Welcome to *Landscape Gardening*. In this 4-H project you will learn about some of the different types of plants you can plant around your house or school to make it more attractive. You will also learn how to care for these living plants and keep them beautiful. You will actually design and landscape a flower garden to improve and beautify your environment.

Landscape gardening is one of America’s fastest growing industries. If you enjoy landscaping, you may want to consider doing this for a rewarding career. You might even consider landscaping as a way to earn money during the summer. Knowing how to make your environment more attractive and liveable with plants is a very important activity. People around the world have been landscaping for thousands of years.

Landscape gardening will strengthen your other 4-H activities. You will be making choices about what, when, where, and why to plant certain types of plants. When you do this, you are using your HEAD. The work involved with handling the plants from the time they are seedlings until they flower makes use of your HANDS. You will experience feelings of pride and achievement that come from your HEART. You improve your HEALTH from the exercise you receive while you are landscaping.

**Check (✔) as you study each lesson:**

1. **Introduction to Landscape Gardening**
   - □ Annuals
   - □ Biennials
   - □ Perennials

3. **Light and Temperature**
   - □ Light
   - □ Temperature-Affected Groups

5. **Soil and Nutrients**
   - □ Soil Type
   - □ Soil Textures
   - □ Plant Nutrition

2. **Designing Your Landscape**
   - □ Selecting a Site

4. **Water for Landscape Gardening**
   - □ Watering
   - □ Photosynthesis
   - □ Transpiration

6. **Planting and Care of the Landscape**
   - □ Deciding on the Landscape Site
   - □ Planning Your Flower Garden
   - □ Soil Preparation
   - □ Purchasing Transplants

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**Other things to do:**

**1-Help others learn** (see *Sharing with Others* on page 32)

- □ Show someone in your family what you learned from this project.
- □ Show another 4-H member what you learned from this project.
- □ Show someone who is not a 4-H member or a family member what you learned in this project.

**2-Record keeping**

- □ Keep accurate records to show what you have learned.
- □ Be neat and complete (spell all of the words in your records correctly). Ask your parents, leader, or teacher if you aren’t exactly sure.

**3-Round up**

- □ Make sure to complete your project book and keep records.
- □ Exhibit something you have done from this project book.
Welcome to *Landscape Gardening!* Before we start this lesson, let’s use our imagination. Pretend it’s a hot summer day. Your new neighbor has invited you over to play. Close your eyes and imagine the cool, green grass on your bare feet as you walk across the lawn. Colorful flowers gently wave in the breeze. Birds flutter from shrubs to the leafy branches of the large maple trees. You leave the cool shade as you enter your friend’s yard. The sun beats down on you as you cross the bare soil. A light breeze causes dust to swirl around your hot, bare feet. It takes only a few seconds to invite your new friend back to the pleasant shade of your own yard. What is the difference between these two yards? Why is one yard so much more inviting than the other?

The difference is due to *plants*. Making choices about using them is called *landscaping*. Landscaping allows us to create more attractive, comfortable, and usable outdoor areas. We use a wide variety of plants—trees, shrubs, and flowers—to create beauty, to increase our comfort (for example, for shade and windbreaks), to give us privacy, and to screen off unsightly areas or unpleasant noises.

Landscaping even improves the air we breathe. Plants release oxygen and remove impurities from the air. Trees and shrubs provide a home for wildlife. Lawns are not only delightful to walk on, but prevent erosion. Landscaping adds value to our homes. Landscaping improves our communities and cities. Businesses, schools, parks, and parking lots are more interesting and attractive when they are properly landscaped.

Back in your yard, you and your friend quickly climb the ladder to your tree house. Up there you can really see differences between the landscaping in your yards. Can you think of any improvements? Would you like to design landscaping plans?

This project, *Landscape Gardening*, will help you learn how to begin landscaping. You can also plan landscape projects to help your new friend landscape his or her yard. You can also learn about landscaping your community or city parks and even your school.
Grouping Plants by Their Life Cycles

A landscape can be an area for growing fruits, flowers, vegetables, turfgrass, trees, and shrubs. These plants can be organized into groups according to how long they live, how the environment affects them, or in their botanical (scientific) group. Let's learn more about how plants can be grouped.

How something lives, grows, and dies is its **life cycle**. The human life cycle begins with babies who grow into children, teenagers, and then into adults. When those adults have children, a human life cycle is completed. Plants are grouped into three kinds of life cycles. Let's look at each of these groups.

**Annuals**

Many plants grow from a seed in the spring, produce a flower and seeds, and then die in the fall. The seeds fall to the ground and the cycle starts over again next spring. Plants with life cycles like this—**annuals**—are very popular for use in landscapes. You can choose new and different ones each year. In a landscape garden, annual flowers add a lot of color. Some common annuals are zinnias, poppies, and snapdragons.

**Biennials**

Some plants spend their first year growing leaves, stems, and roots. The second year of their life cycle they produce flowers and seeds, and then die. These plants—**biennials**—have a two-year life cycle (*bi* = two and *ennial* = year). Some examples of biennials are hollyhocks, delphiniums, and foxgloves.
Perennials
The third group of plants—perennials—grow and produce flowers and seeds every year. Some perennials (such as trees, shrubs, and vines) live for hundreds of years. Examples of perennials are daffodils, chrysanthemums, turfgrass, English ivy, and oak trees.

Perennials are also subdivided into woody or nonwoody plants. Nonwoody perennials have soft stems that die and grow back in the spring. Woody perennials, like trees and shrubs, keep the same stems and branches from year to year.

Can you think of one of the most famous perennials that grows in northern California? (Hints: they can grow to be 300 feet tall, are hundreds of years old, and their wood is red.)

As a first-time landscape gardener it will be easier to work with annuals. When you gain more experience gardening you may choose to grow biennials and perennials.
ACTIVITY 1. "Understanding Your Seed's Needs"—Write a Letter or Go On A Field Trip

What you will need:
• pen or pencil  • writing paper  • envelope  • one first class postage stamp

What you will do:
1. Write to one of the seed companies shown below to request a seed catalog.
   Choose different companies to write to so you can share seed catalogs with your friends.

   * Park Seed Company  * Thompson and Morgan  * W. Atlee Burpee Company
   * Hwy 254 North  * Box 1308  * 2386 Burpee Building
   * Greenwood, SC 29647  * Jackson, NJ 08527  * Warminster, PA 18974

2. Use the catalog to select 10 annual flowers that you want to grow
   or
   visit a garden center, plant nursery, or flower shop where flower seeds and/or plants are sold.

3. Record the names of the 10 annual flowers on the worksheet below.

4. Fill-in the other parts of this worksheet as you complete lessons in Landscape Gardening.

### ANNUAL WORKSHEET

<table>
<thead>
<tr>
<th>Flower name</th>
<th>Color</th>
<th>Height</th>
<th>Spacing</th>
<th>Light requirement (sun, part sun, shade)</th>
<th>Hardiness (tender, hardy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>example: zinnia</td>
<td>pink</td>
<td>12&quot;–14&quot;</td>
<td>6&quot;–8&quot;</td>
<td>full sun</td>
<td>hardy</td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
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<tr>
<td>4.</td>
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<td></td>
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<tr>
<td>5.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
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<td></td>
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<tr>
<td>7.</td>
<td></td>
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<td></td>
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<tr>
<td>8.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LESSON 2

DESIGNING YOUR LANDSCAPE

In Lesson 1 you learned that plants can make our homes, neighborhoods and schools more beautiful places to live. To make your home or school more attractive, think about where you can plant a flower bed. Below are some good places to plant flower beds.

![Diagram of good places for flower beds]

Good places for flower beds include the front of buildings, fences or hedges, along sidewalks, terraces or drives, in corners of our yards, or around lamp posts or mailboxes. Avoid planting square or circular flower beds in the center of lawns. If you have to mow the grass, it will be more difficult to mow around your flower bed. Take a walk around your yard or school. Where would a flower bed look attractive?

ACTIVITY 1. Selecting a Site

What you will need:
- pencil
- graph paper (see page 7)
- ruler or tape measure

What you will do:
1. Identify three small areas around your home or school to landscape.
2. Give each area a site number (1, 2, or 3).
3. Record in the Landscape Site Worksheet on page 6 what the site looks like. Measure its length and width.
4. Draw each of the three sites on the graph paper (use a scale of 1/4 inch of paper equals one foot of landscape). Include buildings, walls, fences, and trees in your plan. Start small. As you get more experience it will be easier to make your landscape sites bigger. You will use this Landscape Site Worksheet throughout this project.
## LANDSCAPE SITE WORKSHEET

**Example:** SITE #X—description: strip along fence in back yard  
Measurements of the site: 3 feet wide and 6 feet long

<table>
<thead>
<tr>
<th>Light</th>
<th>Water</th>
<th>Soil</th>
</tr>
</thead>
</table>

**SITE #1—description:**
Measurements of the site:

<table>
<thead>
<tr>
<th>Light</th>
<th>Water</th>
<th>Soil</th>
</tr>
</thead>
</table>

Annuals that will grow on this site:

**SITE #2—description:**
Measurements of the site:

<table>
<thead>
<tr>
<th>Light</th>
<th>Water</th>
<th>Soil</th>
</tr>
</thead>
</table>

Annuals that will grow on this site:

**SITE #3—description:**
Measurements of the site:

<table>
<thead>
<tr>
<th>Light</th>
<th>Water</th>
<th>Soil</th>
</tr>
</thead>
</table>

Annuals that will grow on this site:
Decide which annual flowers you want to plant in your flower bed. To keep everything simple, don't use more than three different flowers. Make a plan for your bed. Keep in mind the color and height of the flowers and the location of the flower bed.

Use colors that go well together. The colors of your flowers should look good with what is behind and beside them. Some examples of colors are shown on the color wheel. Here are some suggestions for color combinations:

- Use one color from the color wheel or different shades of the same color.
- Use combinations of colors next to each other on the color wheel (red, red orange, yellow).

If you choose to put your flower bed in front of something or in a corner, it will be seen from one side. Flower beds that will be seen from one side should have taller growing flowers in the back, medium-height flowers in the middle, and low-growing varieties in the front. What would happen if you planted tall flowers in front of shorter ones? Would you see the short ones?

If you plant a flower bed along a sidewalk or driveway or around a lamp post or mailbox, it will be seen from many sides. If flower beds are seen from many sides, the tallest flowers should be planted in the center. The shortest plants are put around the edge of your flower bed. Where do you suppose the medium height varieties are planted? You're right—between the edge and the center.
Light is important for plants during their growth. Soon after germinating and emerging from the soil, plants should receive plenty of light. Plants need light to start the process called photosynthesis. Have you ever used a solar-powered calculator? What happens when you cover the solar cells on the calculator? Without light energy hitting the solar cells, you can’t use your calculator. A plant works in the same way. If it doesn’t receive enough light, it will not work.

The leaves of plants are similar to the solar cells in the calculator. Leaves have a special chemical called chlorophyll which absorbs the light and converts it into energy. This new energy powers the growth of plants. The green color of the leaves tells you that chlorophyll is present. The plant is making food (photosynthesis) when the leaves receive light.

**EXPERIMENT 1. Light For Green Growth**

**What you will need:**
- one paper plate  
- one short nail (3-4 inches)

**What you will do:**
1. Select an area on a lawn.
2. Lay the paper plate flat on the grass.
3. Push the nail through the center of the plate into the soil to hold the plate down.
4. After 1 week, remove the plate and compare the grass under the plate with the rest of your lawn.

**Questions to Answer:**

What happened?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

Why?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

What do you think would happen if the plate was on the patch of grass for 2 weeks?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
Not all plants require the same amount of light. Plants can be put into three different groups based upon how much light they require. **Full sun** plants need to receive bright sunlight for at least six hours per day. **Full shade** plants grow best when they spend most of the day in shade. The third group includes plants that need **partial shade**. They need to receive some sun and some shade each day. A general rule to follow is that most annual flowers are full sun plants. They will do very well with lots of sunshine. However, a few prefer full shade. Below is a list of some annuals that like to grow in shady areas.

<table>
<thead>
<tr>
<th>Alyssum</th>
<th>Impatiens</th>
<th>Pansy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coleus</td>
<td>Forget-me-not</td>
<td>Wax Begonia</td>
</tr>
</tbody>
</table>

**ACTIVITY 1. I See the Light**

**What you will need:**
* pencil or pen

**What you will do:**
1. On a sunny day observe the light intensity in the three landscape sites you selected in Lesson 1.
2. Record at these times whether each site receives **full sun, partial shade, or full shade**.

<table>
<thead>
<tr>
<th>Site 1</th>
<th>Site 2</th>
<th>Site 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 a.m.</td>
<td>12:00 p.m.</td>
<td>3:00 p.m.</td>
</tr>
<tr>
<td>full sun</td>
<td>partial shade</td>
<td>full shade</td>
</tr>
<tr>
<td>partial shade</td>
<td>full shade</td>
<td>full shade</td>
</tr>
<tr>
<td>full sun</td>
<td>partial shade</td>
<td>full shade</td>
</tr>
</tbody>
</table>

3. Record your findings on your **LANDSCAPE SITE WORKSHEET** on page 6.
Temperature-Affected Groups

Annuals are divided into two groups based on the temperature they need to grow best. Hardy annuals can withstand the most cold. Light frosts won’t kill or damage them badly. Some hardy annuals are snapdragons, pansies, and sweet alyssum. Most annuals are called tender annuals. They need warm temperatures and frosts can kill them. Some tender annuals include zinnias, cosmos, impatiens, petunias, marigolds, and geraniums. To produce the best flowers, they need a long summer.

Unlike annuals, biennials and perennials must live through the winter. Some biennials and perennials live through colder temperatures than others. Pennsylvania is a large state and some parts are warmer than others. Because of these differences in temperature, some biennials and perennials will only grow in certain parts of the state.

Pennsylvania is divided into four hardiness zones. These zones tell us the lowest temperatures that we can expect during the winter. A lower hardiness zone number means an area is colder than the others. A higher hardiness zone number means that the area is generally warmer in the winter. Plants that grow in cold zones will grow in the warmer zones. But not all plants that grow in warmer zones will grow in the cold zones. All biennial and perennial plants we buy have been given a hardiness rating.

ACTIVITY 2. The Temperate Zone

What you will need:
• a colored pencil

What you will do:
1. On the hardiness zone map, locate the county where you live. Use the colored pencil to shade it in.

Questions to Answer:
a. In which hardiness zone do you live?

b. What is the lowest temperature you can expect in a normal winter?

c. What is the average last frost date where you live?

How can we find out if a biennial or perennial will grow in our garden or yard? Just compare the hardiness zone of your area with the hardiness rating of the plant. If they match, or if the rating of the plant is lower, you can grow the plant in your area. If the hardiness rating of the plant is higher than your hardiness zone, you will probably not be able to grow the plant successfully.

Some gardeners like to plant their annuals outside early in the spring because they will flower sooner. Tender annuals can be planted after the last frost date. Hardy annuals can be planted one month before the last expected frost date. If you do not know when your last expected frost date is, check with your county extension office.
LESSON 4

WATER FOR LANDSCAPE GARDENING

The seedling plants you started or purchased are delicate. They require special care like babies. As the seedlings grow up to be mature plants, they will need less care to survive and grow and flower. However, plants still have certain basic needs like all living things.

Seeds need water in order to germinate. Germination is the process that occurs when seeds begin to grow. When water enters the seed, it makes the seed swell. Inside the seed, the immature plant or embryo begins to grow. The hard outer coat of the seed cracks and the little rootlet pushes its way out. This rootlet takes in more water and minerals from the soil. If the soil dries out while the seed is germinating, this young plant will die.

Most mature flowering plants need about an inch of water each week. During dry weather, flowering plants in gardens, as well as plants in containers, need extra water. When you water your plants, be sure to wet the soil 4" to 6" deep. Soaker hoses and trickle irrigators are two good tools to use when you water.

Watering this way causes the roots to push deeply into the soil for water. Frequent light watering, like sprinkling with a bucket or hose, promotes shallow root growth. Another problem with frequent sprinkling is that diseases can often appear because the foliage is constantly wet.

Water is one of our most important natural resources. Conserve water whenever possible. Some simple ways to save water are: (1) Don't leave the hose running after you finish watering; (2) Use a mulch or ground cover around your plants so the ground won't dry out as quickly; (3) Water plants early in the morning so more water will soak into the soil and less will evaporate.

EXPERIMENT 1. Sprouting Seeds
What you will need:
• seeds (beans are best)  • 4 paper towels  • 3 plates  • water

What you will do:
1. Number the plates Plate 1, Plate 2, and Plate 3.
2. Place a paper towel on Plates 1 and 2.
3. Place 4-6 seeds on each of the 3 plates.
4. Cover the seeds on Plates 1 and 2 with another paper towel.
5. Set Plate 3 aside to compare with the other plates. Keep Plate 3 completely dry.
6. Add enough water to Plate 1 to soak the paper towels. Check this plate daily to make sure the paper towels stay completely wet.
7. Keep Plate 2 completely filled with water.
8. After several days, observe the seeds on all three plates.

Describe what happened to the seeds that received too much water, on Plate 2.

Describe what happened to the seeds that didn't receive enough water, on Plate 3.
**ACTIVITY 1. Let’s Measure the Rainfall**

A rain gauge measures how much water your plants are getting from the rain. If your landscape gets less than one inch of rain per week, you will need to check if your flowers need watering.

**What you will need:**
- tin can (any size will work)
- ruler
- crayon or waterproof marker

**What you will do:**
1. Place the ruler inside the can and mark every 1/4 inch from the bottom of the can.
2. Place the can in one of the landscape sites you selected in Lesson 2 where it will collect rainfall.
   
   You can make a rain gauge for each of other two landscape sites also.
3. After each rain, record how much rain was collected in the rain gauge.
4. Pour the water out after each rain so you can record the next rainfall.
5. At the end of each week, total the amount of rainfall for that week.

<table>
<thead>
<tr>
<th>Week of</th>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: 6/15</td>
<td>1/4&quot;</td>
<td>0&quot;</td>
<td>1/2&quot;</td>
<td>1/4&quot;</td>
<td>0&quot;</td>
<td>1/4&quot;</td>
<td>3/4&quot;</td>
<td>2&quot;</td>
</tr>
</tbody>
</table>

In *Meet the Plants* you learned about photosynthesis. Water plays a key role in photosynthesis. It carries nutrients from the soil to the leaves where the nutrients are made into sugars. After sugar is made, water transports it to all parts of the plant where the sugar is used for growth. Water also keeps plants standing upright. It fills the cells in the stem so that it can support the weight of its leaves.
Transpiration
Water can leave the plant through its leaves. This process is called transpiration. When a plant loses water too quickly, it may wilt. Wilting occurs when water is being transpired through the leaves faster than the roots can take it up from the soil. This can happen when the wind blows or if it is very warm and the soil is dry. If your plants look like they are wilting, you should probably give them a good, deep watering.

Activity 2. How Dry I Am

What you will need:
• pencil
• information from Activity 1

What you will do:
1. Record the rainfall each of your three sites receives per week (use an average from Activity 1).
2. Feel the soil in each site three or four times per week. Is each site mainly wet, moist, or dry.

<table>
<thead>
<tr>
<th>SITE #1</th>
<th>Average rainfall</th>
<th>Wet/moist/dry</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITE #2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SITE #3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Which site will require the most extra watering?

2. Which site will require the least amount of watering?

3. Are any of the sites too wet or too dry for annual flowers?

4. How did you determine this?

Record your findings on your LANDSCAPE SITE WORKSHEET on page 6.

In Lesson 5, you will learn that the best landscape site will be one that has well-drained soil. The soil should never be too wet. If there is excess water at your site, the roots of your flowering plants can be damaged or killed. A well-drained soil lets air circulate through it to reach the roots.
Good plant nutrition begins at the roots. Roots take up nutrients, water, and air from the soil. Soil is made up of particles that rest on top of one another in such a way that spaces are left between them. If you look carefully at this diagram, you can see air and water fill up these spaces. About 1/2 of soil is made up of solid particles, 1/4 of it is air, and 1/4 of it is water.

Soil is made of a combination of large, medium, and small particles. Sand is the largest particle, silt is a medium-sized particle, and clay is the smallest. Loam is an equal mixture of all three of these particles. The relative amounts of each of these three particles in the soil determines the texture.

For example, if a soil is five parts clay, two parts sand, and two parts silt, it is considered a clay soil. A soil containing five parts sand, three parts silt, and two parts clay is a sandy soil. These are general guidelines you can follow when you determine the texture of your soil. It is important to remember that the smaller the particle size of the soil, the more it will stick together. That is why we can make pots and dishes from clay and not from sand or silt.
EXPERIMENT 1. Sudsy Soil Separator

What you will need:
• 1 cup of dry, finely crushed soil (remove grass, sticks, stones and leaves) • water
• 1 quart glass jar with a lid • non-sudsing detergent (dishwasher detergent)
• index card or a white sheet of paper • pencil

What you will do:
1. Fill the quart jar 2/3 full of water and pour the cup of soil into the jar.
2. Add 3 tablespoons of detergent, cover the jar tightly, and shake well for 5 minutes.
3. Let the jar sit for 24 hours.
4. Later: Place the index card next to the jar and mark on the card where each layer of soil has settled.

Questions to Answer

How many total inches of soil are in the jar? ________________________________________________

How many inches of sand are in the jar? ______________________________________________________

How many inches of silt are in the jar? ______________________________________________________

How many inches of clay are in the jar? _____________________________________________________

What soil type is this? _________________________________________________________________

Explain why ________________________________________________________________


ACTIVITY 1: Soil Textures

What you need:
• one cup of sugar or salt • one cup of flour • some modeling clay
• one quart of dry soil from your yard (well mixed) • one cup of water

What you will do:
1. Rub sugar or salt between your thumb and finger to give you an idea of what sand feels like. Describe the feeling to other members.
2. Add a few drops of water to the sugar or salt and share with others how it feels now? Do the particles stick together?
3. Feel some flour between your fingers. This is the way silt feels.
4. Add a few drops of water to the flour. How does it feel now? Do the particles stick together?
5. Feel the modeling clay. This is how clay in the soil feels.
6. Add a few drops of water to the clay. How does it feel now? Do the particles stick together?
**ACTIVITY 2. What’s Your Type?**

**What you will need:**
- soil from each of your three landscape sites
- cup of water

**What you will do:**
1. Feel the soil from Site #1. Add a few drops of water. What does it feel like now?

2. Is the soil from Site #1 mainly: sand    silt    clay

3. What factors made you decide on this soil type? ____________________________________________

Repeat these same steps for the soil from Site #2.
4. Feel the soil from Site #2. Add a few drops of water. What does it feel like now?

5. Is the soil from Site #2 mainly: sand    silt    clay

6. What factors made you decide on this soil type? ____________________________________________

Repeat these same steps for the soil from Site #3.
7. Feel the soil from Site #3. Add a few drops of water. What does it feel like now?

8. Is the soil from Site #3 mainly: sand    silt    clay

9. What factors made you decide on this soil type? ____________________________________________

8. Record your three soil types on your *LANDSCAPE SITE WORKSHEET* on page 6.
**Plant Nutrition**

Plants need 16 different nutrients. Three of these nutrients—carbon, oxygen, and hydrogen—come from air (carbon and oxygen) and water (hydrogen and oxygen). The other 13 come from the soil.

The three nutrients needed in the largest amounts are nitrogen (N) for healthy foliage, phosphorus (P) for root and flower development, and potassium (K) for general health and hardiness. These elements are commonly provided by adding fertilizer to the soil. This practice is called fertilizing. Fertilizer should be added regularly to plants when they are actively growing. Most non-woody landscape plants need fertilizer one to two times a year. A good time to fertilize these plants is during the summer when they grow the most. You can fertilize woody landscape plants in October after the plants have stopped growing because of the cooler temperatures.

**Plant Fertilizers**

There are two general categories of fertilizers. **Organic** fertilizers come from plant or animal sources. Most contain only moderate amounts of nutrients which are released slowly. Examples of organic fertilizers are animal manure, blood meal, and wood ashes. Spread and dig them into the top several inches of soil two weeks before planting.

**Inorganic** fertilizers come from chemical or mineral sources. Many of them are easily dissolved by water which makes them available to plants after watering. They do not improve the structure of the soil. Inorganic fertilizers should be applied just before planting and mixed well into the soil. These fertilizers are concentrated so you must be careful not to use more than the recommended amount.

Fertilizers have numbers on their labels that tell the amounts, or percentages, of nitrogen (N), phosphorus (P), and potassium (K) found in the fertilizer. Organic and inorganic fertilizers are equally effective for plants. When added to soil, organic fertilizers become available to the plant less quickly than inorganic fertilizers.

Fertilizers come as powders, tablets, or in liquid form. The most economical are powders that can be mixed with water when needed. It is very important to carefully read and follow label directions when applying fertilizers. Add fertilizers only when plants are actively growing. Before adding fertilizer to your soil, you need to know which nutrients your soil needs and how much.

The soil in your garden won’t always be the best for plants. Organic matter, fertilizer, and lime can improve the soil for plants. Organic materials improve the structure of the soil. Some may be available at no cost. Your leader can help you find out what is available in your area. You may want to purchase a soil testing kit from your local cooperative extension office. Your 4-H leader or parents may want to help you collect your soil sample.
EXPERIMENT 2. More Isn’t Always Better

What you will need:
- a small area of your lawn you can use (get your parent’s permission first)  • pencil  • tablespoon
- 5 popsicle sticks numbered 1 thru 5  • powdered lawn fertilizer  • water

What you will do:
1. Place each popsicle stick in the lawn 12 inches apart.
2. Sprinkle 1 tablespoon of fertilizer in a 1-foot circle around stick #1.
3. Sprinkle 2 tablespoons of fertilizer in a 1-foot circle around stick #2.
4. Sprinkle 3 tablespoons of fertilizer in a 1-foot circle around stick #3.
5. Sprinkle 4 tablespoons of fertilizer in a 1-foot circle around stick #4.
6. Sprinkle 5 tablespoons of fertilizer in a 1-foot circle around stick #5.
7. Water the areas around the sticks to dissolve the fertilizer into the soil.
8. Wait five days and then observe the area around each stick.
9. Record your observations below. Use a few words to describe the grass around each stick.

Stick #1

Stick #2

Stick #3

Stick #4

Stick #5

10. Water the areas around each of the sticks, wait five more days and observe the grass.
11. Record each of your observations below.

Stick #1

Stick #2

Stick #3

Stick #4

Stick #5

What did you find?

Should you always apply a lot of fertilizer to your plants?

Why?
Deciding on Your Landscape Site
In the last three lessons, you have studied environmental factors which affect how a plant grows. Another very important step in landscaping is to evaluate the site where you plan to landscape. Evaluating a site helps you decide which site is best for planting your flower garden. Here are some factors you should keep in mind as you select the final site: How much sun does the site get? How well does the soil drain? How well will the flowers you selected grow there?

Now that you have completed the information on light, water, and soil on your LANDSCAPE SITE WORKSHEET, go back to your ANNUAL WORKSHEET and match the flowers that will grow best in each site. Make sure the annual flower light requirement matches the site's light condition.

ACTIVITY 1. Final Site Selection
What you will need:
• pencil  • ANNUAL WORKSHEET (page 4)  • LANDSCAPE SITE WORKSHEET (page 6)

What you will do:
1. Complete your ANNUAL WORKSHEET.
2. Complete your LANDSCAPE SITE WORKSHEET by writing the names of at least three annual flowers that will grow best in each of the three sites.
3. Select the one best site for your landscape garden.

My decision
I will use Site # _____ for my landscape project. The factors I considered in selecting this site are:

1. ____________________________________________________________
2. ____________________________________________________________
3. ____________________________________________________________
4. ____________________________________________________________
5. ____________________________________________________________
Planning Your Flower Garden

Now that you have selected the site for your landscape garden, you should also have selected which flowers you will plant in your site. The next step is to draw a plan of your flower garden on paper. This is called a plot plan. Drawing a plot plan helps to prevent mistakes. It also gives you an idea of how many plants you will need. In this plot plan you will show the kinds of flowers you will plant, where you plan to place them, how far apart they are going to be planted, how tall they will be, and their colors. Here are two examples of flower bed designs.

ACTIVITY 2. Site Plan

What you will need:
- pencil
- paper
- drawing on graph paper of selected site done in Lesson 1

What you will do:
1. Use your original drawing to draw two plot plans like the examples shown above for your landscape site
Soil Preparation

Before you plant any flowers, you will need to prepare your site. This helps ensure that the flowers will grow well and be healthy. The soil should be spaded to a depth of 8 to 10 inches. Before spading, squeeze a handful of soil. If it crumbles easily, it is ready for spading. If it sticks together, it is too wet to spade. If you spade wet soil, it can remain hard and cloddy for weeks.

When you spade the soil, push a spade or shovel into the soil, lift up the chunk of soil, and turn it over. If you are spading a new garden in the spring, do it as early as possible before planting. This leaves time for the soil to settle. Before you spade the soil, you should remove all grass growing in the area. If you pick a site where flowers have been planted before, spade the soil at least two weeks before planting your seeds or transplanting.

Add a two inch layer of organic matter, fertilizer, and lime on the surface only if a soil test says you need it. Then, spade it into the soil. Be sure to rake the spaded area smooth and level. Remove sticks, rocks, and weeds from the surface of the soil and break up large clods of soil.

ACTIVITY 3. “The Ace of Spades”

What you will need:
- a landscape site    - rake    - a spade or hand trowel    - any organic matter, fertilizer, or lime needed

What you will do:
1. Check the soil in your site to see if it is ready for spading.
2. Spread the fertilizer, lime, and organic matter over the top of your landscape site.
3. Use the spade or trowel to turn the soil over in your flower garden site.
4. Rake the area smooth (unless you are working in the fall).
Purchasing Transplants

You have selected the landscape site where you are going to plant your flowers. You’ve decided which flowers you want to plant. You have also drawn your landscape plan. And you have finally prepared the soil for your flowers.

Now it’s time to purchase transplants for your flower garden. Your leader can help you locate a greenhouse, garden store, or nursery where you can buy these transplants. Make sure you use your landscape plan so you will know what kind and how many transplants to buy.

When you purchase annual flower transplants, they may come in a plastic container which is divided into six individual cells. Or there may be six transplants in a plastic container. They are called many different names.

When you purchase your transplants, be a wise shopper by observing a few helpful hints about what to look for. Here are a few things to look for when you buy transplants:
• Plants should be similar in size and height.
• Each plant should have at least two sets of true leaves.
• Plants must have good root growth, but should not be root bound in the container. Check the bottom of the container for lots of tangled roots.
• The color of the leaves of transplants should be dark green and look healthy.
• If insect damage is present, don’t purchase them.

After you purchase your transplants, you are ready to plant them in your landscape site.

ACTIVITY 4. The Transplant Doctor

What you will need:
• flower transplants  • plot plan
• hand trowel  • pocket knife

What you will do:
1. If your transplants grew in containers made of peat moss (peat pots), tear the upper 1/2 inch off the container and remove the bottom of the peat pot also.

2. If they came in a plastic container, carefully turn the container over and gently knock the plant out. DO NOT pull on the stem.

3. If roots are very tangled, make fine cuts with the knife 1/4 inch deep in the surface of the root ball.

4. Dig holes for the transplants with a trowel and set them in the soil a little deeper than they were in the containers. Seedlings in peat pots can be planted in the container if you follow the directions in Step 1.

5. Pat the soil down firmly around the roots of each plant.

6. Providing shade for transplants for a few days will help to prevent wilting.
   You can use newspaper to make tents to shade your plants.

7. Water the transplants once each day for the first week if it doesn’t rain each day.
Growing Flowers from Seeds
Many annuals you can plant in your landscape will grow from seeds. Don’t be in too big of a hurry to start seeds outdoors. Most seeds won’t germinate in cold soil. A late frost can kill or injure early plants. But you can get a jump on the weather by growing your own transplants. You can even learn how to start seeds indoors in containers.

To start seeds outdoors, wait until the soil warms up to at least 60 degrees F. Prepare the soil in your landscape site the same way you did for your transplants. Use a round stick or hoe handle to make a furrow or tiny trench for your seed. Plant the seeds at the depth recommended on the seed packet. Do not plant the seeds too deeply. Cover the seeds with a thin layer of fine soil.

After you cover the seeds, water the soil carefully with a fine spray of water. Apply enough water to soak the soil deeper than the seeds. Be careful not to wash the seeds out of the soil. Water your seedbed every day, unless it rains, until the seedlings germinate and sprout above the surface of the soil.

After the seedlings germinate, they will develop their first true leaves. Soon after this stage of development, it is time to thin them. Thinning means removing extra plants carefully. This insures the seedlings you want to leave in your flower garden will have enough room to grow. The plants you have removed or thinned can be transplanted to other sites. After thinning, the space between the remaining plants should equal the spacing on the ANNUAL WORKSHEET on page 4.

Caring for Your Landscape
Pinching
Some annuals will grow tall and spindly if left to grow naturally. We can direct their growth. To make them bushy and appear fuller, pinch them back. Pinching should be done when your plants have at least 3 or 4 sets of leaves. Using your thumb and forefinger, remove the top inch of growth by pinching the soft growing tip of the plant. Be sure to find out if the transplants you purchased have been pinched. Do not pinch them a second time. Never pinch cockscomb, poppies, stock, or balsam.

Fertilizer
Sometimes you will need to apply more fertilizer to the soil while your plants are growing. Usually 1 or 2 cups for every 100 square feet of surface is enough. You can use the same fertilizer you added when you prepared your soil. If fertilizer is needed, apply it every 4 to 6 weeks. If dry fertilizer falls on the leaves or flowers of your plants, carefully brush it off with your hand or rinse it off with water. Make sure that you water the soil thoroughly after you apply fertilizer.
**Weed Control**
Weeds can be a problem in the summer flower garden. Unless they are removed while they are small, they will compete with the flowers for space, moisture, and nutrients. Lightly cultivate or loosen the surface of the soil once a week. Don’t go any deeper than about 1/2 inch to avoid injuring the roots of the flowers.

A mulch on the surface of the soil will help conserve moisture during the summer and help control weeds. A mulch should let water down to the soil and smother weeds. A mulch may consist of grass clippings or peat moss which covers the soil surface about one inch thick. If plants are spaced correctly, they will grow together and discourage weeds from growing.

**Watering**
During dry periods when there is no rain, you will have to water your landscape. It is best that the soil be kept damp to a depth of 4 inches. You can use a trowel to dig down four inches to check if the moisture has reached this depth. Frequent light watering encourages shallow roots. This is not good for plants.

**Staking**
Some varieties of flowers and plants grow tall, become top heavy, and fall over. To prevent this, we have to put a stake in the ground to help support them. The easiest time to do staking is when you transplant. The growth of the plant will be supported by the stake. Tie one loop of plastic string around the plant and another loop around the stake. Most dwarf varieties of plants do not need staking.

**Grooming**
Annuals produce many, many blooms during the growing season. Be sure to remove the old, faded blooms every 3 to 5 days (or as needed). This encourages the plant to produce new blooms.

**Disease and Pest Control**
Insect pests and diseases sometimes attack flowers. For good pest control, follow these cultural practices:
- Start with healthy seeds and plants.
- Remove diseased plants or plant parts from your landscape site.
- Stay out of your flower garden when the foliage is wet.
- Remove dead or fallen plant material from your flower garden.
- Water your plants only during the early part of the day.
- Keep weeds out of your garden.
- Change flower beds to new areas and use different flowers every 2 to 3 years.
- Remove dead plants from the landscape site at the end of the growing season in the fall.
- Turn the soil over at the end of the growing season.
# Activity 5. Landscape Gardening Word Search

Search down, across and diagonally for the new terms you learned in *Landscape Gardening*.

<table>
<thead>
<tr>
<th>Landscape Gardening</th>
<th>Trees</th>
<th>Shrubs</th>
<th>Seeds</th>
<th>Annual</th>
</tr>
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<tbody>
<tr>
<td>Biennial</td>
<td>Perennial</td>
<td>Life Cycle</td>
<td>Woody</td>
<td>Non-Woody</td>
</tr>
<tr>
<td>Groundcover</td>
<td>Chorophyll</td>
<td>Photosynthesis</td>
<td>Full Sun</td>
<td>Full Shade</td>
</tr>
<tr>
<td>Partial Shade</td>
<td>Hardy</td>
<td>Half Hardy</td>
<td>Tender</td>
<td>Clay</td>
</tr>
<tr>
<td>Loam</td>
<td>Sand</td>
<td>Silt</td>
<td>Texture</td>
<td>Nitrogen</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>Potassium</td>
<td>Fertilizer</td>
<td>Organic Matter</td>
<td>Germination</td>
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<tr>
<td>Transpiration</td>
<td>Wilt</td>
<td>Color Wheel</td>
<td>Transplants</td>
<td>Pinching</td>
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<tr>
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<td>Grooming</td>
<td>Spading</td>
<td>Raking</td>
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<tr>
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O F U L L S H A D E A J Q C P B B G J P O W E G
T R G J V A W Z O R C W I L T X I D P T Y N U R
F K G L A N D S C A P E G A R D E N I N G O C O
C U K A Y D Z U E M I Q R W A V N L N B S N M O
H F L G N C H E N E X H O L N M N E C L T W O M
L X N N N O I P Z U I D I U H S F I R H F A O D I
O J W N S V C L A Y K S N U P K A E I S K O Q N
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J P E S L F B E H Y L A C O L O R W H E E L O Y
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N X R I S E C Z W O O D Y W R E D C D X R N F Y
G O E G E R M I N A T I O N L N E M Y A J C Q A
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**How did you do?**

Number of words found:
- 36-42 ➞ **EXCELLENT** you have a green thumb!
- 26-35 ➞ **GREAT**
- 18-25 ➞ **GOOD**
- less than 18 ➞ **OK**, but you should review the materials again.
Record and Review

Congratulations! You have just completed Landscape Gardening. It is important that you take a few minutes to record and review some of the things you learned. These questions will help you bring together all of the information, experiments, and activities that you have completed.

There is more than one right answer for each question. Be sure to do your own work. Write neatly and think about your answers before you write them down. Your parents, leader, or teacher will help you if you have any problems. Good Luck!

1. Describe the life cycles of an annual, biennial, and perennial.

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

2. What three areas around your home or school would be good landscape sites? Why?

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

3. List three reasons why light is so important to plants?

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________
4. What are the best methods to use when watering landscape plants? Why are they important?

5. Describe the process of transpiration. Why is it important to know about this process?

6. Why are fertilizers important for landscape plants?

7. What factors should be considered when selecting a landscape site? Why are they important?
8. Describe the soil preparation process you used for your landscape site.

9. What characteristics should you look for when buying transplants?

10. Briefly describe the next landscaping project you will do. Where is it? What will it look like?
Sharing with Others
If you do any of the activities listed below, you will help others in your family, club, class, and community to learn about landscape gardening. Sharing what you know will help you learn even more about landscape gardening. Circle the sharing activities you plan to complete. When you complete an activity, enter the date on the line.

——— Read a report about landscaping.
——— Put up a poster.
——— Exhibit an item and present information about it.
——— Give a demonstration.
——— Keep a scrapbook and show it to others.
——— Have a poem or report about landscaping published in school, city, or 4-H news.
——— Tape-record meaningful information about landscape plants.
——— Show pictures or slides.
——— Turn in a written report.
——— Present a skit.
——— Do a bulletin board or window display.

Round-Up Projects
You will exhibit your completed project book and one of the following:
• A completed experiment from Landscape Gardening showing the results. Include a poster with an explanation.
  or
• A story of your landscape project using pictures that show before, during, and after shots.
  or
• A landscape plot plan for a new site you are going to landscape around your house, school, or community.
  or
• A vase of flowers from your flower garden, with your drawing or a photograph of the garden.
**4-H ACTIVITIES REPORT**

This report will help you keep a better record of your club activities. Fill it in as you complete each assignment. Refer to this record when you are entering county, state, and national programs. Ask your local leader to explain these programs to you.

My 4-H Activities Report for the 19____ Club Year

<table>
<thead>
<tr>
<th>Projects taken</th>
<th>Number of new members you encouraged to join 4-H__</th>
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<tbody>
<tr>
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<tr>
<td>Program title</td>
<td>Number of boys and girls you helped with projects__</td>
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<tr>
<td>In what way?</td>
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Offices held

<table>
<thead>
<tr>
<th>Club</th>
<th>Check those attended and tell how you helped</th>
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</thead>
<tbody>
<tr>
<td>County</td>
<td>□ 3- or 4-day camp</td>
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<tr>
<td></td>
<td>□ 1-day camp</td>
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“Show-and-tell” given to:

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<th>Family</th>
<th>□ Club or county tours</th>
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<tbody>
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<td>□ Club picnic</td>
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<td>□ 4-H Sunday</td>
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<tr>
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<td>□ Achievement programs</td>
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<td>State</td>
<td>□ Roundup</td>
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<td></td>
<td>□ Teen Leader Retreat</td>
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<td>□ Camp Leadership Training</td>
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<td>□ Penn State 4-H Week</td>
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<td>□ Pennsylvania Farm Show</td>
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<td>□ National 4-H Week</td>
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<td>By myself</td>
<td>□ Others</td>
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<tr>
<td>With club</td>
<td></td>
</tr>
</tbody>
</table>

Number of meetings your club(s) held this year

Number you attended
This project was developed by Timothy J. Rollins, associate professor of agricultural and extension education, J. Robert Nuss, professor of ornamental horticulture, Dennis J. Wolnick, associate professor of floriculture, and Jeff Miller, 4-H horticulture project assistant, in consultation with the state 4-H Horticulture Curriculum Committee. Committee members who contributed were: Tom Becker, Janet Klobert, David Quatchak, Judy MacRone.

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Name ____________________________

Address ____________________________

Name of Club ____________________________

Leader’s Name ____________________________

Name of Project ____________________________

4-H Club Motto
"To make the best better"

4-H Club Pledge
I pledge
my head to clearer thinking,
my heart of greater loyalty,
my hands to larger service, and
my health to better living, for
my club,
my community,
my country, and
my world.

4-H Club Colors
Green and White