**Pesticide Utilization Record**

Certified Supervisor

Applicator

Date: ___________________________  Time a.m. ________  p.m. ________

Location

Pesticide Name

Amount of Pesticide Concentrate Used

Total Solution Applied ________ gal(s) or lb(s)  Rate/acre ________

Target Pest(s)

Plant Material(s) Treated

Equipment Used

Wind Direction  Wind Velocity

Temperature  Sunny  Cloudy

Dew:  None  Light  Heavy

Equipment Cleaning:
Rinsed  Washed  Neutralized

Notes:

______________________________

______________________________

Supervisor's Signature

Applicator's Signature

W.O. #__________
# Fertilization Record

<table>
<thead>
<tr>
<th>Dates of Fertilization</th>
<th>Fertilizer Analysis</th>
<th>Sq. Ft. of Lawn</th>
<th>Amount of Fertilizer</th>
<th>Next Application Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Equipment Maintenance Records

## VEHICLE MAINTENANCE CARD

<table>
<thead>
<tr>
<th>Vehicle No:</th>
<th>Week of:</th>
</tr>
</thead>
</table>

### DAILY SERVICE & LOG:

<table>
<thead>
<tr>
<th>Day</th>
<th>Operator</th>
<th>Gasoline</th>
<th>Oil</th>
<th>Battery Checked</th>
<th>Mileage Out</th>
<th>Mileage In</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tues.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thurs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fri.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sat.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL MILES DRIVEN FOR WEEK: ________

### WEEKLY SERVICE:

- Tire Pressure Check by __________ Date __________

### REPAIRS NEEDED:

---

## EQUIPMENT USE AND SERVICE CARD

<table>
<thead>
<tr>
<th>Equipment No:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Operator</th>
<th>Job No. Equip. Used On</th>
<th>CHECK SERVICE PERFORMED</th>
<th>Hrs. Used On Job</th>
<th>Repairs Needed and/or Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>LUB</td>
<td>ENG. OIL</td>
<td>TRANS. OIL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Checked</td>
<td>Changed</td>
<td>Checked</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Accident Report

(Please Print or Type All Entries)

Accident With Injury □  Accident With Property Damage □  Near Miss □

1. Dept.: ______________  2. Date of Accident: _____________  3. Time _____________ a.m. (Circle p.m. One)


10. Employee is:  Full Time /  Part Time /  Student (Circle all that apply)

11. Location of Accident: (Be Specific) __________________________________________________________

12. Witnesses: __________________________________________________________

13. Severity of Injury:  First Aid Only □  Medical Treatment Required □

14. Treatment was obtained at:  ISU Health Center □  Ames Medical Center □  Personal Physician □  Other □

15. a. Accident may result in lost time from work?  Yes /  No /  Unknown (Circle One)

   b. Probable loss time: ______________________

   c. Physician released Injured to:  Normal Duty □  Limited □

      If not released to duty or assigned to limited duty, estimate return to normal duty Date: _____________

   d. If property damage occurred, estimate dollar amount: _____________

16. Kind of Injury: __________________________________________________________

17. Part of Body Involved: __________________________________________________

18. Act or operation being performed at the time of Injury: ______________________

19. Prior training or safety instruction for this job has been given?  Yes /  No /  Unknown (Circle One)

20. What was the victim doing that may have contributed to the accident? ______________________

21. What personal factors may have contributed to the accident? ______________________

22. What conditions existed that may have contributed to the accident? ______________________

23. How could this accident have been prevented? ______________________

24. Report filed by: ______________________  Date: ______________________

FILE REPORT WITHIN 24 HOURS OF NOTIFICATION

The statements and facts included in this form shall not constitute nor be construed to constitute any admission or evidence of liability.
# Mileage Log

For Vehicle # __________________________

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Customer</th>
<th>Beginning Mileage</th>
<th>Ending Mileage</th>
<th>Driver</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Performance Evaluation Form

NAME: ___________________________  SOCIAL SECURITY NUMBER: ________

DEPARTMENT: _____________________  POSITION AND GRADE: ______________

DATE OF EVALUATION: ___________  TYPE OF EVALUATION: _______________

Rating System:  S—Satisfactory  N—Needs Improvement  U—Unsatisfactory

1. Quality of work (neatness, thoroughness, accuracy, etc.)
2. Quantity of work (fair work load, effective use of time, etc.)
3. Job knowledge (appropriate techniques used)
4. Cooperativeness (follows policies, helps others)
5. Dependability (reliable, works without constant supervision)
6. Attendance (punctual, good use of leave and break privileges)
7. Attitude (good attitude toward others)
8. Physical condition (good health, hygiene, appearance)
9. Adaptability (can change to meet new situations)
10. Housekeeping and safety (safe use and care of materials)

Overall rating: ____________

Recommendations: __________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Supervisor's Signature ___________________________ Date ____________

Employee's Signature ___________________________ Date ____________
Discontinuance Form

1. Name_________________________  2. Position Classification_______
3. Date and time of Discontinuance_____________________________________
4. Was employee working full time or part time?__________________________
5. Reason for Discontinuance____________________________________________

| 1. Ability to work with others | Poor | Average | Good |
| 2. Punctuality, promptness     |      |         |      |
| 3. Willingness to do assigned task |     |         |      |
| 4. Ability to do job          |      |         |      |

6. Would this person be eligible for rehire: Yes ______ No ______
   If answer is no, give explanation____________________________________

7. Was this employee suited for this position: Yes ______ No ______
8. Forwarding address_________________________________________________
   A separate form (signed by employee) should be submitted for mailing final check.

9. Should we recruit a new employee for this position: Yes ______ No ______
10. If no, should we recruit for a different position: Yes ______ No ______
    Please specify position/classification___________________________________________

________________________________________
Superintendent

________________________________________
Director/Assistant Director/Manager
Materials/Services Request

☐ Confirming Order
Order No. __________________

☐ Routine

Account to be Charged ____________________ Date ____________________

Work Order Number ____________________ Requested By ____________________

Location ____________________ Wanted Date ____________________

☐ Estimated ☐ Quoted Quoted By ____________________

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>QUANTITY</th>
<th>DESCRIPTION</th>
<th>UNIT COST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VENDOR

Name ____________________

Address ____________________

City ______ State ______ Zip ______

SPECIAL INSTRUCTIONS
## Stock Request

**WORK ORDER NO.** [Blank]  
**DATE AND TIME REQUESTED** [Blank] / [Blank]

**REQUESTED BY** [Blank]  
**DATE AND TIME NEEDED** [Blank] / [Blank]

<table>
<thead>
<tr>
<th>STOCK NUMBER</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LM3-29**
ASSIGNMENT SHEET #1 — COMPLETE RECORD KEEPING FORMS

NAME ___________________________    SCORE ___________________________

Directions: Complete the following record keeping forms with the given information.

1. On September 10, 1988, from 8:00 a.m. to 4:00 p.m. Sue Daniels is applying Surflan to the grass beds on the south side of the Westin building in order to kill the annual weeds. Her supervisor, Dan Jones, has given her 5 quarts of Surflan in a total solution of 250 gallons to be applied at a rate of 100 gallons per acre. The work order number is #1164. Ms. Daniels is using a Cushman and Bean Sprayer with a boom. The wind is out of the north at 5 miles per hour. There is no dew, and the weather is sunny and 75°. She used a “signal” dye at a rate of 1 quart per 100 gallons of water as a marking tracer. She washed and neutralized her equipment when she was finished.

2. Fifty pounds of 10-20-10 fertilizer were applied to Mr. Smith’s 5000 square-foot lawn at 2164 S. 5th in Dallas, Texas on June 10, 1988. The next application of fertilizer should be made on July 20. Call Mr. Smith at 555-1555-1111 to notify him before making the next application.

3. On May 10, 1988, Betty drove vehicle #5 on a 60-mile round trip to Mr. Johnson’s house. She left at 10:00 a.m. and returned at 3:00 p.m. The beginning mileage was 60,125.

4. Bill Rogers, a full-time gardener #1 with the landscaping department for the last two years, cut his leg while rototilling in front of Ag Hall on October 22, 1988 at 4:00 p.m. Mr. Rogers is 27 years old and his social security number is 445-62-1892. Mr. Rogers was working with Sue, Bob, and Fred who witnessed the accident. Mr. Rogers required medical treatment at the ISU Health Center and will need to rest in bed for two days before returning to work. Mr. Rogers had received safety training on using a tiller, and no unsafe factors or conditions contributed to the accident.

5. On October 31, 1988, at 3:00 p.m., Fred Jones, a full-time gardener #3, was terminated because he failed to show up for work for two days without reasons and without notifying anyone at work. Although Mr. Jones did adequate work and was agreeable enough, he rarely came to work on time or came back from breaks on time. The employee we hire to replace him must be better suited for the job. Mr. Jones left no forwarding address. We would not rehire him.

6. As an employee of the landscape department, on April 10, 1988, you make a routine request for forty 2-gallon Burford Hollies at an estimated cost of $3.00 each from ABC Nursery, 1406 Peach, Columbia, MO 64200. You need those hollies by April 12, 1988 delivered to the home office. Work order #11645.
ASSIGNMENT SHEET #1

PESTICIDE UTILIZATION RECORD

Certified Supervisor ________________________________

Applicator _______________________________________

Date: ____________________ Time a.m. ________ p.m. ________

Location _________________________________________

Pesticide Name ____________________________________

Amount of Pesticide Concentrate Used ________________________________

Total Solution Applied ______________ gal(s) or lb(s) Rate/acre ________

Target Pest(s) _________________________________________

Plant Material(s) Treated _______________________________________

Equipment Used ____________________________________________

Wind Direction __________ Wind Velocity __________

Temperature __________ Sunny __________ Cloudy __________

Dew: None __________ Light __________ Heavy __________

Equipment Cleaning:
Rinsed __________ Washed __________ Neutralized __________

Notes: ______________________________________________________

________________________________________________________________

Supervisor's Signature _______________________________________

Applicator's Signature _______________________________________

W.O. #___________

42
## ASSIGNMENT SHEET #1

### FERTILIZATION RECORDS

<table>
<thead>
<tr>
<th>Client:</th>
<th>Phone:</th>
<th>Address:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Dates of Fertilization</th>
<th>Fertilizer Analysis</th>
<th>Sq. Ft. of Lawn</th>
<th>Amount of Fertilizer</th>
<th>Next Application Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# ASSIGNMENT SHEET #1

## MILEAGE LOG

For Vehicle # __________

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Customer</th>
<th>Beginning Mileage</th>
<th>Ending Mileage</th>
<th>Driver</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ASSIGNMENT SHEET #1

Iowa State University
Physical Plant Services
SUPERVISOR'S ACCIDENT REPORT
(Please Print or Type All Entries)

1. Dept.: __________ 2. Date of Accident: __________ 3. Time ________ a.m. (Circle p.m. One)
10. Employee is: Full Time / Part Time / Student (Circle all that apply)
11. Location of Accident: (Be Specific) __________

12. Witnesses: __________

13. Severity of Injury: First Aid Only [ ] Medical Treatment Required [ ]

14. Treatment was obtained at: ISU Health Center [ ] Personal Physician [ ]
   Ames Medical Center [ ] Other [ ]

15. a. Accident may result in lost time from work? Yes / No / Unknown (Circle One)
b. Probable loss time: __________
c. Physician released injured to: Normal Duty [ ] Limited [ ]
   If not released to duty or assigned to limited duty, estimate return to normal duty
   Date: __________
d. If property damage occurred, estimate dollar amount: __________

16. Kind of Injury: __________

17. Part of Body involved: __________

18. Act or operation being performed at the time of injury: __________

19. Prior training or safety instruction for this job has been given? Yes / No / Unknown (Circle One)

20. What was the victim doing that may have contributed to the accident? __________

21. What personal factors may have contributed to the accident? __________

22. What conditions existed that may have contributed to the accident? __________

23. How could this accident have been prevented? __________

24. Report filed by: __________________________ Date: __________

* See back of pink copy for examples. (Use back of this sheet for additional information.)

FILE REPORT WITHIN 24 HOURS OF NOTIFICATION
The statements and facts included in this form shall not constitute nor be construed to constitute
any admission or evidence of liability.
White (Director) Yellow (Safety) Pink (Retain for your files)
### ASSIGNMENT SHEET #1

#### EXAMPLES

*Supervisor's Accident Report — Continued*

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Amputation</td>
<td>Cleaning, oiling, adjusting or repairing of moving, energized, or pressurized equipment</td>
</tr>
<tr>
<td>Burn (Thermal, scald, chemical)</td>
<td>Disregarded instructions or operating without authority</td>
</tr>
<tr>
<td>Contusion, crushing, bruise</td>
<td>Failure to receive proper job instruction</td>
</tr>
<tr>
<td>Cut, laceration, puncture, open wound</td>
<td>Failure to use available personal protective equipment</td>
</tr>
<tr>
<td>Dislocation</td>
<td>Failure to secure or warn</td>
</tr>
<tr>
<td>Electric shock, electrocution</td>
<td>Horseplay, quarreling, or fighting</td>
</tr>
<tr>
<td>Foreign body (dust, rust, embedded)</td>
<td>Improper use of hands or body parts</td>
</tr>
<tr>
<td>Fracture</td>
<td>Inattention to footing or surroundings</td>
</tr>
<tr>
<td>Heat stroke, sunstroke, heat exhaustion</td>
<td>Making safety devices inoperative</td>
</tr>
<tr>
<td>Injuries, internal</td>
<td>Operating or working at unsafe speed</td>
</tr>
<tr>
<td>Scratches, abrasions</td>
<td>Using unsafe equipment</td>
</tr>
<tr>
<td>Sprains, strains</td>
<td>No unsafe act</td>
</tr>
<tr>
<td>Multiple Injuries</td>
<td>Unclassified</td>
</tr>
<tr>
<td>Undetermined</td>
<td></td>
</tr>
<tr>
<td>Occupational disease (dermatitis, ganglion, etc.)</td>
<td></td>
</tr>
<tr>
<td>Other injury</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Head (including face)</td>
<td>Under influence of drug/alcohol</td>
</tr>
<tr>
<td>Eye</td>
<td>Fatigue</td>
</tr>
<tr>
<td>Arm</td>
<td>Illness</td>
</tr>
<tr>
<td>Wrist</td>
<td>Improper attitude</td>
</tr>
<tr>
<td>Hands</td>
<td>Lack of job knowledge or skill</td>
</tr>
<tr>
<td>Abdomen</td>
<td>Bodily defects</td>
</tr>
<tr>
<td>Back</td>
<td>Act of other than injured</td>
</tr>
<tr>
<td>Chest</td>
<td>Undetermined</td>
</tr>
<tr>
<td>Hips</td>
<td>No unsafe personal factor</td>
</tr>
<tr>
<td>Shoulders</td>
<td>Other unsafe personal factor</td>
</tr>
<tr>
<td>Neck</td>
<td></td>
</tr>
<tr>
<td>Knee</td>
<td></td>
</tr>
<tr>
<td>Leg</td>
<td></td>
</tr>
<tr>
<td>Foot</td>
<td></td>
</tr>
<tr>
<td>Multiple injuries</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>22. Unsafe Condition</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Defective tools, equipment, substances</td>
<td></td>
</tr>
<tr>
<td>Dress or apparel hazard</td>
<td></td>
</tr>
<tr>
<td>Environmental hazards</td>
<td></td>
</tr>
<tr>
<td>Hazardous methods or procedures</td>
<td></td>
</tr>
<tr>
<td>Inadequately guarded</td>
<td></td>
</tr>
<tr>
<td>Improper illumination</td>
<td></td>
</tr>
<tr>
<td>Poor housekeeping</td>
<td></td>
</tr>
<tr>
<td>Undetermined</td>
<td>No hazardous condition</td>
</tr>
</tbody>
</table>
ASSIGNMENT SHEET #1

DISCONTINUANCE FORM

1. Name __________________________  2. Position Classification ____________

3. Date and time of Discontinuance ________________________________

4. Was employee working full time or part time? ______________________

5. Reason for Discontinuance _______________________________________

<table>
<thead>
<tr>
<th></th>
<th>Poor</th>
<th>Average</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ability to work with others</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Punctuality, promptness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Willingness to do assigned task</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Ability to do job</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Would this person be eligible for rehire: Yes ______ No ______

If answer is no, give explanation __________________________________

_________________________________________________________________

7. Was this employee suited for this position: Yes ______ No ______

8. Forwarding address_____________________________________________

A separate form (signed by employee) should be submitted for mailing final check.

9. Should we recruit a new employee for this position: Yes ______ No ______

10. If no, should we recruit for a different position: Yes ______ No ______

Please specify position/classification ___________________________________

_________________________________________

Superintendent

_________________________________________

Director/Assistant Director/Manager
ASSIGNMENT SHEET #1

MATERIALS/SERVICES REQUEST

- [ ] Confirming Order
  Order No. ____________
- [ ] Routine

Account to be Charged ____________________ Date ____________________

Work Order Number ____________________ Requested By ____________________

Location ____________________ Wanted Date ____________________

- [ ] Estimated
- [ ] Quoted
  Quoted By ____________________

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>QUANTITY</th>
<th>DESCRIPTION</th>
<th>UNIT COST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VENDEOR

Name ____________________
Address ____________________
City ____________________ State ___ Zip ______

SPECIAL INSTRUCTIONS
ORIENTATION
UNIT I

ASSIGNMENT SHEET #2 — DISCUSS POSSIBLE SOLUTIONS TO PERSONNEL AND PUBLIC RELATIONS PROBLEMS

NAME ___________________________  SCORE ___________________________

Directions: Read the following situations and describe how you would deal with them if you were working as a field supervisor.

1. You are given a job to create an 8' x 4' planting bed, install edging, and plant ground cover in the bed on 6" centers. You have a four member crew. How would you explain the job and divide responsibilities to your crew?

2. Mrs. Smith called your office and wants you to look at a shrub that you planted for her six months ago. It has died and she is very upset and feels that it is your company's fault that it died. She wants you to replace the plant. When you arrive, you notice that the area around the plant looks very dry and that some of her other plants look like they have died from lack of water. What would you do?
3. Mr. Black has called and complained to your supervisor that when your crew left the job-site they drove the company truck off the driveway and rutted the lawn next to the drive. Your company's owner has told you to deal with this customer and repair the damage. How would you handle this situation?

4. A customer complained that your crew members were making too much noise and acting up while they worked. When you confront them with this accusation, one crew member becomes angry and insists he was not part of this activity. What would you do?

5. You have an employee who for the last three weeks has been moody, late to work several times, and just generally seems depressed. You think she may be having family problems, but you're not sure. How would you deal with this situation?
**Orientation Unit I**

**Answers to Assignment Sheets**

*Assignment Sheet #1*

**Pesticide Utilization Record**

<table>
<thead>
<tr>
<th>Certified Supervisor</th>
<th>Dan Jones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicator</td>
<td>Sue Daniels</td>
</tr>
</tbody>
</table>

Date: 9/10/88  Time a.m. 8:00  p.m. 4:00

Location: South side of Westin bldg.

Pesticide Name: Surflan

Amount of Pesticide Concentrate Used: 5 qts.

Total Solution Applied: 200 gal(s) or lb(s)  Rate/acre 100 GPA

Target Pest(s): Annual weeds

Plant Material(s) Treated: Grass beds

Equipment Used: Cushman and Bean sprayer with boom

Wind Direction: N  Wind Velocity: 5 mph

Temperature: 75°  Sunny  Cloudy

Dew: None  Light  Heavy

Equipment Cleaning:
- Rinsed
- Washed
- Neutralized

Notes: Used signal dye @ rate of 1 oz/100 gal for marking traces.

Supervisor's Signature: Dan Jones

Applicator's Signature: Sue Daniels

W.O. # 1164
## Answers to Assignment Sheets

### Fertilization Records

**Client:** Mr. Smith  
**Phone:** 555-555-1111  
**Address:** 214 S 5th Dallas, TX

<table>
<thead>
<tr>
<th>Dates of Fertilization</th>
<th>Fertilizer Analysis</th>
<th>Sq. Ft. of Lawn</th>
<th>Amount of Fertilizer</th>
<th>Next Application Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/10/88</td>
<td>10-20-10</td>
<td>5000 sq. ft.</td>
<td>50 lbs.</td>
<td>7/20/88</td>
</tr>
</tbody>
</table>

---
ANSWERS TO ASSIGNMENT SHEETS

MILEAGE LOG

For Vehicle # 5

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Customer</th>
<th>Beginning Mileage</th>
<th>Ending Mileage</th>
<th>Driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/10/88</td>
<td>10:00am-3:00pm</td>
<td>Mr. Johnson</td>
<td>60,125</td>
<td>60,185</td>
<td>Betty</td>
</tr>
</tbody>
</table>
ANSWERS TO ASSIGNMENT SHEETS

Iowa State University
Physical Plant Services

SUPERVISOR’S ACCIDENT REPORT
(Please Print or Type All Entries)

Accident With Injury ☑
Accident With Property Damage ☐
Near Miss ☐

1. Dept.: Landscaping
2. Date of Accident: 10/22/88
3. Time: 4:00 p.m.
4. Name of Injured: Bill Rogers
5. SSN: 454-65-1892
6. Age: 27
7. Sex: M
8. Title/Occupation: Janitor
9. Time Employed in Present Position: 2
10. Employee is: Full Time
     Part Time
     Student
11. Location of Accident: (Be Specific) Ag Hall
12. Witnesses: Sue, Bob, Fred
13. Severity of Injury: First Aid Only ☑
     Medical Treatment Required ☑
14. Treatment was obtained at: ISU Health Center ☑
     Ames Medical Center ☐
15. a. Accident may result in lost time from work? Yes ☑
     No ☐
     Unknown ☐
     (Circle One)
b. Probable loss time: 2 days
16. Kind of Injury: Cut
17. Part of Body Involved: Leg
18. Act or operation being performed at the time of Injury: Rototilling
19. Prior training or safety instruction for this job has been given? Yes ☑
     No ☐
     Unknown ☐
     (Circle One)
20. What was the victim doing that may have contributed to the accident? no unsafe act
21. What personal factors may have contributed to the accident? no unsafe personal factor
22. What conditions existed that may have contributed to the accident? no hazardous condition
23. How could this accident have been prevented? undetermined
24. Report filed by: [your name] Date: 10/22/88

FILE REPORT WITHIN 24 HOURS OF NOTIFICATION
The statements and facts included in this form shall not constitute nor be construed to constitute
any admission or evidence of liability.
ANSWERS TO ASSIGNMENT SHEETS

DISCONTINUANCE FORM

1. Name: Fred Jones
2. Position Classification: Hardener #3

3. Date and time of Discontinuance: 10/31/89, 3:00 p.m.

4. Was employee working full time or part time? Full time

5. Reason for Discontinuance: Failure to show up for work for 2 days without reason or notice

<table>
<thead>
<tr>
<th></th>
<th>Poor</th>
<th>Average</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ability to work with others</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>2. Punctuality, promptness</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>3. Willingness to do assigned task</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>4. Ability to do job</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

6. Would this person be eligible for rehire: Yes [ ] No [ ✓ ]

If answer is no, give explanation: Doesn't show up for work, or not on time when he does show up.

7. Was this employee suited for this position: Yes [ ] No [ ✓ ]

8. Forwarding address: unknown

A separate form (signed by employee) should be submitted for mailing final check.

9. Should we recruit a new employee for this position: Yes [ ✓ ] No [ ]

10. If no, should we recruit for a different position: Yes [ ] No [ ✓ ]

Please specify position/classification:

Your name: 
Superintendent

Your boss: 
Director/Assistant Director/Manager
MATERIALS/SERVICES REQUEST

- Confirming Order
- Routine

Account to be Charged: Landscape Dept.
Date: 4/10/88

Work Order Number: 1645
Requested By: Your name

Location: Home office
Wanted Date: 4/12/88

- Estimated
- Quote

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>QUANTITY</th>
<th>DESCRIPTION</th>
<th>UNIT COST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40</td>
<td>2 gal. Buglond Holly</td>
<td>$3.00</td>
<td>$120.00</td>
</tr>
</tbody>
</table>

VENDOR
Name: ABC Nursery
Address: 1406 West Peach
City: Columbia, State: MO, Zip: 65200

SPECIAL INSTRUCTIONS
1. Define a field supervisor.

2. Name three basic divisions of the landscape and horticultural industry where a supervisor may work.
   a.
   b.
   c.

3. Name four characteristics of a good supervisor.
   a.
   b.
   c.
   d.

4. Identify the following types of records used in a landscape or horticultural business.

   Equipment No:

<table>
<thead>
<tr>
<th>Date</th>
<th>Operator</th>
<th>Job No.</th>
<th>Equip. Used On</th>
<th>CHECK SERVICE PERFORMED</th>
<th>Hrs. Used On Job</th>
<th>Repairs Needed and/or Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>LUB</td>
<td>ENG</td>
<td>OIL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Checked</td>
<td>Changed</td>
<td>Checked</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   a.  

5.
**TEST**

Certified Supervisor

Applicator

Date: ___________ Time a.m. ___________ p.m. ___________

Location

Pesticide Name

Amount of Pesticide Concentrate Used

Total Solution Applied _______ gal(s) or lb(s) Rate/acre _______

Target Pest(s)

Plant Material(s) Treated

<table>
<thead>
<tr>
<th>Client:</th>
<th>Phone:</th>
<th>Address:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dates of Fertilization</td>
<td>Fertilizer Analysis</td>
<td>Sq. Ft. of Lawn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b.  

c.  

53
### TEST

Accident With Injury □  Accident With Property Damage □  Near Miss □

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dept.:</td>
<td>2. Date of Accident:</td>
<td>3. Time:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a.m. (Circle p.m. One)</td>
</tr>
<tr>
<td>4. Name of Injured:</td>
<td>5. SSN:</td>
<td>6. Age:</td>
</tr>
<tr>
<td>7. Sex:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Title/Occupation:</td>
<td>9. Time Employed In Present Position:</td>
<td></td>
</tr>
<tr>
<td>10. Employee is:</td>
<td></td>
<td>🆓</td>
</tr>
<tr>
<td>🆓</td>
<td>🆓</td>
<td>🆓</td>
</tr>
<tr>
<td>11. Location of Accident: (Be Specific)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Witnesses:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Severity of Injury:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>🆓</td>
<td>Medical Treatment Required</td>
<td></td>
</tr>
<tr>
<td>14. Treatment was obtained at:</td>
<td>ISU Health Center</td>
<td>Ames Medical Center</td>
</tr>
<tr>
<td></td>
<td>Personal Physician</td>
<td>Other</td>
</tr>
<tr>
<td>15. a. Accident may result in lost time from work?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>b. Probable loss time:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Physician released injured to:</td>
<td>Normal Duty</td>
<td>Other</td>
</tr>
</tbody>
</table>

5. Arrange in order the following steps of supervision by placing a 1 next to the first step, 2 by the second, and so on.

   a. Return to shop and clean up and service tools and equipment
   b. Explain the job to the crew
   c. Complete job records
   d. Give individual assignments to crew members
   e. Study and plan the best way to begin job
   f. Assemble needed materials, tools, and personnel
   g. While crew is working, observe and give suggestions to crew, check on job quality, and make sure all safety rules are followed
   h. Tell customer what has been finished
   i. Finish job and clean up and load
   j. Review the day's work, decide what you could have done better, and plan for next job
6. List six items included in a company policy manual.
   a. __________________________________________________________
   b. __________________________________________________________
   c. __________________________________________________________
   d. __________________________________________________________
   e. __________________________________________________________
   f. __________________________________________________________

7. Select true statements concerning working with employees by placing a “T” or “F” by the statement to indicate if it is true or false.
   _____a. Criticize employees in front of others.
   _____b. It is good to socialize with subordinates.
   _____c. Avoid negative reinforcement when possible.
   _____d. You should try to always be friends with your employees.
   _____e. Be fair in enforcing rules.
   _____f. Treat employees as you expect to be treated.
   _____g. Act bored so employees will hurry.
   _____h. Have self-confidence.
   _____i. Encourage friendly competition.
   _____j. Order your workers around.

8. Name two oral and two written communication skills a good supervisor should have.
   a. Oral
      1) __________________________________________________________
      2) __________________________________________________________
   b. Written
      1) __________________________________________________________
      2) __________________________________________________________
9. Select true statements on dealing with the customer and general public by placing a "T" or "F" by the true or false statements.

_____a. Present yourself as a professional.
_____b. Be neat and courteous.
_____c. Keep the job site messy so the customer knows you are working.
_____d. Be enthusiastic about the job you do.
_____e. It is acceptable to argue with a customer if you are right.

10. Name three factors to consider when determining cost.
   a. 
   b. 
   c. 

11. Name three factors to consider when determining pricing (job estimating).
   a. 
   b. 
   c. 

(NOTE: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

12. Complete record keeping forms. (Assignment Sheet #1)

13. Discuss possible solutions to personnel and public relations problems. (Assignment Sheet #2)
ORIENTATION
UNIT I

ANSWERS TO TEST

1. A person responsible for managing materials, machines, and people effectively and efficiently in order to complete jobs successfully in the landscape and horticultural industry.

2. Any three of the following:
   a. Nursery stock growing operations
   b. Garden store operations
   c. Landscaping operations
   d. Landscape maintenance
   e. Golf course maintenance

3. Any four of the following:
   a. Can combine materials, machinery, and manpower in order to successfully complete a job efficiently and effectively
   b. Follows instructions
   c. Communicates with others well
   d. Reads and understands well
   e. Organizes activities efficiently
   f. Writes neatly and fills out forms correctly
   g. Learns quickly
   h. Deals with pressures, people, and problems effectively without “flying off the handle”
   i. Supports company policies and government regulations and laws

4. a. Equipment maintenance record
   b. Pesticide record
   c. Fertilizer use form
   d. Accident report

5. a. 8  
   b. 3  
   c. 9  
   d. 4  
   e. 1  
   f. 2  
   g. 5  
   h. 7  
   i. 6  
   j. 10
ANSWERS TO TEST

6. Any six of the following:
   a. Vacation
   b. Sick leave
   c. Military leave
   d. Administrative leave
   e. Holidays
   f. Insurance
   g. Grounds for termination
   h. Absenteeism
   i. Tardiness
   j. Dress codes
   k. Image
   l. Care of equipment

7. a. F   f. T
   b. F   g. F
   c. T   h. T
   d. F   i. T
   e. T   j. F

8. a. Any two of the following:
    1) Don't interrupt.
    2) Maintain eye contact with listener.
    3) Be an interested listener.
    4) Have presentations organized.
    5) Know when to end conversations.
   b. Any two of the following:
    1) Understand forms to be completed and complete them accurately.
    2) Write legibly.
    3) Complete forms when required.
    4) Submit forms promptly upon completion.
    5) Retain copies for personal file when needed.

9. a. T
   b. T
   c. F
   d. T
   e. F
ANSWERS TO TEST

10. Any three of the following:
   a. Size
   b. Quality
   c. Quantity
   d. Substitutions

11. Any three of the following:
   a. Labor
   b. Material cost
   c. Overhead
   d. Profit percent

12.-13. Evaluated to the satisfaction of the instructor
BASIC LANDSCAPE DESIGN PRINCIPLES
UNIT II

UNIT OBJECTIVE

After completion of this unit, the student should be able to read and draw a simple landscape design. Competencies will be demonstrated by completing the assignment sheets, job sheet, and the unit tests with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to basic landscape design principles with the correct definitions.
2. State the guiding principles of landscape design.
3. Match the elements in a landscape design with the correct descriptions.
4. Match the basic principles of landscape design with the correct descriptions.
5. Select from a list the general objectives for developing a landscape plan.
7. State the best times to develop a landscape plan.
8. Distinguish between the main areas to be developed in a landscape plan.
9. Complete statements concerning the basic planting groups found in the public area.
10. List common mistakes made in foundation plantings.
OBJECTIVE SHEET

11. Identify basic drafting tools used in making a landscape plan.
12. Answer questions on using a scale.
13. Identify common symbols used on landscape plans.
14. Select true statements concerning good drafting habits.
15. Arrange in order the steps in drawing a landscape plan.
16. Read a landscape blueprint. (Assignment Sheet #1)
17. Calculate lawn square footage. (Assignment Sheet #2)
18. Calculate cubic measurements of soil. (Assignment Sheet #3)
19. Demonstrate the ability to draw a landscape plan. (Job Sheet #1)
BASIC LANDSCAPE DESIGN PRINCIPLES
UNIT II

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to class to supplement/reinforce information provided in this unit of instruction.

   (NOTE: This activity should be completed prior to the teaching of this unit.)

B. Make transparencies from the transparency masters included with this unit.

C. Provide students with objective sheet.

D. Discuss unit and specific objectives.

E. Provide students with information and assignment sheets.

F. Discuss information and assignment sheets.

   (NOTE: Use the transparencies to enhance the information as needed.)

G. Provide students with job sheet.

H. Discuss and demonstrate the procedure outlined in the job sheet.

I. Integrate the following activities throughout the teaching of this unit:

   1. Go on a walking tour around your school or neighborhood and notice how plants have been used in the landscape. Discuss the good and bad uses of the plants you have seen.

   2. Visit a nursery or business that draws landscape designs and see how they do their work.

   3. Obtain the landscape plan for your school and use it to calculate lawn sq. ft. and develop a material list. Also make sure students understand how to read and interpret it.

   4. Contact your state Association of Nurserymen to determine industry standards in landscape designs and for judging the quality of nursery stock.

   5. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

J. Give test.

K. Evaluate test.

L. Reteach if necessary.
RESOURCES USED IN DEVELOPING THIS UNIT


SUGGESTED SUPPLEMENTAL RESOURCES

A. Computer Software — *Landscape Design* (for Apple computers)

   Available from:

   Jefferson Software
   #2 Players Club Drive, Dept. JS1
   Charleston, WV 25311
   800/468-4227

B. Slide films or slide sets, both with study guides

   1. *Introduction to Landscape Design*
   2. *Creating a Design*
   3. *Putting Plants into the Design*
   4. *Landscape Design Series*
      a. *Fundamental Aspects of Good Design*
      b. *Moods, Seasons, Soil, and Water*
      c. *Considerations in Planning*
      d. *Small Properties, Naturalistic Landscapes, and Patios*

   5. *Landscape Planting Plan Series* (includes various types of names and recommended plants)

Films listed in B are available from:

   Vocational Agriculture Service
   College of Agriculture
   University of Illinois
   1401 South Maryland Drive
   Urbana, IL 61801
   217/333-3871
SUGGESTED SUPPLEMENTAL RESOURCES

C. Computer Software — Ortho's Personalized Plant Selector (for Apple IIe, IIc, Macintosh, Commodore 64, and IBM 128K). Includes various guides with disk

Available from:
Vocational Education Productions
California Polytechnic State University
San Luis Obispo, CA 93407
800/235-4146

D. Videotapes (VHS)
   1. The Principles of Landscape Design
   2. The Landscape Design Process
   3. Fast and Effective Plan View Drawing Methods
   4. Color Rendering Techniques for Presentation Drawings

Available from:
Vocational Education Productions
California Polytechnic State University
San Luis Obispo, CA 93407
800/235-4146

E. American Association of Nurserymen (AAN) booklets
   2. Living Screens for North America
   3. Residential Landscape Designs

Available from:
AAN Member Services
1250 I Street, N.W., Suite 500
Washington, DC 20005
202/789-2900

F. Computer software — Selecting Trees for the Landscape (Apple II)

Available from:
Teaching Aids, Inc.
711 West 17th Street
Building E, Units 1 and 2
Costa Mesa, CA 92627
714/548-9321
SUGGESTED SUPPLEMENTAL RESOURCES

G. Computer software (Apple or IBM)
   1. *Landscape Design I*
   2. *Landscape Design II*
   3. *Landscape Design III*

   Available from:

AAVIM
120 Driftmier Center
Athens, GA 30602
404/542-2586

H. Sound filmstrips — *Principles of Landscaping* (six parts)
   1. *Design Fundamentals: Applied Art*
   2. *Design Fundamentals: Practical Considerations*
   3. *The Landscape Plan: Getting It Down on Paper*
   4. *Landscape Elements: Plant Material*
   5. *Landscape Elements: Manmade Materials*
   6. *Landscape Design: Developing Cost Estimates*

   Available from:

Vocational Media Associates
Box 1050
Mount Kisco, NY 10549-9989
800/431-1242
BASIC LANDSCAPE DESIGN PRINCIPLES
UNIT II

INFORMATION SHEET

I. Terms and definitions

A. Asymmetrical — Uneven number of items on each side of a point

B. Balance — Even distribution of mass on each side of an axis

C. Blueprint — Reproduction of a scaled drawing (map, landscape plan, house plan, etc.) using special paper and machines (blueprinter or diazo copier) to produce a white background print with blue lines or a blue background print with white lines — both are commonly referred to as blueprints

D. Focal point — Center of interest

Examples: Front door, statue, fountain

E. Foundation plantings — Plants at the base of a building

F. Landscape design — Selection and placement of plants in order to develop spaces around buildings and houses for a maximum of beauty and utility with a minimum of maintenance

G. Legend — A list of the symbols on a map explaining what they represent

H. Materials list — A list of all plant materials and other supplies necessary to install a landscape plan

I. Scale — Making a drawing representative of the area of which it is a picture by letting usually 1 inch on paper represent a definite number of feet on the ground

J. Symmetrical — Same number of items on each side of a point
II. Guiding principles of landscape design
   A. Simplicity
   B. Beauty
   C. Convenience
   D. Function
   E. Maintenance

III. Elements in a landscape design
   A. Space — The area allowed to work with
      (NOTE: The size of the space often prohibits certain designs.)
   B. Line — Moves the viewer’s eye from one point to another; may be straight, curved, or angled
      Examples:
INFORMATION SHEET

C. Form — Gives the element shape; may be square, rectangular, circular, triangular, or irregular

Example: Plant forms

![Plant forms](image)

D. Texture — Visual and tactile (to the touch) surface characteristics and appearance

Examples: Fine or coarse textured plants, rough textured stucco wall, smooth textured steel statue

E. Color — Attracts the eye and provides contrast as well as sets the mood of a design

(Note: Red, yellow, and orange are lively, warm colors, and tend to “jump” out of a setting. Blue, green, and purple are calming, cool colors, and tend to recede into a setting.)

IV. Basic principles of landscape design (Transparencies 1 and 2)

A. Balance

1. Symmetrical balance

   a. Landscape design on one side of a focal point is identical to the other side.

   b. Use of this type of balance creates a more formal, planned look.

       (Note: This design element is most easily seen in a formal garden.)

2. Asymmetrical balance

   a. Landscape designs on each side of a focal point are not identical.

   b. Use of this type of balance creates a more informal, natural look.
INFORMATION SHEET

B. Sequence

1. Refers to a logical order in the placement of plants based on their mature size and their rate of growth.

2. A logical order or sequence would be placing low plants in the foreground, followed by medium-sized plants in the mid-foreground, and taller plants in the background.

   (NOTE: In order to predict proper sequence, plant growth for each specimen must have a known growth rate. This is attained by knowing the cultivar.)

C. Contrast

1. Is desired to break what otherwise might be considered monotonous.

2. Is attained by using plants of different sizes, colors, and foliage characteristics.

3. Flowers and fruits can offer contrast, but only part of the time. foliage and bark are better and more harmonious sources of contrast.

4. Contrast in plant forms and colors should be gradual and subtle.

5. Too many contrasting forms and colors will make the scene appear like a circus with too many elements vying for attention.

D. Repetition or rhythm

1. A reappearance of the same plant form throughout the landscape setting.

2. Can be attained by varying and repeating forms, colors, and textures in an appealing and inviting way.

3. Repetition can easily cross over to monotony.

4. The master of good repetition is also a master of subtlety.

   (NOTE: Japanese-type gardens are good examples of this design. They dramatize nature in perfect scale, line, and form and relate it all to the human element.)
INFORMATION SHEET

E. Proportion or scale

1. Is the art of keeping all of the elements of the landscape in relation to each other.

   (NOTE: Proportion or scale is a relative term involving the artistic sense that one has been able to develop over the years, often with deliberate practice or training.)

2. The size of plant materials should be complementary to the size of other plant materials used nearby and to the size of the structure.

   Examples: A 60-80 foot tall tree would overpower a one-story, flat-roofed home. A 15-foot tall tree would be lost next to a five-story hotel complex.

V. General objectives for developing a landscape plan

A. To secure attractive grounds
B. To provide natural, easy, and safe approaches
C. To provide privacy for the family
D. To provide for the recreational needs of the family
E. To provide a convenient, well-arranged, attractive service area
F. To harmonize the home, buildings, various areas, walks, drives, and garden into one complete unit

VI. Advantages of having a landscape plan

A. Serves as a guide for long-range development of the home grounds
B. Saves time, money, and effort

VII. Best times to develop a landscape plan

A. After a careful survey of the area and surrounding properties are made (Handouts #1 and #2)
B. After the desires and purposes of the occupants have been examined (Handout #3)
VIII. **Main areas to be developed in a landscape plan (Transparency 3)**

**A. Private area**

1. Is mainly the recreation area of the family.

2. Includes such features as the barbecue pit, children's playground, flower garden, specimen shrubs, birdbath, or rock garden.

3. Enclose the area to ensure privacy and to form a background for landscape features.

4. Arrange flower beds, rock garden, or other features around the perimeter.

5. Allow the center to remain open.

6. Make the area accessible to the house and to other parts of the property.

**B. Service area**

1. Should contain the garage and turning area.

2. Should contain the vegetable garden, greenhouse, propagating frames, compost pile, and potting bench if used.

3. Tools, lawn mowers, and other equipment can be stored in a shed which is easily screened from view with fencing or plant material.

4. A back or side door could have access to this area.

**C. Public area**

1. Make the lawn open and spacious in proper proportion to the area available.

2. Balance the plantings, both trees and shrubs, about an imaginary line through the entrance of the house or property.

3. Use only those trees and shrubs which will complement the house to best advantage.
IX. Basic planting groups found in the public area

A. Entrance planting
   1. Should emphasize the entrance and make it more inviting.
   2. Has both evergreen and deciduous plants.

B. Corner planting
   1. Should grow taller than those at the entrance.
   2. Should soften the sharp angles of the corners of the house by using naturally rounded plant forms.
   3. Should be about two-thirds of the distance between eaves and ground.
   4. Should be placed according to the style of the house and size of the lot.

C. Foundation plantings
   1. Should break the monotony of a wide expanse of blank wall or draw attention to a window.
   2. Should keep in mind rate of growth as well as the final size of the plant when mature.
   3. Should accent the textures and colors of the building materials of the house by using plants for their shape, fruit, flower, and foliage effects.

X. Common mistakes made in foundation plantings

A. Over-planting (too many plants)
B. Planting too close to buildings
C. Spacing plants too close together
D. Using plants not suited to the building
E. Using plants not adapted for the local climate
XI. Basic drafting tools used in making a landscape plan (Transparency 4)

A. T-square or parallel bar — Used to draw horizontal and vertical lines

B. Triangles — Flat, plastic tools which are used to draw 30°, 45°, 60°, and 90° (perpendicular) lines when placed next to the T-square’s or parallel bar’s horizontal plane

C. Scales — Used for proportional reductions of actual (outdoor) dimensions to dimensions that will fit on a drawing sheet

(NOTE: A scale has 6 edges with each representing a different proportion such as 1/4” = 1’, 1/2” = 1’, etc.)

D. Pencils or pens — Used for applying graphite or ink lines to a drawing

E. Pointers — Used for sharpening pencils

F. Erasers — Used for removing pencil or ink lines

G. Drafting media — Papers, vellums, and polyester films used as drawing bases

H. Templates — Used for drawing common shapes, symbols, and letters

(NOTE: These are the tools and supplies used for manual [by hand] drafting. Many firms also use computers for developing landscape plans. Although these are faster, more accurate, and more efficient, they require trained operators and expensive computer hardware and software.)

XII. Using a scale

A. Drawing to scale means letting 1 inch of paper represent a definite number of feet on the ground.

B. Some scales commonly used are 1”=4’, 1”=8’, 1”=10’, and 1”=20’.
INFORMATION SHEET

C. You will need a ruler, engineering or architectural scale, or cross-section paper to draw landscape features to scale.

Examples:

Architect's Scales

1" = 4 FT OF AREA

1" = 8 FT OF AREA

Engineer's Scale

1" = 10 FT OF AREA

XIII. Common symbols used on landscape plans

(NOTE: These symbols should be drawn to scale on your landscape plan.)

A. Deciduous tree or shrub

B. Narrowleaf evergreen

C. Broadleaf evergreen

D. Sheared hedge
E. Shrub border or group

F. Ground cover

G. Fences

H. Gate

I. Sidewalk, concrete or asphalt

J. Sidewalk, brick

K. Driveway, concrete or asphalt

L. Stepping stones

M. Steps

N. Patio or deck

(Note: All plants and landscape features should also be labeled to prevent misunderstandings.)

XIV. Good drafting habits

A. Keep your instruments and equipment clear.

B. Keep the leads on your pencils sharp for good line quality.

C. Make sure your hands are clean before you start drafting.

D. Always lift tools (triangles, templates, T-squares) when moving them across your drawing sheet. Sliding them can smear work underneath.

E. Store drawings flat or rolled up. Do not fold drawings. Creases will interfere in blueprinting or reproduction of the original.
F. Use an appropriate straight edge (triangle, template, T-square, parallel bar) for drawing straight lines. DO NOT use your scale to draw straight lines.

G. Use light pencil guidelines for uniform lettering.

H. Pick one lettering style and stick with it throughout an entire drawing.

Examples:

```
ABAB
Block

ABAB
Slanted
(Italic)

ABAB
Raised or Lowered Midlines
(Architectural Style)
```

I. Use all capital letters for standard landscape plans. Do not mix lower case letters with upper case letters.

XV. Drawing a landscape plan (Job Sheet #1)

(NOTE: It is best to start by drawing a rough sketch of the area and its existing features and then possible locations for landscaping features. Time spent planning is well worth it. An eraser is much easier to use than a shovel! After making the sketch, you can then draw a more finished landscape plan to scale.)

A. Draw the length and width of the selected site. Draw these dimensions to scale using an architect's or engineer's scale or graph paper.

(NOTE: You need to use a scale for all dimensions.)

```
+------------------+
|                  |
|                  |
|                  |
+------------------+
|                  |
```

B. Draw a north arrow to show the correct orientation of the site.

```
N
E
S
```

```
N
```

```
NORTH
```

```
NORTH
```

```
triangle
```

```
up
```

```
8
```
C. Draw existing building(s) using the exact dimensions and distances from property lines.

D. Draw existing man-made features such as sidewalks, drives, patios, fences, planters, exposed utility lines, and sewer lateral lines if known.

E. Draw existing natural features such as trees, shrubs, and borders or planting beds using appropriate symbols.

(NOTE: These should be drawn at their mature sizes to avoid overplanting.)

F. Draw the floor plan of the house. Also indicate doors, windows, porches, and steps. Indicate the height of the windows from the ground.
INFORMATION SHEET

G. Note any special features of the site such as good or bad views, drainage problems, and slopes.

H. Draw proposed landscape plants and structures according to the principles of design discussed earlier, the planned use of the area, and your knowledge of plant characteristics. Label all materials neatly.

(Note: Keep in mind the needs and wants of the home owner, the plants adapted for your locale, the mature size of the plants, and any special requirements of plants such as sun or shade, low or high maintenance, flowers or not, etc.)

Courtesy of Oklahoma State University Cooperative Extension Service.
Basic Principles of Landscape Design

Symmetrical Balance

Asymmetrical Balance

Low Objects in Foreground, Taller in Background

Sequence

Reappearance of Materials in Several Locations

Repetition
Basic Principles of Landscape Design
(Continued)

Contrast in Form

Contrast in Texture

Contrast

Proportion (Scale)
Main Areas in a Landscape Plan

- Living Area
- Service Area
- Public Area
Basic Drafting Tools

- T-Square
- Parallel Bar
- Triangles
- Scale (Several types available)
- Eraser
- Wooden Mechanical Pencils
- Pointer
- Templates
BASIC LANDSCAPE DESIGN PRINCIPLES
UNIT II

HANDOUT #1 — A NEW SITE CHECKLIST
(To Use Before Making a Landscape Plan)

☐ Is there topsoil, or only subsoil?

☐ Are there slopes that are difficult to mow?

☐ Are there large stones to be removed, or can they be incorporated into the plan?

☐ Is there building debris in the soil that would interfere with normal plant growth?

☐ Are there any drainage problems?

☐ Is the existing plant material worth saving, or should it be replaced?

☐ Is there sufficient or insufficient shade?

☐ Is the topography an asset or a liability?

☐ Will the space the property offers be sufficient to use plant material for the privacy desired?

☐ Are there overhead or underground utility lines that will interfere with the plan?

☐ Has a soil test been taken?
BASIC LANDSCAPE DESIGN PRINCIPLES
UNIT II

HANDOUT #2 — ESTABLISHED SITE CHECKLIST
(To Use Before Making a Landscape Plan)

☐ Is the lawn a complement to the property?
☐ Will the existing plant material serve the purposes you have in mind for the property?
☐ Would ground cover plant material or mulch be a better substitute in some areas of the lawn?
☐ Are there large evergreen trees which provide too much shade, especially in the winter months?
☐ Will the large trees require professional care from an arborist?
☐ Are the shrubs overgrown to the point where they spoil the aesthetics of the house, or impair the movement of pedestrian and vehicular traffic?
☐ Do any of the structural features of the property need changing?
☐ Does the soil structure and pH present a problem for a new plant material?
☐ Will utility lines or poles pose a problem for the landscaping you have in mind?
☐ Is the patio big enough to serve all the members of the family adequately?
☐ Has a soil test been taken?
BASIC LANDSCAPE DESIGN PRINCIPLES
UNIT II

HANDOUT #3 — NEW CLIENT CHECKLIST
(To Use Before Making a Landscape Plan)

☐ What particular plant materials do you like or dislike?
☐ What colors do you like or dislike?
☐ Do you like annuals or perennials?
☐ How much time are you willing to spend maintaining your landscape?
☐ How much recreation time do you and your family spend in your yard?
☐ How much social entertaining do you do outside?
☐ How much privacy do you need?
☐ Do you want a garden or fruit tree area?
☐ Do you intend to do any major construction projects such as a tennis court, swimming pool, or hobby building in the future?
☐ Do you have pets? If so, what type and how many?
☐ How much have you budgeted for landscaping?
ASSIGNMENT SHEET #1 — READ A LANDSCAPE BLUEPRINT

NAME ___________________________    SCORE ___________________________

Directions: Use a scale and the following scaled drawing to answer these questions.

1. Make a plant material list of all plants used in the design.

2. If one 50 lb. bag of mulch will cover 25 square feet 3 inches deep, how many bags will be needed? ________

3. How many linear feet of 2” x 6” redwood edging will be needed to create the planting bed on the left hand side of the drawing? ________

4. a. How far are the foundation shrubs planted from the house? ________
   b. How far apart from each other? ________ (Round to the nearest foot)

5. a. How far is the shade tree planted from the street? ________
   b. How far is it planted from the left property line? ________
BASIC LANDSCAPE DESIGN PRINCIPLES
UNIT II

ASSIGNMENT SHEET #2 — CALCULATE LAWN SQUARE FOOTAGE

NAME ___________________________  SCORE ___________________________

The square foot lawn area is calculated using the formula of length \times width = \text{sq. ft. of lawn.}

Example:

\[
\text{30'} \times 10' = 300 \text{ sq. ft.}
\]

Sometimes this is complicated by the fact that obstructions are in the way or a house sits in the middle of a property. The best way to measure the square footage in this case is to break the area up into small areas and add these up to get the total.

Example:

\[
\begin{array}{c}
\text{Area 1} = 4 \times 98 = 392 \\
\text{Area 2} = 4 \times 98 = 392 \\
\text{Area 3} = 12 \times 98 = 1176 \\
\text{Area 4} = 12 \times 98 = 1176 \\
\text{Area 5} = 70 \times 80 = 5600 \\
\text{Area 6} = 70 \times 80 = 5600 \\
\text{Area 7} = 30 \times 60 = 1800 \\
\text{Area 8} = 10 \times 20 = 200 \\
\text{Area 9} = 10 \times 20 = 200 \\
\text{TOTAL} = 16,896 \text{ sq. ft.}
\end{array}
\]
ASSIGNMENT SHEET #2

Directions: Using the drawing from Assignment Sheet #1, answer the following questions.

1. Calculate the square feet of lawn area on the drawing.

2. If the backyard is 40 feet by 70 feet and has a 20’ x 40’ vegetable garden, how many square feet is the back lawn?

3. If the backyard in #2 above also contains a 10’ x 15’ flower garden and a 10’ x 12’ patio, how many square feet is the back lawn?
ASSIGNMENT SHEET #3 — CALCULATE CUBIC MEASUREMENTS OF SOIL

NAME ___________________________     SCORE ___________________________

If you want to measure the amount of soil you have on a truck or how much you would need to fill in a particular location, use the formula length (L) × width (W) × depth (D) = cubic volume.

Example:

\[
\begin{array}{c}
27' \\
9'
\end{array}
\]

You have an area 9’ × 27’ and you need to add 1’ of soil to bring it up to grade. How many cubic feet of soil would you need?

\[
9' \times 27' \times 1' = 243 \text{ cubic feet}
\]

Since soil is ordered by the cubic yards, divide the cubic feet by 27 to get the number of cubic yards.

\[
243 \div 27 = 9 \text{ cubic yards}
\]

Directions: Answer the following questions.

1. How many cubic feet are in a cubic yard?__________

2. If you had a truck full of top soil which was 3’ high, 6’ wide, and 9’ long, how many cubic feet of topsoil would you have?__________

   How many cubic yards is this?__________

3. A pile of soil is 2’ high, 8’ wide, and 10’ long. How many cubic feet of soil is this?__________

   How many cubic yards is this?__________

95
Assignment Sheet #1

1. 1 — 5 gal. Specimen Shrub
   9 — 5 gal. Foundation Shrubs
   1 — 2" Shade Tree

2. Left bed 10' × 30' = 300 sq. ft.
   Right bed 10' × 25' = 250 sq. ft.
   550 total square footage
   550 ÷ 25 sq. ft./bag = 22 bags of mulch

3. 40 feet of redwood edging

4. a. 2½ feet or 2'-6"
    b. 5 feet

5. a. 15 feet
    b. 20 feet

Assignment Sheet #2

1. 65’ × 25’ = 1625 sq. ft. (large lawn area)
   + 17.5 × 32.5 = 568.75 sq. ft. or 568'-9" (left upper area)
   − 10’ × 30’ = 300 sq. ft. (bed)
   = 1625 + 568'-9" − 300"
   = 1893'-9" total lawn area

2. 2800 sq. ft. − 800 sq. ft. = 2000 sq. ft.

3. 2000 sq. ft. − 150 ft. − 120 ft. = 1730 sq. ft.

Assignment Sheet #3

1. 3’ × 3’ × 3’ = 27 cubic feet

2. 3’ × 6’ × 9’ = 162 sq. ft.
   162 sq. ft. ÷ 27 cubic feet = 6 cubic yards

3. 2’ × 8’ × 10’ = 160 sq. ft.
   160 sq. ft. ÷ 27 cubic feet = 5.925 cubic yards or round to 5.93 cubic yards
BASIC LANDSCAPE DESIGN PRINCIPLES
UNIT II

JOB SHEET #1 — DRAW A LANDSCAPE PLAN

A. Tools and materials

1. Site assigned by instructor
2. #3 pencils
3. White stick eraser
4. Vellum drawing paper
5. T-square
6. Drawing triangle
7. Architect's or engineer's scale
8. Circle or landscape template
9. Drawing board or drafting table
10. Pencil sharpener or lead pointer
11. Compass

B. Procedure

1. Take measurements of the physical features of the assigned site including boundaries, existing buildings or man-made features, and existing natural features such as trees and water.
2. Draw this layout to scale on the appropriate size sheet of vellum or other paper which can be blueprinted.
3. Complete a checklist of the site using Handout #1 or #2.
4. Determine client's needs using Handout #3.
5. Draw a total landscape design for this area. Include:
   a. A foundation planting for all sides of the house
   b. Corner plantings for the backyard
   c. Entrance planting for main entry of house
JOB SHEET #1

6. Label all materials used on the drawing.
7. Create a materials list from the drawing.
8. Have the drawing blueprinted at the instructor's option.
9. Check in all tools and materials.
BASIC LANDSCAPE DESIGN PRINCIPLES
UNIT II

PRACTICAL TEST
JOB SHEET #1 — DRAW A LANDSCAPE PLAN

STUDENT'S NAME _______________________________ DATE __________

EVALUATOR'S NAME _______________________________ ATTEMPT NO. _____

Instructions: When you are ready to perform this task, ask your instructor to observe the procedure and complete this form. All items listed under “Process Evaluation” must receive a “Yes” for you to receive an overall performance evaluation.

PROCESS EVALUATION

(EVALUATOR NOTE: Place a check mark in the “Yes” or “No” blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.)

The student:

1. Checked out proper tools and materials. YES NO
2. Took measurements of site. YES NO
3. Drew layout to scale. YES NO
4. Completed checklists (Handouts #1, #2, and #3). YES NO
5. Made a landscape plan for foundation, corner, and entrance. YES NO
6. Labeled all materials. YES NO
7. Made a materials list for plan. YES NO
8. Had drawing blueprinted (optional). YES NO
9. Checked in/put away tools and materials. YES NO
10. Cleaned the work area. YES NO
11. Used proper tools correctly. YES NO

EVALUATOR'S COMMENTS: ____________________________________________

__________________________________________________________________
JOB SHEET #1 PRACTICAL TEST

PRODUCT EVALUATION

(EVALUATOR NOTE: Rate the student on the following criteria by circling the appropriate numbers. Each item must be rated at least a "3" for mastery to be demonstrated. (See performance evaluation key below.) If the student is unable to demonstrate mastery, student materials should be reviewed and another product must be submitted for evaluation.)

Criteria:

- Neat and legible
  
  | 4 | 3 | 2 | 1 |

- Everything to scale
  
  | 4 | 3 | 2 | 1 |

- Followed basic design principles
  
  | 4 | 3 | 2 | 1 |

- Plants are correctly labeled
  
  | 4 | 3 | 2 | 1 |

- Plants are suited to design and locale
  
  | 4 | 3 | 2 | 1 |

- Creativity shown

EVALUATOR'S COMMENTS: ____________________________


PERFORMANCE EVALUATION KEY


<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Skilled — Can perform job with no additional training.</td>
</tr>
<tr>
<td>3</td>
<td>Moderately skilled — Has performed job during training program; limited additional training may be required.</td>
</tr>
<tr>
<td>2</td>
<td>Limited skill — Has performed job during training program; additional training is required to develop skill.</td>
</tr>
<tr>
<td>1</td>
<td>Unskilled — Is familiar with process, but is unable to perform job.</td>
</tr>
</tbody>
</table>

(EVALUATOR NOTE: If an average score is needed to coincide with a competency profile, total the designated points in “Product Evaluation” and divide by the total number of criteria.)
BASIC LANDSCAPE DESIGN PRINCIPLES
UNIT II

TEST

NAME_________________________ SCORE_________________________

1. Match the terms on the right with the correct definitions.
   _____a. Center of interest 1. Asymmetrical
   _____b. Same number of items on each side of a point 2. Balance
   _____c. A list of all plant materials and other supplies necessary to install a landscape plan 3. Blueprint
   _____d. Reproduction of a scaled drawing using special paper and machines to produce a white background print with blue lines or a blue background print with white lines 4. Focal point
   _____e. Selection and placement of plants in order to develop spaces around buildings and houses for a maximum of beauty and utility with a minimum of maintenance 5. Foundation plantings
   _____f. Uneven number of items on each side of a point 6. Landscape design
   _____g. Plants at the base of a building 7. Materials list
   _____h. Making a drawing representative of the area of which it is a picture by letting 1 inch on paper represent a definite number of feet on the ground 8. Scale
   _____i. Even distribution of mass on each side of an axis 9. Symmetrical
   _____j. Xerox copy

2. State three of the guiding principles of landscape design.
   a. ________________________________________________________________
   b. ________________________________________________________________
   c. ________________________________________________________________
3. Match the elements in a landscape design on the right with the correct descriptions.

_____a. Gives the element shape; may be square, rectangular, circular, triangular, or irregular

_____b. The area allowed to work with

_____c. Visual and tactile surface characteristics and appearance

_____d. Attracts the eye and provides contrast as well as sets the mood of the design

4. Match the basic principles of landscape design with the correct descriptions.

_____a. Refers to a logical order in the placement of plants based on their mature size and their rate of growth.

_____b. A reappearance of the same plant form throughout the landscape setting.

_____c. Is the art of keeping all of the elements of the landscape in relation to each other.

_____d. May be symmetrical or asymmetrical.

_____e. May be formal or informal.

_____f. Is desired to break what otherwise might be considered monotonous; is attained by using plants of different sizes, colors, and foliage characteristics.

_____g. The size of plant materials should be complementary to the size of other plant materials used nearby and to the size of the structure.

_____h. Too much of this will make the scene appear like a circus with too many elements vying for attention.

5. Select from a list the general objectives for developing a landscape plan.

_____a. To provide natural, easy, and safe approaches

_____b. To aid in remodeling the home's interior
TEST

_____ c. To aid in remodeling the home's exterior
_____ d. To provide privacy for the family
_____ e. To secure attractive grounds
_____ f. To evaluate a home's plumbing and air-conditioning needs
_____ g. To provide a convenient, well-arranged, attractive service area
_____ h. To provide for the recreational needs of the family

6. List two advantages of having a landscape plan.
   a. _____________________________________________
   b. _____________________________________________

7. State the best time to develop a landscape plan.

8. Distinguish between the main areas to be developed in a landscape plan by placing the following letters next to the correct descriptions.
   • S—Service area
   • PR—Private area
   • PU—Public area

   _____ a. Make the lawn open and spacious in proper proportion to the area available.
   _____ b. Should contain the garage and turning area.
   _____ c. Tools, lawn mowers, and other equipment can be stored in a shed which is easily screened from view with fencing or plant material.
   _____ d. Includes such features as the barbecue pit, children's playground, flower garden, specimen shrubs, birdbath, or rock garden.
   _____ e. Should contain the vegetable garden, greenhouse, propagating frames, compost pile, and potting bench if used.
   _____ f. Balance the plantings, both trees and shrubs, about an imaginary line through the entrance of the home or property.
   _____ g. Is mainly the recreation area of the family.
TEST

9. Complete statements concerning the basic planting groups found in the public area by circling the correct words.
   
a. Entrance planting should emphasize the entrance and make it more (mysterious, inviting).

b. Corner plantings should grow (shorter, taller) than those at the entrance.

c. Corner plantings should (soften, emphasize) the sharp angles of the corners of the house.

d. Foundation plantings should (break, continue) the monotony of a wide expanse of blank wall.

10. List three common mistakes made in foundation plantings.
   
a. 

b. 

c. 

11. Identify the following basic drafting tools used in making a landscape plan.

   a. 

   b. 

   a. 

   b. 

   a. 

   b. 

   a. 

   b. 

   a. 

   b. 

   a. 

   b. 

   a. 

   b. 

   a. 

   b. 

   a. 

   b. 

   a. 

   b. 

   a. 

   b. 

   a. 

   b. 

   a. 

   b. 

   a. 

   b. 

   104
12. Answer the following questions on using a scale by filling in the blanks.

a. Drawing to scale means letting 1 inch on paper represent a definite number of feet on the __________.

b. A scale commonly used is __________.

c. You will need a ruler, __________, or cross-section paper to draw landscape features to scale.
13. Identify common symbols used on landscape plans.

![Diagram of landscape plan]

a. ___________________________  b. ___________________________

c. ___________________________  d. ___________________________

e. ___________________________  f. ___________________________

g. ___________________________  h. ___________________________

14. Select true statements concerning good drafting habits by placing a “T” next to the true statements and an “F” by the false ones.

_____a. Keep your instruments and equipment clean.

_____b. Keep the leads on your pencils dull so they won’t smear.

_____c. Make sure your hands are clean before you start drafting.

_____d. Always slide equipment such as triangles and templates when moving them across your drawing sheet.

_____e. Store drawings folded up. Rolling them takes too much room.
TEST

_____f. Use light pencil guidelines for uniform lettering.

_____g. Use your scale for drawing straight lines.

_____h. Use mixed upper and lower case letters when lettering a standard landscape plan.

15. Arrange in order the steps in drawing a landscape plan by placing the correct numbers (1-8) in the appropriate blanks.

_____a. Draw a north arrow to show the correct orientation of the site.

_____b. Draw existing man-made features such as sidewalks, drives, patios, fences, planters, exposed utility lines, and sewer lateral lines if known.

_____c. Draw proposed landscape plants and structures according to the principles of design, the planned use of the area, and your knowledge of plant characteristics. Label all materials neatly.

_____d. Draw the length and width of the selected site. Draw these dimensions to scale using an architect’s or engineer’s scale or graph paper.

_____e. Draw existing building(s) using the exact dimensions and distance from property lines.

_____f. Note any special features of the site such as good or bad views, drainage problems, and slopes.

_____g. Draw existing natural features such as trees, shrubs, and borders or planting beds using appropriate symbols.

_____h. Draw the floor plan of the house. Also indicate doors, windows, porches, and steps. Indicate the height of the windows from the ground.

(NOTE: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

16. Read a landscape blueprint. (Assignment Sheet #1)

17. Calculate lawn square footage. (Assignment Sheet #2)

18. Calculate cubic measurements of soil. (Assignment Sheet #3)

19. Demonstrate the ability to draw a landscape plan. (Job Sheet #1)
BASIC LANDSCAPE DESIGN PRINCIPLES
UNIT II

ANSWERS TO TEST

1. a. i. f. 1
   b. 9 g. 5
   c. 7 h. 8
   d. 3 i. 2
   e. 6

2. Any three of the following:
   a. Simplicity
   b. Beauty
   c. Convenience
   d. Function
   e. Maintenance

3. a. 2
   b. 4
   c. 5
   d. 1

4. a. 5 e. 1
   b. 4 f. 2
   c. 3 g. 3
   d. 1 h. 2

5. a, d, e, g, h

6. a. Serves as a guide for long-range development of the home grounds.
   b. Saves time, money, and effort.

7. Either of the following:
   a. After a careful survey of the area and surrounding properties are made.
   b. After the desires and purposes of the occupants have been examined.

8. a. PU d. S
    b. S f. PU
    c. S g. PR
    d. PR
ANSWERS TO TEST

9.  a. Inviting
    b. Taller
    c. Soften
    d. Break

10. Any three of the following:
   a. Over-planting
   b. Planting too close to buildings
   c. Spacing plants too close together
   d. Using plants not suited to the building
   e. Using plants not adapted for the local climate

11. a. Triangles
    b. Templates
    c. T-square
    d. Scale
    e. Pencils
    f. Eraser

12. a. Ground
    b. Any one of the following: 1"=4', 1"=8', 1"=10', 1"=20'
    c. Engineering or architectural scale

13. a. Shrub border
    b. Steps
    c. Narrowleaf ever-een
    d. Brick sidewalk
    e. Ground cover
    f. Deciduous trees
    g. Fence
    h. Gate
    i. Stepping stones
    j. Concrete or asphalt driveway

14. a. T    e. F
    b. F    f. T
    c. T    g. F
    d. F    h. F
ANSWERS TO TEST

15.  a. 2  e. 3
     b. 4  f. 7
     c. 8  g. 5
     d. 1  h. 6

16.-19. Evaluated to the satisfaction of the instructor
IRRIGATION DESIGN AND INSTALLATION
UNIT II

UNIT OBJECTIVE

After completion of this unit, the student should be able to describe the basics of drainage, irrigation scheduling, wiring, design, and installation of an irrigation system. Competencies will be demonstrated by completing the assignment sheet, job sheets, and the unit tests with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to irrigation design and installation with the correct definitions.
2. Distinguish between the two types of drainage systems which may be needed in a landscape.
3. Select the basic methods for controlling surface drainage.
4. List factors affecting types of subsurface drainage systems.
5. Match types of subsurface drainage systems with the correct descriptions.
6. Complete statements concerning the parts of a subsurface drain.
7. Complete a chart of soil textures and their water intake and holding rates.
8. Select factors affecting irrigation scheduling.
9. Select true statements concerning the fundamentals of good irrigation design.
OBJECTIVE SHEET

10. Distinguish between the common sprinkler head spacing patterns.

11. Design a simple irrigation system. (Assignment Sheet #1)

12. Demonstrate the ability to:
   a. Wire a controller and valve. (Job Sheet #1)
   b. Use a flow gauge. (Job sheet #2)
   c. Install an irrigation system. (Job Sheet #3)
IRRIGATION DESIGN AND INSTALLATION
UNIT III

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to class to supplement/reinforce information provided in this unit of instruction.

   (NOTE: This activity should be completed prior to the teaching of this unit.)

B. Make a transparency from the transparency master included with this unit.

C. Provide students with objective sheet.

D. Discuss unit and specific objectives.

E. Provide students with information and assignment sheets.

F. Discuss information and assignment sheets.

   (NOTE: Use the transparency to enhance the information as needed.)

G. Provide students with job sheet.

H. Discuss and demonstrate the procedure outlined in the job sheet.

I. Integrate the following activities throughout the teaching of this unit:

   1. Collect as many data sheets on sprinkler equipment as you can. Have students compare and study the features available.

   2. Have a speaker from an irrigation sales and installation company.

   3. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

J. Give test.

K. Evaluate test.

L. Reteach if necessary.

RESOURCES USED IN DEVELOPING THIS UNIT


RESOURCES USED IN DEVELOPING THIS UNIT


SUGGESTED SUPPLEMENTAL RESOURCES

A. Irrigation Design Literature available from your local Rain Bird Distributor or

Rain Bird Sales, Inc., Turf Division
145 North Grand Avenue
Glendora, CA 91740
818/963-9311

1. Lawn Sprinkler System Design Guide, D30845

2. Landscape Drip Design Manual, D38829

3. Equipment Installation Details, D38811

4. Turf Design Manual, D38470
SUGGESTED SUPPLEMENTAL RESOURCES

B. VHS Videotapes also available from Rain Bird
   1. *Residential Controllers/Valves*, D38822
   2. *Landscape Drip Design*, D38828
   4. *Turf Design*, D38855

C. Sound filmstrips on landscape irrigation systems available from
   Vocational Education Productions
   California Polytechnic State University
   San Luis Obispo, CA 93407
   800/235-4146
   1. *System Design*, 1-295-201G
   3. *System Installation*, 1-295, 203G
   4. *System Conservation*, 1-295, 204G

D. Brochure — *How to Install an Underground Sprinkler System, Without Digging a Trench*. Available from:
   The Charles Machine Works, Inc. (Ditch Witch)
   P.O. Box 66
   Perry, OK 73077-0066
   405/336-4402
IRRIGATION DESIGN AND INSTALLATION
UNIT III

INFORMATION SHEET

I. Terms and definitions

A. Backflow — Water which drains back or is siphoned back from irrigation lines

(NOTE: Backflow preventers or antisiphon devices are commonly used on lines to prevent backflow water which could contain insecticides, fertilizers, or bacteria from contaminating the domestic water supply.)

B. Circuit — Section of sprinkler heads operating at one time and supplied with water and pressure by one valve

C. Cycle — One complete run of a controller through all programmed stations

D. Distribution curve — Curve showing the rate of water application by a sprinkler at various points along the radius

![Distribution Curve Diagram]

E. Elevation gain — Pressure gained as water is used downhill from its source

(NOTE: This is figured at the rate of 0.433 pounds per square inch for each foot of elevation.)

F. Elevation loss — Pressure lost as water is used uphill from its source

G. Friction loss — That loss incurred when water is moving through an enclosure; reflects smoothness of pipe, length of pipe, orifice sizes in components, mechanical restrictions, and volume of water being moved

H. Gallons per minute (G.P.M.) — Measures the standard flow of water in irrigation design

I. Head-to-head spacing — Spacing of sprinklers so that the radius of the sprinklers match the spacing of them

J. Heat reflection — The reflection or throwing back of heat from objects in the landscape such as concrete and buildings which tends to increase the soil temperature
INFORMATION SHEET

K. Infiltration rate — Rate at which soil can absorb water; expressed in inches per hour

(NOTE: This is important because if the precipitation rate exceeds the infiltration rate, runoff and erosion will occur.)

L. Microclimates — The environmental conditions of a small place or region which is affected by very minute changes

M. Multicycling — Programs of many short watering cycles rather than one long cycle

N. Overlap — The amount one sprinkler pattern overlaps another one when installed in a pattern

O. Overspaced — Sprinkler heads that are designed or installed farther apart than they should be

P. Permeability of soil — The ability of soil to let water pass through it

Q. Pounds per square inch (P.S.I.) — Measures the standard pressure of water in irrigation design

R. Precipitation rate — Rate at which water is applied to the soil by the sprinkler system; expressed in inches per hour

Example: System applies water 1" deep over the lawn or shrub area in 1 hour. Precipitation rate — 1" per hour.

S. Pressure — The force of water

T. Program — The watering schedule set up by the turf manager which regulates which areas receive water for how long and how often

U. Runoff — Water which is not absorbed by the turf to which it is applied; occurs when there is a severe slope or when water is applied at too great a rate or for too long a time

V. Spacing — The distance between sprinkler heads

W. Static pressure — The pressure of water when it is not moving

X. Swale — A gradient or inclined surface area which slopes downward on one side only

Y. Underspaced — Sprinkler heads that are spaced closer than they need to be
INFORMATION SHEET

Z. Uniform slope — A gradient or inclined surface area which slopes at a uniform angle and degree

AA. Velocity — The speed at which water travels

Definitions courtesy of The Toro Company

II. Types of drainage systems which may be needed in a landscape

A. Surface drainage — Controlled removal of surface runoff from rain, irrigation, spring thaw, or hillside seeps

B. Subsurface drainage — Removal of underground water from the soil

III. Methods for controlling surface drainage

A. Alter contour of the ground to divert water away from depressions

1. Create drainage channels which use gravity to channel water to natural outlets before it reaches the depressions.

2. Create drainage channels which provide a path through which water can flow out of the depressions.

3. On a flat terrain or where water can’t flow to a natural outlet, channel water to an area above or below ground where it can be pumped away.

B. Modify soil components to encourage vertical percolation (drainage) through the soil.

(Note: This may involve removing the natural topsoil to a depth of 1-2 feet and replacing it with a mixture of sand, soil, and peat to provide a growth medium for turf, resist compaction, and permit rapid natural vertical percolation of the water. This system must be coupled with a subsurface drainage system to be effective.)

IV. Factors affecting types of subsurface drainage systems

A. Arrangement of drains

B. Slope

C. Terrain
INFORMATION SHEET

V. Types of subsurface drainage systems

A. Random drain — Used to drain several locations in an otherwise well-drained area
B. Gridiron system — Used to drain areas with a uniform slope
C. Herringbone system — Used to drain swale areas
D. Interceptor drains — Used to drain areas wet by hillside seepage

VI. Parts of a subsurface drain

A. Inlet
   1. Water must enter freely.
   2. Must be constructed of durable material such as brick, stone, concrete, sewer tile, or metal pipe.
   3. Protective grating must be placed over inlet to allow water in but keep large objects out.
   4. Inlet must be at a higher elevation than outlet.
B. Drain pipe — Can be made from concrete tile, clay tile, or corrugated plastic tubing
C. Outlet
   1. Water must flow out freely.
   2. Must be maintained frequently to check for broken or crushed pipe, deterioration due to freezing or thawing, displacement of tiles, or erosion of soil from the outlet

VII. Soil textures and their water intake and holding rates (Translucency 1)

<table>
<thead>
<tr>
<th>Soil Texture</th>
<th>Water Intake Rate</th>
<th>Holding Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Coarse textured soils (sandy soils)</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>B. Medium textured soils (loamy soils)</td>
<td>Medium</td>
<td>High to medium</td>
</tr>
<tr>
<td>C. Fine textured soils (clay soils)</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>
VIII. Factors affecting irrigation scheduling

(NOTE: These must be considered when determining how much and how often water should be applied.)

A. Permeability of soil
   1. If soil is not very permeable, water should be applied in smaller quantities with more frequent applications to avoid runoff.
   2. If soil is more permeable, water can be applied less often and in greater amounts.

B. Heat reflection and soil temperature — In an area where soil temperature and heat reflection are greater, evaporation of water from the soil will be greater and the total amount of water needed will be greater.

C. Wind — If wind is more prevalent in a given area, more water must be applied to compensate for wind drift and extra wind evaporation.

D. Microclimates — The effect landscaping has on the overall climate must be taken into consideration when determining water needs.
   Example: A berm may alter the situation by causing the East and South sides of the berm to get more sunlight and thus requiring more water due to evaporation.

E. Environmental factors
   1. Climate — Warmer areas require more water, and areas with low humidities require more water.
   2. Surrounding vegetation — Plants nearby slow down the evaporative losses.
   3. Surrounding buildings — Buildings nearby raise the temperature and increase water needs.

F. Precipitation — The amount of rainfall that occurs naturally in an area affects how much water is needed from the irrigation system.

G. Use — The use of the area should be known so the irrigation will turn on and off at the appropriate times.

Examples: Residential and commercial areas are watered in the early morning before people are using the areas.
IX. Fundamentals of good irrigation design

A. Design the irrigation system so that the area is watered completely and uniformly.

B. Use full circle lawn heads for most efficient coverage of turf.

C. Use part circle heads along property boundaries, building walls and windows, drives, and other non-turf areas to keep from wasting water and to avoid inconvenience from wet walkways.

D. In general, plan to irrigate ornamentals separately from turf since their water requirements and growing environments are different.

(Note: Ornamentals usually have deeper roots that require longer cycles for adequate water penetration. Ornamentals also are usually mulched which increases their holding rates. Excessive watering of ornamentals can cause as many problems as deficient watering.)

E. Plan to use shrub sprays, bubblers, or drip irrigation on ornamentals.

F. Do not exceed the manufacturer's recommendations for head spacings.

1. Underspacing heads (too close) is not efficient use of water.

2. Overspacing heads (too far apart) results in dry spots.
X. Sprinkler head spacing patterns

A. Triangular spacing

1. All heads are placed an equal distance from each other in an equilateral triangle pattern.

   ![Diagram of triangular spacing]

   Each side of the triangle is equal.

2. The distance between heads is usually
   
   a. 70% of the total wetted diameter for spray heads
   
   b. 60% of the total wetted diameter for rotary heads

   Example: For a sprinkler with a 10' radius (20' diameter), the distance between spray heads should be 70% of 20' which is 14'. The distance between rotary heads should be 60% of 20' which is 12'

   ![Diagram of 70% and 60% triangular spacing]
INFORMATION SHEET

3. The spacing between rows is less than the spacing between sprinklers. Multiply .87 times the recommended spacing to determine the altitude of the equilateral triangle which is the distance between rows.

Example: $14' \times .87 = 12'$ Altitude

4. Triangular spacing is commonly used because it provides a minimum of unnecessary overlap and uses a minimum number of heads for complete coverage.

B. Square spacing

1. All heads are placed an equal distance from each other in a square pattern.
2. The distance between heads is usually
   a. 50% of the total wetted diameter for stream-type jet sprays
   b. 55% of the total wetted diameter for rotary heads
   c. 60% of the total wetted diameter for spray heads

   Example: For a sprinkler with a 10' radius (20' diameter)

   ![Diagram showing 50% Square Spaing, 55% Square Spacing, and 60% Square Spacing]

3. The spacing between rows is equal to the spacing between sprinklers.

4. Square spacing is used less because it requires more heads for complete coverage; however, it is well suited for small square or rectangular areas.

   (NOTE: In many residential landscapes, there are small or odd-shaped areas that do not adapt to any pattern. In these cases "fill-in" heads are used for complete and uniform coverage.)
Soil Textures and their Particles

A diagram showing the classification of soil textures based on the percentage of sand, silt, and clay. The diagram uses a triangular graph with axes for percent sand, percent silt, and percent clay. Different textures such as sandy loam, sandy clay loam, loam, silty clay loam, and clay are marked and classified within the graph.
IRRIGATION DESIGN AND INSTALLATION
UNIT III

ASSIGNMENT SHEET #1 — DESIGN A SIMPLE IRRIGATION SYSTEM

NAME ___________________________               SCORE ___________________________

Directions: Design a simple irrigation system for the landscape plan you drew in the last unit, "Basic Landscape Design Principles" or another area selected by your instructor.

A. Measure the water capacity in gallons per minute (gpm) to determine the maximum flow of water available to the irrigation system from the water supply.

1. **Find out the size of your water meter** — Usually stamped on the side of the meter or call the water company.

2. **Measure the size of your service line** — Measure the pipe directly after the meter by wrapping a string around the pipe and measuring the length of the string; use the table below to determine the size of the service line.

   **Table 1: Size of Service Line**

<table>
<thead>
<tr>
<th>Length of string</th>
<th>2(\frac{3}{4})&quot;</th>
<th>3(\frac{1}{4})&quot;</th>
<th>3(\frac{1}{2})&quot;</th>
<th>4&quot;</th>
<th>4(\frac{3}{4})&quot;</th>
<th>5&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of service line — Copper</td>
<td>(\frac{3}{4})&quot;</td>
<td>1&quot;</td>
<td>1(\frac{1}{4})&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size of service line — Galvanized</td>
<td>(\frac{3}{4})&quot;</td>
<td>1&quot;</td>
<td>1(\frac{1}{4})&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. **Measure static water pressure** by using a pressure gauge or calling the water company.
ASSIGNMENT SHEET #1

4. Use the table below to determine water capacity based on the 3 factors you measured above.

Table II: Capacity in gallons per minute

<table>
<thead>
<tr>
<th>Size of Water Meter</th>
<th>Static Water Pressure (PSI)</th>
<th>Gallons Per Minute (GPM) Subtract 5 GPM for Galvanized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>3/8&quot; x 1/2&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/8&quot; x 3/4&quot;</td>
<td>2.0</td>
<td>3.5</td>
</tr>
<tr>
<td>3/4&quot; x 1&quot;</td>
<td>3.5</td>
<td>5.0</td>
</tr>
<tr>
<td>3/4&quot; x 1 1/4&quot;</td>
<td>6.0</td>
<td>7.5</td>
</tr>
<tr>
<td>3/4&quot; x 1&quot;</td>
<td>7.5</td>
<td>10.0</td>
</tr>
<tr>
<td>3/4&quot; x 1 1/4&quot;</td>
<td>10.0</td>
<td>12.0</td>
</tr>
<tr>
<td>3/4&quot; x 1&quot;</td>
<td>6.0</td>
<td>7.5</td>
</tr>
<tr>
<td>1&quot; x 3/4&quot;</td>
<td>6.0</td>
<td>7.5</td>
</tr>
<tr>
<td>1&quot; x 1&quot;</td>
<td>10.0</td>
<td>12.0</td>
</tr>
<tr>
<td>1&quot; x 1 1/4&quot;</td>
<td>12.0</td>
<td>15.5</td>
</tr>
</tbody>
</table>

(NOTE: Pressures in new neighborhoods are usually greater than the planned future. Contact your local water authority for the planned pressures.

B. Draw a plot plan of the area or use the landscape plan that you have already drawn for Unit II. Make sure all of the necessary information is included.

1. Measure the area with a tape measure.

2. Draw a diagram of it to scale on a grid sheet.
   a) Start from outside and work inward.
   b) Outline all buildings.
   c) Show walks, drives, patios, etc.
   d) Locate trees, flagpoles, and other obstacles.
   e) Locate ground cover, grass, and flower beds.
   f) Locate water meter and service line.
   g) Show all underground lines and pipes.
   h) Re-check measurements for accuracy.
C. Check local codes and permits affecting irrigation systems. Contact water company or the city authority.

(NOTE: Codes may state that backflow preventers are required as well as what types of pipe materials, construction materials, and procedures may or may not be used.)

D. Obtain information about the types of equipment available and their features.
   1. Sprinkler heads
   2. System controllers
   3. Valves
   4. Pipe and fittings

E. Obtain the following specifications about sprinklers:
   1. Uses — Turf, shrubs
   2. Minimum and maximum spacing between heads
   3. Spray pattern — Full circle, part circle, special
   4. Water use (gpm)
   5. Water pressure required for operation (psi)

F. Select and position sprinkler heads.
   1. Divide the lawn into areas and label according to its surface cover (grass, shrubs, flowers, ground cover).
   2. Use the equipment specifications you learned to decide what kind of heads are needed in each area.

G. Divide the system into circuits. The total gpm for each circuit must be no greater than the usable capacity of the supply.

H. Locate valves.

I. Lay out the piping on your plan drawing, and choose the correct pipe sizes.
IRRIGATION DESIGN AND INSTALLATION
UN:T III

ANSWERS TO ASSIGNMENT SHEET #1

The answers will depend on the information given. The instructor may choose to make up an imaginary situation or you may assign an area from the school campus or the students' homes. Look for understanding of basic concepts.
IRRIGATION DESIGN AND INSTALLATION
UNIT III

JOB SHEET #1 — WIRE A CONTROLLER AND VALVE

A. Tools and materials
1. Knife and wire strippers
2. Screwdriver
3. Long-nose pliers
4. Electrician's tape
5. Pliers
6. Valves
7. Controller (timer)
8. Wire for common ground (white)

B. Procedure
1. Place the valve down and notice there are two wires coming from it.
2. Straighten the wires and bring toward the controller.
   (NOTE: Repeat these 2 steps for all valves being used.)
3. Take one wire from each valve and twist these together.
4. Prepare a “pigtail” (a short piece of wire about 1' long) and twist this together with the already twisted valve wires.
5. Wrap the connection with tape.
6. Connect the “pigtail” to the common terminal on the controller (timer).
7. Take the other wire from each valve and connect one wire per terminal to the other terminals in sequence.
8. Plug in the controller timer.
9. Test the system by electronically opening and shutting each valve in sequence.
IRRIGATION DESIGN AND INSTALLATION
UNIT III

JOB SHEET #2 — USE A FLOW GAUGE

A. Tools and materials
   1. Flow gauge
   2. Fittings necessary to connect to gauge
   3. Water source

B. Procedure
   1. Connect flow gauge to water source using any necessary fittings.
   2. Turn water on.
   3. Read gallons per minute (GPM) on dial — This is the gallons per minute that flows out of the water source at maximum pressure.
IRRIGATION DESIGN AND INSTALLATION
UNIT III

JOB SHEET #3 — INSTALL AN IRRIGATION SYSTEM

A. Tools and materials
   1. Hacksaw
   2. Knife
   3. Screwdriver
   4. Pipe wrench
   5. PVC solvent, primer, rags, and small paint brush
   6. PVC pipe
   7. Sprinkler heads
   8. System controller (timer)
   9. Electric valves
  10. Compression tee
  11. Hammer
  12. String
  13. Wooden stakes
  14. Shovel
  15. Backflow preventer
  16. PVC pipe and fittings
  17. Pipe plugs
  18. Gravel
  19. Water hose
  20. PVC cutter
B. Procedure

(Note: Some of the steps may have to have additional instructions from the manufacturer of the components to accommodate different designs of system. The instructor will provide additional information in this event. The following is a generalized installation procedure.)

1. Connect the sprinkler system to the water supply.
   a. Turn off the water supply.
   b. Cut into the service line.
      (Note: A plumber may be needed.)
   c. Remove a section of pipe large enough to put in a compression tee.
   d. Slip the tee over each end of the cut pipe.
   e. Tighten the compression nuts.
   f. Install a short section of pipe coming out of the tee.
   g. Attach a shut-off valve and then a backflow preventer to this section of pipe.

2. Use stakes and string to locate where the pipe goes and dig a trench for the main line.

3. Use stakes to mark the locations of the valves as per design. Protect valves by sheltering them in valve boxes.

4. Attach the pipe main line to the service line by running pipe from valve to valve.

5. Connect control valves to the main line using manifold "tees."

6. Flush the main line by turning on the water and running until water runs clear. Remember to let the solvent on the pipes dry first.

7. Flush the valves in the same way. Open the valves by using the manual bleed finger screws.

8. Install the automatic system controller using the technique you learned in Job Sheet #1.

9. Install the circuits one at a time by using the procedures you have learned so far.

10. Mark the location of the sprinkler heads with stakes.
JOB SHEET #3

11. Dig trenches for the pipe connecting the sprinkler heads to the valve.

12. Lay the connecting pipe.

13. At each stake where a sprinkler head belongs, put a tee or elbow in the line and attach a riser.

FIGURE 1

14. Install automatic drain valves at low points in each circuit.
   a. Attach the automatic drain valve to a reducer tee.
   b. Attach the reducer tee to a short section of pipe sloped downward at a 45° angle.
   c. Cover the short section of pipe with a bed of packed gravel to allow for proper drainage.

15. Flush the system by sealing all the risers except the end riser with pipe plugs and turning on the water and flushing until the water runs clear.

16. Install sprinkler heads to risers.
   a. Remove pipe plugs.
   b. Attach sprinkler heads to risers.
c. Check the height of the heads.

FIGURE 2

![Diagram showing too high and proper height for heads.]

d. Cut the risers if necessary to adjust the head height.

FIGURE 3

![Diagram showing riser cut to proper height.]

17. Turn on the water and open the control valve to check the proper operation of the system.

18. Backfill trenches and clean up area.
IRRIGATION DESIGN AND INSTALLATION
UNIT III

PRACTICAL TEST
JOB SHEET #1 — WIRE A CONTROLLER AND VALVE

INSTRUCTIONS: When you are ready to perform this task, ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

(EVALUATOR NOTE: Place a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.)

The student:

1. Checked out proper tools and materials.
2. Placed valves and controllers and ran wires.
3. Twisted common wires together.
4. Attached "pigtail" correctly to twisted wires.
5. Attached "pigtail" to common on controller box.
6. Attached one wire per terminal to the other terminals in sequence (for each valve).
7. Plugged in the controller timer.
8. Tested the system by electronically opening and shutting each valve in sequence.
10. Cleaned the work area.
11. Used proper tools correctly.

EVALUATOR'S COMMENTS: ____________________________

__________________________________________
JOB SHEET #1 PRACTICAL TEST

PRODUCT EVALUATION

(EVALUATOR NOTE: Rate the student on the following criteria by circling the appropriate numbers. Each item must be rated at least a "3" for mastery to be demonstrated. (See performance evaluation key below.) If the student is unable to demonstrate mastery, student materials should be reviewed and another product must be submitted for evaluation.)

Criteria:

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve works correctly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection points are tight and insulated</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proper wires are attached to proper places</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EVALUATOR'S COMMENTS:

__________________________________________________________________________

PERFORMANCE EVALUATION KEY

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Skilled — Can perform job with no additional training.</td>
</tr>
<tr>
<td>3</td>
<td>Moderately skilled — Has performed job during training program; limited additional training may be required.</td>
</tr>
<tr>
<td>2</td>
<td>Limited skill — Has performed job during training program; additional training is required to develop skill.</td>
</tr>
<tr>
<td>1</td>
<td>Unskilled — Is familiar with process, but is unable to perform job.</td>
</tr>
</tbody>
</table>

(EVALUATOR NOTE: If an average score is needed to coincide with a competency profile, total the designated points in “Product Evaluation” and divide by the total number of criteria.)

137
IRRIGATION DESIGN AND INSTALLATION
UNIT III

PRACTICAL TEST
JOB SHEET #2 — USE A FLOW GAUGE

STUDENT'S NAME ______________________________ DATE __________

EVALUATOR'S NAME ________________________ ATTEMPT NO. _____

Instructions: When you are ready to perform this task, ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

(EVALUATOR NOTE: Place a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.)

The student:

1. Checked out proper tools and materials. YES NO
2. Connected flow gauge to water source. _______ _______
3. Turned on water. _______ _______
4. Read gallons per minute from gauge. _______ _______
5. Checked input away tools and materials. _______ _______
6. Cleaned the work area. _______ _______
7. Used proper tools correctly. _______ _______
8. Practiced safety rules throughout procedure. _______ _______

EVALUATOR'S COMMENTS: ___________________________________________________________________
JOB SHEET #2 PRACTICAL TEST

PRODUCT EVALUATION

(EVALUATOR NOTE: Rate the student on the following criteria by circling the appropriate numbers. Each item must be rated at least a “3” for mastery to be demonstrated. (See performance evaluation key below) If the student is unable to demonstrate mastery, student materials should be reviewed and another product must be submitted for evaluation.)

Criteria: 4  3  2  1

Read the correct gallons per minute on the dial

EVALUATOR’S COMMENTS:

PERFORMANCE EVALUATION KEY

4 — Skilled — Can perform job with no additional training.
3 — Moderately skilled — Has performed job during training program; limited additional training may be required.
2 — Limited skill — Has performed job during training program; additional training is required to develop skill.
1 — Unskilled — Is familiar with process, but is unable to perform job.

(EVALUATOR NOTE: If an average score is needed to coincide with a competency profile, total the designated points in “Product Evaluation” and divide by the total number of criteria.)
IRRIGATION DESIGN AND INSTALLATION
UNIT III

PRACTICAL TEST
JOB SHEET #3 — INSTALL AN IRRIGATION SYSTEM

STUDENT'S NAME ____________________________ DATE __________
EVALUATOR'S NAME ____________________________ ATTEMPT NO. _____

Instructions: When you are ready to perform this task, ask your instructor to observe the procedure and complete this form. All items listed under “Process Evaluation” must receive a “Yes” for you to receive an overall performance evaluation.

PROCESS EVALUATION

(EVALUATOR NOTE: Place a check mark in the “Yes” or “No” blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.)

The student: YES NO

1. Checked out proper tools and materials.
2. Connected sprinkler system to the water supply correctly.
3. Located and dug pipe trenches.
4. Located and placed valves.
5. Attached pipe main line to the service line.
6. Connected control valves to the main line.
7. Flushed the main line.
8. Fluid the valves.
9. Installed the automatic system controller.
10. Installed circuits.
11. Marked location of sprinkler heads.
12. Dug trenches for the pipe connecting the sprinkler heads to the valve.
13. Laid connecting pipe.
15. Installed automatic drain valves.
16. Flushed the system.
17. Installed sprinkler heads to risers.
18. Checked the system for proper operation.
20. Cleaned the work area.
22. Used proper tools correctly.
23. Practiced safety rules throughout procedure.

EVALUATOR'S COMMENTS: ____________________________

__________________________________________
## JOB SHEET #3 PRACTICAL TEST

### PRODUCT EVALUATION

(EVALUATOR NOTE: Rate the student on the following criteria by circling the appropriate numbers. Each item must be rated at least a "3" for mastery to be demonstrated. (See performance evaluation key below.) If the student is unable to demonstrate mastery, student materials should be reviewed and another product must be submitted for evaluation.)

Criteria:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>No leaks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heads proper height</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proper coverage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heads operate correctly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drain valves operate correctly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe is correct depth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct backfill</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neat and to original (correct) grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EVALUATOR'S COMMENTS: __________________________________________

### PERFORMANCE EVALUATION KEY

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Skilled — Can perform job with no additional training.</td>
</tr>
<tr>
<td>3</td>
<td>Moderately skilled — Has performed job during training program; limited additional training may be required.</td>
</tr>
<tr>
<td>2</td>
<td>Limited skill — Has performed job during training program; additional training is required to develop skill.</td>
</tr>
<tr>
<td>1</td>
<td>Unskilled — Is familiar with process, but is unable to perform job.</td>
</tr>
</tbody>
</table>

(EVALUATOR NOTE: If an average score is needed to coincide with a competency profile, total the designated points in "Product Evaluation" and divide by the total number of criteria.)
1. Match the terms on the right with the correct definitions.

   ______a.  Sprinkler heads that are designed or installed farther apart than they should be
   ______b.  The distance between sprinkler heads
   ______c.  One complete run of a controller through all programmed stations
   ______d.  The pressure of water when it is not moving
   ______e.  The force of water
   ______f.  The speed of water
   ______g.  The watering schedule set up by the turf manager which regulates which areas receive water for how long and how often
   ______h.  Measures the standard pressure of water
   ______i.  That loss incurred when water is moving through an enclosure
   ______j.  Section of sprinkler heads operating at one time and supplied with water and pressure by one valve

   1. Circuit
   2. Cycle
   3. Elevation loss
   4. Friction loss
   5. Gallons per minute (GPM)
   6. Infiltration rate
   7. Multicycling
   8. Overlap
   9. Overspaced
   10. Pounds per square inch (PSI)
   11. Precipitation rate
   12. Pressure
   13. Program
   14. Spacing
   15. Static pressure
   16. Underspaced
   17. Velocity
TEST

2. Distinguish between the two types of drainage systems which may be needed in a landscape by placing an “X” next to the description of subsurface drainage.

_____a. Controlled removal of runoff from rain, irrigation, and spring thaws

_____b. Removal of underground water from the soil

3. Select from the following list the basic methods for controlling surface drainage by placing an “X” next to the correct methods.

_____a. Alter contour of the ground to divert water away from depressions.

_____b. Create depressions to hold water until they can evaporate.

_____c. Modify soil components to encourage vertical percolation (drainage) through the soil.

4. List two factors affecting the types of subsurface drainage systems.

a. __________________________________________

b. __________________________________________

5. Match types of subsurface drainage systems on the right with the correct descriptions.

_____a. Used to drain several locations in an otherwise well-drained area

1. Gridiron

_____b. Used to drain areas with a uniform slope

2. Herringbone

_____c. Used to drain swale areas

3. Interceptor

_____d. Used to drain areas wet by hillside seepage

4. Random

6. Complete the following statements concerning the parts of a subsurface drain by circling the correct words.

a. Protective grating must be placed over an (inlet, outlet) to allow water in but keep large objects out.

b. Inlet must be at a (lower, higher) elevation than outlet.

c. A drain pipe can be made from concrete tile, clay tile, or (corrugated plastic tubing, copper tubing).
7. Complete the following chart of soil textures and their water intake and holding rates.

<table>
<thead>
<tr>
<th>Soil Texture</th>
<th>Water Intake Rate</th>
<th>Holding Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Coarse textured soils</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(_____________ soils)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Medium textured soils</td>
<td>Medium</td>
<td>High to Medium</td>
</tr>
<tr>
<td>(_____________ soils)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Fine textured soils</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(_____________ soils)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Select from the following list the factors affecting irrigation scheduling by placing an “X” next to the correct factors.

   a. Wind conditions
   b. Environmental factors such as climate and surrounding vegetation
   c. Use of area
   d. Time when neighbors' systems go on
   e. Precipitation (rainfall)

9. Select true statements concerning the fundamentals of good irrigation design by placing a “T” next to the true statements and an “F” next to the false.

   a. Design the irrigation system so that the area is watered completely and uniformly.
   b. Use quarter (1/4) circle heads for most efficient coverage of turf.
   c. Use part circle heads along boundaries, walls, and walks to prevent waste and avoid inconvenience.
   d. Irrigate ornamentals and turf at the same time using the same heads and circuits.
   e. Heads may be overspaced without loss of efficiency.
10. Distinguish between the common sprinkler head spacing patterns by placing a “T” next to the descriptions of triangular spacing and an “S” next to the square spacing descriptions.

_____a. The distance between spray heads is usually 70% of the total wetted diameter and 60% for rotary heads.

_____b. The distance between spray heads is usually 60% of the total wetted diameter and 55% for rotary heads

_____c. The spacing between rows is equal to the spacing between heads.

_____d. The spacing between rows is less than the spacing between heads.

_____e. Is more commonly used because it provides a minimum of unnecessary overlap and uses fewer heads.

(NOTE: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

11. Design a simple irrigation system. (Assignment Sheet #1)

12. Demonstrate the ability to:

   a. Wire a controller and valve. (Job Sheet #1)
   b. Use a flow gauge. (Job Sheet #2)
   c. Install an irrigation system. (Job Sheet #3)
IRRIGATION DESIGN AND INSTALLATION
UNIT III

ANSWERS TO TEST

1. a. 9  f. 17
   b. 14  g. 13
   c. 2  h. 10
   d. 15  l. 4
   e. 12  j. 1

2. b

3. a, c

4. Any two of the following:
   a. Arrangement of drains
   b. Slope
   c. Terrain

5. a. 4
   b. 1
   c. 2
   d. 3

6. a. Inlet
   b. Higher
   c. Corrugated plastic tubing

7. | Soil Texture                | Water Intake Rate | Holding Rate |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Coarse textured soils</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>(Sandy soils)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Medium textured soils</td>
<td>Medium</td>
<td>High to Medium</td>
</tr>
<tr>
<td>(Loamy soils)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Fine textured soils</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>(Clay soils)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ANSWERS TO TEST

8. a, b, c, e

9. a, c

10. a. T
    b. S
    c. S
    d. T
    e. T

11. Evaluated to the satisfaction of the Instructor

12. Performance skills evaluated to the satisfaction of the Instructor
LANDSCAPE PLANT MATERIALS
UNIT IV

UNIT OBJECTIVE

After completion of this unit, the student should be able to recognize characteristics of specific plants commonly used in landscaping. Competencies will be demonstrated by completing the assignment sheets and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to landscape plant materials with the correct definitions.
2. Identify parts of a plant's botanical name.
4. Answer questions about shade trees.
5. Select true statements about ornamental trees.
6. Complete statements about deciduous shrubs.
7. Answer questions about broadleaf evergreens.
8. Select true statements about conifers.
9. Select true statements about vines and ground covers.
10. Name nursery plant selection criteria for trees.
11. Name nursery plant selection criteria for shrubs and groundcovers.
OBJECTIVE SHEET

12. Collect plant samples. (Assignment Sheet #1)
13. Evaluate nursery plant materials. (Assignment Sheet #2)
14. Select appropriate plants. (Assignment Sheet #3)
15. Recommend plants for various situations. (Assignment Sheet #4)
LANDSCAPE PLANT MATERIALS
UNIT IV

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to class to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to the teaching of this unit.)

B. Provide students with objective sheet.

C. Discuss unit and specific objectives.

D. Provide students with information and assignment sheets.

E. Discuss information and assignment sheets.

F. Integrate the following activities throughout the teaching of this unit:
   1. Take a field trip to an arboretum or nursery in your area and identify the plants growing there.
   2. Take students to different nurseries and compare the quality of the plants found at each.
   3. Compile a list of common plants in your locale.
   4. Develop slides showing the plant materials discussed in this unit or of plant materials common in your locale.
   5. Make copies of the blank form in Teacher Supplement #1 and complete them for common local plants. Provide students with copies of these supplements.
   6. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

G. Give test.

H. Evaluate test.

I. Reteach if necessary.

RESOURCES USED IN DEVELOPING THIS UNIT

A. Whitcomb, Carl E., Know It and Grow It II, Stillwater, OK Lacebark Publications, 1983.


SUGGESTED SUPPLEMENTAL RESOURCES

A. American Association of Nurserymen (AAN) brochures — Available from:

AAN Member Services
1250 I Street, N.W., Suite 500
Washington, D.C. 20005
202/789-2900

1. How to Use, Select, and Register Cultivar Names
2. Inspection Guide for Landscape Planting
3. Living Screens for North America
4. Special Trees for Special Places

B. Computer software (for IBM or Apple) — Available from:

AAVIM
120 Driftmier Engineering Center
Athens, GA 30602
404/542-2586

1. Deciduous Shrubs I, II, III, and IV
2. Deciduous Trees I, II, III, and IV
3. Evergreen Trees and Shrubs
4. Selecting Trees for The Landscape
5. Ortho's Computerized Gardening

C. The Backpocket Guide to Ornamental Plants (handbook)

D. Plant Identification Slide Sets (Nos. 1, 2, 3, and 4)
   (50 color slides in each set — 200 slides total)

C and D are available from:

Vocational Education Productions
California Polytechnic State University
San Luis Obispo, CA 93407
800/235-4146 or 805/546-2295

E. American Standard for Nursery Stock (ANSI Z60.1-1986)

Available from:

American Association of Nurserymen, Inc. (AAN)
1250 I Street, N.W., Suite 500
Washington, D.C. 20005
TEACHER SUPPLEMENT #1 — COMMON PLANTS

Common Name(s): ____________________________

Botanical Name: ____________________________  Size: ____________________________

Hardiness Zone: ____________________________  Exposure: ____________________________

Form: ____________________________  Texture: ____________________________

Leaves: ____________________________

Flowers: ____________________________

Fruit: ____________________________

Color: ____________________________

Cultural Notes: ____________________________

Cultivars: ____________________________
### TEACHER SUPPLEMENT #1 — COMMON PLANTS

<table>
<thead>
<tr>
<th>Common Name(s):</th>
<th>Botanical Name:</th>
<th>Size:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hardiness Zone:</th>
<th>Exposure:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Form:</th>
<th>Texture:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Leaves:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flowers:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fruit:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Color:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### Cultural Notes:

- 

<table>
<thead>
<tr>
<th>Cultivars:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Common Name(s):</th>
<th>Botanical Name:</th>
<th>Size:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hardiness Zone:</th>
<th>Exposure:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Form:</th>
<th>Texture:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Leaves:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flowers:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fruit:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Color:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### Cultural Notes:

- 

<table>
<thead>
<tr>
<th>Cultivars:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
LANDSCAPE PLANT MATERIALS
UNIT IV

INFORMATION SHEET

I. Terms and definitions

A. Accent plant — Any plant, placed in contrast to its surroundings, which has distinctive form, foliage, texture, or color that calls attention to itself

B. Acclimatization — The adjustment of a plant to a climatic zone or area to which the plant is not native

C. Botanical name — Latin identification of plant materials divided into genus and species

(NOTE: The botanical name is used as the standard in the industry for precise plant selection.)

D. Broadleaf evergreen — Plant material which has leaves that are broad (not needle-like) and that are retained year round

E. Common name — Plant name used by the general public

(NOTE: A plant may have several common names but has only one botanical name.)

F. Conifer — Cone-bearing plant that is usually also evergreen and needle-bearing

G. Cultivar — A cultivated variety of a plant which when reproduced will retain its distinguishing features

H. Deciduous — Plants that lose their foliage (leaves) at the end of the growing season

I. Dormant — Not actively growing, but capable of resuming growth when environmental conditions become favorable

J. Evergreen — Plants that retain most of their foliage throughout the year

K. Hardiness zone — A geographical zone in which a plant is considered to be hardy; generally based on temperature

L. Hardy — Capable of living over winter without artificial protection

M. Hybrid — A genetic cross between two species of plants

N. Ornamental — A plant grown for the beauty of its form, foliage, flowers, or fruit, rather than for food, fiber, or other uses
INFORMATION SHEET

O. Resistant — Tolerant and capable of withstanding adverse conditions or pests

P. Specimen plant — Any plant which is displayed to its best advantage either singly or in multiple plantings

II. Parts of a plant's botanical name

A. Genus — The first name in a botanical name; always capitalized and italicized (or underlined)

B. Species — The second name in a botanical name; not capitalized but is also italicized (or underlined)

C. Cultivar (Cultivated + variety) — Named variety of a plant; listed after the species name; capitalized and is surrounded by single quotation marks

Examples:

Malus baccata ‘Margaret’
Acer negundo ‘Variegata’
Populus alba ‘Bolleana’
III. Meanings of common botanical names

Albidus, albus — White
Aureus — Golden
Baccatus — With berries
Bl — Two
Brachy — Short
Examples: Brachycarpus — With short fruit
Brachyphyllus — With short leaves
Chnensis — From China
Compactus — Compact, dense
Cyaneus — Blue
Diffusus — Spreading
Domesticus — Domesticated or cultivated
Elatus — Tall
Elegans — Elegant, handsome
Fallax — False or deceptive
Flavus — Yellow
Florespleno — With full or double flowers
Floribundus — Free-flowering, blooming abundantly
Fragrans — Fragrant
Gracilis — Graceful, slender
Gradifolius — With large leaves
Grandiflorus — With large flowers
Japonica — From Japan
Luteus — Yellow
Macro — Large
Example: Macrocarpus — With large fruit
Major — Large, larger
Micro — Small
Example: Microphyllus — With small leaves
Minor — Small
Mono — One
Nigra — Dark, black
Paniculatus — With flowers in compound racemes or panicles
Poly — Many
Procumbens — Flat or trailing
Pungens — Piercing, sharp-pointed
Repens — Creeping
Robustus — Strong, robust
Roseus — Rosy, pink
Rubens, rubra — Red, ruddy
Sempervirens — Evergreen
Speciosus — Showy, good-looking
Stellatus — Star-like
Tri — Three
Variegatus — Variegated, usually of different colors
Virens, viridis — Green
Vulgars — Vulgar, common, usual
IV. Shade trees

A. Common Name(s): River Birch

Botanical Name: Betula nigra  Size: Large
Hardiness Zone: 2  Exposure: Sun to part shade
Form: Typically multiple stemmed—Oval, deciduous
Texture: Medium
Leaves: Simple, alternate, egg-shaped with point at the tip. Double-toothed margin, veins generally on underneath side of leaf
Flowers: Not showy
Fruit: 1” long cone-like containing small winged seeds
Color: Foliage is dark green, turning bright yellow in fall. Bark is copper-colored and papery.
Cultural Notes: Transplant in very late winter to a location with abundant moisture. Needs supplemental watering during drought, unless planted next to water. Ideal for soggy locations in the landscape.

B. Common Name(s): Lacebark Elm

Botanical Name: Ulmus parvifolia  Size: Large
Hardiness Zone: 4  Exposure: Sun to part shade
Form: Round to oval crown  Texture: Fine
Leaves: Simple, alternate, lopsided with a serrated margin
Flowers: Not showy
Fruit: Showy, borne in multiple clusters among the leaves during October
Cultural Notes: Extremely tough and durable and will grow almost anywhere. Tolerates many adverse conditions, and is highly resistant to disease and insect attacks. Responds vigorously to good cultural practices. Susceptible to leaf spot in the spring.
Cultivars: ‘Sempervirens’ greater retention of foliage. ‘Drake’ like ‘Sempervirens’ except grows more upright. Generally an inferior variety in moist humid areas of the country because of leaf spot diseases.
C. **Common Name(s):** Northern Red Oak  
**Botanical Name:** *Quercus rubra*  
**Size:** Large  
**Hardiness Zone:** 3  
**Exposure:** Sun  
**Form:** Round to oval head  
**Texture:** Coarse  
**Leaves:** Simple, alternate, 5-8” long, 4-6” wide, usually has 7-11 lobes with 1-3 bristle tips  
**Flowers:** Not showy  
**Fruit:** Mature in fall of second year 1-1 ½” long and ½-1” wide.  
**Color:** Foliage is deep dark green on top of the leaf with a lighter green underside, petiole is usually red, red-orange fall color.  
**Cultural Notes:** Grows well in fairly good soils. Grows west about as far as Oklahoma City and Wichita. Transplants well in fall, winter, or early spring.  
**Cultivars:**

D. **Common Name(s):** Pin Oak  
**Botanical Name:** *Quercus palustris*  
**Size:** Large  
**Hardiness Zone:** 3  
**Exposure:** Sun  
**Form:** Pyramidal with drooping lower branches  
**Texture:** Medium  
**Leaves:** Simple, alternate, 4-6” long, 2-5” wide with 5-9 variable lobes. Like most of the Red Oak group the leaves are generally forked with bristles on the tips.  
**Flowers:** Not showy  
**Fruit:** Small acorn matures in early fall, is rounded and light brown, bitter to taste  
**Color:** Dark green, with good fall color either red or red-orange  
**Cultural Notes:** Does well in most conditions except areas where the soils are extremely poor and the pH of the soil is high. Sometimes develop chlorosis which is usually due to an iron and manganese deficiency. Responds well under good cultural practices if the pH is kept below 6. This tree is more of a specimen tree as the growth habit requires the lower branches to be removed if it is to be used for shade. By removing these lower branches only the narrow top of the tree remains casting no shade. Do not plant this tree next to drives or sidewalks as the downward angle of the branches are stiff and hazardous.  
**Cultivars:** ‘Sovereign’ has only horizontal or upright branches which makes it more desirable for street and other uses. ‘Clownright’ similar to ‘Sovereign’ but more narrow and upright.
INFORMATION SHEET

E. Common Name(s): Live Oak
   Botanical Name: Quercus virginiana   Size: Medium to large
   Hardiness Zone: 7   Exposure: Sun
   Form: Broad, oval crowned   Texture: Fine

   Leaves: Simple, alternate, leathery, elliptical shaped; leaf margins are usually smooth and unlobed but new growth may have rounded lobes with serrated margins

   Flowers: Female flowers not showy, males long, slender, yellowish clusters in the early spring

   Fruit: Football-shaped acorn about 1” long

   Color: Dark green foliage

   Cultural Notes: Growth is very slow in most areas. Extremely tough and tolerant of poor soils and compaction but susceptible to cold weather. Also grows slower if the climate is colder. Transplant in spring.

   Cultivars:

F. Common Name(s): Fruitless Mulberry
   Botanical Name: Morus alba 'Fruitless'   Size: Medium
   Hardiness Zone: 3   Exposure: Sun
   Form: Spreading round headed   Texture: Medium

   Leaves: Simple, alternate, oval or lopsided, usually have 3 lobes with a serrated margin

   Flowers: None

   Fruit: None

   Color: Bright green leaves

   Cultural Notes: Grows rapidly in most soils with proper care. Dense shade makes growing anything except a ground cover very difficult.

   Cultivars: Morus alba 'Fruitless' is the cultivar recommended because the common Mulberry produces a lot of fruit which creates a litter problem.
G. Common Name(s): Water Oak

Botanical Name: *Quercus nigra*  
Size: Large

Hardiness Zone: 6  
Exposure: Sun to part shade

Form: Broad, oval or round topped  
Texture: Medium

Leaves: Simple, alternate, narrow with a club-shaped end, margin is smooth or wavy with a bristle tip

Flowers: Not showy

Fruit: Small round acorn which is ripe in early fall

Color: Deep green foliage but brown in the winter, tends to hold its leaves well into the winter

Cultural Notes: Grows rapidly under very wet conditions but this produces an undesirable tree. In more Northern and Western areas it grows slower and produces a good landscape tree which tolerates most soil conditions and compacted soils. One of the best oak shade trees.

Cultivars:

H. Common Name(s): Chinese Pistache

Botanical Name: *Pistacia chinensis*  
Size: Medium

Hardiness Zone: 6  
Exposure: Sun

Form: Low, vase shaped  
Texture: Fine

Leaves: Compound, alternate, 8-10” long, 4-5” wide, generally 10-14 leaflets

Flowers: Not showy

Fruit: Small, round berries about ¼” in diameter; green to purple-red in the fall

Color: Medium to dark green, with orange to red-orange fall color

Cultural Notes: A very tough, durable, small tree which grows best in well-drained soil but tolerates other conditions. Transplants well in the spring.

Cultivars:
1. **Common Name(s):** Sweetgum  
   **Botanical Name:** *Liquidambar styraciflua*  
   **Size:** Large  
   **Hardiness Zone:** 4  
   **Exposure:** Sun  
   **Form:** Oval crowned  
   **Texture:** Medium  
   **Leaves:** Simple, alternate, 3-6" long; star shaped with a saw-toothed edge  
   **Flowers:** Not showy  
   **Fruit:** Golf ball sized, round, spiny fruit  
   **Color:** Deep green, yellow to red-orange fall color  
   **Cultural Notes:** Requires an abundance of water to grow well and needs a good soil. Fruit creates quite a litter problem. Should not be transplanted in the fall.  
   **Cultivars:** ‘Autumn Glow’—better fall color

---

2. **Common Name(s):** Sycamore  
   **Botanical Name:** *Platanus occidentalis*  
   **Size:** Very large  
   **Hardiness Zone:** 3  
   **Exposure:** Sun  
   **Form:** Huge, pyramidal  
   **Texture:** Coarse  
   **Leaves:** Simple, alternate, 10-12" long, 6-8" wide, 5 main lobes that are coarsely toothed or lobed a second time  
   **Flowers:** Not showy  
   **Fruit:** Golf ball sized round ball made up of many seeds  
   **Color:** Medium green foliage turning light orange-brown in the fall  
   **Cultural Notes:** Are fairly tolerant to wide variety of soils as long as extra water is present. Is very susceptible to anthracnose and lacebug problems. Creates a litter problem with large leaves and seed balls. They are easy to transplant in spring, fall, winter, and early summer if dug while dormant.  
   **Cultivars:**
K. Common Name(s): Weeping Willow

Botanical Name: *Salix babylonica*  
Size: Medium to large

Hardiness Zone: 3  
Exposure: Sun

Form: Round headed with drooping branches  
Texture: Fine

Leaves: Simple, alternate, very narrow

Flowers: Not showy

Fruit: Not showy

Color: Medium to olive green, yellow fall color

Cultural Notes: Does well all over the U.S. If an abundance of water is present. It is mostly a short lived tree with only about 15-30 years expected. Borers and willow leaf beetles are major pests. Wood is extremely brittle.

Cultivars: 'Golden' yellow stems

L. Common Name(s): Southern Magnolia

Botanical Name: *Magnolia grandiflora*  
Size: Medium to large

Hardiness Zone: 7  
Exposure: Sun to part shade

Form: Pyramidal  
Texture: Coarse

Leaves: Simple, alternate, thick, leathery, oval with smooth margin

Flowers: Single, cup-shaped, 6-16 round petals, usually white and very fragrant

Fruit: Looks like a pine cone 2-4” long 1 1/2” wide, splits open to expose red seeds (about 40-60/cone)

Color: Shiny dark green foliage

Cultural Notes: Grows mostly in Southeastern states with adequate moisture and fairly fertile soil. Difficult to transplant but should be done in early spring. Susceptible to magnesium deficiency as evidenced by yellow band around margin of the leaf. Winter damage turns leaves brown, protect from north winter wind. Even mature trees need supplemental irrigation during drought, causing leaf drop.

Cultivars:
INFORMATION SHEET

M. Common Name(s): Common Hackberry
   Botanical Name: Celtis occidentalis  Size: Medium to large
   Hardiness Zone: 2  Exposure: Full sun
   Form: In youth weakly pyramidal, in maturity the crown is a broad top of ascending-arching branches, often with drooping branchlets.
   Texture: Medium-coarse in leaf and in winter
   Leaves: Alternate, simple, ovate to oblong ovate, acute to acuminate, rounded at base, serrate except at base.
   Flowers: Not showy. Solitary in axils of the leaves during April and May.
   Fruit: Fleshy, orange-red to dark purple rounded drupe. flavored like dates and relished by birds and wildlife.
   Color: Dull light to medium green in summer and yellow or yellow green in fall.
   Cultural Notes: Prefers rich, moist soils but grows in dry, heavy or sandy, rocky soils. Will withstand acid or alkaline conditions and will tolerate wind.
   Cultivars: 'Prairie Pride', selected for glossy green foliage, and uniform compact crown.

N. Common Name(s): Green Ash
   Botanical Name: Fraxinus pennsylvanica  Size: Large
   Hardiness Zone: 3  Exposure: Full sun
   Form: Pyramidal when young and developing an upright spreading habit at maturity.
   Texture: Medium in leaf, coarse in winter
   Leaves: Opposite, pinnately compound and serrate
   Flowers: Not ornamentally important. Dioecious, both sexes appearing in panicles before or with the leaves.
   Fruit: Samara, 1 to 2 inches long. Not of ornamental significance.
   Color: Shiny, medium to dark green in summer, changing to yellow in the fall
   Cultural Notes: Found native in most bottomlands and along streambanks. Transplants readily. Once established it tolerates high pH, salt, and drought.
   Cultivars: 'Kindred', 'Marshall Seedless', 'Bergeson', 'Patmore' and 'Summit'
V. Ornamental trees

A. Common Name(s): Flowering Crabapple

Botanical Name: *Malus* spp. 
Size: Small
Hardiness Zone: 3 
Exposure: Sun
Form: Low branches, rounded head
Texture: Medium

Leaves: Simple, alternate, oval, 2-4" long with serrated margin

Flowers: White, pink, or red, fragrant, clustered, end blossoms open first and progress backward producing a longer show of flowers than most trees

Fruit: Small, tart, apple-like fruits which are edible

Color: Dark green

Cultural Notes: Tolerates most soils, needs some corrective pruning, somewhat susceptible to fire blight, cedar apple rust, powdery mildew, and scab.

Cultivars: 'Snowdrift'—white
'Hops'—pink
Many others

B. Common Name(s): Dogwood

Botanical Name: *Cornus* *florida*
Size: Small to medium
Hardiness Zone: 4 
Exposure: Shade
Form: Rounded head
Texture: Medium

Leaves: Simple, opposite, egg-shaped, 3-5" long, smooth margin, short petiole

Flowers: 4 petal-like bracts (white or pink) surrounding a cluster of small yellow or white flowers

Fruit: Clustered, egg-shaped, about ½" long, red

Color: Foliage is bright green on top, pale green underside

Cultural Notes: Is an understory tree which grows best in fairly good soils that are moist but not wet. Will not tolerate wet feet, full sun, hot, dry or exposed locations. Will not tolerate compacted soils.

Cultivars: 'Cherokee Chief'—dark pink flowers which are very showy
**INFORMATION SHEET**

**C.** Common Name(s): Goldenrain Tree  
Botanical Name: *Koelreuteria paniculata*  
Size: Small to medium  
Hardiness Zone: 5  
Exposure: Sun  
Form: Broad, round head  
Texture: Medium  
Leaves: Alternate, twice compound, 16-22" long, ovate leaflets with irregularly toothed margins  
Flowers: Bright yellow clusters on top of tree, 15-20" long. Very attractive.  
Fruit: Thin walled round pod-like capsules with 2 or 3 round black seeds inside; capsules are pink and are retained until late summer or fall when they fall off.  
Color: Foliage medium green, yellow fall color  
Cultural Notes: Fairly tough plant which grows in heavy clay as well as sandy soils. Needs some corrective pruning. Responds well to good cultural practices. Attracts boxelder bugs which may become a nuisance as they move indoors in the fall. Leave adequate distance between tree and dwellings.  
Cultivars: None

**D.** Common Name(s): Yaupon Holly  
Botanical Name: *Ilex vomitoria*  
Size: Small to medium  
Hardiness Zone: 7  
Exposure: Sun to shade  
Form: Irregular  
Texture: Fine  
Leaves: Simple, alternate, evergreen, flat elliptical or oval, usually small 1/2", serrated margins  
Flowers: Not showy  
Fruit: 3/10" Red—showy  
Color: Foliage is glossy green  
Cultural Notes: Very tough, tolerates heat, drought, full sun and poor soil, also grows in swampy areas. Multi-trunk specimens very showy and decorative as ornamental.  
Cultivars: Dwarf cultivars are available, reach 4-5 feet high
INFORMATION SHEET

E. Common Name(s): Saucer Magnolia
   Botanical Name: Magnolia soulangiana
   Size: Small to medium
   Hardiness Zone: 5
   Exposure: Sun to part shade
   Form: Broad spreading
   Texture: Coarse
   Leaves: Simple, alternate, 1-2" long, 2-4" wide, thick, smooth margin with a point at the tip
   Flowers: 4-6" in diameter, white with a purple center
   Fruit: Not showy
   Color: Foliage is light to medium green, pale yellow fall color
   Cultural Notes: Prefers rich, well drained soil, difficult to transplant.
   Cultivars: 'Alexandrina' purplish-pink flowers blooms later.

F. Common Name(s): Bradford Pear
   Botanical Name: Pyrus calleryana 'Bradford'
   Size: Medium
   Exposure: Sun
   Form: Pyramidal
   Texture: Medium
   Leaves: Simple, opposite, 2-3" long, rounded at base with irregular serrated margin
   Flowers: White, spectacular show in early spring
   Fruit: Generally fruitless
   Color: Foliage is deep green, orange fall color
   Cultural Notes: Grows well in many locations especially poor soil and urban situations. A very spectacular tree which grows well with minimum care. Resistant to fire blight.
   Cultivars: 'Bradford' is a cultivar
G. Common Name(s): Purpleleaf Plum

Botanical Name: *Prunus cerasifera*  
Size: Small to medium

Hardiness Zone: 3  
Exposure: Sun

Form: Pyramidal  
Texture: Medium

Leaves: Simple, ovate, 1 1/2” long, 1-2” wide, round at base, tapering to tip, serrated edge

Flowers: Showy flowers in April which are pink

Fruit: Small plum about 1” diameter, edible but not very tasty

Color: Purple or purple-red foliage

Cultural Notes: Easy to grow and tolerates a wide variety of soils and conditions. Needs to grow in full sun for best color. Borers are a major problem and will kill these trees.

Cultivars: 'Thunderbond' intense purple foliage.  
Many others

H. Common Name(s): Redbud

Botanical Name: *Cercis canadensis*  
Size: Small to medium

Hardiness Zone: 4  
Exposure: Sun

Form: Flat topped, widely spreading  
Texture: Medium

Leaves: Simple, alternate, heart-shaped 2-3” long and wide with smooth margins and long petioles

Flowers: Very showy with purple or white flowers grouped in clusters along the stem in early spring

Fruit: Oblong, flattened pod, 2-3” long, brown

Color: Foliage is dark green, yellow fall color

Cultural Notes: Grows well in very poor soils but responds well to good culture. Needs some corrective pruning. Difficult to transplant. Very susceptible to borers, leaf rollers, and tiers.

Cultivars: 'Alba' has white flowers  
'Oklahoma' deep purple flowers, very shiny leaves which resists leaf rollers and tiers. The best variety.  
'Forest Pansy' has purple foliage
I. Common Name(s): Purpleleaf Sand Cherry
   
   Botanical Name: *Prunus cistena*  
   (Cross between *P. pumila* and *P. cerasifera*)  
   
   Hardiness Zone: 2  
   
   Form: Upright and somewhat spreading  
   
   Exposure: Full sun  
   
   Size: 7 to 10 feet with slightly smaller spread  
   
   Texture: Medium in leaf and in winter  
   
   Leaves: Alternate, simple, and moderately serrate  
   
   Flowers: Single, pink, fragrant, and borne after leaves have developed in late April and May  
   
   Fruit: Blackish purple. Desirable for wildlife.  
   
   Color: Intensely reddish purple throughout the summer  
   
   Cultural Notes: One of the hardiest purple-leaf plants.  
   
   Cultivars: None

J. Common Name(s): Amur Maple
   
   Botanical Name: *Acer ginnala*  
   
   Hardiness Zone: 2  
   
   Form: Irregular to oval to rounded, can be successfully tailored to specific landscape requirements.  
   
   Texture: Medium-fine in leaf, medium in winter  
   
   Leaves: Opposite, simple, three-lobed with middle lobe much longer than the lateral lobes, doubly serrate and dark green.  
   
   Flowers: Yellowish white, fragrant, borne in small panicles  
   
   Fruit: Samara, 3/4 to 1 inch long, red to brown in September and October  
   
   Color: Bark, grayish brown; Leaves, dark glossy green, changing to yellow and red in the fall. Best color in full sun.  
   
   Cultural Notes: Performs best in moist, well drained soils. Very easy to transplant. Adaptable to a wide range of soils and pH ranges.  
   
   Cultivars: 'Compactum', 'Durand Dwarf', 'Red Fruit'
INFORMATION SHEET

VI. Deciduous shrubs

A. Common Name(s): ‘Crimson Pygmy’ Barberry

Botanical Name: *Berberis thunbergi* ‘Crimson Pygmy’  Size: Small shrub

Hardiness Zone: 3  Exposure: Sun to part shade

Form: Dwarf rounded  Texture: Medium

Leaves: Simple, alternate, oval with pointed tip, born on clusters

Flowers: Inconspicuous

Fruit: Not showy

Color: Purple

Cultural Notes: Tough and durable but not very tolerant of drought

Cultivars: Many cultivars of barberry from evergreen to deciduous, from dwarf to 8’ tall

B. Common Name(s): Pampas Grass

Botanical Name: *Cortaderia selloana*  Size: Medium to large

Hardiness Zone: 7  Exposure: Sun to part shade

Form: Grass clump  Texture: Fine

Leaves: Grassy clump often 5-7’ tall

Flowers: Long 12-24” plumes on top of stalks usually white, emerge in August, remain until January or February. Good for dried flower arrangements.

Fruit: Not showy, like grass seed

Color: Foliage is dark green, flowers are white or pink

Cultural Notes: Tough and drought resistant, doesn’t like shade or very wet conditions, will turn brown in fall but foliage must be left on until March. Leaves are serrated and will cut anyone who grabs the leaves. Use caution around children.

Cultivars: ‘Rosea’ pink flower plumes, but not as winter hardy
C. **Common Name(s):** Forsythia  
   **Botanical Name:** *Forsythia* *spp.*  
   **Size:** Large shrub  
   **Hardiness Zone:** 5  
   **Exposure:** Sun  
   **Form:** Mostly upright  
   **Texture:** Medium  
   **Leaves:** Opposite, simple, 3-4” long, oval, serrated margin  
   **Flowers:** Bell shaped, yellow, very early spring, very showy  
   **Fruit:** Not showy  
   **Color:** Foliage medium to light green  
   **Cultural Notes:** Easy to grow in many soil types but susceptible to drought damage  
   **Cultivars:** *Forsythia suspense* is a weeping or cascading variety  
   *'Linwood Gold'* is the best upright variety  

D. **Common Name(s):** Crape myrtle  
   **Botanical Name:** *Lagerstroemia* *indica*  
   **Size:** Large shrub or small tree  
   **Hardiness Zone:** 7  
   **Exposure:** Sun  
   **Form:** Multi-stemmed can be tree form  
   **Texture:** Medium  
   **Leaves:** Simple, opposite, elliptical, 2-4” long, 1-2” wide, rounded at base and tip with a smooth margin  
   **Flowers:** Many different colors including variegated, very showy  
   **Fruit:** Round, tan capsule  
   **Color:** Foliage is medium green, shows variable fall color  
   **Cultural Notes:** Low maintenance plant, easy to grow and transplant, tolerates drought and poor soil, needs to be planted in an area with good air circulation because of susceptibility to powdery mildew.  
   **Cultivars:** Many cultivars with different colored blooms  
   Many dwarf varieties which grow up to 3 or 4’ tall
E. Common Name(s): Common Lilac

Botanical Name: *Syringa vulgaris*  
Size: Large shrub

Hardiness Zone: 3  
Exposure: Sun

Form: Multiple stemmed, rounded head  
Texture: Medium

Leaves: Opposite, heart-shaped with long point and smooth margin

Flowers: Terminal clusters in a variety of colors (white, violet), known for fragrance

Fruit: Not showy

Color: Deep green on top, paler green underneath

Cultural Notes: Extremely tough and durable, susceptible to powdery mildew in shade and areas with poor air circulation

Cultivars: Many cultivars with different flower colors. Persian lilac (*Syringa persica*) is more compact and smaller with smaller flower clusters.

F. Common Name(s): Flowering Quince

Botanical Name: *Chaenomeles speciosa*  
Size: Large shrub

Hardiness Zone: 4  
Exposure: Sun to part shade

Form: Round dense shrub  
Texture: Medium

Leaves: Simple, alternate, 1-3" long, oval with a sharply serrated margin, leaves may be clustered on short stalks or spurs, has thorns

Flowers: Red, pink, or white 1-2" across, very showy in early spring

Fruit: Small 1-2" across, apple-like green or yellow

Color: Foliage glossy green

Cultural Notes: Very tough and durable, tolerates wide range of soils except for very high pH, a low maintenance plant. Susceptible to fire blight.

Cultivars: Many cultivars with various colors of flowers
G. Common Name(s): Vanhoutte Spirea or Bridalwreath Spirea
   Botanical Name: Spirea x 'Vanhouttei'
   Size: 6 to 8 feet high with 6 to 10 foot spread
   Hardiness Zone: 3
   Exposure: Full sun
   Form: Upright to spreading, fountain-like with rounded top, arching branches recurving to the ground
   Texture: Fine texture when in leaf and fine in winter
   Leaves: Alternate, simple, toothed, often incised 3 to 5 lobed
   Flowers: Flowers are white appearing in late April or May. Borne in many flowered umbels. Very showy when in bloom.
   Fruit: Small and insignificant
   Color: Stems are slender, brown and rounded. Leaves are a light green with no significant fall color change.
   Cultural Notes: Adapted to a wide range of soil condition.
   Cultivars: None. Vanhoutte is a hybrid between S. trilobata and S. cantoniensis

H. Common Name(s): Shrubby or Bush Cinquefoil
   Botanical Name: Potentilla fruticosa
   Size: 1 to 4 feet with 2 to 4 foot spread
   Hardiness Zone: 2
   Exposure: Full sun
   Form: A very bushy shrub with a rounded to bread rounded outline
   Texture: Fine in leaf, medium-fine in winter
   Leaves: Alternate, compound pinnate with 3 to 7 leaflets, dark green and more or less silky.
   Flowers: Perfect, bright yellow, June through frost. Excellent color.
   Fruit: Not showy, persistently retained on plant.
   Color: Leaf emergence silky grey green changing to bright to dark green. Fall color is green to yellow to brown.
   Cultural Notes: Transplants well. Withstands poor dry soils and extreme cold.
   Cultivars: 'Abbotswood' best of the white bloomers, 'Dakota Sunrise', 'Goldfinger', 'Hurstborne', 'Jackmanii'
INFORMATION SHEET

VII. Broadleaf evergreens

A. Common Name(s): Glossy Abelia

Botanical Name: Abelia grandiflora

Size: Medium to large 6-10’ h x 4-6’ w

Hardiness Zone: 6

Exposure: Sun to part shade

Form: Oval

Texture: Fine

Leaves: Simple, opposite, oval 1-1 ½” L x ½” W tapering to a point. Turns green-bronze during cold weather

Flowers: White to pink, bell shaped 1” long flowers. Very showy. Blooms from May through August on new growth.

Fruit: None

Color: Deep green to purple-green

Cultural Notes: Grows under almost any condition. Wet or dry, good or poor soil. Can be hedged, yet still flowers profusely. Compact varieties less durable.

Cultivars: ‘Edward Goucher’ 3-4’ tall—pink flowers
‘Francis Mason’—yellow variegated leaves—dwarf

B. Common Name(s): Aucuba

Botanical Name: Aucuba japonica

Size: Small to medium

Hardiness Zone: 7

Exposure: Part shade to shade

Form: Oval shrub

Texture: Coarse

Leaves: Opposite, elliptical, 3-7” long, 1-3” wide, leaf margin smooth at base, coarse teeth on outer ½ of leaf

Flowers: Male and female plants. Inconspicuous

Fruit: Not important criteria for selection. Football shaped, 1” long red berries

Color: Green to speckled with yellow, to yellow blotched

Cultural Notes: Must be protected from high heat, persistent winds, and direct hot sunlight. Can get blackened leaves during severe winters with inadequate soil moisture.

Cultivars: ‘Picturata’—bright yellow gold centers. Slow growing and compact.
‘Variegata’—gold speckled
‘Seratafolia’—dark green leaf
C. Common Name(s): Azalea

Botanical Name: *Rhododendron spp.*

Size: Small to medium 3-4’ tall

Hardiness Zone: 6

Exposure: Shade to part shade

Form: Dense mound

Texture: Medium

Leaves: Simple, alternate, 1” long, ½” wide, oval shaped

Flowers: Very showy in many different colors

Fruit: Not usually seen

Color: Dark and glossy above, dull pale green below.

Cultural Notes: Soil must be well drained, fertile, moist, and acidic. Use slow release fertilizer and an organic mulch. Leaves are mildly toxic. Azaleas require yearly mulching, pruning, and fertilization, and require irrigation during the summer. Iron chlorosis is a problem with high pH. Florist-types are usually unsuitable for exterior landscaping.

Cultivars:
- ‘Snow’—pure white
- ‘Hino-crimson’—deep dark red
- ‘Coral Bell’—clear pink
- Many varieties exist. There are over 100 named varieties along with genetic crosses with Rhododendrons.

D. Common Name(s): Evergreen Euonymus

Botanical Name: *Euonymus japonica*

Size: Medium shrub (10-12’)

Hardiness Zone: 7

Exposure: Sun to shade

Form: Oval

Texture: Medium

Leaves: Opposite, simple, 1 ½-3” long, 1-1 ½” wide. Slightly serrate oval leaves. Always attached to stems at a 45° angle.

Flowers: Inconspicuous—small white clusters at leaf axes

Fruit: Low number—not an important consideration

Color: Green to cultivars with silver or gold variegation

Cultural Notes: Extremely tough durable plant. Grows almost anywhere and adds a definite splash of color to the landscape. Very susceptible to Euonymus scale which is a major weakness of this plant. All plant parts are mildly poisonous.

Cultivars:
- Gold margins with green centers (Golden Euonymus)
- ‘Gold Spot’—has golden-yellow blotches
- ‘Silver King’—creamy white blotches
- Many others
INFORMATION SHEET

E. Common Name(s): Burford Holly

Botanical Name: *Ilex cornuta* 'Burfordi'

- Size: Small to large. 4-20’ high x 4-50’ wide.
- Hardiness Zone: 7
- Exposure: Sun to part shade
- Form: Compact and round headed shrub
- Texture: Coarse
- Leaves: Glossy, plastic-like oval shaped. Brittle with 1 terminal spire.
- Flowers: Clusters of small yellow-green flowers at the leaf axes. Not showy
- Fruit: 1⁄4 - 1⁄2” bright red in clusters of 5-8. Very showy
- Color: Dark shiny green above, pale dull green below

Cultural Notes: Tolerates most any soil, but performs better in rich well-drained types. Gets spindly and fruits poorly in dense shade. Avoid high heat areas. Susceptible to grasshoppers in rural areas and occasionally to scale. Can be sheared to all lost any form and makes an unusual small broad-headed tree after many years. Good foundation plant. Widely used sturdy plant.

Cultivars: 'Dwarf Burford'—slow grower, eventually 6-10’ without pruning, smaller, very shiny leaves.

'Chinese or Horned Holly'—3 terminal very sharp spires. Very vandal resistant.

Many others.

F. Common Name(s): 'Nellie R. Stevens' Holly

Botanical Name: *Ilex* X 'Nellie R. Stevens'

- Size: Medium (6-8’)
- Hardiness Zone: 7
- Exposure: Sun to part shade
- Form: Round headed shrub
- Texture: Coarse
- Leaves: Alternate. Typical holly leaf but with 3 terminal spines
- Flowers: Male and female on separate plants of *Ilex cornuta*. 'Nellie R. Stevens' is a female plant. Not showy. Flowers at the leaf axils
- Fruit: Large amounts of bright red berries
- Color: Deep green

Cultural Notes: Very tough holly which can grow under almost any conditions. Male plant of *Ilex cornuta* must be nearby for pollination and berry protection. One of the most winter hardy of the hollies. As with all hollies, very sensitive to water soluble fertilizers.

Cultivars: 'Nellie R. Stevens' is a hybrid between English Holly and Chinese Holly. Many cultivars of these species are available and are worthy of their popularity.
INFORMATION SHEET

G. Common Name(s): Foster Holly
   Botanical Name: Ilex X ‘Foster’
   Size: Moderately large (20’)
   Hardiness Zone: 6
   Exposure: Sun to part shade
   Form: Pyramidal
   Texture: Coarse
   Leaves: Alternate, leaves 1-1 1/2” x 2-3” long. Leaves serrate at tip with oval shape.
   Flowers: On female plants, borne at leaf axes. Not showy
   Fruit: Prolific producer of bright red fruit approximately 1/4” in diameter
   Color: Deep blue green with red berries in wintertime
   Cultural Notes: Tolerant to varied amounts of light, exposure, moisture and soil conditions. Probably the best of the upright pyramidal-shaped hollies.
   Cultivars: Foster Holly is a hybrid between American Holly (Ilex opaca) and Ilex attenuata. There are numerous cultivars of Ilex opaca which deserve attention as a landscape plant.

H. Common Name(s): Nandina
   Botanical Name: Nandina domestica
   Size: Small to large, 24” to 7’ tall
   Hardiness Zone: 6
   Exposure: Sun to shade
   Form: Mounding, layered
   Texture: Fine
   Leaves: Alternate, 2-3 times compound leaflets opposite on stems of leaves
   Flowers: White terminal clusters. Showy in spring.
   Fruit: 1/4” berries turning red in fall. Spectacular grapelike clusters.
   Color: Blue green in shade, red-purple in fall
   Cultural Notes: Grows under any conditions, but does not like hot areas caused by structures or concrete. Avoid parking lots. Vigorous grower. Prune by removing tallest canes at ground level. Good foundation plant.
   Cultivars: ‘Compacta’—smaller version of parent easily maintained at 3-4’
   ‘Dwarf or Nana’—soft foliage, dense dwarf oval form
   ‘Harbour Dwarf’—smaller, darker leaflets
INFORMATION SHEET

I. Common Name(s): Fraser's Photinia
   Botanical Name: Photinia X 'Fraseri'
   Size: Large 12-15' x 8-10' wide
   Hardiness Zone: 7
   Exposure: Sun to part shade
   Form: Large upright oval shrub
   Texture: Medium
   Leaves: Alternate, simple, 1 1/2" wide, 3" long, serrated with a point at the tip
   Flowers: Usually none
   Fruit: Usually none
   Color: Dark green upon maturity of leaf. New growth is bright red.

   Cultural Notes: Grows in most locations but does not tolerate wet feet. Requires repeated pruning to achieve dense growth. Gets leaf spot and powdery mildew during the spring when cool, wet, and humid. Allow for growth! Will overgrow some locations so plant no closer than 6' away from buildings. Makes good screens and specimen plants. Good sound barrier.

   Cultivars: None

VIII. Conifers

A. Common Name(s): Atlas Cedar
   Botanical Name: Cedrus atlantica
   Size: Large tree
   Hardiness Zone: 6
   Exposure: Sun
   Texture: Fine
   Leaves: 1" long needles in clusters on spurs or short shoots
   Flowers: Not showy
   Fruit: 2-3" cone, rarely seen in U.S.
   Color: Green or blue depending on cultivar

   Cultural Notes: Difficult to transplant and slower growing. Does well in soils with good drainage and moderate nutritional conditions. Bagworms may be a problem.

   Cultivars: 'Glauca'—blue atlas cedar
INFORMATION SHEET

B. Common Name(s): Eastern Red Cedar
   Botanical Name: *Juniperus virginiana*  Size: Medium tree
   Hardiness Zone: 2  Exposure: Sun
   Form: Upright  Texture: Fine
   Leaves: Scale-like foliage, new leaves have a distinct odor when crushed
   Flowers: Not showy
   Fruit: Blue or purple, smooth, round, about 1/4”
   Color: Green or blue-green
   Cultural Notes: Prefers a good, well drained soil, but adapts fairly well to others. Very susceptible to bagworms and cedar apple rust.
   Cultivars: 'Canaert' has sharp angular branching and pyramidal growth. One of the best. Also 'Kosterl', 'Manhattan Blue', others

C. Common Name(s): Chinese Juniper
   Botanical Name: *Juniperus chinensis*  Size: Medium shrub
   Hardiness Zone: 3  Exposure: Sun
   Form: Variable  Texture: Fine
   Leaves: Scale-like Juniper with new growth being needle-like
   Flowers: Not showy
   Fruit: Smooth, round, blue, about 1/4” in diameter
   Color: Blue green or green
   Cultural Notes: Tough and durable but will not take very wet conditions. Branches layer and will spread to outgrow a site if used incorrectly. Bagworms can be a serious problem.
   Cultivars: Many cultivars including blues, compacts, and dwarfs — 'Blue Vase', 'Pfitzeriana', Pfitzerana compacta'.
## INFORMATION SHEET

### D. Common Name(s): Austrian Pine

- **Botanical Name:** *Pinus nigra*
- **Hardiness Zone:** 4
- **Form:** Pyramidal
- **Leaves:** 3-6” long stiff needles in bundles of two, often twisted
- **Flowers:** Not showy
- **Fruit:** Oval cones 2-4” long, mature every year
- **Color:** Dark green
- **Cultural Notes:** Very durable and tough after established, will tolerate salt, wind, and drought. Pine twig blight and needle blight during spring and summer.

### E. Common Name(s): Japanese Black Pine

- **Botanical Name:** *Pinus thunbergi*
- **Hardiness Zone:** 6
- **Form:** Pyramidal
- **Leaves:** 3-4” straight needles in bundles of 2, fairly stiff and harsh to touch
- **Flowers:** Not showy
- **Fruit:** 1-2 ½” cone, light brown, with prickly scales
- **Color:** Dark green
- **Cultural Notes:** Tough, grows rapidly, transplants easily. Grows informally. Gets open and unsightly if grown too rapidly. Susceptible to pine tip moth. Not for the formal landscape.

### Cultivars:

- None
INFORMATION SHEET

F. Common Name(s): Scotch Pine

Botanical Name: *Pinus sylvestris*  
Size: Large tree

Hardiness Zone: 2  
Exposure: Sun

Form: Pyramidal  
Texture: Medium

Leaves: Needles 1-3" long in bundles of 2 twisted and stiff

Flowers: Not showy

Fruit: Spineless cone 1-2" long, rounded, brown

Color: Light green

Cultural Notes: Used in commercial Christmas tree production. Grows best in Midwest and Northeast. This tree gets very large and asymmetrical with age. Allow room for growth.

Cultivars: Many different cultivars

---

G. Common Name(s): Colorado Blue Spruce

Botanical Name: *Picea pungens*  
Size: Large tree

Hardiness Zone: 2  
Exposure: Sun to part shade

Form: Pyramidal  
Texture: Fine

Leaves: Stiff, sharp-pointed single needles (1 1/2" long)

Flowers: Not showy

Fruit: 2-4" drooping cone

Color: Green to blue-green

Cultural Notes: Needs cool soil and night temperatures, difficult to transplant and establish. Needs protection from drying southwest winds. The addition of heavy mulch will help in keeping the soil and root systems cool. Very slow growing.

Cultivars: 'Glauca' more blue color

'Koster' - a very deep powdery blue spruce cultivar. Dense pyramidal growth.
INFORMATION SHEET

H. Common Name(s): Mugo Pine

Botanical Name: *Pinus mugo* 'Mughus'  
Size: Small shrub

Hardiness Zone: 3  
Exposure: Sun

Form: Round  
Texture: Medium

Leaves: Straight needles in bundles of 2, about 1 1/2” long

Flowers: Not showy

Fruit: Small (1 1/2”) oval cone

Color: Dark green

Cultural Notes: Can't take extreme heat. Grows best in zone 7 and northward. Needs well drained soil, but is not drought resistant. Very susceptible to pine tip moth. Shearing the new growth lightly will help in maintaining a tight symmetrical shrub.

Cultivars:

I. Common Name(s): Yew

Botanical Name: *Taxus media* 'Densiformis'  
Size: Large shrub or small tree

Hardiness Zone: 4  
Exposure: Part sun to shade

Form: Irregular  
Texture: Fine

Leaves: Long and slender, often 1-1 1/2” long, 1/3” wide, spirally arranged on stem

Flowers: Not showy

Fruit: Pinkish red, fleshy cup, open at one end containing a seed. Showy

Color: Dark green

Cultural Notes: All plant parts are very poisonous, needs adequate moisture but well drained soil, can't withstand hot exposure. Very slow grower. Make sure the location is very well drained as waterlogged soil will kill the plant, even after a short time.

Cultivars: Many different cultivars; some are upright growers while some are shrub and hedge types.
IX. Vines and ground cover

A. Common Name(s): Purpleleaf Honeysuckle

Botanical Name: *Lonicera japonica* 'purpurea'

Size: Ground cover

Hardiness Zone: 4

Exposure: Sun or shade

Form: Spreading vine

Texture: Medium

Leaves: Opposite, oval with a pointed tip

Flowers: Red turning yellow, very fragrant

Fruit: Not showy

Color: Dark green to purple with sunlight intensifying purple color

Cultural Notes: Grows in nearly any soil, grows best in full sun. Transplant early spring to early fall. ‘Purpurea’ is one of the easiest to contain, as the others are ambitious in growth habit.

Cultivars: Many different cultivars from vine to shrub-like, most vines tend to overgrow location and cover anything in their path

B. Common Name(s): English Ivy

Botanical Name: *Hedera helix*

Size: Ground cover

Hardiness Zone: 5

Exposure: Shade

Form: Spreading vine

Texture: Medium

Leaves: Alternate, with 3 to 5 rounded lobes, with smooth margins

Flowers: Not showy

Fruit: Not showy

Color: Foliage shiny green

Cultural Notes: Hardy ground cover for shady locations that are not too wet or exposed to extremely bright and hot sunlight. Susceptible to spider mites in dry locations and leaf spot in humid locations.

Cultivars: Many, some are used for houseplants
C. Common Name(s): Monkey Grass, Liriope, Lily Tuft

Botanical Name: *Liriope muscari*  
Size: Ground cover

Hardiness Zone: 6  
Exposure: Part shade to shade

Form: Dense grass clump  
Texture: Medium

Leaves: Grass-like blades about ½” wide, 8-20” long, many leaves coming from central crown

Flowers: Purple or white riser above to foliage, very showy, mid to late spring

Fruit: Small, black berries

Color: Deep green on top, light green underneath

Cultural Notes: Doesn't like extreme heat and must be kept in shade or very little sun, otherwise grows well in fair soil with little care. Mow back to 3-4” in early spring before new flush of growth. Propagate by dividing clumps.

Cultivars: 'Variegata' leaves with a yellow stripe on outer margin  
'Big Blue'—taller, blue green leaves

D. Common Name(s): Compact Andorra Creeping Juniper

Botanical Name: *Juniperus horizontalis*  
Size: Small compact shrub

'Youngstown'  

Hardiness Zone: 2  
Exposure: Sun

Form: Irregular  
Texture: Fine

Leaves: Scale-like typical juniper

Flowers: Inconspicuous

Fruit: Not showy

Color: Medium green, turning plum purple in winter

Cultural Notes: Will not tolerate water-logged soils but grows well in moderately dry conditions, grows well in a variety of soils

Cultivars: There are standard varieties available but 'Youngstown' is preferred because it remains compact while standard varieties open up in center with age allowing weed growth
E. Common Name(s): Common Littleleaved Periwinkle

Botanical Name: Vinca minor

Size: Ground cover 4-6" tall

Hardiness Zone: 3

Exposure: Shade

Form: Dense ground cover

Texture: Fine

Leaves: Opposite, ½-1" long, ½" wide, elliptical with a smooth margin

Flowers: Vary in color, small, not very showy

Fruit: None

Color: Glossy green upper surface

Cultural Notes: Does best in a moist, shady location not for hot, dry locations. One of the best ground covers as it grows into a dense mat, keeping out most weed infiltration


F. Common Name(s): Japanese Garden Juniper

Botanical Name: Juniperus procumbens

Size: Small ground cover 6-8’

Hardiness Zone: 4

Exposure: Sun

Form: Ground cover

Texture: Fine

Leaves: Needle-like, grouped in irregular clusters about ¼” long

Flowers: Not showy

Fruit: Not showy

Color: Foliage is blue-green

Cultural Notes: Will not tolerate wet conditions but generally grows well in most soil types, needs full sun to develop compact form, spider mites can be a problem in late summer. Wood is somewhat brittle, so watch using this plant near foot traffic. Makes a good patio tub or planter specimen. One of the best, most beautiful junipers as long as spider mites are controlled.

Cultivars: ‘Nana’—very dwarf and compact
X. Nursery plant selection guide for trees

A. Container grown
   1. Trunk in center of container
   2. Straight trunk or meets design criteria
   3. Symmetrical branching
   4. No evidence of borers or insects
   5. No evidence of disease
   6. No damage to trunk or branches
   7. Container not crushed
   8. Root system fills container adequately
   9. Plant fully leafed out, or green showing in dormant stems
   10. Roots not growing out through drain holes excessively

B. Balled and burlapped (B&B)
   1. Trunk in center of ball
   2. Straight trunk or meets design criteria
   3. Symmetrical branching
   4. No evidence of borers or insects
   5. No evidence of disease
   6. No damage to trunk or branches
   7. Base of trunk not loose in soil root ball
   8. Firm root ball
   9. Burlap not excessively rotted

C. Bareroot
   1. Straight trunk or meets design criteria
   2. Symmetrical branching
   3. No evidence of borers or insects
INFORMATION SHEET

4. No evidence of disease
5. No damage to trunk or branches
6. Roots are firm and well-developed
7. Root system moist (not wet) and protected from drying

XI. Nursery plant selection guide for shrubs and groundcovers
A. Plants are symmetrical
B. Good branching (full with damaged branches removed)
C. No evidence of disease
D. No evidence of borers or insects
E. Container not crushed
F. Root system fills container adequately
G. Plant fully leafed out, or green showing in dormant stems
H. Roots not growing through drain holes excessively
LANDSCAPE PLANT MATERIALS
UNIT IV

ASSIGNMENT SHEET #1 — COLLECT PLANT SAMPLES

NAME _______________________________  SCORE __________________________

Directions: Collect and preserve in wax paper samples of leaves from twenty (20) plant materials specified by your instructor. Label the samples and tell what characteristics you used to identify these plant materials.
LANDSCAPE PLANT MATERIALS
UNIT IV

ASSIGNMENT SHEET #2 — EVALUATE NURSERY MATERIALS

NAME ___________________________  SCORE ___________________________

Directions: Using a plant materials list given to you by your instructor, visit two different nurseries in your area and determine the prices for the items on your list. Also judge the quality of those plants based on the criteria listed in the information sheet (sections X and XI) and rate them as excellent, very good, good, poor, or bad.

NURSERY #1

<table>
<thead>
<tr>
<th>Plant Material</th>
<th>Price</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NURSERY #2

<table>
<thead>
<tr>
<th>Plant Material</th>
<th>Price</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ASSIGNMENT SHEET #2

Now evaluate the plant materials according to both price and quality and state at which nursery (#1 or #2) you would recommend buying the plants. Which has the best buy?

<table>
<thead>
<tr>
<th>Plant Material</th>
<th>Where you recommend buying this plant (Nursery #1 or #2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
</tbody>
</table>
I. M3-203

LANDSCAPE PLANT MATERIALS
UNIT IV

ASSIGNMENT SHEET #3 — SELECT APPROPRIATE PLANTS

NAME ________________________  SCORE ________________________

Directions: Select plants which would be appropriate in your locale for the corner and porch of the two-story house below. Label the plants directly on the drawing or use numbers or letters and an accompanying listing.
## LANDSCAPE PLANT MATERIALS
### UNIT IV

## ASSIGNMENT SHEET #4 — RECOMMEND PLANTS FOR VARIOUS SITUATIONS

<table>
<thead>
<tr>
<th>NAME</th>
<th>SCORE</th>
</tr>
</thead>
</table>

Directions: Read the following situations and answer the questions for your locale.

A. Mary Smith would like to have some shrubs put on the north side of her house. She would like to have flowering shrubs if possible. What would you recommend? What questions might you ask to narrow down the choices?

B. Bob Jones would like to have you install some trees in his front yard. He would like something smaller in front of the house and larger trees on the sides of the front yard which are not in front of the house. What would you recommend? What questions might you ask to narrow down the choices?
C. Carol Williams would like for your company to landscape the area in front of her commercial convenience store. It needs to be low maintenance and attractive to customers. What would you recommend?

D. Mr. and Mrs. Dixon live in Western Arkansas. Their home faces east, which is partially shaded by trees. Mrs. Dixon prefers spring-blooming plants, while Mr. Dixon wants evergreen shrubs. Name two (2) shrubs that can be used together which will fit the needs of both Mr. and Mrs. Dixon.
1. Match the terms on the right with the correct definitions.

- a. A geographical zone in which a plant is considered to be hardy; generally based on temperature.
- b. Cone-bearing plant that is usually also evergreen and needle-bearing.
- c. Latin identification of plant materials divided into genus and species.
- d. Plant material which has leaves that are not needle-like and that are retained year round.
- e. A genetic cross between two species of plants.
- f. A plant grown for the beauty of its form, foliage, flowers, or fruit, rather than for food, fiber, or other uses.
- g. A cultivated variety of a plant which when reproduced will retain its distinguishing features.
- h. Plant name used by the general public.

2. Identify the following parts of a plant’s botanical name.

\[Elaeagnus \quad \text{angustifolia} \quad \text{‘Cardinal’}\]

- a. 
- b. 
- c. 

1. Botanical name 
2. Broadleaf evergreen 
3. Common name 
4. Conifer 
5. Cultivar 
6. Deciduous shrub 
7. Hardiness zone 
8. Hybrid 
9. Ornamental 
10. Species

NAME ___________________________  SCORE ___________________________
3. State the meanings of the following common botanical names.
   a. Albus
   b. Bi
   c. Brachy
   d. Domesticus
   e. Fallax
   f. Floribundas
   g. Fragrans
   h. Grandiflorus
   i. Major
   j. Minor
   k. Nigra
   l. Poly
   m. Rubra
   n. Sempervirens
   o. Tri

4. Answer the following questions about shade trees by filling in the blanks.
   a. The botanical name for river birch is __________. __________.
   b. The size of a river birch is __________.
   c. The botanical name for lacebark elm is __________. __________.
   d. The form of a lacebark elm is __________. __________. __________.
   e. The fruit of a northern red oak matures in the __________. __________.__________. __________.
   f. The northern red oak requires a __________. exposure.
   g. An important cultivar of the pin oak is __________.
TEST

h. The botanical name for pin oak is ___________ ___________.

i. The live oak is very ___________ growing.

j. *Quercus virginiana* is the botanical name for the ___________ ___________.

k. A fruitless mulberry does not have ___________ or ___________.

l. Fruitless mulberry grows ___________ in most soils with proper care.

m. A water oak tends to ___________ its leaves well into the winter.

n. The form of a water oak is ___________ ___________ or ___________ topped.

o. The common name for *Pistacia chinensis* is ___________ ___________.

p. The common name for *Celtis occidentalis* is ___________.

q. The common name for *Fraxinus pennsylvanica* is ___________.

r. The sweetgum creates a litter problem with its ___________ ___________.

s. ___________ ___________ is the botanical name for the sycamore.

t. The form of the sycamore is huge and ___________.

u. The weeping willow requires ___________ water.

v. The weeping willow is a ___________ lived tree.

w. The botanical name for southern magnolia is ___________ ___________.

x. The form of a southern magnolia is ___________.

5. Indicate if the statements about ornamental trees are true or false with a T or F.

   a. The flowers on a flowering crabapple can be white, pink, or red in color. **T**

   b. The flowering crabapple is somewhat susceptible to fire blight. **T**

   c. The botanical name for the dogwood is *Cornus florida*. **T**

   d. The dogwood is a large tree. **T**

   e. The goldenrain tree has bright green clusters of flowers on top of the tree. **T**

   f. The goldenrain tree attracts boxelder bugs which may become a nuisance. **T**

   g. The sweetgum creates a litter problem with its leaves. **T**

   h. The form of the sycamore is huge and large. **T**

   i. The weeping willow requires water. **T**

   j. The sweetgum is a large tree. **T**

   k. The sycamore is a deciduous tree. **T**

   l. The goldenrain tree attracts boxelder bugs which may become a nuisance. **T**

195
TEST

g. The yaupon holly has fruit which is purple and showy.

h. The yaupon holly is a delicate plant and can't tolerate heat or drought very well.

i. The botanical name for saucer magnolia is *Magnolia soulangiana*.

j. The flowers of a saucer magnolia are usually purple with a white center.

k. The 'Bradford' pear is a cultivar.

l. The form of the 'Bradford' pear is pyramidal.

m. The purpleleaf plum is red in color.

n. The flowers on the purpleleaf plum are very showy.

o. The botanical name for the redbud is *Cercis indica*.

p. The 'Oklahoma' redbud has deep purple flowers.

6. Complete the following statements about deciduous shrubs by circling the right word or phrase.

   a. The 'Crimson Pigmy' barberry *(is, is not)* a cultivar.
   
   b. The *Berberis thunbergi* 'Crimson Pigmy' is *(purple, yellow)*.
   
   c. Pampas grass is dark *(green, blue)* with white or pink flower plumes.
   
   d. *Cortaderia selloana* is *(pampas grass, forsythia)*.
   
   e. Flowers on the forsythia are *(yellow, white)*.
   
   f. Forsythia is susceptible to *(drought, overwatering)*.
   
   g. *Lagerstroemia indica* is the botanical name for *(crape myrtle, forsythia)*.
   
   h. The *(crape myrtle, Vanhoutte spirea)* has many cultivars with different colored blooms.
   
   i. The *(common lilac, bush cinquefoil)* has heart shaped leaves.
   
   j. The *(common lilac, flowering quince)* is known for the fragrance of its flowers.
   
   k. *Chaenomeles speciosa* is the botanical name for the *(flowering quince, common lilac)*.
7. Answer the following questions about broadleaf evergreens by filling in the blanks.
   a. The botanical name for glossy abelia is __________ __________.
   b. *Aucuba japonica* has leaves that are green to speckled with __________.
   c. Azalea shrubs form a dense __________.
   d. Azalea shrubs grow best in __________ to part __________ exposure.
   e. *Euonymus japonica* is an extremely __________ plant.
   f. __________ is a major weakness of evergreen euonymus.
   g. Burford holly is a __________ textured shrub.
   h. 'Nellie R. Stevens' holly is a deep __________ color.
   i. *Nandina domestica* leaves turn a __________ __________ color in fall.
   j. New growth on the Fraser's photinia is __________ __________.

8. Indicate if the following statements about conifers are true or false with a T or F.
   a. Atlas cedar is pyramidal in form.  
   b. Atlas cedar has a 2-3" cone which is usually seen throughout the U.S.
   c. 'Canaerti' juniper is a cultivar.
   d. 'Canaerti' juniper is susceptible to bagworms and cedar apple rust.
   e. The fruit on a Chinese (pfitzer) juniper are smooth, round, blue, and about 1/4" in diameter.
   f. A pfitzer juniper is blue-green or green.
   g. Austrian pine is a tough and durable plant after it gets established.
   h. Austrian pine has cones which mature every other year.
   i. Japanese black pine transplants easily.
   j. Japanese black pine is irregular in form.
   k. Scotch pine is used in commercial Christmas tree production.
   l. *Pinus pungens* is the botanical name for the Scotch pine.
TEST

m. Colorado blue spruce needs warm soil and night temperatures.
n. *Picea pungens* 'Glauc'a is a Colorado blue spruce with a more blue color.
o. Mugo pine can tolerate extreme heat.
p. Mugo pine is a large tree.
q. *Taxus media* is very poisonous.
r. The flowers on *Taxus media* are showy.

9. Indicate if the following statements about vines and ground covers are true or false with a T or F.

a. Purpleleaf honeysuckle grows best in full sun.
b. *Lonicera japonica* 'purpurea' is purpleleaf honeysuckle.
c. English ivy grows best in full sun.
d. English ivy is a spreading vine.
e. Monkey grass is a spreading vine.
f. *Liriope muscari* is the botanical name for English ivy.
g. Compact andorra creeping juniper has scale-like typical juniper leaves.
h. Compact andorra creeping juniper's foliage turns plum purple in the winter.
i. *Vinca minor* is the botanical name for Japanese garden juniper.
j. Japanese garden juniper is a ground cover.
k. Japanese garden juniper has leaves which are needle-like, and grouped in irregular clusters about 1/4” long.

10. Name four nursery plant selection criteria for trees.

a. 

b. 

c. 

d. 

TEST

11. Name four nursery plant selection criteria for shrubs and groundcovers.
   a. __________________________________________
   b. __________________________________________
   c. __________________________________________
   d. __________________________________________

   (NOTE: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

   12. Collect plant samples. (Assignment Sheet #1)
   13. Evaluate nursery plant materials. (Assignment Sheet #2)
   14. Select appropriate plants. (Assignment Sheet #3)
   15. Recommend plants for various situations. (Assignment Sheet #4)
ANSWERS TO TEST

1. a. 7 e. 8
   b. 4 f. 9
   c. 1 g. 5
   d. 2 h. 3

2. a. Genus
   b. Species
   c. Cultivar

3. a. White
   b. Two
   c. Short
   d. Domesticated or cultivated
   e. False or deceptive
   f. Free flowering, blooming abundantly
   g. Fragrant
   h. With large flowers
   i. Large
   j. Small
   k. Dark, black
   l. Many
   m. Red, ruddy
   n. Evergreen
   o. Three

4. a. *Betula nigra*
   b. Large
   c. *Ulmus parvifolia*
   d. Round to oval crown
   e. Fall of the second year
   f. Sunny
   g. 'Sovereign' or 'Clownright' (or others mentioned in class)
   h. *Quercus palustris*
   i. Slow
   j. Live oak
   k. Flowers or fruit
   l. Rapidly
   m. Hold
   n. Broad, oval, round
   o. Chinese pistache
   p. Common hackberry
   q. Green ash
**ANSWERS TO TEST**

<p>| | | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>r.</td>
<td>Fruit or leaves</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>s.</td>
<td><em>Platanus occidentalis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t.</td>
<td>Pyramidal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>u.</td>
<td>Abundant (much)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v.</td>
<td>Short</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>w.</td>
<td><em>Magnolia grandiflora</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x.</td>
<td>Pyramidal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 5. a. | T | l. | T |   |   |   |   |   |   |   |   |
| 6. a. | Is |   |   | g. | Crapemyrtle |   |   |   |   |   |   |
| 6. b. | Purple |   | h. | Crapemyrtle |   |   |   |   |   |   |
| 6. c. | Green |   | i. | Common lilac |   |   |   |   |   |   |
| 6. d. | Pampas grass |   | j. | Common lilac |   |   |   |   |   |   |
| 6. e. | Yellow |   | k. | Flowering quince |   |   |   |   |   |   |
| 6. f. | Drought |   |   |   |   |   |   |   |   |   |   |

| 7. a. | *Abelia grandiflora* |   | f. | Scale |   |   |   |   |   |   |   |
| 7. b. | Yellow |   | g. | Coarse |   |   |   |   |   |   |   |
| 7. c. | Mound |   | h. | Green |   |   |   |   |   |   |   |
| 7. d. | Shade |   | i. | Red-purple |   |   |   |   |   |   |   |
| 7. e. | Tough (durable) |   | j. | Bright red |   |   |   |   |   |   |   |

| 8. a. | T | j. | F |   |   |   |   |   |   |   |   |
| 8. b. | F | k. | T |   |   |   |   |   |   |   |   |
| 8. c. | T | l. | F |   |   |   |   |   |   |   |   |
| 8. d. | T | m. | F |   |   |   |   |   |   |   |   |
| 8. e. | T | n. | T |   |   |   |   |   |   |   |   |
| 8. f. | T | o. | F |   |   |   |   |   |   |   |   |
| 8. g. | T | p. | F |   |   |   |   |   |   |   |   |
| 8. h. | F | q. | T |   |   |   |   |   |   |   |   |
| 8. i. | T | r. | F |   |   |   |   |   |   |   |   |

| 9. a. | T | g. | T |   |   |   |   |   |   |   |   |
| 9. b. | T | h. | T |   |   |   |   |   |   |   |   |
| 9. c. | F | i. | F |   |   |   |   |   |   |   |   |
| 9. d. | T | j. | T |   |   |   |   |   |   |   |   |
| 9. e. | F | k. | T |   |   |   |   |   |   |   |   |
| 9. f. | F |   |   |   |   |   |   |   |   |   |   |
ANSWERS TO TEST

10. Any four of the following:
   a. Trunk in center of container or ball
   b. Straight trunk or meets design criteria
   c. Symmetrical branching
   d. No evidence of borers or insects
   e. No evidence of disease
   f. No damage to trunk or branches
   g. Container or ball not crushed or damaged
   h. Root system fills container adequately
   i. Plant fully leafed out, or green showing in dormant stems
   j. Roots in containers not growing out through drain holes excessively
   k. Bare roots are firm and well-developed
   l. Root system moist (not wet) and protected from drying

11. Any four of the following:
   a. Plants are symmetrical
   b. Good branching (full with damaged branches removed)
   c. No evidence of disease
   d. No evidence of borers or insects
   e. Container not crushed
   f. Root system fills container adequately
   g. Plant fully leafed out, or green showing in dormant stems
   h. Roots not growing through drain holes excessively

12.15. Evaluated to the satisfaction of the instructor
TURF MANAGEMENT
UNIT V

UNIT OBJECTIVE

After completion of this unit, the student should be able to develop a turf management calendar for various turfs. Competencies will be demonstrated by completing the assignment sheets and the unit test with minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Define turf management.
2. List tasks involved in turf management.
3. Name types of turf management calendars.
4. List factors to consider when developing a turf management calendar.
5. State the purpose of a soil test.
6. Name major and minor nutrients essential to turfgrasses.
7. Distinguish between quickly-available and slow-release nitrogen sources.
8. Determine amounts of nutrients in fertilizers. (Assignment Sheet #1)
9. Determine fertilizer ratios. (Assignment Sheet #2)
10. List budget considerations.
11. Answer questions using a turf management calendar. (Assignment Sheet #3)
12. Develop a turf management calendar for a local landscape. (Assignment Sheet #4)
TURF MANAGEMENT
UNIT V

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to class to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to the teaching of this unit.)

B. Provide students with objective sheet.

C. Discuss unit and specific objectives.

D. Provide students with information and assignment sheets.

E. Discuss information and assignment sheets.

F. Integrate the following activities throughout the teaching of this unit:

1. Obtain maintenance calendars from organizations in your area and show how to read and interpret these calendars.

2. Invite a guest speaker from a nearby university, golf course, or maintenance business and have them talk about the maintenance program they use.

3. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

G. Give test.

H. Evaluate test.

I. Reteach if necessary.

RESOURCES USED IN DEVELOPING THIS UNIT


C. Oklahoma State University Cooperative Extension Service, Stillwater, OK

1. Maintenance Calendar for Bentgrass Putting Greens

2. Turf Maintenance Calendar for Bermudagrass Fairways, Tees, and Clubhouse Grounds and Other Recreational Areas
RESOURCES USED IN DEVELOPING THIS UNIT

D. Iowa State University Cooperative Extension Service, Ames, IA

1. *Turfgrass Renovation*
2. *Thatch Control in the Home Lawn*
3. *Mowing Your Lawn*
4. *Turfgrass Management Calendar: Kentucky Bluegrass Lawns*
5. *Lawn Weed Control*
6. *Insecticides and Miticides Labeled for Turfgrass Pests*

SUGGESTED SUPPLEMENTAL RESOURCES

Check for appropriate fact sheets on turfs and turf management from the cooperative extension service in your state.
TURF MANAGEMENT
UNIT V

INFORMATION SHEET

I. Turf management — The process of following all maintenance practices to grow and maintain quality turf.

II. Tasks involved in turf management (Transparency 1 and Assignment Sheets #3 and #4)

A. Weed control — The control or eradication of weeds from turf, whether by chemical (herbicides) or mechanical (such as hand weeding) methods

B. Insect and disease control — The control of turf insects and diseases with chemicals (insecticides and fungicides)

C. Watering — The management of turf soil moisture by the use of irrigation

D. Fertilization — The management of turf's nutritional needs by the use of organic and inorganic fertilizers

E. pH adjustment — The process of applying either sulfur (to lower pH) or limestone (to raise pH) in order to alter the acidity/alkalinity to make a more desirable soil in which to grow turf

F. Mowing — The act of mechanically cutting the turf to its proper height

G. Aeration — The process of puncturing compacted soil to allow oxygen, nutrients, and water to reach the root system of turfgrass plants

H. Thatch control — The process by which turf is stirred and vacuumed to remove the buildup of grass clippings (thatch)

I. Renovation or lawn installation — The process of improving a poor, weak lawn or establishing a new lawn

III. Types of turf management (maintenance) calendars (Transparency 1)

A. Residential — A schedule of items to be performed in the maintenance of a homeowner's lawn.

B. Commercial — A schedule of items to be performed by a business which serves both homeowners and commercial buildings in the maintenance of turf.

C. Institutional — A schedule of items to be performed by an organization which maintains an institution such as a school or church.

D. Golf course — A schedule of items to be performed by an organization which maintains a golf course including fairways, tees, and greens.

E. Athletic field — A schedule of items to be performed by an organization which maintains an athletic field (baseball, football, etc.).
IV. Factors to consider when developing a turf management calendar (Assignment Sheets #3 and #4)

A. Type of grass

B. Expected use of area (football field, playground, residential lawn, etc.)

C. Climatic factors (temperatures, humidity, rainfall, wind)

D. Soil type

E. Budget considerations

F. Equipment needs

G. Soil analysis

(NOTE: If the soil analysis shows chemical deficiencies, you must plan to correct this condition on the management calendar)

V. Purpose of a soil test — To determine fertility and pH of the soil so that necessary corrections can be performed.

VI. Nutrients essential to turfgrasses

A. Major nutrients

1. Nitrogen (N) — Necessary for growth and color (green) of the plant

2. Phosphorus (P) — Necessary for root development and cell growth and development of the plant

3. Potassium (K) — Necessary for cell division and disease resistance

B. Minor nutrients

1. Iron (Fe) — Necessary for the synthesis of chlorophyll, which gives plants their green color

2. Manganese (Mn) — Essential to the synthesis of chlorophyll

3. Calcium (Ca) — Needed for root and stem growth

(NOTE: There are several other minor nutrients, but they are usually present in sufficient quantities for turf growth.)
INFORMATION SHEET

VII. Categories of nitrogen sources

A. Quickly-available — These materials are water-soluble, and the nitrogen is immediately available. Fertilization results in a flush of growth and rapid depletion of nitrogen. This makes it necessary to make several lighter applications to obtain uniform amounts of nitrogen in the soil. These sources are less expensive per pound of actual nitrogen.

Examples: Urea, ammonium nitrate, ammonium sulfate, diammonium phosphate

B. Slow-release — Nitrogen is released as natural organic fertilizers decompose into inorganic ions or as synthetic organics chemically react with water to release nitrogen.

Examples: Activated sewage sludge, manures, animal tankage, isobutyline diurea (ICDI), coated nitrogen materials

VIII. How to determine actual quantities of nutrients in fertilizer (Assignment Sheet #1)

A. Fertilizer analysis designates the percentage by weight of nitrogen, phosphorus, and potassium in the product.

Example: 10-20-10 contains 10% nitrogen, 20% phosphorus, and 10% potassium

B. Calculations

Weight of bag × % of nutrient in bag = Weight (lbs) of nutrient per bag

Examples: 50 lbs × 10% Nitrogen = 5 lbs Nitrogen per bag

50 lbs × 20% Phosphorus = 10 lbs Phosphorus per bag

50 lbs × 10% Potassium = 5 lbs Potassium per bag

IX. Fertilizer ratios (Assignment Sheet #2)

A. Refers to the relationship between the percentages of nitrogen, phosphorus, and potassium.

B. Determining ratios — Divide each number by the smallest whole number in the grade, or by the largest whole number divisible into all three numbers of the grade.

Example: For 10-20-10, divide each number by 10 to get a ratio of 1-2-1. For 6-9-12 divide by 3 to get 2-3-4.

(NOTE: You have probably done this in your math class and called it reducing by the lowest common denominator. Reduce the ratios until they cannot be reduced any more. Although 2-4-2 is reduced by 5 from 10-20-10, it is not correct until reduced to 1-2-1.)
INFORMATION SHEET

X. Budget considerations

A. Labor costs (such as for mowing, edging, fertilizer, weed and insect control, watering, and aerification; usually the largest cost)

B. Equipment costs (such as for new machines, depreciations, repair parts and labor, tires, fuels, and lubricants)

C. Chemical costs (such as for fertilizers and pesticides)

D. Utility costs (such as for water and electricity use)
Sample Turf Management Calendars

Cool Season Grasses:

<table>
<thead>
<tr>
<th></th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUNE</th>
<th>JULY</th>
<th>AUG</th>
<th>SEPT</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weed Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insect and Disease Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X-Quick</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O-Slow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH Adjustment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mowing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aeration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thatch Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lawn Installation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Warm Season Grasses:

<table>
<thead>
<tr>
<th></th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUNE</th>
<th>JULY</th>
<th>AUG</th>
<th>SEPT</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weed Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insect and Disease Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X-Quick</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O-Slow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH Adjustment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mowing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aeration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thatch Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lawn Installation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These are only samples. Tasks and when they are performed will vary for different locations and turf uses.
TURF MANAGEMENT
UNIT V

ASSIGNMENT SHEET #1 — DETERMINE AMOUNTS OF NUTRIENTS IN FERTILIZERS

NAME_________________________          SCORE_________________________

Directions: Solve the problems below involving 50 lb. bags of fertilizer.

1. How many lbs. of N P and K in 10-20-10?
   N — _______________________
   P — _______________________
   K — _______________________

2. How many lbs. of N P K in 33-0-0?
   N — _______________________
   P — _______________________
   K — _______________________

3. How many lbs. of P in 17-6-6?
   P — _______________________

211
TURF MANAGEMENT
UNIT V

ASSIGNMENT SHEET #2 — DETERMINE FERTILIZER RATIOS

NAME ___________________________  SCORE ___________________________

Directions: Solve the following problems, reducing to lowest ratios.

1. 18-6-6 — ___________________________
2. 10-20-10 — ___________________________
3. 21-10-5 (round) — ___________________________
4. 18-6-12 — ___________________________
5. 10-6-4 — ___________________________

__________________________
Directions: Read the attached maintenance calendar for Kentucky bluegrass lawns and answer the following questions.

(Note: This was written for a specific location and the dates and activities may be different in your area. Answer according to the calendar shown.)

1. According to the calendar, when would be the best time to apply lime? __________

2. During what months are leaf spots a problem? ____________

3. During what months can lawns be installed by sodding? ____________

4. In what month(s) should fertilization be done? __________

5. What diseases should you be on the lookout for in July? __________

6. When is the best time to overseed for renovation? __________

7. What insect(s) are prevalent in September? __________

8. In what months should dethatching be done? __________

9. When is the best time to control broadleaf weeds? __________

10. What are the mowing months? __________
**Turfgrass Management Calendar for Kentucky Bluegrass Lawns**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disease occurrence</td>
<td>Snow molds</td>
<td>Leafspot</td>
<td>Dollarspot</td>
<td>Fusarium blight</td>
<td>Leafspot</td>
<td>Snow molds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>occurrence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>occurrence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insect control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mowing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mowing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seeding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seeding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thatch removal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thatch removal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thatch removal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weed control</td>
<td>Crabgrass preemerge</td>
<td>Crabgrass postemerge</td>
<td>Broadleaf</td>
<td>Broadleaf</td>
<td>Best time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Follow with preemergence crabgrass herbicide.*

Source — Iowa State University Cooperative Extension Service
TURF MANAGEMENT
UNIT V

ASSIGNMENT SHEET #4 — DEVELOP A TURF MANAGEMENT
CALENDAR FOR A LOCAL LANDSCAPE

NAME ___________________________    SCORE ___________________________

Directions: Develop a turf management calendar for a landscape in your geographical region.
Use either Calendar A below or B on the next page.

CALENDAR A

Directions: Check or fill in when these tasks should be accomplished in your area.

<table>
<thead>
<tr>
<th></th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUNE</th>
<th>JULY</th>
<th>AUG</th>
<th>SEPT</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weed Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insect and Disease Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X-Quick</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O-Slow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH Adjustment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mowing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aeration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thatch Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lawn Installation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CALENDAR B

Directions: List tasks to be accomplished each month in your area and special conditions to watch for (such as specific insects, weeds, or diseases).

<table>
<thead>
<tr>
<th>JANUARY</th>
<th>JULY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ___________</td>
<td>1. ___________</td>
</tr>
<tr>
<td>2. ___________</td>
<td>2. ___________</td>
</tr>
<tr>
<td>3. ___________</td>
<td>3. ___________</td>
</tr>
<tr>
<td>4. ___________</td>
<td>4. ___________</td>
</tr>
<tr>
<td>5. ___________</td>
<td>5. ___________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FEBRUARY</th>
<th>AUGUST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ___________</td>
<td>1. ___________</td>
</tr>
<tr>
<td>2. ___________</td>
<td>2. ___________</td>
</tr>
<tr>
<td>3. ___________</td>
<td>3. ___________</td>
</tr>
<tr>
<td>4. ___________</td>
<td>4. ___________</td>
</tr>
<tr>
<td>5. ___________</td>
<td>5. ___________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MARCH</th>
<th>SEPTEMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ___________</td>
<td>1. ___________</td>
</tr>
<tr>
<td>2. ___________</td>
<td>2. ___________</td>
</tr>
<tr>
<td>3. ___________</td>
<td>3. ___________</td>
</tr>
<tr>
<td>4. ___________</td>
<td>4. ___________</td>
</tr>
<tr>
<td>5. ___________</td>
<td>5. ___________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>APRIL</th>
<th>OCTOBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ___________</td>
<td>1. ___________</td>
</tr>
<tr>
<td>2. ___________</td>
<td>2. ___________</td>
</tr>
<tr>
<td>3. ___________</td>
<td>3. ___________</td>
</tr>
<tr>
<td>4. ___________</td>
<td>4. ___________</td>
</tr>
<tr>
<td>5. ___________</td>
<td>5. ___________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MAY</th>
<th>NOVEMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ___________</td>
<td>1. ___________</td>
</tr>
<tr>
<td>2. ___________</td>
<td>2. ___________</td>
</tr>
<tr>
<td>3. ___________</td>
<td>3. ___________</td>
</tr>
<tr>
<td>4. ___________</td>
<td>4. ___________</td>
</tr>
<tr>
<td>5. ___________</td>
<td>5. ___________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>JUNE</th>
<th>DECEMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ___________</td>
<td>1. ___________</td>
</tr>
<tr>
<td>2. ___________</td>
<td>2. ___________</td>
</tr>
<tr>
<td>3. ___________</td>
<td>3. ___________</td>
</tr>
<tr>
<td>4. ___________</td>
<td>4. ___________</td>
</tr>
<tr>
<td>5. ___________</td>
<td>5. ___________</td>
</tr>
</tbody>
</table>
TURF MANAGEMENT
UNIT V

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

1. N 5
   P 10
   K 5
2. N 161/2
   P 0
   K 0
3. P 3

Assignment Sheet #2

1. 3-1-1
2. 1-2-1
3. 4-2-1
4. 3-1-2
5. 5-3-2

Assignment Sheet #3

1. September through December
2. April, May, September, and October
3. March, April, May or August September, October if water is available
4. April, May, August, September, October
5. Dollarspot, Fusarium Blight, Pythium Blight, and Melting Out
6. August, September, October
7. White grubs and sod webworms
8. April, May, September, October
9. August and September
10. April through early November

Assignment Sheet #4 — Evaluated to the satisfaction of the instructor

217
1. Define turf management.

________________________________________________________________________
________________________________________________________________________

2. List six tasks involved in turf management.
   a. ______________________________________________________________
   b. ______________________________________________________________
   c. ______________________________________________________________
   d. ______________________________________________________________
   e. ______________________________________________________________
   f. ______________________________________________________________

3. Name three types of turf management calendars.
   a. ______________________________________________________________
   b. ______________________________________________________________
   c. ______________________________________________________________

4. List four factors to consider when developing a turf management calendar.
   a. ______________________________________________________________
   b. ______________________________________________________________
   c. ______________________________________________________________
   d. ______________________________________________________________

5. State the purpose of a soil test.

________________________________________________________________________
6. Name three major and three minor nutrients essential to turfgrasses.
   a. Major nutrients
      1)  
      2)  
      3)  
   b. Minor nutrients
      1)  
      2)  
      3)  

7. Distinguish between the types of nitrogen sources by placing a "Q" next to those quickly-available and an "S" next to those that are slow-release.
   ______ a. Manures
   ______ b. Coated nitrogen materials
   ______ c. Urea
   ______ d. Activated sewage sludge
   ______ e. Ammonium nitrate

8. You have a 25 lb. bag of 20-10-20 fertilizer. How many pounds of actual nitrogen, phosphorus, and potassium are in the bag?

9. Determine the fertilizer ratio, to the nearest whole number, for a fertilizer which has an analysis of 17-5-6.

10. List three budget considerations important to turf management.
    a.  
    b.  
    c.  

(Note: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

11. Answer questions using a turf management calendar. (Assignment Sheet #3)

12. Develop a turf management calendar for a local landscape. (Assignment Sheet #4)
TURF MANAGEMENT
UNIT V

ANSWERS TO TEST

1. The process of following all maintenance practices to grow and maintain quality turf.

2. Any six of the following:
   a. Weed control
   b. Insect and disease control
   c. Watering
   d. Fertilization
   e. pH adjustment
   f. Mowing
   g. Aeration
   h. Thatch control
   i. Lawn installation or renovation

3. Any three of the following:
   a. Residential
   b. Commercial
   c. Institutional
   d. Golf course
   e. Athletic field

4. Any four of the following:
   a. Type of grass
   b. Expected use of area
   c. Climatic factors
   d. Soil type
   e. Budget considerations
   f. Equipment needs
   g. Soil analysis

5. To determine fertility and pH of the soil so that necessary corrections can be performed.

6. a. Major
   1) Nitrogen
   2) Phosphorus
   3) Potassium
   b. Minor
   1) Iron
   2) Manganese
   3) Calcium
ANSWERS TO TEST

7.   a.  S  
b.  S  
c.  Q  
d.  S  
e.  Q  

8.  5 pounds nitrogen, 2.5 pounds phosphorus, and 5 pounds potassium  

9.  3-1-1  

10.  Any three of the following:  
a.  Labor costs  
b.  Equipment costs  
c.  Chemical costs  
d.  Utility costs  

11.-12.  Evaluated to the satisfaction of the instructor
LANDSCAPE CONSTRUCTION
UNIT VI

UNIT OBJECTIVE

After completion of this unit, the student should be able to construct basic landscape features such as sidewalks, retaining walls, bed edgings, berms, and flower boxes. Competencies will be demonstrated by completing the assignment and job sheets and the unit tests with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to landscape construction with the correct definitions.
2. Match common landscape construction items with the correct descriptions.
3. List common materials used in landscape construction.
4. Select from a list types of woods commonly used in landscaping.
5. State the correct concrete and mortar mix ratios.
6. Calculate concrete quantities. (Assignment Sheet #1)
7. Identify common brick patterns.
8. List materials used for retaining walls, planters, flower boxes, and raised beds.
9. Distinguish between materials used for paved areas.
10. Complete statements on considerations when designing contained planting areas.
OBJECTIVE SHEET

11. Select from a list types of edgings.

12. Select true statements on considerations when designing berms.

13. List supplementary skills useful in landscape construction.

14. Match common landscape construction tools with descriptions of their use.

15. Identify common carpentry fasteners.

16. Demonstrate the ability to:
   a. Build a landscape timber or railroad tie planter box. (Job Sheet #1)
   b. Install edging for a circular area. (Job Sheet #2)
   c. Build concrete forms. (Job Sheet #3)
   d. Mix and pour concrete. (Job Sheet #4)
   e. Build a paver sidewalk. (Job Sheet #5)
LANDSCAPE CONSTRUCTION
UNIT VI

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to class to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to the teaching of this unit.)

B. Provide students with objective sheet.

C. Discuss unit and specific objectives.

D. Provide students with information and assignment sheets.

E. Discuss information and assignment sheets.

F. Provide students with job sheets.

G. Discuss and demonstrate the procedures outlined in the job sheets.

H. Integrate the following activities throughout the teaching of this unit:

1. Have a speaker from a landscape construction company talk about the different kinds of projects they are involved in.

2. Visit highly maintained public areas and study the types of construction projects they are doing or have done.

3. Discuss types of fences and their uses.

4. Discuss common decking patterns or designs.

5. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

I. Give test.

J. Evaluate test.

K. Reteach if necessary.

RESOURCES USED IN DEVELOPING THIS UNIT


RESOURCES USED IN DEVELOPING THIS UNIT


SUGGESTED SUPPLEMENTAL RESOURCES

A. Slide sets with study guides

2. *Planting, Protecting Existing Features* (71 frames).
4. *Fencing, Patios* (73 frames).
6. *Structures, Seating, Play Areas, Containers* (81 frames)
7. *Water Features, Irrigation, Materials* (81 frames)

B. Transparencies, study guides, and cassette tapes

2. *Landscape Construction* (86 frames).
3. *Landscape Planting and Bed Preparation* (30 frames)

A and B are available from:

Vocational Agriculture Service
College of Agriculture
University of Illinois
1401 South Maryland Drive
Urbana, IL 61801
217/333-3871
RESOURCES USED IN DEVELOPING THIS UNIT

C. Computer software (for Apple series) available from:

AAVIM
120 Driftmier Center
Athens, GA 30602
404/542-2586

1. Mixing and Estimating Concrete (HB088).

D. VHS video tapes available from:

Teaching Aids Incorporated
P.O. Box 1798
Costa Mesa, CA 92628-0798
714/548-9321

(on Building a Deck)

1. Substructure/Decking (R-VT1136).
2. Railings/Roofing (R-VT1137).
3. Fixed Bench/Storage (R-VT1138).
I. Terms and definitions

A. Aggregates — Inert materials such as sand, gravel, or stones that are mixed with cement to form concrete

B. Batter — Amount of lean back on the front of a dry wall

C. Berm — A raised, elongated mound or small hill of soil used to imitate natural features in the landscape or to conceal undesirable views or features

D. Cement — Substance used as a binder to hold other substances together

E. Chalk rocks — Small rocks used when building a dry wall to keep large rocks level and solid

F. Concrete — A hard, strong construction material made by mixing cement, aggregates, and water in a ratio that will cause the cement to set and bind the entire mass

G. Course — A single level, horizontal layer of material such as bricks in a wall
H. Cut and fill — Grading operations which change the contours of the earth's surface

I. Deadmen — Metal, wood, or concrete members connected to a wall (or other structure) used to anchor and secure the wall

J. Dry wall — A wall built without mortar

K. Galvanized — Iron or steel coated with zinc to prevent corrosion

L. Landscape construction — Building structures that enhance the usefulness and/or beauty of a landscaped area

M. Masonry — Construction projects made with bricks, stones, or blocks and mortar

N. Mortar — A mixture of cement, lime, or gypsum plaster with masonry sand and water used between bricks, stones, or blocks to hold them together

O. Plywood — A structural material consisting of sheets of wood glued or cemented together with the grains of alternating layers arranged at right angles
P. Screed — A leveling device (such as a board) drawn over freshly poured concrete

II. Common landscape construction items

(NOTE: A landscaping firm may build all, some, or none of the following items. Many of the larger items are built by specialty firms who have the necessary tools and expertise.)

A. Retaining walls — Used to transform slopes into usable areas and to protect steep banks from erosion

B. Paved walkways and drives — Used for concentrated foot or vehicle traffic

C. Patios — Paved areas built at ground level adjoining dwellings which are used for outdoor entertaining or dining

D. Decks — Wooden floored areas built at any height adjoining dwellings which are used for outdoor entertaining or dining

(NOTE: Decks are often built to convert sloping, rocky, or undesirable terrain into usable space.)

E. Contained planting areas — Allow plants to be placed in locations where they would be difficult or impossible to maintain

Examples: Planters, flower boxes, raised planting beds, planting beds with permanent edgings

F. Fences, gates, screens — Used to enclose an area; restrict movement by man, animals, and machines; conceal unwanted views; or for privacy

G. Patio covers, gazebos — Overhead structures used to protect people from the sun or weather or to provide privacy

H. Additional enrichment items — Natural or man-made features in the landscape that are not functioning as walls, ceilings, or floors in the 'outdoor room'

Examples: Permanent outdoor furniture (benches, tables), outdoor lighting, swimming pools, fountains, music, birdbaths, topiary
INFORMATION SHEET

III. Common materials used in landscape construction

A. Wood
B. Concrete
C. Brick
D. Concrete block
E. Stone (generally larger than 3" in diameter)
F. Gravel (generally 2 mm to 3" in diameter)
G. Earth
H. Asphalt

IV. Types of woods commonly used in landscaping

(Note: Cypress, red cedar, and redwood are naturally resistant to decay. The other woods listed should be treated to resist decay before being used outdoors. These woods may be sold as solid lumber (boards) or manufactured sheets or boards such as plywood.)

A. Cypress
B. Red cedar
C. Redwood
D. Douglas fir
E. Spruce
F. Eastern white pine
G. Southern yellow pine

V. Concrete and mortar mix ratios

A. Concrete
   1. Sand — 2 parts
   2. Aggregate (gravel) — 4 parts
   3. Cement — 1 part
   4. Water — To desired consistency
INFORMATION SHEET

(NOTE: Concrete can also be made from 'ready-mix' which contains sand, aggregate, and cement. Only water needs to be added. This is useful for very small jobs.)

B. Mortar
   1. Masonry sand — 6 parts
   2. Hydrated lime — 1 part
   3. Cement — 1 part
   4. Water — To desired consistency

   (NOTE: Mortar should be 'plastic-like,' not stiff or sloppy)

VI. How to calculate concrete quantities (Assignment Sheet #1)
   A. Determine dimensions of concrete to be poured (length and width in feet.)
   B. Determine depth of concrete slab to be poured. Convert to feet.
   C. Multiply length \times width \times depth to determine cubic feet of concrete.
   D. Divide cubic feet needed by 27 cubic feet (1 square yard) to determine number of cubic yards needed (which is how concrete is ordered).

Example:

Patio is 15' \times 20' and is 4' (\frac{1}{3} foot) deep

15' \times 20' \times \frac{1}{3}' = 99 \text{ cubic feet}

\frac{99 \text{ cubic feet}}{27 \text{ cubic feet}} = 2.67 \text{ cubic yards needed} — \text{order 3 cubic yards}

VII. Common brick patterns
   A. Running bond

\includegraphics[width=0.5\textwidth]{running_bond_diagram.png}
B. Herringbone

NOTE: There are many other patterns used by masons. Many are more elaborate and some are just variations of these common patterns such as the half basketweave below.

C. Basketweave

VIII. Materials used for retaining walls, planters, flower boxes, and raised beds

NOTE: Local codes may restrict the heights of retaining walls without an engineer's drawing.

A. Railroad ties

1. Give an informal, rustic effect to the landscape.
2. Use ties that are straight, not excessively split, and not too heavily coated with creosote.
3. Layers are tied together (above and below) with large spikes.
4. Deadmen are used to stabilize the wall and prevent collapse.
INFORMATION SHEET

B. Landscape timbers or treated posts
   1. Give an informal effect to the landscape, but are less rustic than railroad ties.
   2. Can be used like railroad ties except they are lighter and less strong than railroad ties, but neater to use.

C. Brick
   1. Give formal effect in the landscape.
   2. Are held together in straight courses with mortar.
   3. Commonly used to tie in with other brick elements in the landscape such as the house or sidewalks.
   (NOTE: Weep holes should be placed every 4 feet along the base of solid walls to allow water building up behind the wall to escape.)

D. Concrete block
   1. Give a less formal effect in the landscape.
   2. Can be used like brick or mortared stone walls except they are less expensive and less naturalistic.

E. Mortared stone
   1. Give a naturalistic effect to the landscape.
   2. Are held together in courses with mortar.

F. Dry stacked stone
   1. Give a naturalistic effect to the landscape.
   2. Must have 2" of batter per foot in height of wall to prevent collapse.
   3. Chalk rocks are used to level and solidify the wall.

IX. Materials used for paved areas (such as sidewalks, drives, and patios)
A. Solid paving
   1. Concrete
      (NOTE: Concrete may have smooth, rough, or exposed aggregate finishes.)
   2. Asphalt
INFORMATION SHEET

3. Wood planks
4. Bricks
5. Stone pavers or flagstones

(NOTE: Brick and stone pavers should be laid in sand or in mortar. Stones may be irregularly shaped or cut into squares or rectangles and laid like bricks in patterns.)

B. Loose paving
   1. Gravel or stone
   2. Bark or wood chips
   3. Sawdust
   4. Sand

(NOTE: Permanent edgings should be installed to contain the loose paving. A water permeable, weed-preventing fabric should also be used under the paving to control weeds.)

X. Considerations when designing contained planting areas (such as planters, flower boxes, raised planting beds, or planting beds with permanent edgings)

A. Size should be determined by its use.
   1. For annual plantings or flowers grown for only one season, the area could be basically any size suitable to the landscape plan.
   2. For permanent plantings or plant materials grown for more than one season (shrubs or ornamentals), the area should be large enough to accommodate the root system plus contain an adequate depth and width of soil to afford insulation to the root system to prevent winter injury to the plant material.

B. Design and composition of the planter should be complementary to the style and composition of the building.

Examples: Brick planters and edgings are generally not appropriate in front of stone houses. A railroad tie planting bed is not suited for a formal style building.

C. Planting areas may be designed inground or freestanding.

D. Adequate drainage should be provided, whether or not there is a permanent bottom in the box or planter.
XI. Types of edgings

A. Decay-resistant Wood (natural or treated)
B. Plastic (heavy black)
C. Metal (corrosion-resistant)
D. Masonry (brick, concrete, stone)

(NOTE: Edgings help to retain the material within [plants or pavings], prevent grass from intruding, and give a neater appearance.)

XII. Considerations when designing berms

A. Care must be taken to make the berm look natural to avoid an artificial look. This can be done by imitating the flow of the surrounding terrain.

B. The berm can be surfaced with grass, shrubs, trees, or ground cover or a combination of these.

C. The maximum slope if grass is used as the surface should not exceed a 1:3 gradient or 33% slope for mowing considerations. The berm should not drop or rise over 1' for every 3' in width.

D. Consideration should be given to how the berm will alter the drainage of the area; they should never be allowed to act as a dam which restricts surface water drainage.

E. If properly constructed, berms can be very beautiful but can be expensive.

F. Consideration of how the berm alters the microclimate of the area can provide for a wider selection of plant material and should not be ignored or plants may be misplaced and grow poorly.

Example: On berms 4' or 5' high, grass will become green a week or two earlier on the sunny slopes (south and west) than on the north and east slopes.

XIII. Supplementary skills useful in landscape construction

A. Carpentry — For all wood construction such as building decks, outdoor furniture, planters, or even concrete forms

B. Plumbing — For working with water and gas piping such as in irrigation systems, swimming pools (heated or unheated), or water fountains

C. Electrical wiring — For working with electricity such as exterior lighting on walkways, yards, pools, or dramatic tree or shrub lighting
D. Masonry — Working with bricks and stones such as for walks, patios, walls, and planting bed edgings

E. Concrete work — Working with concrete such as for drives, patios, walks, and planting bed edgings

F. Surveying — Determining the sizes, shapes, and positions of features on a piece of land such as when locating a swimming pool or determining the slope of land

G. Earth moving (grading) — Cutting and filling existing grade to meet a proposed grade such as when trying to improve drainage flow or unusable areas

XIV. Common landscape construction tools

(NOTE: Appropriate safety gear should be worn and safety rules should be followed when using tools and equipment.)

A. Hammers

1. Claw hammer — Used for driving nails and removing them with the claw

2. Sledgehammer — Used for positioning heavy building materials and driving heavy stakes
INFORMATION SHEET

3. Rubber mallet — Used for lightly positioning masonry pavers into place when constructing patios and sidewalks

B. Screwdrivers — Used for turning various screws
   1. Common

   ![Common Screwdriver]

   2. Phillips

   ![Phillips Screwdriver]

C. Level — Used for checking the trueness of horizontal and vertical lines

   ![Level Instrument]
INFORMATION SHEET

D. Tape measures — Used for measuring distances

E. Square — Used for laying out and checking squareness of surfaces and edges (right or 90° angles)

F. Saws

1. Hand — Used for cutting wood (by hand)

2. Hack — Used for cutting metal and plastic
3. Circular — Used for cutting boards to various lengths and widths using electric power

(NOTE: When using a circular saw, the top surface of the board is splintered, so the desirable side of the board should be face down when cutting.)

4. Railroad tie saw (quickie saw) — Used for cutting railroad ties, brick, and concrete; has a body like a chain saw with an exposed blade for cutting; is an extremely dangerous saw

(NOTE: As a safety precaution you should never stand in front of this saw just in case the blade becomes disengaged. It could be deadly.)
INFORMATION SHEET

5. Chain saw — Used for cutting timber (clearing work) and for cutting landscape timbers and posts

G. Chisels — Used in shaping or cutting a wood, stone, or metal material

H. Float — Prepares concrete for troweling

I. Tamper — Forces coarse aggregate slightly below the surface
INFORMATION SHEET

J. Trowel — Produces smooth final finish on concrete

XV. Common carpentry (wood) fasteners

A. Nails

1. Common — Used for framing and rough carpentry
   a. Size is identified by the term ‘penny’; the symbol for penny is d.
   
   Examples: 8d is 8 penny, 16d is 16 penny
   
   b. Comes in a ‘brite’ finish which will rust or galvanized which will not rust.

2. Finish — Used for finished work where visible nail heads are not desirable

3. Duplex — Nail with 2 stacked heads used for concrete forming; is always used in a temporary position. (The forms will be torn down after the concrete is firm.) The stacked head is used for ease in removing the nails.

B. Spikes — Used for joining posts or railroad ties
INFORMATION SHEET

C. Screws — Used for joining pieces having unusual stress; spiral threads help to hold screw in place

D. Bolts — Used with washers and nuts to join very heavy boards or boards and metal

E. Hinges — Used to permanently join gates to fences or to boxes allowing movement between parts

F. Latches — Used to temporarily join gates to fences but can be opened and closed
ASSIGNMENT SHEET #1 — CALCULATE CONCRETE QUANTITIES

NAME ______________________  SCORE ______________________

Directions: You need to order enough concrete to pour a 20’ x 24’ patio for a customer. After backfilling the forms with sand, the concrete will be 4” thick. How much concrete will you need to order?
LANDSCAPE CONSTRUCTION
UNIT VI

ANSWERS TO ASSIGNMENT SHEET

Assignment Sheet #1

20' x 24' x .33' deep = 158.4 cubic feet

\[
\begin{align*}
\frac{158.4 \text{ cubic feet}}{27 \text{ cubic feet/cubic yard}} &= 5.87 \text{ yards}
\end{align*}
\]

NOTE: Order 6 yards of concrete as it is better to have a little too much than less than you need.
A. Tools and materials
   1. Landscape timbers or railroad ties
   2. Appropriate saw
   3. 3/8" x 12" railroad tie spikes
   4. Electric drill with 1/4" by 6" bit
   5. 1 quart motor oil
   6. Sledgehammer
   7. Hacksaw
   8. Digging pick
   9. Shovel
   10. Level
   11. Square
   12. Tape measure
   13. Measuring chalk

B. Procedure
   1. Excavate footing of planter box.

FIGURE 1
JOB SHEET #1

2. Lay first course of ties or timbers, cut to proper length.

   FIGURE 2
   
   a. Partially bury first course to add stability.
   b. Leave drain gaps in bottom course.
   c. Check with a level to make sure ties are level and lying flat.

3. Lay second course of ties, cut to proper length, using a deadmen every 8' if needed.
   
   a. Back-step tie 2" from the tie below.
   b. Stagger joints of ties.
      (NOTE: You may want to pre-drill nail holes, one at each end, and one on each side of joint of underlying course. This is especially helpful when working with railroad ties.)
   c. Nail spike through top tie into bottom tie.

   FIGURE 3
   
   1) Dip nail into motor oil before driving to ease driving.
   2) Use hacksaw to cut off any bent nail—once partially driven, these nails cannot be pulled out.
      (NOTE: You will need to drill a new pilot hole if previous nail is bent and cut off.)
4. Add additional courses until desired height is achieved.
5. Backfill finished planter, tamping each layer of soil as added.
LANDSCAPE CONSTRUCTION
UNIT VI

JOB SHEET #2 — INSTALL EDGING FOR A CIRCULAR AREA

A. Tools and materials
   1. Plastic edging
   2. Pick or shovel
   3. String and 1 x 2 x 12" stakes
   4. Edging connector
   5. Edging nails
   6. Hammer
   7. Small sledge hammer
   8. Tape measure
   9. Hacksaw

B. Procedure
   1. Lay out a circular area of the desired diameter. (We will use 5’ diameter for an example.)
      a. Drive stake in center of proposed ring.
      b. Tie a loop in string and place around stake.
      c. Tie another stake onto the other end of the string so it is exactly half the diameter (2 1/2 feet) from center stake.
      d. Pull string tight and draw pilot circle onto ground.

FIGURE 1
JOB SHEET #2

2. Dig trench at scored mark on ground.

3. Calculate exact amount of edging needed by multiplying the desired diameter by \( \pi \), which is 3.14.

   Example: \( 3.14 \times 5' = 15.7' \) — round to 16'.

4. Cut piece of edging correct length (16') with hacksaw.

5. Join ends together in trench and trim to fit.

6. Using string, align edging into the desired circle, using edging spikes to hold into place.

7. Backfill around edging.


9. Align edging by tamping soil with hammer.
   a. If edging needs to go away from center, pack on inside of ring.
   b. If edging needs to go towards center, pack on outside of ring.
LANDSCAPE CONSTRUCTION
UNIT VI

JOB SHEET #3 — BUILD CONCRETE FORMS

A. Tools and materials
   1. Saw
   2. 1 × 2 × 12" stakes
   3. 2 × 4 utility grade lumber
   4. Shovel
   5. Hammer
   6. Duplex nails
   7. String
   8. Level
   9. Fill sand
   10. Rake

B. Procedure
   1. Stake out a 4' × 12' sidewalk (or other size as directed by instructor.)
      a. Drive stakes as shown.
      b. Tie string as shown.
      
      FIGURE 1

2. Excavate to a depth of 7" from desired top of concrete (or as directed by instructor)
   (NOTE: A depth of 7" will allow a sand bed of 3 1/2" and a concrete layer of 3 1/2". Adjust if directed by instructor.)
3. Install 2 x 4 forming.
   a. Drive stakes to outside of 2 x 4, every 4’ so tops of stakes are below top of forms.

   FIGURE 2

   b. Nail 2 x 4 to inside of stake, using duplex nails.
   c. Repeat all sides of future sidewalk.
   d. Use a level to make sure forms are level or have a slight slope (1%) for drainage.

   FIGURE 3

4. Backfill sand to a depth of 3 1/2” and rake smooth.

   FIGURE 4
A. Tools and materials
   1. Wheelbarrow
   2. Cement hoe
   3. Portland cement
   4. 3/4" gravel
   5. Sand
   6. Water
   7. Shovel
   8. Wooden float
   9. Steel trowel
  10. Broom
  11. Wire mesh reinforcement (optional)
  12. Forms made in Job Sheet #3

B. Procedure
   1. Put 8 parts of gravel into wheelbarrow.
   2. Put 4 parts of sand into wheelbarrow.
   3. Put 2 parts of Portland cement into wheelbarrow.
   4. Mix thoroughly with cement hoe.

FIGURE 1
JOB SHEET #4

5. Add about 2 gallons of water to wheelbarrow.

6. Mix until water is 'used up'.

7. Add more water, a little at a time, mixing as you go until concrete is of desired consistency.

8. (Optional step) Cut wire mesh reinforcement to fit in forms and place on top of sand bed if directed by your instructor.

9. Wet the forms and the ground below (lightly) so moisture will not be drawn too quickly from the concrete (which will weaken it).

10. Pour concrete into form, using a temporary board to act as a 'dam'.

   FIGURE 2

11. Screed concrete, resting strike-off board on forms. Use a sawing (back and forth) motion to fill in depressions and move excess concrete to end.

   FIGURE 3

12. Float top of screeded concrete in a circular motion to work out air pockets.

13. Let partially harden and drag broom across concrete top to texture a non-slip surface or use steel trowel for a smooth surface.

   (NOTE: If weather is hot and windy, sprinkle walk lightly with water to keep surface from drying too rapidly)
LANDSCAPE CONSTRUCTION
UNIT VI

JOB SHEET #5 — BUILD A PAVER SIDEWALK

A. Tools and materials
   1. 2" pavers (quantity determined by area to be covered)
   2. Sand (moist)
   3. 2 x 6 redwood
   4. 1 x 2 x 16" redwood stakes
   5. Common nails
   6. Claw hammer
   7. String
   8. Carpenter's level
   9. Straw broom
  10. Sand tamper (4' handle; 12" x 12" steel plate)
  11. Measuring tape
  12. Rubber mallet
  13. Shovel
  14. Rake
  15. 2 x 6 and stakes for screed

B. Procedure
   1. Mark off a 3' x 10' area.
      a. Stake as in previous assignment.
      b. Tie string to stakes.
   2. Excavate area to a depth of 6" from desired top of paver.
3. Install 2 x 6 redwood (as in forming for concrete). Attach permanently to redwood stakes with common nails. Use carpenter's level to level forms.

FIGURE 1

4. Backfill with sand and thoroughly tamp with sand tamper.

5. Construct a screed out of a 2 x 6 and stakes.

FIGURE 2

6. Drag screed across formed area.
   a. Remove excess sand pushed in front of screed.
   b. Rest stakes on top of form 2 x 6's to leave exact spacing for pavers.
JOB SHEET #5

7. Choose a pattern such as running bond, basketweave, or herringbone (shown in information sheet), and lay pavers.
   a. Always work on paver side, not on smooth sand side.
   b. Tamp pavers together tightly and level with rubber mallet.

   FIGURE 4

8. Throw loose sand onto walk.

9. Sweep sand into cracks between bricks.

   (NOTE: A mixture of 1:3 of portland cement and sand may be used instead of all sand for a more stable crevice material.)

10. Spray walk with water to rinse. (Do not flood.)

11. Add more loose sand to walk and sweep into cracks if necessary.

12. Re-tamp bricks to smooth seams, and remove high spots if necessary.

13. Dress soil next to redwood forms.
LANDSCAPE CONSTRUCTION
UNIT VI

PRACTICAL TEST
JOB SHEET #1 — BUILD A LANDSCAPE TIMBER OR RAILROAD TIE PLANter BOX

STUDENT’S NAME ___________________________ DATE ____________

EVALUATOR’S NAME ___________________________ ATTEMPT NO. _____

Instructions: When you are ready to perform this task, ask your instructor to observe the procedure and complete this form. All items listed under “Process Evaluation” must receive a “Yes” for you to receive an overall performance evaluation.

PROCESS EVALUATION

(EVALUATOR NOTE: Place a check mark in the “Yes” or “No” blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.)

The student:

1. Checked out proper tools and materials. YES NO
2. Excavated footing of planter box. YES NO
3. Left drain gaps. YES NO
4. Ties were level and flat. YES NO
5. First course was partially buried. YES NO
6. Backstepped tie on second course 2” from tie below. YES NO
7. Stagged joints of ties. YES NO
8. Pre-drilled nail holes. YES NO
9. Nailed spike through top tie into bottom tie after dipping into oil. YES NO
10. Used hacksaw to cut off any bent nail. YES NO
11. Redrilled new pilot hole if previous nail was bent and cut off. YES NO
12. Added additional courses until desired height was achieved. YES NO
13. Backfilled finished planter after tamping each layer of soil as needed. YES NO
14. Checked in/put away tools and materials. YES NO
15. Cleaned the work area. YES NO
16. Used proper tools correctly. YES NO
17. Practiced safety rules throughout procedure. YES NO

EVALUATOR’S COMMENTS: __________________________________________

257
JOB SHEET #1 PRACTICAL TEST

PRODUCT EVALUATION

(EVALUATOR NOTE: Rate the student on the following criteria by circling the appropriate numbers. Each item must be rated at least a “3” for mastery to be demonstrated. (See performance evaluation key below.) If the student is unable to demonstrate mastery, student materials should be reviewed and another product must be submitted for evaluation.)

Criteria:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ties are level and straight</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First course is buried</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corners are overlapped</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corners are aligned (square)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deadmen are present as needed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No excessive splintering or damage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EVALUATOR’S COMMENTS: ____________________________________________

<table>
<thead>
<tr>
<th>PERFORMANCE EVALUATION KEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 — Skilled — Can perform job with no additional training.</td>
</tr>
<tr>
<td>3 — Moderately skilled — Has performed job during training program; limited additional training may be required.</td>
</tr>
<tr>
<td>2 — Limited skill — Has performed job during training program; additional training is required to develop skill.</td>
</tr>
<tr>
<td>1 — Unskilled — Is familiar with process, but is unable to perform job.</td>
</tr>
</tbody>
</table>

(EVALUATOR NOTE: If an average score is needed to coincide with a competency profile, total the designated points in “Product Evaluation” and divide by the total number of criteria.)
LANDSCAPE CONSTRUCTION
UNIT VI

PRACTICAL TEST
JOB SHEET #2 — INSTALL EDGING FOR A CIRCULAR AREA

STUDENT'S NAME ___________________________ DATE __________

EVALUATOR'S NAME ___________________________ ATTEMPT NO. ______

Instructions: When you are ready to perform this task, ask your instructor to observe the procedure and complete this form. All items listed under "Process Evaluation" must receive a "Yes" for you to receive an overall performance evaluation.

PROCESS EVALUATION

(EVALUATOR NOTE: Place a check mark in the "Yes" or "No" blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.)

The student:

1. Checked out proper tools and materials. ___________________________ YES NO
2. Laid out and staked the tree ring properly. ___________________________ YES NO
3. Dug trench correctly. ___________________________ YES NO
4. Calculated exact amount of edging needed. ___________________________ YES NO
5. Laid edging into trench. ___________________________ YES NO
6. Joined ends together in trench. ___________________________ YES NO
7. Aligned edging correctly in trench. ___________________________ YES NO
8. Backfilled edging. ___________________________ YES NO
9. Packed backfill properly. ___________________________ YES NO
10. Aligned edging correctly. ___________________________ YES NO
11. Checked in/put away tools and materials. ___________________________ YES NO
12. Cleaned the work area. ___________________________ YES NO
13. Used proper tools correctly. ___________________________ YES NO
14. Practiced safety rules throughout procedure. ___________________________ YES NO

EVALUATOR’S COMMENTS: ____________________________________________

________________________________________

________________________________________
JOB SHEET #2 PRACTICAL TEST

PRODUCT EVALUATION

(EVALUATOR NOTE: Rate the student on the following criteria by circling the appropriate numbers. Each item must be rated at least a “3” for mastery to be demonstrated. (See performance evaluation key below.) If the student is unable to demonstrate mastery, student materials should be reviewed and another product must be submitted for evaluation.)

Criteria:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area is a true circle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edging is level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edging is secure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edging has secure ends</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edging is proper depth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EVALUATOR’S COMMENTS:

PERFORMANCE EVALUATION KEY

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Skilled — Can perform job with no additional training.</td>
</tr>
<tr>
<td>3</td>
<td>Moderately skilled — Has performed job during training program; limited additional training may be required.</td>
</tr>
<tr>
<td>2</td>
<td>Limited skill — Has performed job during training program; additional training is required to develop skill.</td>
</tr>
<tr>
<td>1</td>
<td>Unskilled — Is familiar with process, but is unable to perform job.</td>
</tr>
</tbody>
</table>

(EVALUATOR NOTE: if an average score is needed to coincide with a competency profile, total the designated points in “Product Evaluation” and divide by the total number of criteria.)
LANDSCAPE CONSTRUCTION
UNIT VI

PRACTICAL TEST
JOB SHEET #3 — BUILD CONCRETE FORMS

STUDENT'S NAME ___________________________ DATE ____________
EVALUATOR'S NAME ___________________________ ATTEMPT NO. ______

Instructions: When you are ready to perform this task, ask your instructor to observe the procedure and complete this form. All items listed under “Process Evaluation” must receive a “Yes” for you to receive an overall performance evaluation.

PROCESS EVALUATION

(EVALUATOR NOTE: Place a check mark in the “Yes” or “No” blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.)

The student:

1. Checked out proper tools and materials. YES NO
2. Staked out a 4’ x 12’ sidewalk. YES NO
3. Excavated to a depth of 7” from desired top of concrete. YES NO
4. Drove stakes to outside of 2’ x 4’ every 4’. YES NO
5. Nailed 2’ x 4’ to inside of stakes using duplex nails. YES NO
6. Repeated (5) with all sides of future sidewalk. YES NO
7. Used level to ensure the proper height of the forms. YES NO
8. Backfilled sand to a depth of 3½”. YES NO
9. Checked in/put away tools and materials. YES NO
10. Cleaned the work area. YES NO
11. Used proper tools correctly. YES NO
12. Practiced safety rules throughout procedure. YES NO

EVALUATOR'S COMMENTS: ____________________________________________

___________________________________________________________________
JOB SHEET #3 PRACTICAL TEST

PRODUCT EVALUATION

(EVALUATOR NOTE: Rate the student on the following criteria by circling the appropriate numbers. Each item must be rated at least a "3" for mastery to be demonstrated. (See performance evaluation key below.) If the student is unable to demonstrate mastery, student materials should be reviewed and another product must be submitted for evaluation.)

Criteria:

<table>
<thead>
<tr>
<th>Forms are correct dimensions (W &amp; H)</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forms are level</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Sides are parallel</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Stakes are on outsides of forms</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Sand backfill is proper depth and smooth</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

EVALUATOR'S COMMENTS: ____________________________

PERFORMANCE EVALUATION KEY

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Skilled — Can perform job with no additional training.</td>
</tr>
<tr>
<td>3</td>
<td>Moderately skilled — Has performed job during training program; limited additional training may be required.</td>
</tr>
<tr>
<td>2</td>
<td>Limited skill — Has performed job during training program; additional training is required to develop skill.</td>
</tr>
<tr>
<td>1</td>
<td>Unskilled — Is familiar with process, but is unable to perform job.</td>
</tr>
</tbody>
</table>

(EVALUATOR NOTE: If an average score is needed to coincide with a competency profile, total the designated points in “Product Evaluation” and divide by the total number of criteria.)
LANDSCAPE CONSTRUCTION
UNIT VI

PRACTICAL TEST
JOB SHEET #4 — MIX AND POUR CONCRETE

STUDENT'S NAME ________________________________  DATE ____________

EVALUATOR'S NAME _______________________________  ATTEMPT NO. ______

Instructions: When you are ready to perform this task, ask your instructor to observe the procedure and complete this form. All items listed under “Process Evaluation” must receive a “Yes” for you to receive an overall performance evaluation.

PROCESS EVALUATION

(EVALUATOR NOTE: Place a check mark in the “Yes” or “No” blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.)

The student:

1. Checked out proper tools and materials.        YES  NO
2. Mixed concrete as instructed.                  YES  NO
3. Added water to make the proper consistency.   YES  NO
4. Poured concrete into form, using a temporary board as a “dam”. YES  NO
5. Struck off concrete with board on top of forms. YES  NO
6. Troweled top of concrete.                     YES  NO
7. Let partially harden and textured surface.     YES  NO
8. Took proper precautions according to the weather. YES  NO
9. Checked in/put away tools and materials.       YES  NO
10. Cleaned the work area.                       YES  NO
11. Used proper tools correctly.                  YES  NO
12. Practiced safety rules throughout procedure. YES  NO

EVALUATOR'S COMMENTS: ____________________________________________

________________________________________

263
JOB SHEET #4 PRACTICAL TEST

PRODUCT EVALUATION

(EVALUATOR NOTE: Rate the student on the following criteria by circling the appropriate numbers. Each item must be rated at least a “3” for mastery to be demonstrated. (See performance evaluation key below.) If the student is unable to demonstrate mastery, student materials should be reviewed and another product must be submitted for evaluation.)

Criteria:

Concrete mixed thoroughly

| 4 | 3 | 2 | 1 |

Concrete proper consistency

| 4 | 3 | 2 | 1 |

Surface is level

| 4 | 3 | 2 | 1 |

Surface is textured

| 4 | 3 | 2 | 1 |

Product is protected from weather

EVALUATOR'S COMMENTS:

---

PERFORMANCE EVALUATION KEY

| 4   | Skilled — Can perform job with no additional training. |
| 3   | Moderately skilled — Has performed job during training program; limited additional training may be required. |
| 2   | Limited skill — Has performed job during training program; additional training is required to develop skill. |
| 1   | Unskilled — Is familiar with process, but is unable to perform job. |

(EVALUATOR NOTE: If an average score is needed to coincide with a competency profile, total the designated points in “Product Evaluation” and divide by the total number of criteria.)
LANDSCAPE CONSTRUCTION
UNIT VI

PRACTICAL TEST
JOB SHEET #5 — BUILD A PAVER SIDEWALK

STUDENT'S NAME ___________________________ DATE __________

EVALUATOR'S NAME ___________________________ ATTEMPT NO. _____

Instructions: When you are ready to perform this task, ask your instructor to observe the procedure and complete this form. All items listed under “Process Evaluation” must receive a “Yes” for you to receive an overall performance evaluation.

PROCESS EVALUATION

(EVALUATOR NOTE: Place a check mark in the “Yes” or “No” blanks to designate whether or not the student has satisfactorily achieved each step in this procedure. If the student is unable to achieve this competency, have the student review the materials and try again.)

The student:

1. Checked out proper tools and materials. YES NO
2. Marked off area correctly. __________ __________
3. Excavated to a depth of 6” from desired top of paver. __________ __________
4. Installed redwood forming. __________ __________
5. Backfilled with sand correctly. __________ __________
6. Screeded properly. __________ __________
7. Laid pavers. __________ __________
8. Filled in with loose sand. __________ __________
9. Sprayed walk with water. __________ __________
10. Dressed soil next to redwood forms. __________ __________
11. Checked in/put away tools and materials. __________ __________
12. Cleaned the work area. __________ __________
13. Used proper tools correctly. __________ __________
14. Practiced safety rules throughout procedure. __________ __________

EVALUATOR'S COMMENTS: ______________________________________

______________________________________________________________
JOB SHEET #5 PRACTICAL TEST

PRODUCT EVALUATION

(EVALUATOR NOTE: Rate the student on the following criteria by circling the appropriate numbers. Each item must be rated at least a “3” for mastery to be demonstrated. (See performance evaluation key below.) If the student is unable to demonstrate mastery, student materials should be reviewed and another product must be submitted for evaluation.)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meets specifications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pattern is consistent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walk is level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walk is firm (steady)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No damaged materials present</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neat and attractive appearance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EVALUATOR’S COMMENTS:

<table>
<thead>
<tr>
<th>PERFORMANCE EVALUATION KEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>4  —  Skilled — Can perform job with no additional training.</td>
</tr>
<tr>
<td>3  —  Moderately skilled — Has performed job during training program; limited additional training may be required.</td>
</tr>
<tr>
<td>2  —  Limited skill — Has performed job during training program; additional training is required to develop skill.</td>
</tr>
<tr>
<td>1  —  Unskilled — Is familiar with process, but is unable to perform job.</td>
</tr>
</tbody>
</table>

(EVALUATOR NOTE: If an average score is needed to coincide with a competency profile, total the designated points in “Product Evaluation” and divide by the total number of criteria.)
1. Match the terms on the right with the correct definitions.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>A hard, strong construction material made by mixing cement, aggregates, and water in a ratio that will cause the cement to set and bind the entire mass</td>
</tr>
<tr>
<td>b.</td>
<td>Construction projects made with bricks, stones, or blocks and mortar</td>
</tr>
<tr>
<td>c.</td>
<td>Amount of lean back on the front of a dry wall</td>
</tr>
<tr>
<td>d.</td>
<td>Metal, wood, or concrete members connected to a wall or other structure used to anchor and secure the wall</td>
</tr>
<tr>
<td>e.</td>
<td>Building structures that enhance the usefulness and/or beauty of a landscaped area</td>
</tr>
<tr>
<td>f.</td>
<td>A mixture of cement, lime, masonry sand, and water used between bricks, stones, or blocks to hold them together</td>
</tr>
<tr>
<td>g.</td>
<td>A leveling device (such as a board) drawn over freshly poured concrete</td>
</tr>
<tr>
<td>h.</td>
<td>Grading operations which change the contours of the earth's surface</td>
</tr>
<tr>
<td>i.</td>
<td>Aggregates</td>
</tr>
<tr>
<td>j.</td>
<td>Batter</td>
</tr>
<tr>
<td>k.</td>
<td>Berm</td>
</tr>
<tr>
<td>l.</td>
<td>Cement</td>
</tr>
<tr>
<td>m.</td>
<td>Chalk rocks</td>
</tr>
<tr>
<td>n.</td>
<td>Concrete</td>
</tr>
<tr>
<td>o.</td>
<td>Course</td>
</tr>
<tr>
<td>p.</td>
<td>Cut and fill</td>
</tr>
<tr>
<td>q.</td>
<td>Deadmen</td>
</tr>
<tr>
<td>r.</td>
<td>Dry wall</td>
</tr>
<tr>
<td>s.</td>
<td>Galvanized</td>
</tr>
<tr>
<td>t.</td>
<td>Landscape construction</td>
</tr>
<tr>
<td>u.</td>
<td>Masonry</td>
</tr>
<tr>
<td>v.</td>
<td>Mortar</td>
</tr>
<tr>
<td>w.</td>
<td>Plywood</td>
</tr>
<tr>
<td>x.</td>
<td>Screed</td>
</tr>
</tbody>
</table>
2. Match common landscape construction items on the right with the correct descriptions.

_____a. Wooden floored areas built at any height adjoining dwellings which are used for outdoor entertaining and dining

_____b. Used to transform slopes into usable areas and to protect steep banks from erosion

_____c. Used for concentrated foot or vehicle traffic

_____d. Natural or man-made features in the landscape that are not functioning as walls, ceilings, or floors in the "outdoor room"

_____e. Used to enclose an area; restrict movement by man, animals, or machines; conceal unwanted views; or for privacy

_____f. Overhead structures used to protect people from the sun or weather or to provide privacy

3. List four common materials used in landscape construction.

a. ____________________________

b. ____________________________

c. ____________________________

d. ____________________________

4. Select from the following list the types of wood commonly used in landscaping by placing an "X" in the appropriate blanks.

_____a. Spruce

_____b. Balsa

_____c. Oak

_____d. Southern yellow pine

_____e. Red cedar

_____f. Redwood

_____g. Walnut
TEST

h. Cherry

i. Cypress

j. Douglas fir

5. State the correct concrete and mortar mix ratios.

a. For concrete
   1) Sand ___________ part(s)
   2) Aggregates __________ part(s)
   3) Cement ___________ part(s)
   4) Water ____________________________

b. For mortar
   1) Masonry sand __________ part(s)
   2) Hydrated lime __________ part(s)
   3) Cement __________ parts
   4) Water ____________________________

6. Calculate the concrete quantities needed for the following situation:

A driveway 20' x 70' needs to be poured 6' deep. How many cubic yards should be ordered?

7. Identify the following common brick patterns.

a. ________________

b. ________________
TEST

8. List three materials which may be used for retaining walls, planters, flower boxes, and raised beds.
   a. ___________________________________________________________
   b. ___________________________________________________________
   c. ___________________________________________________________

9. Distinguish between materials used for paved areas by placing an “S” next to those used in solid paving and an “L” next to those for loose paving.
   _____a. Concrete
   _____b. Bark or wood chips
   _____c. Gravel
   _____d. Asphalt
   _____e. Brick
   _____f. Sawdust
   _____g. Stone pavers
   _____h. Sand

10. Complete statements on considerations when designing contained planting areas by circling the correct words.
    a. Planters and boxes for annual flowers may be (shallow, deeper) than planters for ornamental shrubs.
    b. Design and composition of the planter should be complementary to the style and composition of the (neighborhood, building).
    c. Adequate drainage (should, should not) be provided.

11. Select from the following list the types of edging that may be used in landscaping by placing an “X” next to the appropriate edgings.
    _____a. Decay-resistant wood
    _____b. Natural pine (untreated)
    _____c. Glass
TEST

_____d. Heavy black plastic
_____e. Corrosion-resistant metal
_____f. Masonry

12. Select true statements on considerations when designing berms by placing a "T" or "F" next to the true or false statements.

_____a. A berm should look artificial.
_____b. A berm can be surfaced with grass, shrubs, trees, or ground cover.
_____c. If grass is used, the surface may have a 50% slope.
_____d. A berm may act as a dam to restrict surface water drainage.
_____e. You should consider how the berm affects the microclimate of the area when selecting plant materials.

13. List four supplemental skills useful in landscape construction.

a. ___________________________________________________________
b. ___________________________________________________________
c. ___________________________________________________________
d. ___________________________________________________________

14. Match common landscape construction tools listed on the right with their correct uses.

_____a. Used for driving common nails and removing them 1. Chain saw
_____b. Used for turning various screws 2. Chisels
_____c. Used for checking the trueness of horizontal and vertical lines 3. Circular saw
_____d. Used for cutting metal and plastic 4. Claw hammer
                             5. Float
                             6. Hacksaw
                             7. Handsaw
TEST

e. Forces coarse aggregate slightly below the surface

f. Used for lightly positioning masonry pavers

g. Used for laying out and checking squareness of surfaces and edges (right angles)

h. Used for cutting railroad ties, brick, and concrete

15. Identify the following common carpentry fasteners.

a. 

b. 

c. 

d. 

e. 

f. 

8. Level

9. Railroad tie saw

10. Rubber mallet

11. Screwdrivers

12. Sledgehammer

13. Square

14. Tamper

15. Tape measures

16. Trowel
TEST

(NOTE: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

16. Demonstrate the ability to:
   
a. Build a landscape timber or railroad tie planter box. (Job Sheet #1)
   
b. Install edging. (Job Sheet #2)
   
c. Build concrete forms. (Job Sheet #3)
   
d. Mix and pour concrete. (Job Sheet #4)
   
e. Build a paver sidewalk. (Job Sheet #5)
LANDSCAPE CONSTRUCTION
UNIT VI

ANSWERS TO TEST

1. a. 6  e. 12
    b. 13  f. 14
    c. 2  g. 16
    d. 9  h. 8

2. a. 3
    b. 8
    c. 7
    d. 1
    e. 4
    f. 6

3. Any four of the following:
   a. Wood
   b. Concrete
   c. Brick
   d. Concrete block
   e. Stone
   f. Gravel
   g. Earth
   h. Asphalt

4. a, d, e, f, l, j

5. a. 1) 2
    2) 4
    3) To desired consistency
    b. 1) 6
    2) 1
    3) 1

6. 26 cubic yards

7. a. Running bond
    b. Basketweave
ANSWERS TO TEST

8. Any three of the following:
   a. Railroad ties
   b. Landscape timbers or treated posts
   c. Brick
   d. Concrete block
   e. Mortared stone
   f. Dry stacked stone

9. a. S  e. S
    b. L  f. L
    c. L  g. S
    d. S  h. L

10. a. Shallower
    b. Building
    c. Should

11. a, d, e, f

12. a. F
    b. T
    c. F
    d. F
    e. T

13. Any four of the following:
   a. Carpentry
   b. Plumbing
   c. Electrical wiring
   d. Masonry
   e. Concrete work
   f. Surveying
   g. Earth moving (grading)

14. a. 4  e. 14
    b. 11  f. 10
    c. 8  g. 13
    d. 6  h. 9

275
ANSWERS TO TEST

15. a. Screw
    b. Latch
    c. Bolt (and nut)
    d. Finishing nail
    e. Duplex nail
    f. Hinge

16. Performance skills evaluated to the satisfaction of the instructor