

Unit 1: Pie Are Square

Week 1: Circles

Day 1: Introduction

Consider the following situations.

I. Imagine you are a carpenter. You want to make a bench with three sides that faces an outdoor fireplace. The sides of the bench will all be equal lengths, and they will be joined at 45-degree angles. The open side of the trapezoid that's formed—the part that faces the fireplace—has to be 90 inches wide. How long should each side of the bench be? (Assume for this exercise that you measure from the middle of each board.)

True story: This problem was featured on a home renovation show on national TV.

II. Imagine you are a gardener. You have been hired to take care of a circular planter that is 6 feet across. Your final step is to order bark to lay on top of the soil so the flowers won't dry out too quickly. One bag of bark will cover 4 square feet of soil. How many bags of bark should you order?

True story: I'm describing the planter between the dormitories where I went to college. I think it had been a water fountain before they turned it into a planter for pansies.

III. Imagine you are a construction worker laying a foundation. You have to make sure each corner of your building is completely square, or the walls will be crooked. Just using a T-square tool at the corner won't be enough because the

tinest variation at the corner will create inches or feet of variation at the other end of the wall. How can you check your line with just three tape measures?

True story: A homebuilder gave me this situation. He has used this easy solution not only for foundations, but also for fences and other projects.

IV. Imagine you were stranded on a deserted island with only the contents of your pocket: some string, an analog watch that stopped working because it got wet, and a pocket multi-tool. Using the boards of the ship that wash up on shore, design and build a shelter.

All right, this one is not a true story. It does, however, feature the most important tools of geometry, which is why I included it.

- *A compass is the modern equivalent of string.*
- *A protractor can be recreated with an analog watch face.*
- *A ruler is the ultimate straight edge, but a board will work.*

As you can see, Geometry is useful in a wide variety of trades, not just as a prerequisite to get into college. I've even used it as a homemaker. (Being a math teacher didn't hurt, I'll admit. But, can you think of any other way to calculate how much laminate to order when replacing one's carpet?)

If you're still not convinced this class is important, consider this. Psalm 19 says, "*The heavens declare the glory of God . . . There is no speech nor language where their voice is not heard.*" Math itself is a language. The universe itself moves in mathematical formations. The study of math demonstrates the glory of God, if for no other reason, because it is orderly like its Creator. As 1 Corinthians 14:33 says, "*God is not the author of confusion.*"

That gives us multiple reasons to give our attention to the study of Geometry—not just half-hearted study, but serious attention. Colossians 3:23 commands us, “*Whatever ye do, do it heartily, as to the Lord . . .*”

Assignment

1. Make sure you have assembled your tools.

- Compass with a pencil on one end
- Protractor
- Ruler
- String

2. Make sure you have assembled your school supplies.

- Pencil
- Paper
- Notebook
- Scientific Calculator

(Note: If you use the calculator app on a smart phone, turning the phone horizontally often turns the simple calculator into a scientific one. If you use a calculator app on your computer, click the hamburger icon ≡ and select the scientific option.)

3. Make sure you have organized your textbook and lesson plans.

- Will you be printing everything? Make sure you punch holes and put it in a notebook.
- Will you be viewing the PDFs on the computer instead of printing? Make sure they are saved to a folder on your computer.

Because sketching your work is such an important part of Geometry, you will need to have a notebook to keep your written papers organized.

Quick Tip:

Sometimes assignments will take two pages. Always check the next page, even when you think you're done. For example, today's written work doesn't begin until number 4.

4. Learning how to sketch a diagram is an important skill. Look back at situations I, II, and III listed above. Draw a picture of each situation.
5. Place your work in your notebook. Answers can be found in the separate answer key at SchoolhouseTeachers.com.

Students and teachers may have ambivalent thoughts about answer keys. Some may view it as a cheat sheet, while others may use it as a lifeline. No matter where you fall on that spectrum, allow me to give you a fresh perspective.

- Checking the answer key reinforces what you learned. Read through it thoroughly to see if I solved the problem in a different way. There can be more than one way to reach a correct answer.
- Using an answer key to check your work allows you to identify areas you may not have fully understood. When you don't understand something, re-read the lesson to clear it up.
- Sometimes, I may add additional tips to the answer key that didn't really fit with the lesson text. If you don't read it, you'll miss out.

Since reviewing the answers is an important part of learning, be sure to check the answer key every day.

Finally, save all of your graded tests in a special section of your notebook. They will come in handy when you are reviewing for the final!

Day 2: Pie Are Square

Pies are square, at least sometimes. I like to make cobbler or fruit crisp in a square glass pan. Last Thanksgiving, I made a pumpkin pie in my square pan.



By now, though, you must have figured out that my title, “Pie are square,” has more to do with the formula written *on* this pie. That formula relates to something more *round* than *square*. Now that you know, allow me to correct the spelling:

Pi R Squared

This week’s lessons will be devoted to untangling what that means. You’ve known what a circle is since Preschool, but mathematicians have an exact description.

Definitions:

A **circle** contains all points equally distant from another point, the center, in a two-dimensional plane.

A **point** is a location in space.

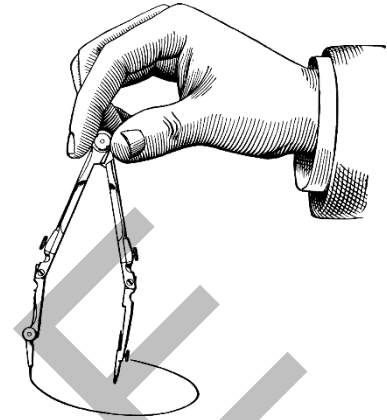
A **plane** is a completely flat surface, like a piece of paper or a table top.

A **radius** is the distance from the center of a circle to its edge.

Assignment

1. Take out your compass and a piece of paper and follow along.

- Pick a point, any point, in the center of the paper. Mark it with a dot.
- Hold the sharp end of the compass on that point.
- Place the pencil end of the compass on the paper.
- Turn the compass, dragging the pencil around in a circle,
- Or, hold the compass still and turn the paper underneath it.



Do you see how that could be done with a piece of string instead? Try tying one end of the string to a paper clip and the other end to a pencil. Practice drawing a few circles each way.

2. Using your ruler, measure the radius of each circle and write the measurement on each drawing. Be sure to include inches (in) or centimeters (cm) in your answer.

3. Some Geometry books teach all the definitions at once, in a single chapter. Boring! Instead, I'm going to have you keep a running tab of our definitions and important points as we go along. Every day or so, you'll be adding to your list.

Today, download the PDF titled "Geometry Notes" and fill in the definitions of a circle, point, plane, and radius on the "Definitions" page.

4. We've introduced an important formula in this lesson:

The Area of a Circle equals Pi R Squared.

That's way too long to write down. We're going to use some "Mathese." (I told you that math is a language, so let's just agree to call it by a new name: Mathese.)

For Area, we always use the abbreviation A . For radii (the plural of radius), we always use the abbreviation r .

Abbreviate that formula this way, but say the bold-text words above as you write.

Formula:

$$A_{(Circle)} = \pi r^2$$

Congratulations! You just translated your first sentence of Mathese! Copy it onto the "Geometry Notes" PDF on the corresponding line of the "Shape Formulas" page (page 5).