


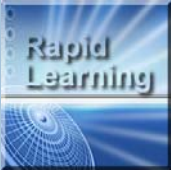
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Rapid Learning Center Presenting ...

Teach Yourself
Geometry Visually in 24 Hours




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 **Introduction to
Geometry**

Rapid Learning Tutorial Series

Wayne Huang, Ph.D.
Theresa Johnson, M.S.
Ingrid Huisman, M.Ed.
Wendy Perry, M.S.
Adel Arshaghi, M.S.

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Learning Objectives

By completing this tutorial, you will learn:

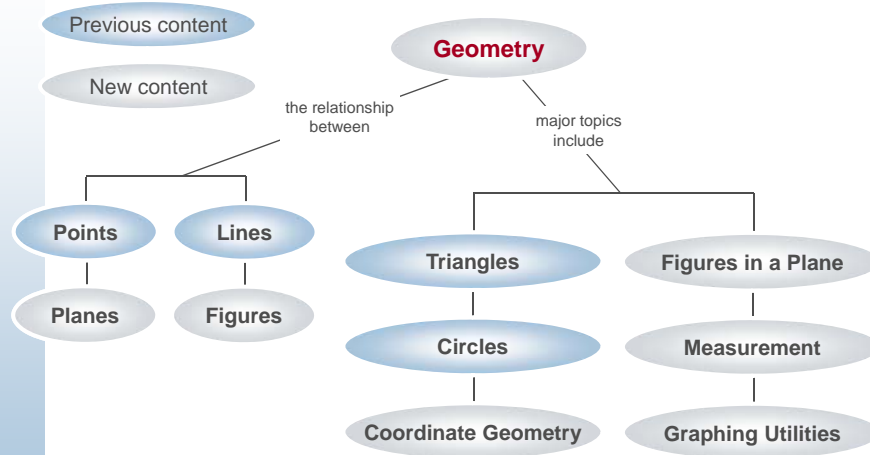


- Definition of geometry
- Topics covered in geometry
- Basic skills for learning geometry
- Study tips and exam tips

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Introduction to Geometry Concept Map



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Definition of Geometry



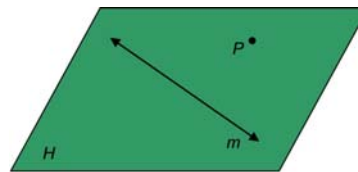
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Definition: Geometry

Geometry (jee-om-i-tree) – *n.*

The branch of mathematics concerned with the properties of and relationships between points, lines, planes, and figures.



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Origins of Geometry – 1

The earliest records of geometry can be traced to ancient Egypt and the Indus Valley from around 3000 BC.

Early geometry was a collection of observed principles concerning lengths, angles, areas, and volumes. These principles were developed to meet practical needs in construction, astronomy, and other fields.



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Origins of Geometry – 2

Euclid, a Greek mathematician, wrote The Elements of Geometry. It is considered one of the most important early texts on geometry.



He presented geometry in a practical form known as Euclidean geometry. Euclid's was not the first elementary geometry textbook, but the others fell into disuse and were lost.

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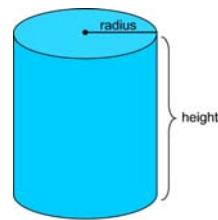
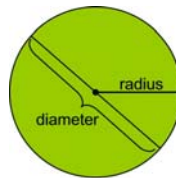
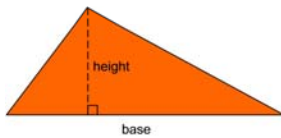




Geometry Accomplishments

Notable accomplishments of geometry include:

- Formulas for area, circumference, and volume
- Pythagorean theorem
- Emergence of trigonometry from astronomy



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Topics in Geometry



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Geometry Topics

The topics covered in a geometry course include:

- Points, Lines, and Planes
- Triangles
- Figures in the Plane
- Circles and Measurement
- Coordinate Geometry
- Basic Skills & Graphing Utilities



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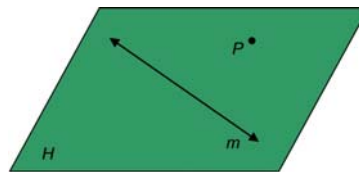


Points, Lines, and Planes - 1

Point – the result of the intersection of two lines; represented by a dot.

Line – a figure formed by connecting two points and extending beyond each point in both directions; represented with arrows on each end.

Plane – a flat surface that extends indefinitely in all directions; represented by a parallelogram.



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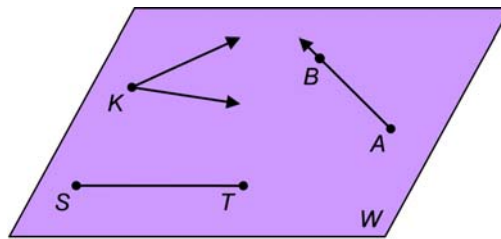


Points, Lines, and Planes - 2

Segment – part of a line consisting of two endpoints and all the points between them.

Ray – part of a line starting at a point and extending infinitely in one direction.

Angle – a figure consisting of two rays with a common endpoint.



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Points, Lines, and Planes - 3

Properties of geometric figures can be proved using one of the following:

Inductive reasoning – uses patterns of evidence to make a plausible prediction.

Deductive reasoning – uses facts and rules to reach a logical conclusion.



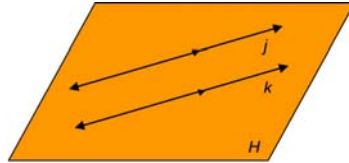
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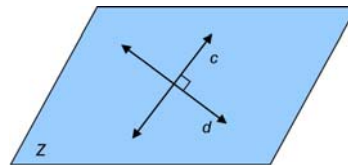


Points, Lines, and Planes - 4

Parallel lines – lines in the same plane that do not intersect.



Perpendicular lines – two lines that intersect to form a right angle.



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Triangles - 1

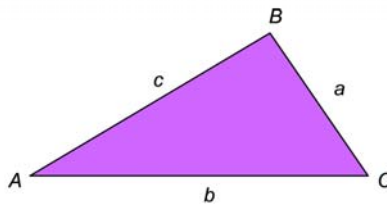
Triangle – a polygon with three sides.

Triangle Inequality

$$a + b > c \quad a + c > b \quad b + c > a$$

Angle Sum Theorem

$$m\angle A + m\angle B + m\angle C = 180^\circ$$



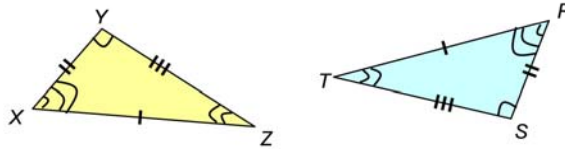
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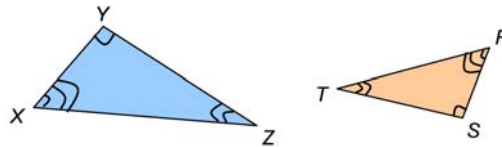


Triangles - 2

Congruent Triangles – triangles that have corresponding parts that have the same measure.



Similar Triangles – triangles that have congruent corresponding angles and the measures of corresponding sides are proportional.



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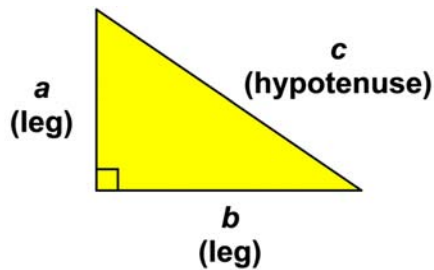


Figures in the Plane - 1

Right triangle – a triangle with a right angle.

Pythagorean Theorem

$$a^2 + b^2 = c^2$$



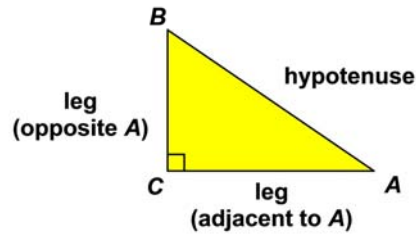
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Figures in the Plane - 2

Trigonometric ratio – a ratio of the lengths of sides of a right triangle.



$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos A = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan A = \frac{\text{opposite}}{\text{adjacent}}$$

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Figures in the Plane - 3

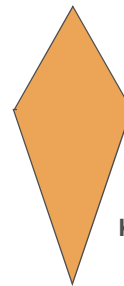
Quadrilateral – a polygon with four sides.



Parallelogram



Trapezoid



Kite

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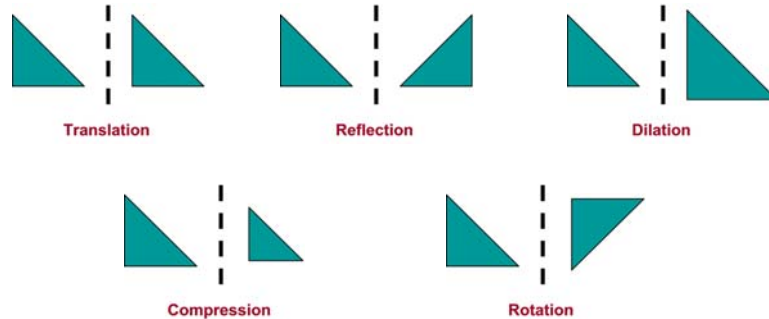




Figures in the Plane - 4

Transformation – a point by point mapping of a figure in a plane.

The standard transformations include:

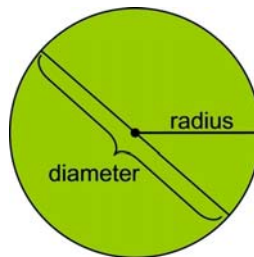


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Circles and Measurement - 1

Circle – a set of points that are a fixed distance from a given point, known as the center.



Radius – a segment whose endpoints are the center of a circle and a point on that circle.

Diameter – a segment through the center of a circle whose endpoints are on that circle.

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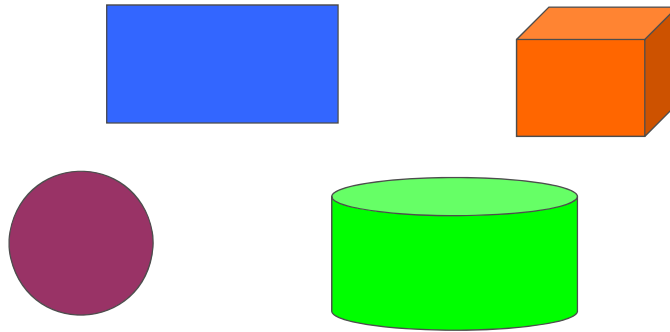




Circles and Measurement - 2

The formulas used to find area, surface area, and volume differ with each geometric figure.

A basic rule is that we find the **area** of **2D** shapes and we find the **volume** of **3D** solids.



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Coordinate Geometry

Coordinate geometry is the study of figures using the coordinate plane.

Commonly used formulas include the **distance** formula, **midpoint** formula, and the formula for the area of a convex polygon.



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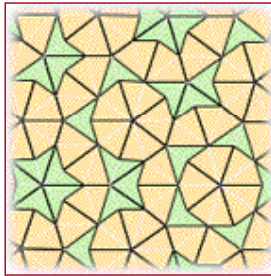




Basic Skills in Geometry

The final unit of the course covers problem solving skills and graphing utilities in geometry.

Software programs like The Geometer's Sketchpad® can help students create more computerized constructions.



Created with The Geometer's Sketchpad®.

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Geometry Skills and Tips



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Required Skills

The basic skills needed for learning geometry are:

- The ability to accurately measure using a ruler, compass, and protractor.
- The ability to construct geometric figures using a ruler, compass, and protractor.
- Understand the vocabulary, theorems, and postulates presented in the course.



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Study Tips – 1

To help while studying geometry:

- Create vocabulary flash cards that include a drawing along with the definition.
- Verbalize each definition and property.
- Study your notes and graded assignments. Redo any problems marked wrong.
- Find a study buddy or group.



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Study Tips – 2

To help while studying geometry:

- Connect new topics to things you already know.
- Be persistent.
- Keep practicing. You will get better at solving problems through continued practice.
- Believe in yourself. Keep trying and eventually you'll get it!



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Exam Tips – 1

Keep the following in mind while preparing for an exam:

- Practice problems with radicals and perfect squares.
- All lines are straight, unless otherwise stated.
- Apply what you know about shapes and not what you see in a diagram.
- If you can find the value for any one of the following in a circle, you can find the rest:
 - radius, diameter, area, and circumference



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Exam Tips – 2

Keep the following in mind while preparing for an exam:

- Arrive early, and be prepared.
- Listen and read instructions carefully.
- Do a “memory dump”.
- Use your time wisely.
- Answer questions thoroughly.



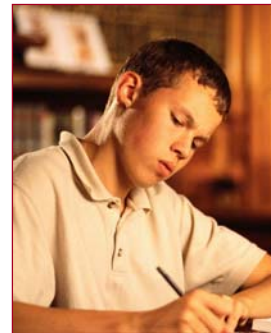
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Exam Tips – 3

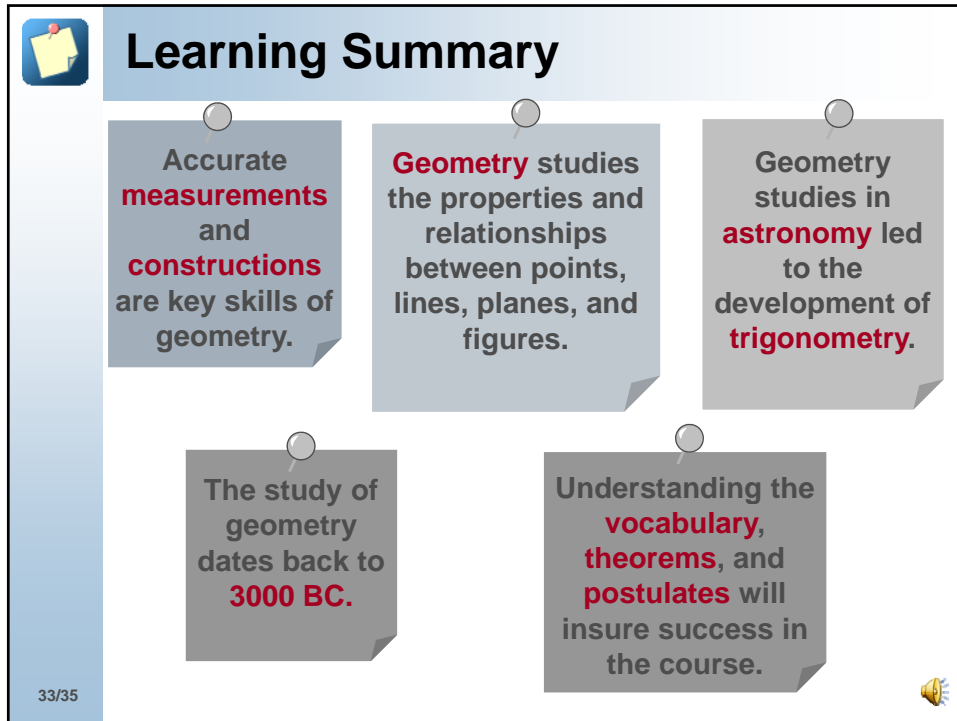
Keep the following in mind while preparing for an exam:

- Familiarize yourself with the required calculator (if allowed).
- Check that each answer makes sense.
- Show your work step by step for maximum credit.
- Answer the easier questions first; save harder questions for later.
- Double check all of your work, numerically and graphically.



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Learning Summary

Accurate **measurements** and **constructions** are key skills of geometry.

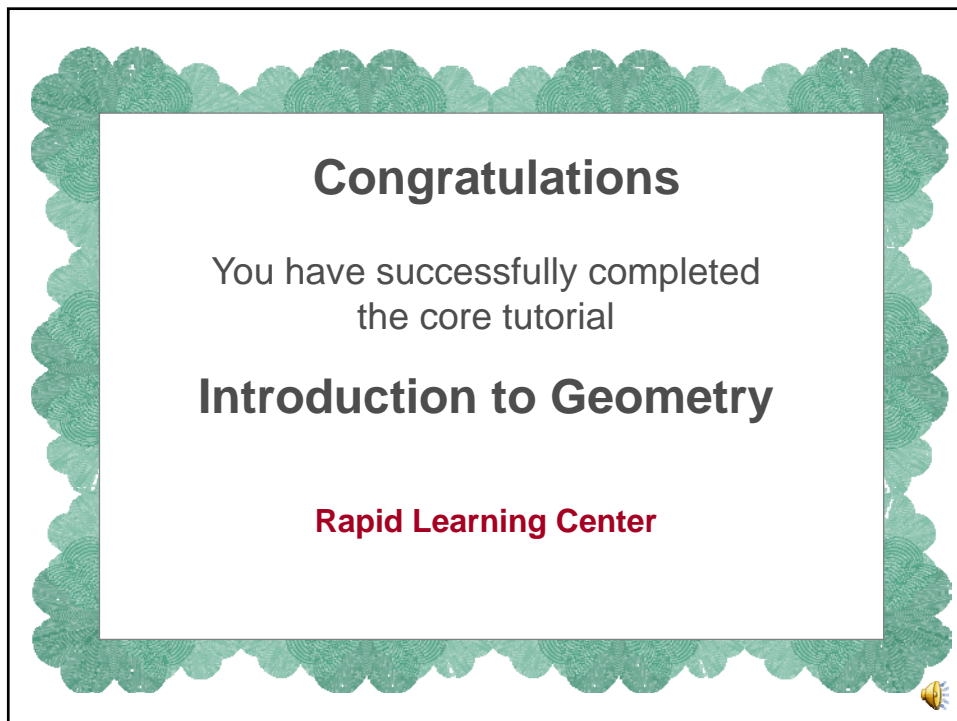
Geometry studies the properties and relationships between points, lines, planes, and figures.

Geometry studies in **astronomy** led to the development of **trigonometry**.

The study of geometry dates back to **3000 BC**.

Understanding the **vocabulary**, **theorems**, and **postulates** will insure success in the course.

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Congratulations

You have successfully completed
the core tutorial

Introduction to Geometry

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What's Next ...

Step 1: Concepts – Core Tutorial (Just Completed)
→ Step 2: Practice – Interactive Problem Drill
Step 3: Recap – Super Review Cheat Sheet

Go for it!



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