RAPID VIZ
A New Method for the Rapid Visualization of Ideas

Hanks and Belliston

WILLIAM KAUFMANN, INC.
"...the learning to visualize of two inseparable images, one on a sheet of paper and the other on the back of your mind."
This is the kind of drawing we are.
Learning to use pen and paper had thus revealed talents I didn't know I had. Not the great talents of a fine artist that you might expect, but the important, practical ability to visualize. I gained the ability to picture something mentally, then quickly convert those thoughts into visual reality on a piece of paper. I could nail my ideas down on a sheet of paper.

I realized that converting these ideas had to be a rapid process taking a minimum amount of time, trouble, and work. An idea is a very delicate or fleeting thing and if it is not quickly crystalized into reality it just slips away never to be found again. A rapid conversion from thought to paper is critical.

I found myself asking the question, "Can this new-found skill be taught to others?" "And can it be done without all the hassle, redundancy, and expense I had gone through in my own education?" As so often happens in life, I found myself eating all those bad words I said about teachers: I became a teacher. In a classroom situation I began to challenge students to learn the kind of drawing that had become such a valuable asset in my life.

For the next couple of years, we (it was always a group effort) evolved a method that worked. The students helped me reduce drawing to the essentials. We developed not a fine art type of drawing, but a simplified approach that people can use for thinking, learning, and communicating.

This book is an outgrowth of classroom teaching. By trial and error we discovered the best teaching approach. I hope that you, too, will gain by the experience many students went through to develop this condensed teaching approach.

About This Book
Some of the objectives and guidelines used to develop this book were:

1. Produce a practical workbook to help individuals visualize their thoughts.
2. Use examples and exercises that have been tried by students.
3. Use tools, technology and definitions that relate to a student's understanding.
4. Design the content of the book for people and students in architecture, landscape architecture, engineering, industrial design, interior design, and for students and other practitioners of many basic sciences and arts in which visualization is vital.
5. Emphasize speed in mastering actions and concepts, reducing time, effort, and cost of learning.
6. Use materials and equipment that are easily attainable and economical.
7. Structure the information from simple to complex, from concrete to abstract, from general to specific.
8. Apply visualization to real-life situations whenever possible.
9. Have students learn by doing. (Although visualization is more a mental process than a physical one, the mental process is learned by actually doing.)
10. Provide positive reinforcement to the student to prove that he can draw and visualize his own ideas.

Earlier Education Sometimes Hampers Our Thinking

Through my teaching, I found that often the less you know about drawing the better off you will be in learning to visualize. The less you know, the fewer the preconceived ideas you have about drawing and visualizing. You don't have to unlearn things. I can remember one class in particular where I had two separate groups. One group was made up of architecture and landscape architecture students who had had what amounted to a lot of previous drawing experience. The other group was made up of beginning interior design students who had no experience—they had no idea even what a "T square" was. At first the experienced...
I do not think that we have begun to understand the surface of thinking in this study. I do not think that we have begun to understand the surface of thinking in this study. I do not think that we have begun to understand the surface of thinking in this study.

Visualization is the key to understanding. Visualization is the key to understanding. Visualization is the key to understanding.

The brain is like a muscle that must be used. The brain is like a muscle that must be used. The brain is like a muscle that must be used.

The hand is like a muscle that must be used. The hand is like a muscle that must be used. The hand is like a muscle that must be used.

The eye is like a muscle that must be used. The eye is like a muscle that must be used. The eye is like a muscle that must be used.

The drawing cycle.

Getting the Most Out of This Book
Another Way of Learning

There are at least two ways of learning and knowing something. One way is the usual way taught in the educational system—the 3 r’s of reading, writing, and arithmetic. With this method you read something, you memorize it, and you are supposed to be able to recall what you learned.

There are also other ways to learn and know something. One way involves the "I feel" method. You know something because you feel it.

Drawing is more the feeling or intuitive kind of learning and knowing than it is the sequential, rote memorization kind of learning. Drawing leans very much toward the holistic or intuitive side of the brain.

An example of "feeling" learning is when I learned to shoot a rifle at targets thrown into the air. As a youngster I took pride in my ability to shoot accurately. One day a friend and I went shooting together—he outclassed me terribly. He was a magnificent shot. And I wanted to be at least as good a shot as he was.

I had heard about a method of shooting wherein you shot from the hip without taking aim. You aimed by "feel" rather than by looking down the sights of the gun. So I set out to learn this "feeling" method of shooting.

Another person would throw items into the air and I would shoot from the hip. It’s like pointing your finger—you don’t need to look down your finger to know that you are pointing in the right direction. As I became able to hit the thrown targets, I progressed to shooting them from a greater distance. Then I progressed to smaller and smaller targets until I became very proficient at shooting moving targets in the air.

I became a very good shot eventually by "feel." You may assume that the best way to learn to shoot is by looking down the sights of a gun. But know that I became a better shot by "feeling" than by the logical, traditional method. And my friend even improved his magnificent shooting ability by adopting the "feeling" method I had learned.

Intuition vs. Logic

Another example of relying on "feelings" or "intuition" is speed reading. Conventional reading experts will tell you that it’s impossible to read a book in 10 minutes and comprehend what you read. But some speed readers do it all the time and have better comprehension than regular slower readers have.

What's their secret? They "feel" what they read. They give you correct answers because they "feel" the answers are right. They don’t rely on logic and sequence to recall what they read. Speed readers utilize the visual, intuitive, holistic half of the brain.

Visualization is to drawing as shooting by feeling is to shooting by the sight method. Visualization is to drawing as speed reading is to conventional reading.

Let me describe how it works in drawing. You know what perspective drawing is—that's where you draw things in three dimensions, giving the appearance of distance and volume. The conventional method is a laborious method of connecting lines and projecting images. It is an elaborate method of drawing that is difficult to understand, more difficult to
Rapid Visualization

In the title of the section, it says, "Rapid Visualization". The text below discusses the benefits of using the rapid visualization method. The method involves creating visual representations of information to aid in understanding and retention. The text explains that difficult to learn concepts are more easily grasped when presented visually. The rapid visualization method is effective for breaking down complex ideas into simpler, more digestible parts. It encourages students to think critically and creatively, enhancing their learning experience.

Principles: Provide sufficient tools for understanding.

Principles don't leave us bare without tools.

Subject: Provide sufficient tools for understanding.

Principles don't leave us bare without tools.

Teacher: Provide sufficient tools for understanding.

Principles don't leave us bare without tools.
But it won’t be without effort or without error. You’re going to make mistakes. That’s part of the program. You learn from mistakes as well as from successes. You must try to push beyond your limits. I’m going to give you exercises to do that are impossible to do within the time allotted. You will learn and grow from trying, not from completing the exercise.

Play

Play. That’s another important part of pushing yourself. This is all one big game to have fun at. And when you win, the rewards will be better than you may imagine.

Little children gain confidence in their ability to cope with life by role playing. "Let’s play house; you be the father, I’ll be the mother, and little Susie will be the baby." You need to play withrapid viz to gain confidence.

If you take things too seriously it will be self defeating. Don’t worry about how well you’re doing, just do it.

Don’t look at your drawings and get discouraged. Don’t meticulously try to fix things. If you’re like most people you will get discouraged and question your own ability. Don’t. Remember, have fun at it!

Drawing is important to mind expansion. You can’t really develop that other half of your mind without some activity like drawing to get things going. But you should feel open and confident and that comes from play. Nobody should laugh at your first funny, crummy, lousy little drawings more than you do. Don’t be afraid to goof-up.

To sum it up—principles will help you travel light and travel quick; and in order to grow you will need to be pushed beyond your abilities so go do it! Have fun and don’t worry about your failings.
Two separate points of view

Logical

Verbal

Sequential

Another language and way of thinking

visual

Holistic

Intuitive

One language and way of thinking

I thought it was this, only it was similar between being and being, but it wasn’t really phrasing such as “It felt like...” “It was

The Biprogual

Mind

Words help us organize and store

water, or eating within the words food,

swimming (not think of the words pool and

so on, then the doctor diagnoses

through language uses a viewpoint on reality and

can sometimes exist without words in reality

to揭开 it—and it becomes something real—

can something exist without words to reality

in

words. He tells his mother when he’s

hungry—or real. In use within pain. But

words. He tells his mother when he’s

possible a baby feels about it. Without

two

language without language—mother may check the new

without language—mother may check the new

words. He tells his mother when he’s
no language existed to convey the experience of flying to others? Aviation would never have progressed to the Wright brothers’ prototype—or beyond.

So language is vital. But, if one language is good, aren’t two languages better? A second language enables us to better express ourselves. A few examples: we call that white stuff which precipitates from the heavens in the winter snow. Sometimes it’s so heavy and wet that just shoveling a path to the front door requires a herculean effort. Sometimes it’s so light and fluffy that you can’t resist the urge to romp and play. Here are two quite different substances—only one name, snow. But the Eskimos’ language has about fifty different terms for what we call snow. Similarly, the Arabs have dozens of words for plain old sand. If we knew a second language, we might not be handicapped by a limited set of words.

A Second Language

A second language also might increase our perceptions of the world around us. If you visit a foreign city where you do not know the language, how much of that city can you actually perceive without being able to read the billboards, the shop names, the window signs? If you were in Spain, for example, you might be able to identify a factory by its exterior, but without knowing Spanish, the sign Muebles hanging on the outside wouldn’t clue you in to the fact that they are manufacturing furniture inside. A second language expands our perceptions, thus increasing our experience and our knowledge.

When we speak of a second language, French, German, Spanish, or some other foreign tongue automatically comes to mind. In this book we’re going to learn another language, a second language, but one that has no nouns, verbs, adjectives or adverbs. Like a foreign language, it will enable you to better express yourself and to increase your perceptions of the world around you. It’s a language of the mind.

Two Minds in One

Our mind is a fascinating instrument. The brain actually has two distinct and separate halves. The left half controls the right side of your body, and vice versa. Each half of your brain also controls different skills and abilities. The left hemisphere is probably your analytical half. It is concerned with order, logic, and reason. It controls your verbal and written skills. The right hemisphere is primarily responsible for your visual thinking. It enables you to recognize faces and objects. Intuition, fantasy, creativity are controlled by this half of the brain. A typical education develops primarily the analytical skills—reading, writing, and arithmetic—the left half. The visual-thinking hemisphere assumes a subordinate role and is seldom if ever developed to its full potential.

A second language, the language of the brain, is initially taught in preschool and kindergarten years. Parents and teachers are continually giving children crayons and paper—not with the goal of teaching them visual expression, unfortunately, but to keep them out of mischief. Painting and drawing are considered by many to be frivolous activities, and the educational process soon replaces them with more scientific, literary learning. The visual language is underutilized, neglected, and eventually lost.

But which language, verbal or visual, is actually the basic or primary language of the mind? Early man didn’t leave behind cave dwellings adorned with vocabulary words and mathematical formulas. He used pictures to communicate how he lived. Before children are taught the verbal tools for self-expression they intrinsically know how to use scissors, crayons and paper to reflect their perceptions of the world.

Develop Another Language—
A Visual Language

The purpose of this book is to help you learn that second language of visual expression. Does the world really need it? Here are some examples. You decide.

Example 1

An airline serves five northeastern cities within a twelve-hour period—Concord, New Hampshire; Albany, New York; Danbury, Connecticut; Elmira, New York; and Boston, Massachusetts. Their flights run from Boston to Concord, Danbury to Concord, Albany to Boston, Concord to Elmira, Albany to Elmira, Concord to Danbury, Boston to Albany, Concord to Albany. What is the shortest way to make a round trip from Albany to Danbury?
with mindfulness. So let’s begin now to expand your visual awareness of thinking. Communicating from your mental capacity, where is your mind forever being updated and fed by the unconscious—the unconscious of the mind.

Regardless of your profession, age, intellect, or your working knowledge of the body, you’ve seen the stuffing of the heart and who has a heart. You’ve seen how a doctor reads a chart quickly. When the doctor reads a header, what does the doctor who reads the chart quickly mean while verbally describe a medical chart or chart? When you a doctor who has memorized the parts of the body from study, who reads the chart quickly? When the doctor would you rather have operate on you?

Summary

A well-crafted document will become a defining document. When you create a defining document, you can imagine the complexity of those who pay the simple diagram shown. Economical way to communicate this pattern—A rapid eye diagram is the most effective communication method

Example 2

Example 2

The solution is still not readily apparent. Now, by a different approach:

Danbury to Concord
Concord to Britain
Concord to Derby
Concord to Albany
Boston to Concord
Albany to Clinton
Albany to Boston

one. appropriate

A verbal approach would require establishing
A frightening thing awaits you. It has made strong men cry and sent women fleeing from its very presence. It is a blank piece of paper. What are you going to do with it? What threat lies beyond its snowy white innocence? You are going to have to make a mark on it—you are about to violate its purity. Can you do it? Of course you can.

First you will need materials. You can play the game that some illustrators/designers play, which is to buy the “very best” special made guaranteed for 40 years or 40,000 miles writing pen; or you can buy a simple felt tip pen. I recommend the simple pen that’s cheap, easy to use, and always there when you need it. For now get any pen or pencil you can find. We’ll have none of this “I can’t go on with the work because my special order pen has not arrived from Walla Walla.”

Use whatever you want as long as it’s simple, cheap, and you can carry it in your pocket or purse at all times. Don’t be one of those designers who is crippled without special drawing tools.

The kind of pen I prefer is a simple felt tip pen with a flexible point. Flair, EG, and Pentel (to name a few) make the inexpensive pens that I like. The only really important thing to me is that the point be able to draw thick lines when I press down firmly or thin lines when I use a light touch. Ball point pens don’t allow this flexibility.

You may decide upon a pencil. I like drawing with pencils but prefer that you begin with a pen. With a pencil you can easily erase and fix up rapid drawings. You should be learning to do rapid drawings correctly the first time, not learning to fix up drawings. A pencil causes many people to become “fix up” artists. You need to be committed—once the pen makes a mark the deed is done. So, for now, use a pen; save the pencil for later.

When it comes time for the pencil, what pencil should you buy? Pencils are rated 6H (hard) to 6B (soft). If you like to scratch your message in the surface with a nail, then 6H is your pencil. If you are a real soft touch, then 6B is the one for you. For me, 2H feels right—not too hard, not too soft.

And Everyone Makes Mistakes

Also, you may want an eraser, in spite of my earlier remarks about erasing. To erase pen lines drawn with a felt tip pen, I wet the end of a pencil eraser. To erase pencil lines I use a kneaded eraser.

You may want to keep a ruler handy as well as a variety of colors of felt tip pens. I find it fun to draw in black then use some other color to add emphasis. The second color is my way of doodling with a drawing. You won’t need other colors or a straight edge, but then again you may find them fun.

Many people have the tendency to load themselves down with tools they cannot afford, cannot easily use, and don’t really need.
1. Line drawing is a quick way to visualize ideas with a minimum use of time and effort.

2. The drawing is the essential way to see what you get. Easier to use and faster expression.

3. The drawing is the essential way to see what you get. Easier to use and faster expression.

4. Line drawing emphasizes the basic structure and foundation of the image.

5. Line drawing emphasizes the basic structure and foundation of the image.

6. Line is easy to reproduce on copy and blueprint machines.

The ultimate goal is to have the tools and techniques at hand with which you can draw a line. Line is the spine of the pen tip to the paper. It is the line of the pen point. Laid flat and down, pen—lines and thin lines. By differentiating, you can and should.

Now you have the necessary tools. You are ready. It's time to begin. The next page has the blueprint machines.

The line drawing is a quick way to visualize ideas with a minimum use of time and effort. The drawing is the essential way to see what you get. Easier to use and faster expression.
Look Close

All of the drawings on this page were done with a single pen. Thick lines, thin lines, dark lines, light lines, crisp lines, and fuzzy lines are all a product of one single pen. You need to learn to control your pen to be able to extract the variety of lines shown here. Finish filling the page with heads.
Exercise:

Check the box as you complete each step. You may make something from your doodle. If you are unable to complete the exercise, recognize your difficulty. It is likely that your doodlings are thinking. Just be sure that your doodlings are thinking. Quickly or slowly, the exercise is to teach visual thinking. The exercise is not an important desire. Quantity of doodling is not an important desire.

Below are some other doodlings. You may use:

- a: Ah, I'm thinking about a square.
- b: Just before Christmas, I started a new job.
- c: I'm thinking about a cube.
- d: In an attempt to get your mind in the groove of visual thinking, I've looked at your squares above. I'll tell you what the squares represent so that you get a purpose for drawing

To make something from the doodle, please:

- a: Draw a square.
- b: Draw a circle.
- c: Draw a triangle.
- d: Draw a rectangle.

Visual Thinking Games

A. Make a doodle. Then, in an attempt to get your mind in the groove of visual thinking, I've looked at your squares above. I'll tell you what the squares represent so that you get a purpose for drawing.

Visual Thinking

You may make something from your doodle. Please:

- a: Draw a square.
- b: Draw a circle.
- c: Draw a triangle.
- d: Draw a rectangle.
Getting the Picture

Most all of us have, at one time or another, played the game of guessing what we see in cloud formations. The fluffy clouds indicate images to our mind. This next visual game is very similar to that.

☐ Shown are a bunch of squiggly lines. A series of sentences describe the lines. You match the sentence with the squiggle. Note: in some instances it isn't necessary that you see a distinct image in the lines, you might just get a certain "feel" that says to your visual mind what the sentence says.

a.  

b.  

c.  

d.  

e.  

–He had learned the amazing ability from his brother’s dog.

–After laboring for weeks she was ready for the unveiling.

–The weird Gople stomped down main street consuming everything in its path.

–How long it had been there was impossible to determine.

–61-year-old Maude hadn't ever been married; indeed, it was doubtful she ever had a suitor.

☐ Make up your own squiggles and sentences to describe what they mean. Remember, there is no single right answer. It is an intuitive exercise.

Key Principles

A number of key statements will help you understand what this book intends to accomplish. Some of the exercises may seem strange, but every exercise has been calculated and tested to be effective in accomplishing a specific purpose. Listed are the goals for the book and the methods that it uses to reach them.

1. The intent of the book is to help you develop your own unique style of visual expression. It is not trying to help you become a master illustrator, just a visual thinker. The exercises take you from copying someone else’s visuals to making your own. As the book progresses, you should develop a style that is comfortable for you.

2. You must push yourself. Becoming better at drawing is similar to other skills in that you must push beyond current capabilities in order to improve. A weight lifter improves by trying to lift heavier pieces. A runner improves by running faster or for longer periods of time. Push your abilities—strive for better work in shorter periods of time.

3. Defer judgment. One of the biggest pitfalls to learning visual skills is the tendency to judge. “My drawings look silly compared to those in the book,” you might say. That’s judging. Don’t judge. Just do the exercises.

4. Humor helps defer judgment. Many artists criticize the cartoons and nonsense drawings in a book like this. The purpose of the humor is to get the student to laugh. If you can laugh at your drawings, it’s easier to defer judgment. Taking things too seriously too early in the learning process discourages some would-be visual thinkers.

5. Set tight parameters. The exercises attempt to restrict your freedom at least for now. Tight restrictions as to what is to be drawn, how long to take, and so forth make drawing easier at first. Do the same for yourself. Set tight goals. Too many choices breed confusion and non-performance. Decide specifically what to do and then do it.

6. Rapid viz is a progressive process. You will learn a little at a time. Go back over things to determine your own improvement. Progress in small steps rather than trying to become proficient in one big step.

7. Learn in sequence. Some things are more easily learned after first learning preparatory skills. Such is the case with many of the rapid viz techniques. Take things in order as much as possible.

8. As you proceed through the book you will be asked to draw things that may not interest you. “Why draw interiors of buildings if I am a landscape architect?” you may ask yourself. The answer is that the techniques you learn are the same no matter what you draw. What you learn by drawing objects different from your area of work or study will be beneficial to you.

9. Keep records of your progress. Check each exercise. Save the drawings that you do. Record the date or sequence you did things in. As you look back over previous work you will be surprised to note the progress.

10. This book is not the ideal teaching medium. A live teacher would be better, but this is a good alternative. The techniques have been tested with live students. Although learning will take effort on your part, the effort expended will be worth the rewards. Learning rapid viz will not only change your drawing habits, it will expand your thinking abilities.

a. a bear climbing a telephone pole
b. the view of the sun through a chuck hole
c. a square peg in a round hole
d. the end of the line
One of the most difficult things for people to learn is to draw in correct perspective. The Box

A box in correct perspective can draw a two-dimensional square correctly. If you can draw an individual like a hand or a box, you can draw a two-dimensional square correctly. The method involves a box of edge. If you have no method that works well, it is easy to learn. In perspective rapid and quickly. I have found a method to teach students to draw correct.

Teachers have struggled for years to teach one simple fact, one of the most difficult things for people to learn is to draw in correct perspective.

Cut out the box.

Quite easy. But if you do, you will find it is really no more the box up or down, you see different views of the box. If you move the box up or down, you see different views of the box. If you move your eye level, the view of the top and bottom of the box changes as you move your eye level.

Your eye level is established and always at the edge of the horizon line. That is called a perspective view. Hold everything very steady. Trace the box on Il.

There are two ways to draw on your clear plastic or a sheet of clear glass and a felt pen. You need a piece of clear glass.

Now, once you have the box together, you need to find a piece of clear glass or box to look at and to draw. So then make your own box. You need this.

One next page is a box to cut out. Cut our

Method

The Box
Cut and Assemble into a Box

☐ Have courage. This is a book to be used; it is a workbook. Cut the book—assemble the box. You will need the box to do other exercises.

Tape sides to assemble your Box.

This is what the assembled box should look like.
position of the cube in relation to your eye.
appear to change shape as you change the
other side. Note how the surfaces of that cube
eye. Hold it below your eye, to one side. To the
cube. Turn it sideways. Hold it above your
cube. Carefully study what happens to the
the lines are exactly vertical; they go straight up or straight down and are parallel one to another. Some of the lines are exactly horizontal; they are parallel across the page. Some lines are perspective lines; they converge at a point on the horizon line.

As you draw the box, the surface that you draw it on is called a picture plane. It is the transparent glass surface. The picture plane is your paper if you are drawing the box on a piece of paper. You draw on paper the same as you trace through glass, but instead of looking through the glass (the picture plane) to draw the box, you hold your paper (the picture plane) in front of you and trace that box.

Two-Point Perspective

A second kind of perspective is called two-point perspective. Turn your cube so that you are looking at an edge of that cube. From that edge the sides of the cube seem to get smaller as they go away from your eye. Both sides get smaller. Both sides seem to vanish at two different points on the horizon line. For this reason, it is called two-point perspective. Two-point perspective means that from a given edge, parallel lines, like the sides of the cube,
Three-point Perspective

1 Kind of Line
Center of Box Appears in Glass
Three-point Perspective

Perspective Lines
Vertical Lines
2 Kinds of Lines
Edge of Box Appears in Glass
Two-Point Perspective

Perspective Lines
Horizontal Lines
3 Kinds of Lines
Side of Box Appears in Glass
One-Point Perspective

The Three Kinds of Perspective

The view of a box of cereal

The photo below is a three-point perspective

a point high above the building. This is three-
point perspective. As you view the building
from a point high above it will appear to be a
triangle. The edges will appear to be parallel.

Building 80 layers away from you. The two parallel
lines of the building cross the edges of the building
and disappear to the sides of the picture plane.
Then lines appear in the corner of the picture.

The third kind of perspective drawing is

Three-Point Perspective
Recognizing a Square in Perspective

You need to develop a critical eye so that you can easily see if a cube is drawn in correct perspective. Below are some lines that are three sides of a square. The fourth side has not been drawn in.

☐ You draw the fourth side so that these squares show accurate perspective. Slide a straight edge along until the square appears visually correct to you. Then, draw the line.

Key Principles of Perspective

Here are some of the key principles to remember when drawing boxes in perspective:

1. Perspective lines converge at a vanishing point.
2. The horizon line is always horizontal.
3. The nearest angle is 90° or greater.
4. The sides of a cube are proportional to a square.

Some common errors happen when you learn to draw cubes. Let me tell you just a few of them to watch for:

Vanishing Point should be behind the box

Parallel lines should converge at a common vanishing point

Nearest angle should be 90° or greater

Vertical lines should be vertical

Horizon line is always horizontal
Two-Point Box in Perspective

Circles of Vision

Boxes outside of circle appear distorted. Keep all boxes inside circle.

(1) Horizontal line. If you draw anything within the limits of a circle, it will look real. If you imagine what you are will find it helpful to imagine that you are drawing things beyond the imaginary circle. Then, draw the horizontal line. If you are drawing in two-point perspective, you draw things in perspective. Whenever you are drawing in two-point perspective, whenever you are drawing in two-point perspective, all of those cubes of the perspective drawing that are behind your position are your position above or below the axis in that circle. The line straight down is a circle with a lot of different circles.

An Explanation

Recognizing a Cube

What is wrong with (1)?

Don't think you can have more than one horizon (2) convergence (3) incorrect angle (4) incorrect horizon

What is wrong (1) Draw over the cubes so that you fix what

Two cubes are drawn indoors. Some of the cubes below are drawn indoors.
Drawing Two-Point Boxes

Drawing in two-point perspective is the easiest of all perspective drawing for most people. You have only two kinds of lines—perspective lines or vertical lines. If you seem to have trouble drawing things correctly, draw the box as though it were transparent so that you can see the hidden sides, edges, and corners. Then erase the hidden lines once you have everything drawn correctly.

☐ In the circle I have started an exercise for you to complete. Study the one box that is already finished. Then do the following:

☐ Finish drawing the other box that is started but not yet complete.

☐ Draw 3 more boxes anywhere within the circle.

☐ Draw 2 boxes that sit in front of or behind other boxes.

☐ When finished you should have 7 boxes.

Cutting Edge

Here is a hint to use when drawing objects. The outside lines of the object should be drawn darker and heavier. The darker outside edges make each object appear to stand by itself either in front of or behind another object.
two and three-point perspective.
the circle is more pronounced than with
that occurs when you near the outer limits of
with one-point perspective this distortion
edge of the circle, the more distortion.
vanishing point, the closer to the outer
the farther away from the central
In one-point perspective

A Distortion Problem

should have 5 boxes.
When finished, you

other boxes.
in front of orthogonal
draw 2 boxes that are
circle.

anywhere within the
draw 2 more boxes

circles. Do the following:
complete, do the following:

correctly, thus forming a solid box.
Once you have everything drawn
circles. Then erase the hidden lines.
can see the hidden sides, edges, and
as thought it were transparent so that you

Drawing One-Point Boxes

vertical lines, horizontal lines,
you have three kinds of lines in one-point
Drawing Three-Point Boxes

There is only one kind of line in three-point perspective—perspective lines. Draw the box as though it were transparent so that you can see the hidden sides, edges, and corners if you have trouble drawing things correctly. Once you have everything drawn correctly, erase the hidden lines.

☐ In the circle I have started another exercise for you to complete. Study the one box that is already finished. Then do the following:

☐ Draw 3 more boxes anywhere within the circle.

☐ Draw 2 boxes that sit in front of or behind other boxes.

☐ When finished you should have at least 5 boxes.

Upside Down

The boxes within this circle will look like you’re looking down on them. To reverse the point of view simply turn the book upside down. The boxes will then look like you are underneath them.
Here are some examples of cubes and squares. Draw diagonals so as to cut these squares into equal segments. This principle is used to help divide a square into equal segments. See the illustration below. The diagonal line from the center of the square to the center of the adjacent side will divide the square into two equal halves. This line will also divide the square into two equal rectangles.
A Unit of Measurement

A cube can act as a standard of measurement. The cubes drawn below are all the same size, but they appear to be different sizes because of the surroundings—the man, the lady, the foot. These different cubes can act as different units of measurement. The cube can be one inch, one foot, a five-foot section, one city block, or one mile.

Below is a box divided into equal units. The box measures 10 units tall x 5 units wide x 10 units deep. How do you know that it measures $10 \times 5 \times 10$? Look at the proportions—the box is half as wide as it is tall. That same box could also measure $20 \times 10 \times 20$ because the proportions are the same as $10 \times 5 \times 10$—the box is half as wide as it is tall.

- **Draw this one** $10 \times 10 \times 5$.

- **Divide the cubes below. Figure the proportions and divide accordingly. Use cubes as units of measurement. Divide the cubes to get correct proportions.**

- **Draw** $1 \times 1 \times 0.5$.

- **Try** $1 \times 2 \times 3$.

- **Draw** $2 \times 1.5 \times 1$.

- **Draw this one** $5 \times 5 \times 10$.

- **And last, draw this one** $100 \times 100 \times 75$. 27