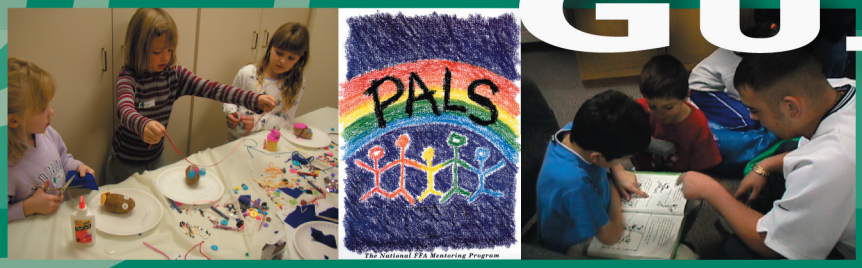
Grow Your PALS Program Guide



The National FFA Mentoring Program

Sponsored by Campbell's

Lesson 46

Garden Grids: Using Perimeter and Area in the Garden

Unit:
Plant Science

Precepts

A. Action
   A1. Work independently and in groups to get things done

Lesson Type:
Large Group

National Standards

NM-MEA.3-5.2 Apply Appropriate Techniques, Tools and Formulas to Determine Measurements

Student Learning Objectives

As a result of this lesson, the student will …

1. Define perimeter and area.
2. Calculate perimeter and area.
3. Determine the number of tomato plants to plant in a garden.

Time

Instruction time for this lesson: **45 minutes.**

Resources

For 1-inch graph paper: www.math.kent.edu/~white/graphpaper/one-bold.pdf
Graph paper for 12-foot by 6-foot garden: http://www.math.kent.edu/~white/graphpaper/two-bold.pdf
Adapted from Learn NC,http://www.learnnc.org/lp/pages/3662.
Math definitions:http://www.mathsisfun.com/definitions/index.html

Tools, Equipment and Supplies

- **yarn – cut into 20-inch pieces –** 3 per student
- **tape**
- **stakes –** for making an outside garden
- **note cards –** 1 per student
- **tape measurer**
- **blank 1-inch grid graph paper –** 4 sheets per student
- **graph paper with a pre-made 12-foot by 6-foot garden –** 1 per student
- **writing utensils –** 1 per student
- **PALS.46. AS.A –** per student

Key Terms

The following term is presented in this lesson and appears in ***bold italics:***

perimeter

area

Interest Approach

In this interest approach, our goal is to get students to estimate how many tomato plants may be properly planted in a pre-measured area of 12 feet by 6 feet. An area should be measured out and marked off before class begins. If you want to actually prepare a small garden with the class, you can measure this area outside; however, you could simply tape off a section of the classroom floor or you may use sidewalk chalk on a sidewalk for them to get a good visual.

As you can see today, we have another problem to solve. We are going to plan a garden. However, I am having a lot of trouble figuring out how many tomatoes will fit into this garden.

*Give each student a note card to capture a guess about how many tomato plants each individual student believes should be planted in the given garden **area**.*

Now that you have your note card, write your best guess on how many tomato plants would fit into our garden. Be sure to include why you guessed that number.

Call on students to share their answers and reasons.

Give us a thumbs-up if you wrote a number greater than 20 on your card. Thank you. How about a thumbs-up from those who wrote a number less than 20?

What helped you in making your guesses? What information do you need to make a better decision?

Process their responses to direct them to the conclusion that there is a much easier and more accurate way to determine how many tomato plants to plant in our garden than by just guessing the number.

Many of us said that we had a hard time just guessing a number because we didn't have enough information. Today we are going to learn an easy way to help solve our tomato problem.

Summary of Content and Teaching Strategies

Objective 1. | Define *perimeter* and *area*.

*Have the students get into groups of four to six. Conduct a Me-You-Us Moment by first asking them to define **perimeter** and **area** individually, then with their group and then as a class. They can write their definitions on the note card they previously used. They should write their group's definitions on a large piece of paper. These will be two different definitions, so handle each one at a time.*

To help us solve our problem we need to first define ***perimeter*** and ***area***. By yourself, come up with your best definition for the word ***perimeter***. Take 45 seconds, and write your answer on the same note card you used earlier. Now take another 45 seconds and write your definition for the word ***area*** on your card.

Hold your card in the air when you have two definitions written on your card.

Divide them into their groups. Ask them to share both of their answers and then come up with a revised definition for ***area*** *and* ***perimeter****.*

Now that we have a rough idea of what ***area*** and ***perimeter*** are, we are going to share our answers with our friends sitting at the same table as us. When I say SHARE, you will have two minutes and 30 seconds for your group to read your individual definitions and then come up with two brand new definitions for the words ***perimeter*** and ***area***. When you have your definitions, write them on a large piece of paper. What questions do you have?

SHARE.

Elicit responses from groups. Have them share their definitions.

All right, our time is up! Let's see what our groups came up with. Who will share first?

Process their responses into the following definitions for the words ***perimeter*** *and* ***area****.*

Sounds like we are on the right track. Now let's take all of our group definitions and mold them into a definition for the entire class.

Have definitions written on posters posted on the walls, or simply write the definitions on the board to reveal the correct definitions of the words ***perimeter*** *and* ***area****.*

Perimeter is the distance around a two-dimensional shape; like the ***area*** we have laid out here. Walk around the shape while saying this definition.

Area is the amount of space inside the ***area*** of a two-dimensional space. Stand inside the shape when saying this definition.

OBJECTIVE 2. | Calculate *perimeter* and *area*.

Have students collect their materials for the next activity. They will each need the following items: three pieces of yarn that are 20 inches long, four pieces of graph paper and tape.

To complete the next activity, we will all need some supplies. Here in front of me I have yarn, graph paper and tape. Each person will have his or her own yarn and graph paper, but we will be sharing the tape at each table.

Each person will need three pieces of yarn, four pieces of graph paper and one roll of tape for the table to share. When I say GO, send **one** person from your table up to the front to gather your supplies. What three things will you need? How many people will come up front from each table? Exactly.

GO.

Instruct students to tape their yarn onto their graph paper to make three rectangles. Have them make three rectangles of various sizes: 2 inches by 8 inches, 3 inches by 7 inches and 4 inches by 6 inches. Inform them that each box on their grid represents one inch.

Now we are going to turn our yarn into three different rectangles. One rectangle will be 2 inches by 8 inches, 3 inches by 7 inches, and 4 inches by 6inches. Each square on your graph paper represents one inch. Tape your rectangles to your graph paper. Each piece of graph paper will have one rectangle on it.

Help to ensure students are taping their rectangles to their graph paper correctly. After that is completed, ask them to compare the three rectangles as they relate to ***perimeter****.*

Now that we have our rectangles taped to our paper, we need to determine their ***perimeter***s. Take a few moments to calculate the ***perimeter*** for your three rectangles.

You many need to do the first rectangle together. Show them that 2 inches + 2 inches + 8 inches + 8 inches = 20 inches. All the rectangles should come out with the same ***perimeter****.*

Let's do the first one together! Let's take a look at our ***perimeter*** poster to help jog our memories on how we determine ***perimeter***. We determine ***perimeter*** by adding all the side lengths. What numbers do we need to add? That's right we add 2 + 2 + 8 + 8 = 20 inches.

So, we determined the ***perimeter*** for each of our rectangles was 20 inches. Even though they all had sides that were different lengths, they still started out with our 20-inch piece of string.

*Transition the students into determining the **area**, by questioning them about **perimeter**s and **area**s.*

So, all of our ***perimeter***s were the same for each of the rectangles. Raise your hand if you think the ***area***s will be the same too. Let's figure the ***area***s together to see if we are right. Once again, let's look at our ***area*** poster to help us out. ***Area*** is determined by multiplying the length by the width.

For the first rectangle, we multiply 2 inches by 8 inches. What is two times eight? 16 square inches

For the second rectangle, what do we multiply? We multiply 3 inches by 7 inches to get 21 square inches.

For the third rectangle, let's each do this one by ourselves and then share with a partner what we did and our answers. Wait for students to do the problem, and then ask for someone to share their process.

Who will share what they did to obtain the ***area*** of the last rectangle? Volunteer PALS should say that he or she multiplied 4 inches by 6 inches to get 24 square inches.

Point out to them that if they were to count the number of boxes that are inside their rectangles, they would equal each of these numbers.

To make sure we are correct, you can count all the boxes up that are inside your three rectangles. Did you get the same results?

Go back to your big "garden" that you measured out prior to class. Have students volunteer to measure the "garden." Determine the perimeter and area of your "garden" using the tape measure.

Let's take a look at the garden we began with. At the beginning of the hour, we guessed how many tomato plants we could plant here. By determining the ***perimeter*** and ***area***, it can help us solve our problem.

Who will measure the dimension with this tape measure? So, we determined that it is 12 feet long by 6 feet wide.

Let's determine the ***perimeter***. Take 12 feet + 12 feet + 6 feet + 6 feet = 36ft.

Let's determine the ***area***. Take 12 feet by 6 feet = 72 ft

OBJECTIVE 3. | Read a seed packet to determine the number of seeds that can be planted in a certain *area*.

Introduce reading a seed packet to help in determining how many plants to plant in our tomato garden. Use PALS.46.AS.A.

Let's take a look at a sample seed packet. On this handout is all the information that is important to growing this tomato plant. What information do you think will be most useful to us?

Point out the row spacing of 3 feet and that final sentence that states the plants should be at least 3 feet apart.

There is a lot of important information on this seed packet. If we read this information carefully, it will help us grow a better plant. Look where it says row spacing. How many feet apart should our rows be? That is right; 3 feet apart.

Using the pre-made garden grid that represents your big garden, have the students determine how many tomato plants could fit in the garden.

*Determine the **area** needed for each plant and draw this on the graph paper.*

We read that each plant needs 3 feet in each direction in order to grow properly in our garden. What is the ***area*** each plant needs?

We can determine ***area*** by multiplying one side by the other side. So each plant needs 9 square feet to grow. Divide our garden rectangle into smaller rectangles of 9 boxes to determine how many plants we can plant.

Each student should be able to trace out eight 3 feet by 3 feet boxes to indicate that there can be eight tomato plants planted in the big garden. See which student's guess at the beginning of the hour was the closest to the correct answer of eight.

At the beginning of the hour, each one of us guessed how many tomato plants we could fit into our garden. Did anyone guess eight? *If not, did anyone guess nine or seven? Continue to see who has the closest guess.*

Review/Summary

*Use the Hieroglyphic Moment to have students create an icon to help them remember **perimeter** and **area**. Have them draw their two icons on their note cards.*

Today we have learned about ***perimeter*** and ***area***. When I say DRAW, you will have two minutes to create an icon that will help you to remember ***perimeter*** and ***area***. Questions? DRAW.

Thanks for working so diligently everyone. Please keep these note cards to serve as a reminder of ***perimeter*** and ***area***.

Application

Small Group Suggestion: *Work in small groups of mentors/mentees giving each group a garden plot that is the same in **perimeter** but different in **area**. Each group will be able to plant a different amount of tomato plants in their garden. Come together at the end to show the different results.*

One-on-One Suggestion: *Review with your mentee **perimeter** and **area** using string. Go and visit a garden and measure out its **perimeter** and **area**.*

PALS.46.AS.A

Tomato

Large Red Cherry

A highly productive variety that is a tasty addition to summer salads.

Days to Germination	Depth to Sow	Seed Spacing	Row Spacing	Days to Harvest
15-20	1/4 inch	1/2 inch	3 feet	55-60

Sow seeds indoors in a warm, well-lighted area, 8-10 weeks before last frost.

The final spacing of the plants should be three feet apart.