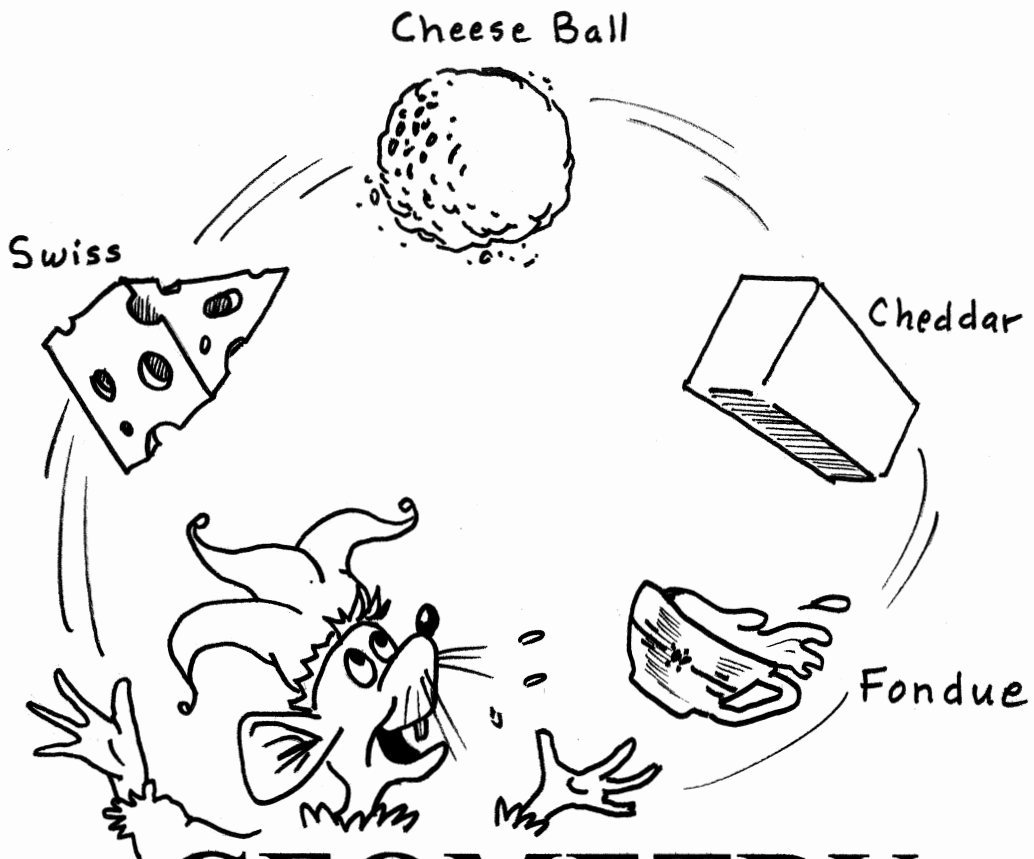


# SECTION 9



# GEOMETRY

## **Introduction to GEOMETRY**

Do you ever get confused when you see or read the words "geology", "geography," and "geometry"? Each of these words have the same beginning --"geo"--which comes from the Latin letters "ge", meaning "the earth." Maybe even the name "George" means somebody who is "down to earth!" The "metry" in geo-metry--means "measure."

**Geometry** is the mathematical study of the shapes of things on the earth and their relationships to each other.

You may not know it, but you studied geometry since you were a baby! You may have had a "mobile" above your crib with various shapes, colors and sizes dancing around to stimulate your eyesight. Later on, you probably played with blocks and rolled balls. Then, as you began to learn about the world around you, you may have looked at pictures of the earth's sphere and made trains with boxes of different sizes and shapes. Even when you put a lid on a jar you are connecting two cylinders together. All these "hands-on" experiences were teaching you about geometry--"The study of the shapes of things on the earth and their relationships to each other!"

So who needs geometry anyway? Is it just for play? Well, here are some people who use geometry in their jobs every day:

Architects	Geologists
Artists	Astronomists
Home interior designers	Inventors
Surveyors of land	Scientists in all fields
Chemists	Mechanics
Students of Physics	Smart students like you

You could probably think of other kinds of jobs which require geometry. But for now, let's have some fun on our own. You can keep in "shape" with your math skills by going through this section. And nobody will ever call you a "square."

**Let's get started!**

## NOTES on "Plane Figures"

The word "plane" has different meanings. The most familiar is perhaps the air-plane. It was named that, because actually, the airplane is a flat surface flying through the air!

Another word sounds like "plane" but is spelled differently. This word is "plain". Plain can mean a vast meadow or long stretch of land. Your history book may have a picture of a long line of wagons jolting across a large valley or desert. Under the picture, it may state, "The Pioneers Crossing the Plains." (One young boy heard about that, and imagined the pioneers walking across the tops of airplane wings! He couldn't figure out how the pioneers did that!)

Another meaning of "plain" is when something is blank--like a "plain" piece of paper.

One more meaning is someone who is not very handsome or pretty. You may have read in books about a person who was "quite plain" in looks and dress.

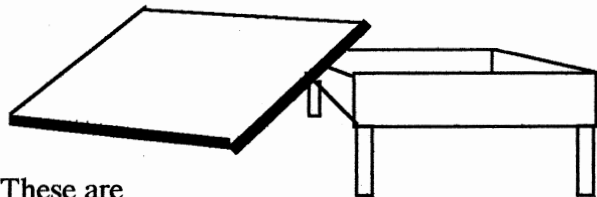
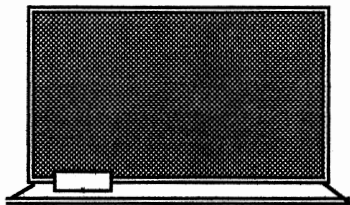
But now let's learn about the "Plane Figures" of geometry!

### PRINCIPLE #1

**IN GEOMETRY, ANY  
FLAT SURFACE IS  
CALLED  
A "PLANE."**

### EXAMPLE

A **plane** can be the floor, a table top or chalkboard.



These are  
"plane figures."

### Learning Exercise

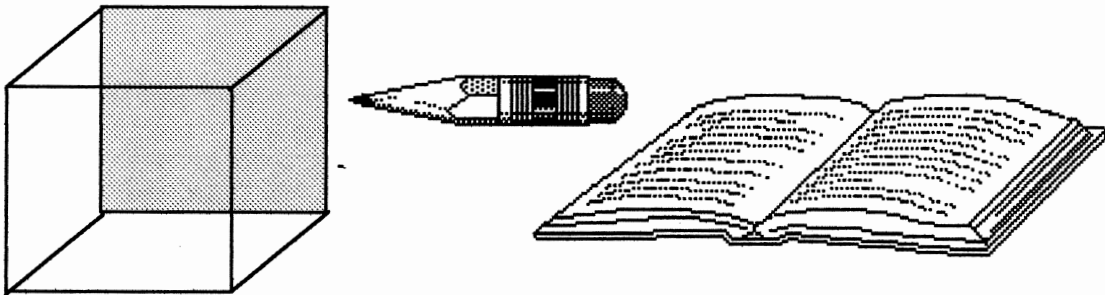
Find four objects in the room which are "plane figures."  
Write them down, and then draw one of them.

**PRINCIPLE #2**

**GEOMETRY CAN WORK  
WITHIN AN AREA  
CALLED "SPACE",  
WHICH MAY EXTEND IN  
ANY DIRECTION, AND IS  
REFERRED TO AS A  
"SOLID."**

**EXAMPLE**

A solid is anything which takes up space--such as a box, a pencil, or a book.  
Each of these are made up of various geometrical shapes.



**Learning Exercise**

List 10 objects in the room which are considered to be  
geometric "solids." Draw two of them.

**PRINCIPLE #3**

**A LINE EXTENDS  
INDEFINITELY  
IN TWO DIRECTIONS IN  
A PLANE, AND HAS NO  
PARTICULAR WIDTH.**

**EXAMPLE OF A BASIC GEOMETRIC LINE**



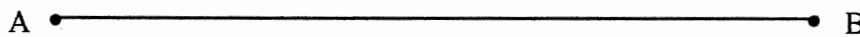
**Learning Exercise**

Draw five lines of different lengths,  
extending in different directions.

**PRINCIPLE #4**

**A PART OF A LINE  
WHICH HAS TWO "END  
POINTS" IS CALLED A  
LINE SEGMENT.**

**EXAMPLE OF A GEOMETRIC LINE SEGMENT**



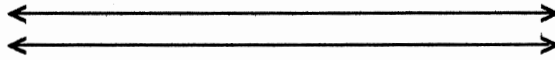
**Learning Exercise**

Draw five line segments of different lengths,  
extending in different directions.  
Label each segment end as "A" or "B".

**PRINCIPLE #5**

**LINES WHICH NEVER  
MEET ARE CALLED  
"PARALLEL LINES."**

**EXAMPLE OF PARALLEL LINES**



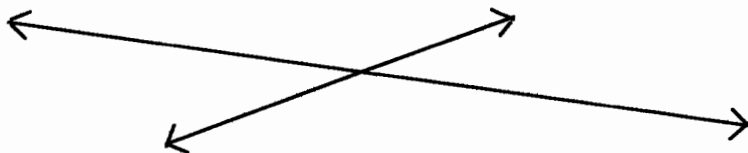
**Learning Exercise**

Find ten sets of "parallel lines" in the room.  
Draw one object which has parallel lines.

**PRINCIPLE #6**

**LINES WHICH CROSS  
EACH OTHER ARE  
CALLED  
"INTERSECTING LINES."**

**EXAMPLE OF INTERSECTING LINES**



**Learning Exercise**

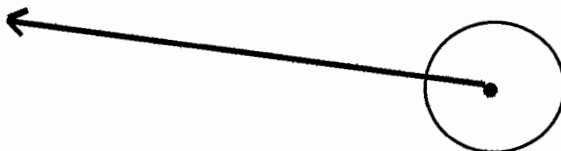
Find five objects in the room which have intersecting lines.  
Draw a sharpened pencil. Extend the intersecting lines at the point  
of the pencil, showing how they form the pencil point  
where the two lines meet.



**PRINCIPLE #7**

**A LINE WHICH STARTS  
AT A CERTAIN POINT  
AND EXTENDS  
INDEFINITELY IN ONE  
DIRECTION IS CALLED A  
"RAY."**

**EXAMPLE OF A RAY**



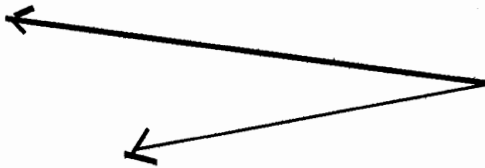
**Learning Exercise**

Draw a circle. Make a dot in the center of the circle.  
With a ruler, make "rays" on the outside of the circle,  
measuring from the dot in the center.  
Put a smily face on your circle!

**PRINCIPLE #8**

**WHEN TWO RAYS START  
FROM THE SAME POINT,  
AN ANGLE IS FORMED.**

**EXAMPLE OF AN ANGLE**



**Learning Exercise**

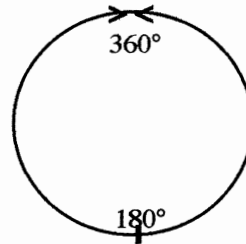
Draw three different objects which have at least one angle.

**PRINCIPLE #9**

**AN ANGLE IS MEASURED  
IN DEGREES, AND THE  
SYMBOL FOR  
"DEGREE" IS: °**

**EXAMPLE**

One complete revolution  
is three hundred sixty  
degrees--(written like this:  $360^\circ$ ).  
Half-way around is  $180^\circ$ .

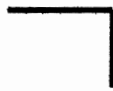


**Learning Exercise:**

- Write three sentences using the symbol for degrees.
- Draw a half-circle showing the degrees.
- Draw  $\frac{1}{4}$  of a circle and show the degrees.

**PRINCIPLE #10**

**A 90° ANGLE IS CALLED  
A RIGHT ANGLE,  
AND THE SYMBOL  
REPRESENTING A  
RIGHT ANGLE IS :**



**EXAMPLE**

$\frac{1}{4}$  of a circle forms a right angle and is ninety degrees ( $90^\circ$ ).



**Learning Exercise**

Find ten places in the room which have "right angles."  
Draw the outside walls of the room you are in,  
as if you were looking down from the top.