GROW NYC

Raised Bed Guide

Double high raised beds

Basic 4′ x 8′ Raised Bed Assembly Plans

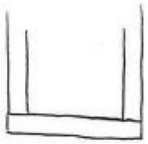
Instructions below are for **one 4′x8′** bed, but are applicable to beds of other dimensions.
Assemble materials:

- Two 2″x10″x4′ pieces of lumber (cut from a 2″x10″x12′ board)
- Two 2″x10″x8′ pieces of lumber (cut from a 2″x10″x12′ board)
- Power drill
- One pilot hole drill bit
- One star drive drill bit
- Star head screws
- Staple gun (optional)
- Corner clamps (optional)

Step 1: Decide how you want to assemble the pieces of your bed. You can place the two long sides on the **outside** of the short pieces of lumber, as shown below (note: the width of this bed will be **wider** than 4:

Bird's eye view of end of bed with long boards on the outside

You can also place the two long sides on the **inside** of the short end piece of lumber, as shown below:



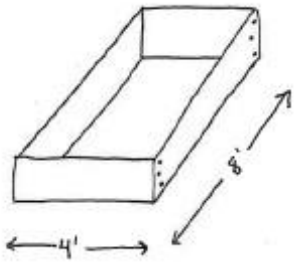
Bird's eye view of end of bed with long boards on the inside

Step 2: Create an L-shape with one 4′ piece of lumber and one 8′ piece of lumber, using a partner or a corner clamps to hold them firmly together.

Step 3: At the corner junction where the two pieces of wood meet, use a pilot drill bit and power drill to drill three pilot holes through both pieces of lumber. Slightly offset the three pilot holes as shown below.

*Note: A **pilot hole** is a small hole drilled into the lumber to guide the screw into the appropriate location and to make it easier to drill the screw into the wood.*

Step 4: Insert the star drill bit into the power drill. Drive one screw into each hole created by the pilot holes, making sure the screw goes through both pieces of lumber. Once the screw head is flush with the surface of the lumber, the screw is sufficiently tightened. Repeat these steps with each corner of the bed until you have a rectangular structure as seen below.



Step 5: Cut a piece of landscaping fabric 1-2 feet longer than the length of your bed. Lay the fabric inside the bed, making sure that the fabric covers both the bottom and the sides of the bed. If using a staple gun, secure the fabric to the inside walls of the bed by placing staples approximately every 6 inches along the edge of the fabric. If you are not using a staple gun, begin filling the bed with soil, making sure that the fabric still covers the floor and the walls of the bed.

Why raised beds?

There are lots of advantages to gardening in raised beds, particularly in a school garden:

Preventing contact with contaminated city soils
Soil in New York City can contain unsafe levels of lead and other contaminants, which makes working in the soil or eating plants grown in the soil dangerous. GrowNYC School Gardens encourages schools to grow edible and ornamental crops in containers with new soil in order to prevent inhaling or ingesting contaminated soil.

Clear areas for planting and for walking
Raised beds clearly mark which areas are for growing plants, and which areas are for walking, sitting, and working. Having clear pathways between raised beds makes students less likely to step in garden beds, causing harmful soil compaction. Standard practice is to leave 3 feet between beds for wheelchair accessibility.

Attractive

Many people like the look of a traditional garden with raised beds made from wood. Lots of options for decoration and embellishments exist: schools can paint beds, add trellises, and more!

Ability to be customized
Although the most common raised bed is 4' wide by 8' long, raised beds can be made in virtually any dimension, making them easy to customize for a school's particular space. Beds can be made high to be accessible for students in wheelchairs, narrow to fit in a tight space, or even L-shaped to take advantage of a schoolyard corner.

Examples

Grace Dodge High School, Bronx P.S. 107, Brooklyn

These fairly traditional raised beds are on a sunny, south-facing side of the school building.

P.S. 107, Brooklyn

This narrow bed takes advantage of a small border around the school building and a fence is used as a trellis for climbing plants.

Bronx Academy of Arts and Letters, Bronx

Double-height raised beds are accessible to students in wheelchairs, and also provide more growing space for plants' roots. Painting the beds brightens up the garden and can increase the wood's longevity.

Family Life Academy Charter School, Bronx

You can get creative with raised beds dimensons and plans. There are many resources on the internet, including raised bed kits for purchase.

Raised Bed Considerations

Before building raised beds at your school, there are a few things to consider:

Size:
Raised beds are often 8' long by 4' wide by 10"-1' high, although they can be made in virtually any dimension. To calculate the best width for your bed, keep in mind how far students and adults can reach into the bed to work. The ideal length of your bed will depend on the space you have available.

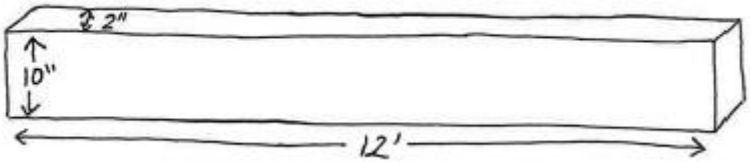
Building materials:
Pine is the most common wood for raised beds. It is easy to find, affordable, and durable. Pine will last 5-10 years before needing replacement. Cedar is a more expensive wood, but will last longer and is more rot resistant. Trex "lumber", a material made from recycled plastics, is also a more expensive but durable option. No matter the type of wood, make sure that it is **untreated**, as treated woods often contain toxic compounds.

Placement:
When selecting a location for your raised beds, consult with the Custodian or maintenance staff at your school. Consider the spacing between beds (will a lawn mower fit between them, if applicable?), the placement of beds (are you blocking an exit, trash area, or other important area?), and water source and access (is there a spigot on the exterior of the building? If so, who has the key?). As with any garden, consider the amount of light your raised beds will receive; if you can, try and build your beds on the south-facing side of your school.

Lining:
Raised beds should be lined with lightweight landscaping fabric. This lining helps create a barrier between plants' roots and the soil below and, even more, helps keep small particles of soil inside the garden bed when watered.

Materials List, Sourcing, and Budget

The following materials list is for **one 8'x4'** raised bed.

Material	Price per unit	# of units	Total	Source
12'x2"x10"' lumber	$16.00	2	$32.00	Price quote from Lowes.com Other potential sources include: -Home Depot -Build It Green (cheap or free reclaimed lumber) -Free from GreenThumb with attendance at qualifying workshop (4-6 mo. delivery delay)
Lumber notes: Dimensional lumber comes in a variety of sizes. The lumber budgeted above is12' long, 2" wide, and 10" high.  A thickness of at least 2" ensures longevity: raised beds will rot from the inside (where there is damp soil), so a board at least 2" thick will last longer than a 1" thickness. A height of 10" ensures enough root space for plants to grow, but you can go taller (if lumber is available) or shorter -- just remember that crops with big root systems, like tomatoes, will be happier with more space for roots to grow. If purchasing from a big box store like Home Depot or Lowes, you can ask to have your lumber cut to your specifications in the store. If you're receiving lumber from GreenThumb of Build It Green, you'll need to cut your own lumber using a table saw or circular saw. Follow appropriate safety precautions if cutting your own lumber.				
1 lb. box of 3" deck screws	$10.00	1	$10.00	Price quote from Lowes.com Other potential sources include: -Home Depot -Neighborhood hardware store
Screw notes: Assembling your raised bed will require a power drill. Make sure that the screws you purchase match the drill bit that you have available (Phillip's head, star drive, etc). Many screws come with the appropriate drill bit in the box, but not all.				

Landscaping fabric	$20.00	1	$20.00	Price quote from Lowes.com Other potential sources include: -Home Depot -Neighborhood hardware store
Optional: staple gun	$17.00	1	$17.00	Price quote from Lowes.com Other potential sources include: -Home Depot -Neighborhood hardware store
Optional: staples	$11	1	$11.00	Price quote from Lowes.com Other potential sources include: -Home Depot -Neighborhood hardware store
Staples notes: You can use a staple gun to secure the landscaping fabric to the interior of the raised bed. If using a staple gun, make sure the staples you purchase match the size and model of your staple gun. It is also possible to line the bed with landscaping fabric and fill with soil without stapling the lining to the raised bed.				
		Total:	$90.00	

Tools

Depending on the number of beds you'll be building, the tools and expertise available in your school community, and whatever additional assistance you're able to get, it is possible to build your raised beds without purchasing any tools. See the list below for required and optional tools, and where to source them.

Saw

Most likely, you'll need to cut the lumber you purchase into pieces of the desired dimensions for your beds. If you're purchasing from a big box store like Home Depot or Lowes or from a local lumber yard, you can ask to have your lumber cut to your specifications in the store.

Hand saw

Circular saw

Table Saw

If you're receiving lumber from GreenThumb of Build It Green, you'll need to cut your own lumber using a hand saw, table saw, or circular saw.

Ask members of your school community (custodians, teachers, parents) if they have any of those tools and would be able to assist during a garden build day. **Follow appropriate safety precautions if cutting your own lumber**.

GrowNYC's School Gardens offers beginner and advanced bed building workshops throughout the Fall and Spring seasons, which may include demonstrations and practice with hand and circular saws, as well as an overview of safety precautions. Check GrowNYC's School Gardens' events page at http://growtolearn.org/view/events for upcoming workshops.

Optional: Measuring tape and speed square

If you're cutting your own lumber, you'll need to make careful measurements and cut lines to follow when using the saw. Use a measuring tape to mark the length of the piece you need to cut. Then use a speed square to make a dark line with pencil to follow as you cut.

Power drill with appropriate drill bits

A power drill is the most important tool for assembling the raised beds. It is also a fairly common

tool in people's home toolkits, or perhaps even in your custodian's collection.

You'll need two different drill bits to assemble your raised beds: a bit to make a pilot hole, and a bit to drive the screws you purchased (either a star or a Phillip's head). A pilot bit is used first to make a small hole in the lumber which guides the screw to the appropriate location and makes it easier to drill the screw into the wood. A driver bit is used next to drive in and secure the screws. Depending on how the drill bits attach to your particular power drill, the base of your drill bits may appear different, but the following pictures show the two types of bits you'll need:

Pilot hole drill bit

Star drive drill bit with matching screw head

Phillip's head drill bit with matching screw head

Optional: Staple gun

Raised beds should be lined with lightweight landscaping fabric. This lining helps prevent a barrier between plants' roots and the soil below and, even more, helps keep small particles of soil inside the garden bed when watered. You may want to secure the lining to the inside of the raised bed using a staple gun. A staple gun is optional as it is also possible to line the bed with landscaping fabric and fill with soil without stapling the lining to the raised bed.

Optional: corner clamps

If you're building a raised bed by yourself (or even if you're not!), it may be worth investing in a corner clamp. A corner clamp can hold the corners of a raised bed in place while you use the drill to assemble the pieces. Check the alignment of your lumber before drilling, though, as a corner clamp can sometimes hide where the lumber joins, making it easy to drill two pieces together that are not aligned.

Advanced Options

Using the same principles involved in building a basic 4'x8' raised bed, you can create a variety of advanced, "outside the box" options for your garden.

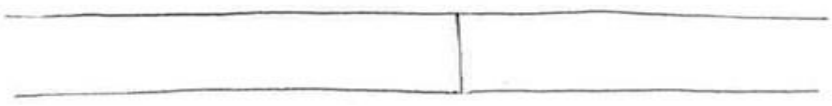
Beds with unusual dimensions

PS 64 Pura Belpre, Bronx This school created one long bed (2'x16') along the front wall of their building.

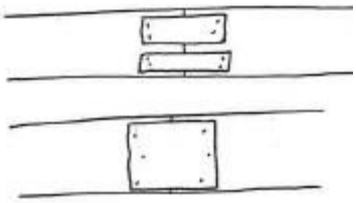
Building an extra-long raised bed follows the same instructions outlined earlier in this toolkit, plus two additional techniques: joining lumber to create extra-long sides, and adding support across the width of the bed so that the long sides don't buckle.

1. Decide on the dimensions of your bed. Based on what you decide, you'll need to purchase and lumber to your desired specifications. For example, to make a bed with 16' sides, you'll need to purchase 4 2"x10"x8' boards. By joining two, you'll make one 16' side.

2. To create an extra-long piece of lumber for the sides of the bed, you'll need to join two smaller pieces together, to make one continuous side. You'll join these pieces of lumber using one or more smaller pieces of lumber as a "patch" holding the two lengths together.



External view of joined boards.



Internal views of patches joining boards.

3. Cut a "patch" piece of lumber. If using one piece of lumber to make a patch, cut it so that it is the same height as your board, and extends beyond the seam where the boards meet (as shown in the diagram).

4. Lay the two pieces of your extra-long side on the ground and place the patch over the seam where the two pieces meet so that there are a few inches of patch on each side of the seam.

5. Drill 3 slightly offset pilot holes on each side of the patch, through the patch and into the lumber below. Switch to a drill bit and drive a screw into each of the pilot holes.

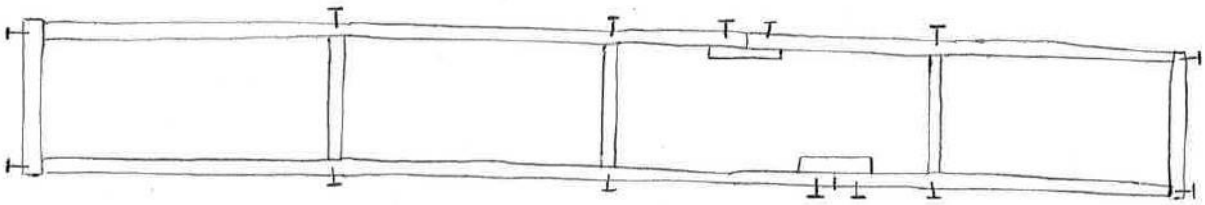
6. Working with a partner, hold one the extra-long side in an L-shape with one of the short end pieces.

7. Drill 3 slightly offset pilot holes through the end of the extra-long side, making sure that the drill goes through both pieces of lumber (the extra-long piece and the perpendicular shorter piece). Switch to a drill bit and drive a screw into each of the pilot holes, making sure they pierce both pieces of lumber. Repeat steps until all four sides of the bed are attached.

8. **Adding Supports:** The number of supports you will need will depend on the width of your bed. You should have a support at least every 8' along the length of your bed.

9. Cut the appropriate number of supports to the appropriate size: supports should be the same height as the rest of the bed, and should fit snugly between the two long sides. Attach the supports to both of the extra-long sides with three pilot holes and screws.

10. Line with landscaping fabric and fill with soil in the same manner as the 4x8 beds.



Bird's eye view of an extra-long bed with patches holding the long sides together and internal supports across the width of the beds.

Double-high Beds

Expeditionary Learning School for Community Leaders, Brooklyn

Double-high raised beds can be more accessible for students in wheelchairs, can provide more growing space for plants with large root systems, and are easy to build, once you've mastered the basics.

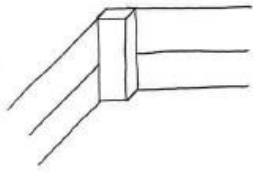
Building a double-high raised bed follows the same instructions for the basic raised bed outlined earlier in this toolkit, plus one additional technique: stacking and joining beds to create a taller bed. You'll also need to purchase 2"x4"s to join the two stacked beds together. Depending on the dimensions you decide on, you'll need to purchase and lumber to your desired specifications. In this example, we'll plan on building a double high 4'x8' bed.

1. Build two 4'x8' raised beds according to the basic raised bed instructions outlined

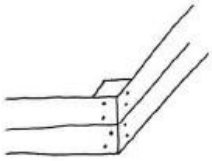
earlier in this toolkit. Make sure that *both* are built with either the long ends of your bed on the *outside* of the short sides or the *inside* so that they stack evenly on top of one another.

2. Set your bottom bed in its final location, once the beds are stacked they will be difficult to move. Stack the second bed on top of the first.

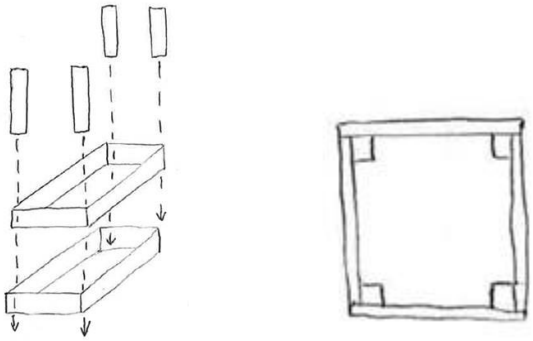
3. Cut your 2″x4″s into four pieces, each of the same height as your double high raised bed. Place the first 2″x4″ post in one corner of the bed.



4. Drill 4-6 pilot holes on each side of the bed, through the sides of the bed and into the 2″x4″ below.



5. Having switched drill bits, drive a screw into each of the pilot holes. Repeat in the remaining corners of the bed to stabilize and connect the two single height beds. Line with landscaping fabric and fill with soil in the manner described for 4′x8′ basic raised bed earlier in this toolkit.

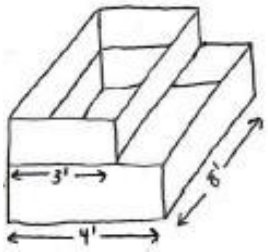


Assembly and overhead view of double high bed

Tiered Raised Beds

PS 323, Brooklyn By stacking beds of different dimensions, you can create a tiered garden bed, like this one at an elementary school in Brooklyn.

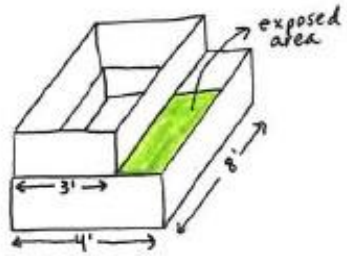
Building a tiered raised bed follows the same instructions for the double-high raised bed outlined earlier in this toolkit, only the beds being stacked are of different dimensions, creating a tiered effect. You'll also need to purchase 2"x4"s to join the two stacked beds together. Depending on the dimensions you decide on, you'll need to purchase and lumber to your desired specifications. In this example, we'll plan on building a 4'x8' base bed with one additional 3'x8' tier.



1. Build one 4'x8' raised bed according to the basic raised bed template outlined earlier in this toolkit. Build one 3'x8' raised bed according to the same instructions. Make sure that *both* are built with either the long ends of your bed on the *outside* of the short sides or the *inside* so that they stack evenly on top of one another.

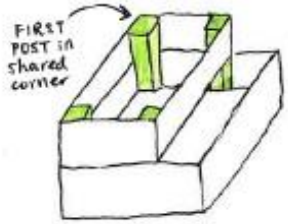
2. Place the 4'x8' bed in its final location and stack the 3'x8' bed on top of it, lining up two of the beds' four corners. This will create a double stacked bed with an exposed rectangle

along the long edge.



3. Cut your 2"x4"s into four pieces of the same height as your double high raised bed. In this example, our bed is 20" high (two beds 10" high stacked), so we would cut four 2"x4"x20" pieces.

4. Place the first 2"x4" post in the shared corner of the bed. And drill 4-6 pilot holes on each side of the corner, through the sides of the bed and into the 2"x4" below. Switch drill bits and drive a screw into each of the pilot holes



5. Repeat in the remaining corners of the bed to stabilize and connect the two single height beds. Repeat these steps for as many tiers as you would like your bed to have.

6. Line the bottom bed with landscaping fabric and fill with soil according to the instructions for the basic raised bed. Fill with as much soil as possible, as it will settle into the bottom tier.

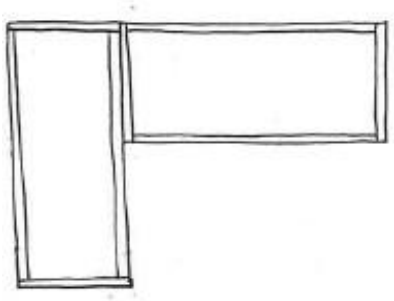
L-shaped raised beds

PS/MS 202, Brooklyn This school created L-shaped beds to fit into the sunniest corner of their school's rectangular front yard.

1. The easiest method for building an L-shaped raised bed requires building two basic raised beds (as detailed earlier in this toolkit), and positioning them in an L shape. Depending on the dimensions you decide on, you'll need to purchase and lumber to your desired specifications. In this example, we'll plan on building 2 4'x8' beds.

2. Build 2 4'x8' raised beds according to the basic raised bed template outlined earlier in this toolkit. Make sure that *both* are built with either the long ends of your bed on the *outside* of the short sides or the *inside* so that they look even when placed next to one another.

3. Place your first bed in the corner of your space. Then place the second bed adjacent to the first, creating an L shape or a 90° angle. Don't worry about attaching the beds to one another because once they're filled with soil they won't be able to move.



1. Line the bottom bed with landscaping fabric and fill with soil according to the instructions for the basic raised bed

Wheelchair Accessible Raised Bed Design

Gardens should be accessible to everyone, regardless of age or mobility. This raised bed design lifts the growing space off the ground to ensure easier access to garden for members in wheelchairs.

Design by Eric Thomann at GreenThumb

TABLE TOP RAISED BED SUPPLY LIST

MATERIALS:
One (1) 3/4" 4x8 plywood (BOTTOM…one (1) piece)
Three (3) 8' x 2" x 10" (untreated) (FRAME…cut one in half to make two 45" pieces for the short ends)
Four (4) 8' x 2" x 6" (treated) (LEGS…cut twelve (12) to 36")
Three (3) 8' x 2" x 4" (treated) (CROSSBRACES…cut ten (10) to 24" with 45 degree angles both sides)
One (1) 10' x 6' x 4 mil. (LINER)
Two (2) SHOWER FLOOR DRAINS…male and female
Two (2) 10" x 10" ½" mesh hardware cloth (FILTER HOLDER)
Two (2) 10" x 10" Landscape cloth (FILTER)
Thirty Two (32) linear feet of discarded, leaky garden hose (TOP EDGE LINER)
One (1) cubic Yard of Soil

HARDWARE:

Four (4) lbs 3” #8 square drive screws, exterior (LEG and FRAME FASTENERS)
One (1) lb 2 ½” #8 square drive screws, exterior (CROSSBRACE FASTENERS)
One (1) box 1 3/8” #8 square drive screws, exterior (PLYWOOD TO FRAME FASTENERS)
One (1) box 4d flat head nails (FASTENERS FOR HOSE)
One (1) qt wood glue
Four (4) 1/8” drill bits
Four (4) #2 square drive bits
0ne (1) box ½” T-50 staples

TOOLS:

- Radial Arm Saw with cross cut blades
- Carpenter Square
- Combination Square
- Tape Measure
- Hammer
- Speed Square
- Pencils
-
- T-50 Stapler
- 12” bar clamp
- 3/8” Drive Drills
- Drill Bit Holders
- Tin Snips
- Scissors
- 24“ Level
- Mattock
- Rake
- Shovel
- 1 ½” Hole Saw
- Work gloves
- Safety Goggles
- First Aid Kit (small cuts)

Cutting and assembly procedure:

1. Cut twelve (12) legs to 36" from 2x6s
2. Cut twelve (12) corner leg braces to 24" from 2x4s (Note: Braces have 45 degree angles)
3. Cut two (2) planting box sides to 45” from 2x10s
4. Cut three (3) bottom braces to 45" from 2x6s
5. Attach planting box ends and planting box sides together.

(Note: Long ends are on the OUTSIDE. Short ends are on the INSIDE.)

6. Attach 4x8 plywood to planting box assembly.
   (Note: Attach one short end FIRST. Be sure corners align with plywood. THEN push box frame into alignment with plywood.)

7. Attach bottom braces to the two ends and middle.
   (Note: Be sure bottom braces are inset 1 1/2" from edges.)

8. Attach 12 parts together into 6 legs.
9. Attach 6 legs to the ends of the 3 bottom braces.
10. Attach 12 cross braces to the 6 legs.
11. Drill 2 holes into middle of planting box bottom.
    (Note: Holes should be about 2 feet from ends and sides.)

12. Attach two shower drains to the two holes.
13. Attach hardware cloth squares over top of shower drains

14. Attach landscape cloth squares over hardware cloth squares.
15. Attach plastic liner to planting bed.
16. Level the planting bed.
17. Fill with soil.

Resources

Skill-building and Instruction	
GrowNYC School Gardens	GrowNYC School Gardens teaches workshops on beginner and advanced bed building seasonally.
GreenThumb	GreenThumb teaches workshops on bed building seasonally.
Edible Schoolyard NYC	Edible Schoolyard NYC teaches workshops on bed building and garden infrastructure.

Materials	
GreenThumb	Schools registered with GrowNYC School Gardens can attend eligible workshops (eligibility to request free soil will be included in the workshop description) to request **free soil and lumber**. Eligible workshops will be listed online. They will also be announced in GrowNYC School Gardens email newsletter. Requests for soil and lumber will be filled on a first-come-first-served basis. Lumber, soil, compost, or mulch will be delivered in bulk in December of that year.
Urban Garden Center	Urban Garden Center in Harlem is family owned and operated here in New York City. Urban Garden Center sells high-quality soil and compost and will deliver across the city for a fee. Urban Garden Center offers a 10% discount to school gardeners.