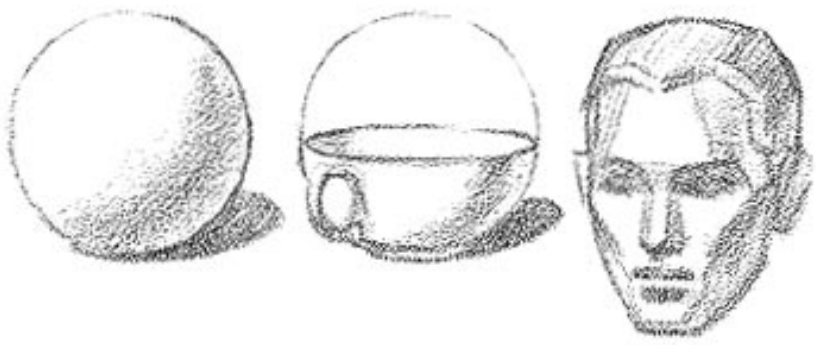
ALL DRAWING STEMS FROM ONE OR MORE OF THESE FORMS



ROUND

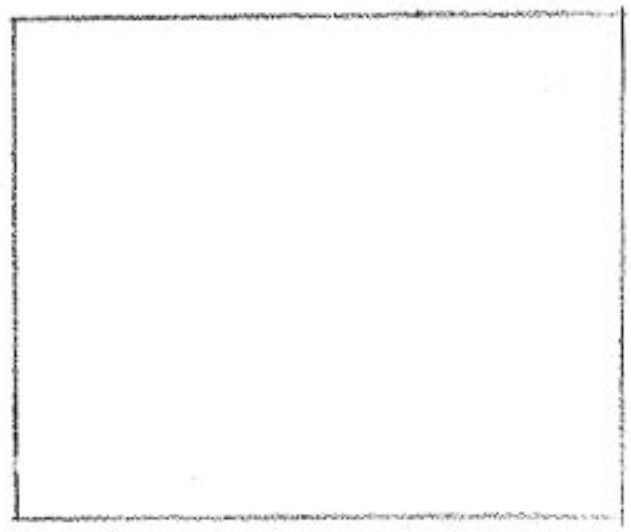
SQUARE

CYLINDRICAL

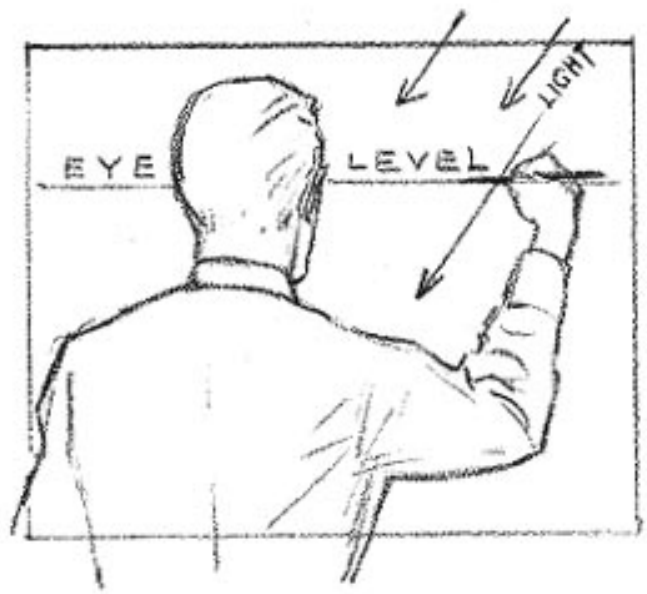
CONICAL

PYRAMIDAL

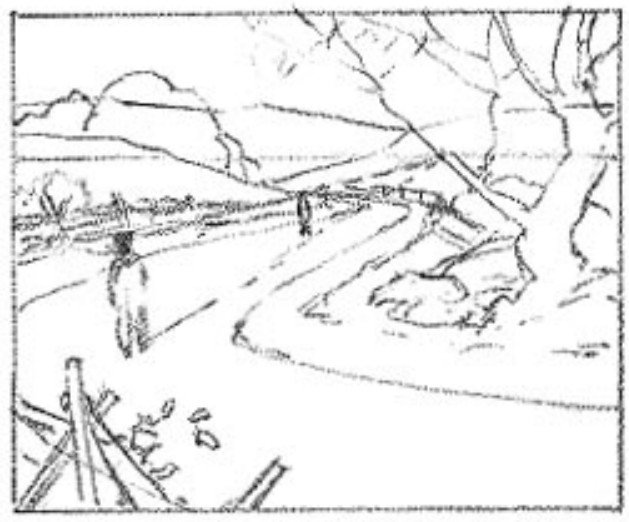
Think of your paper as representing open space, not as a two-dimensional surface, but as if its edges were the boundaries of an open window. You look at all of life and nature through this paper window.



Attempt either to set forms into this space that exists before you or to give a feeling of actuality to forms which you create from a knowledge of the laws of nature. We study nature for effects and set them down.

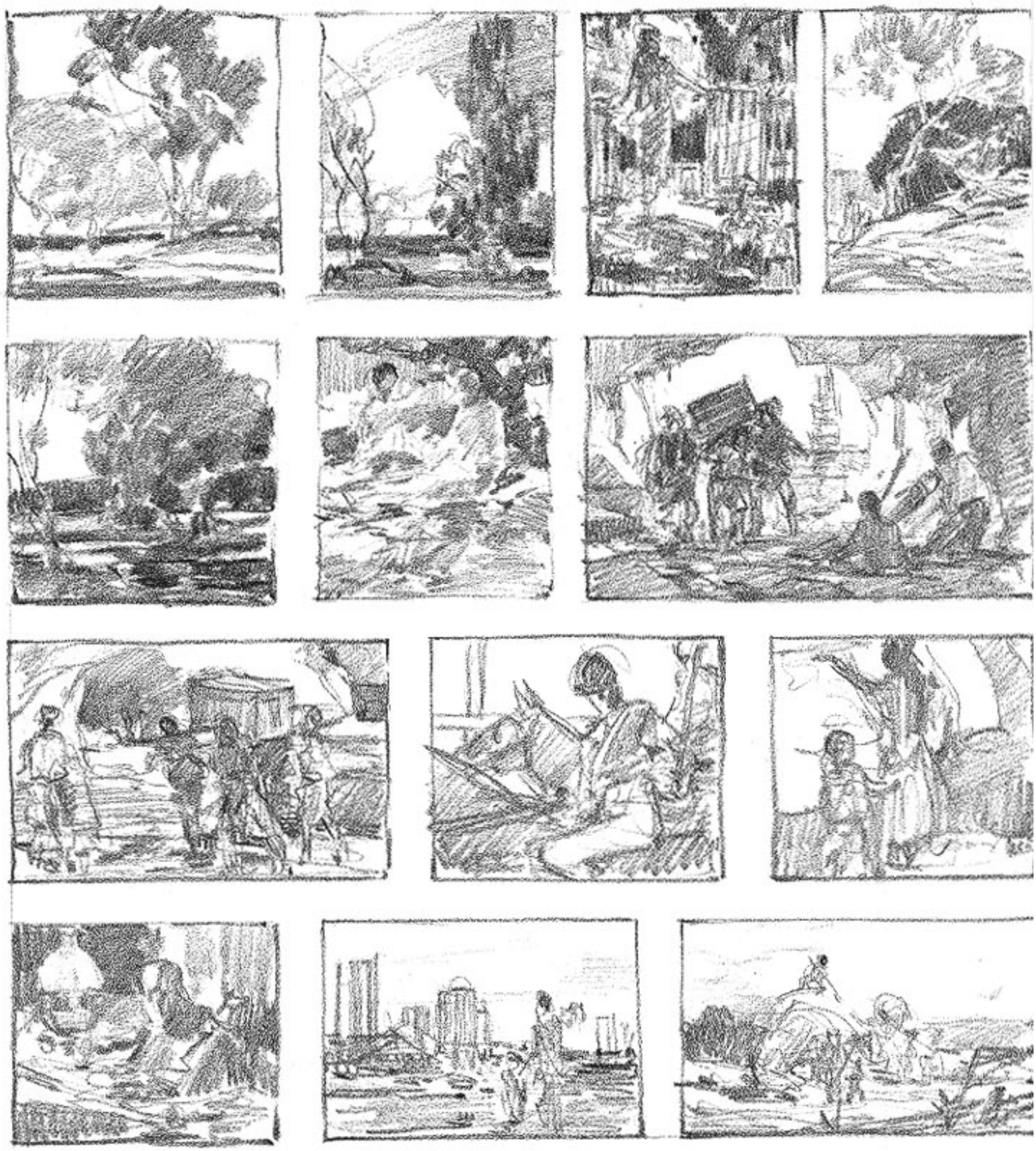


This involves dimension, contour, viewpoint (meaning perspective), and lighting. Only through light, which produces all tone, color, and appearance, can we produce a true image of life.



Really to draw, we cannot think only of any single aspect of drawing, such as contour, without the other essentials, but must seek to unify all aspects into a complete and organized whole.

THUMBNAIL ROUGHS

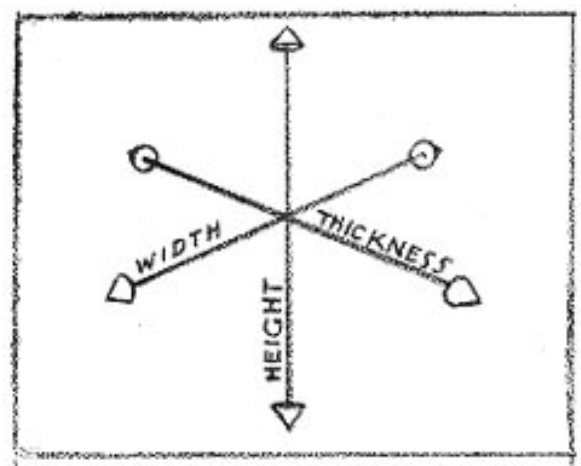


The habit of setting down your mental conception of a subject in miniature roughs can play a most important part in your development as an artist. The best way is to shut your eyes and try to visualize what is taking place, as it would be in life. You have no detail to go by, so just suggest the material. Think of some kind of light. It will come.

THE FIVE P'S

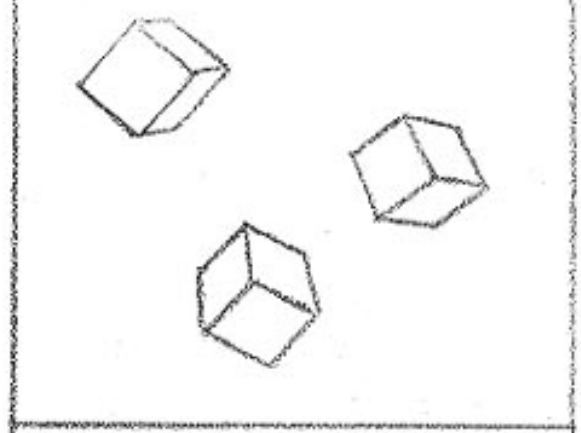
1

PROPORTION
The three dimensions



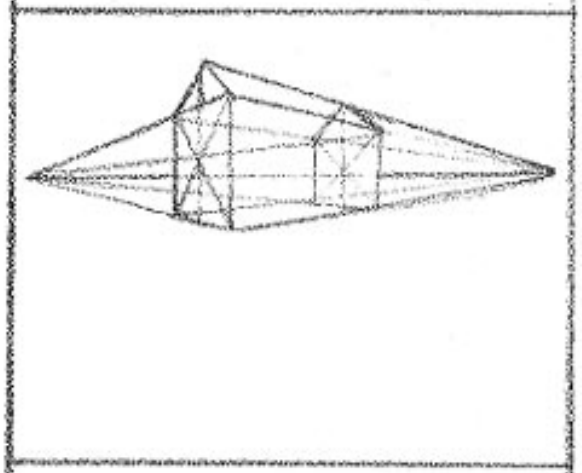
2

PLACEMENT
A position in space



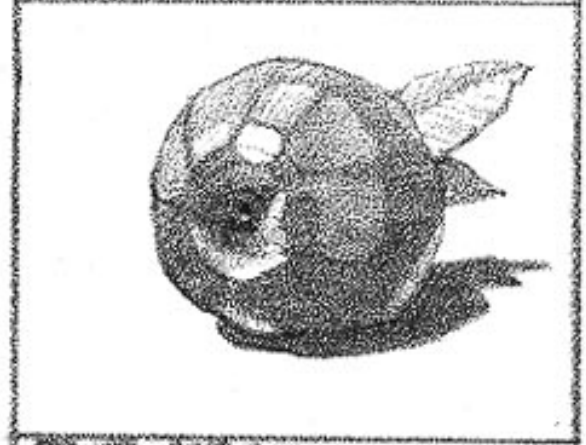
3

PERSPECTIVE
Relationship of viewpoint to subject



4

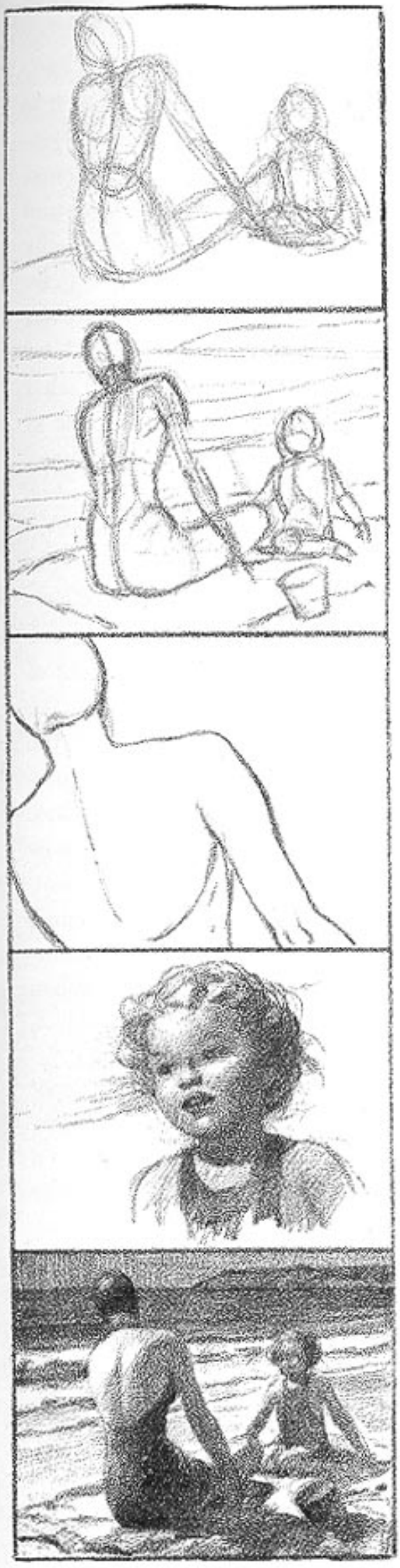
PLANES
Surface appearance as defined by light and shadow



5

PATTERN
The deliberate arrangement of the tones of the subject

THE FIVE C'S



CONCEPTION
A rough indication of an idea

1

CONSTRUCTION
An attempt to establish the forms from life or from basic knowledge

2

CONTOUR
The limits of forms in space, according to viewpoint

3

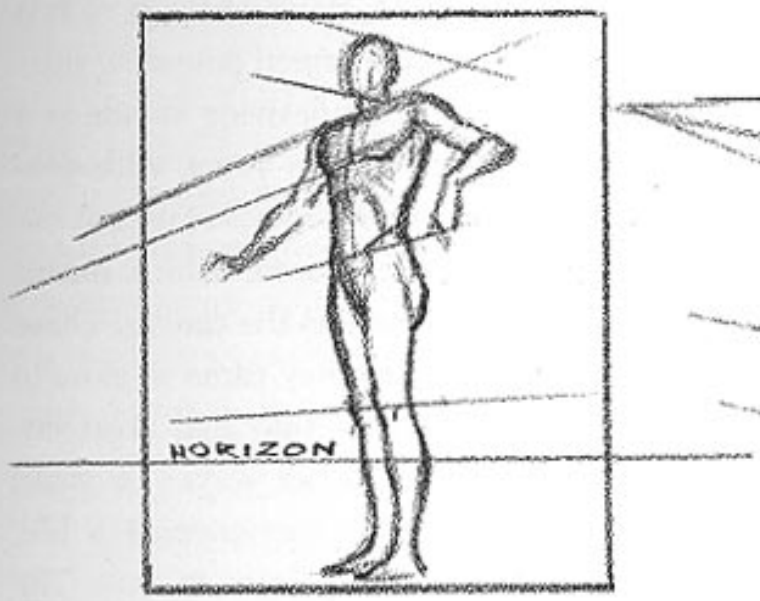
CHARACTER
The specific qualities of individual units of your subject in light

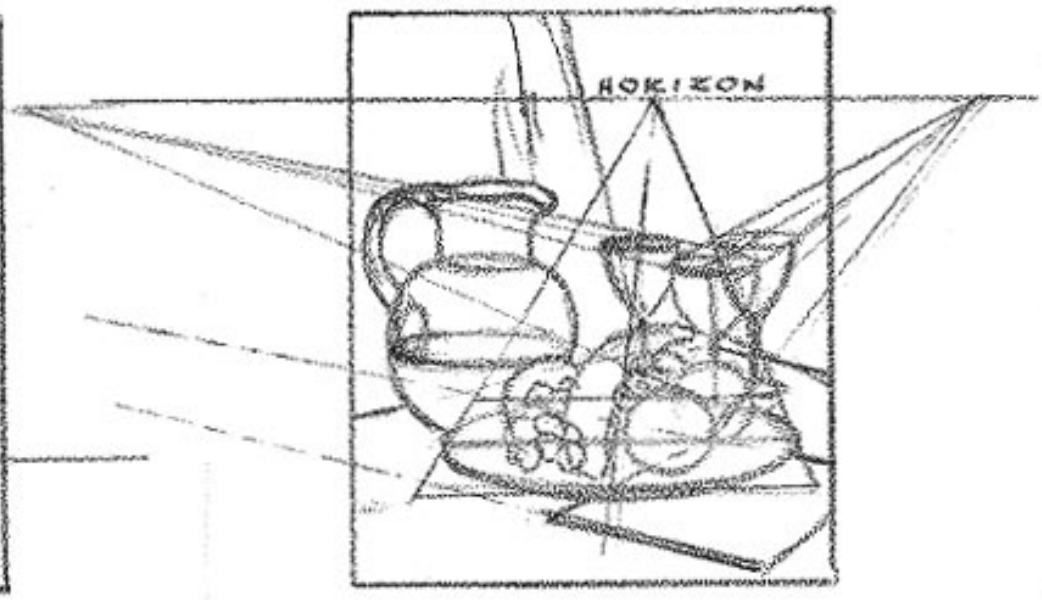
4

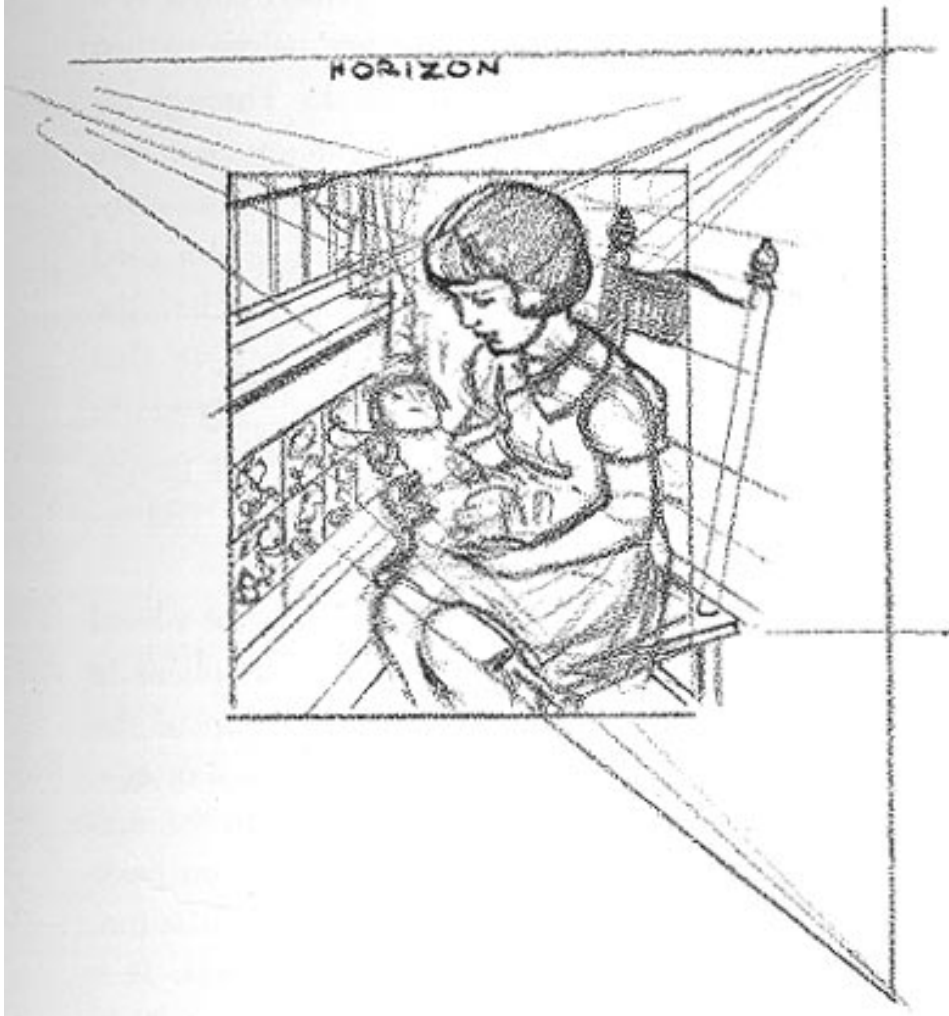
CONSISTENCY
All the essentials of construction, lighting, and pattern, organized as a unit

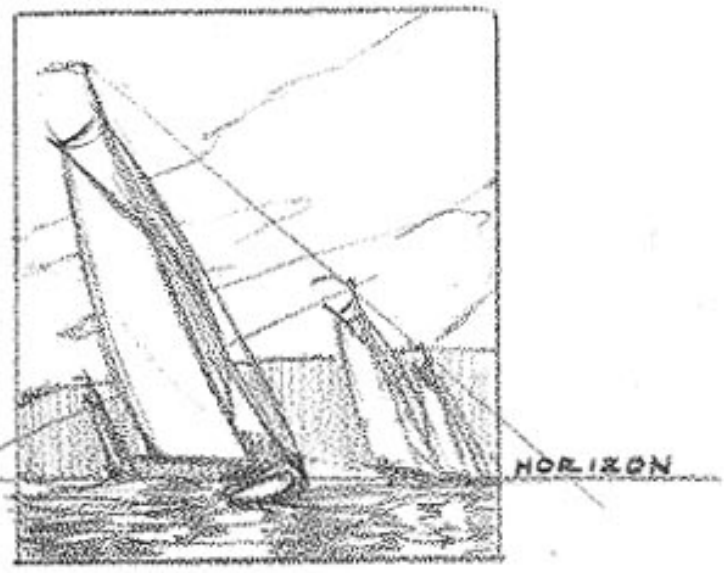
5

EVERY DRAWING HAS A HORIZON



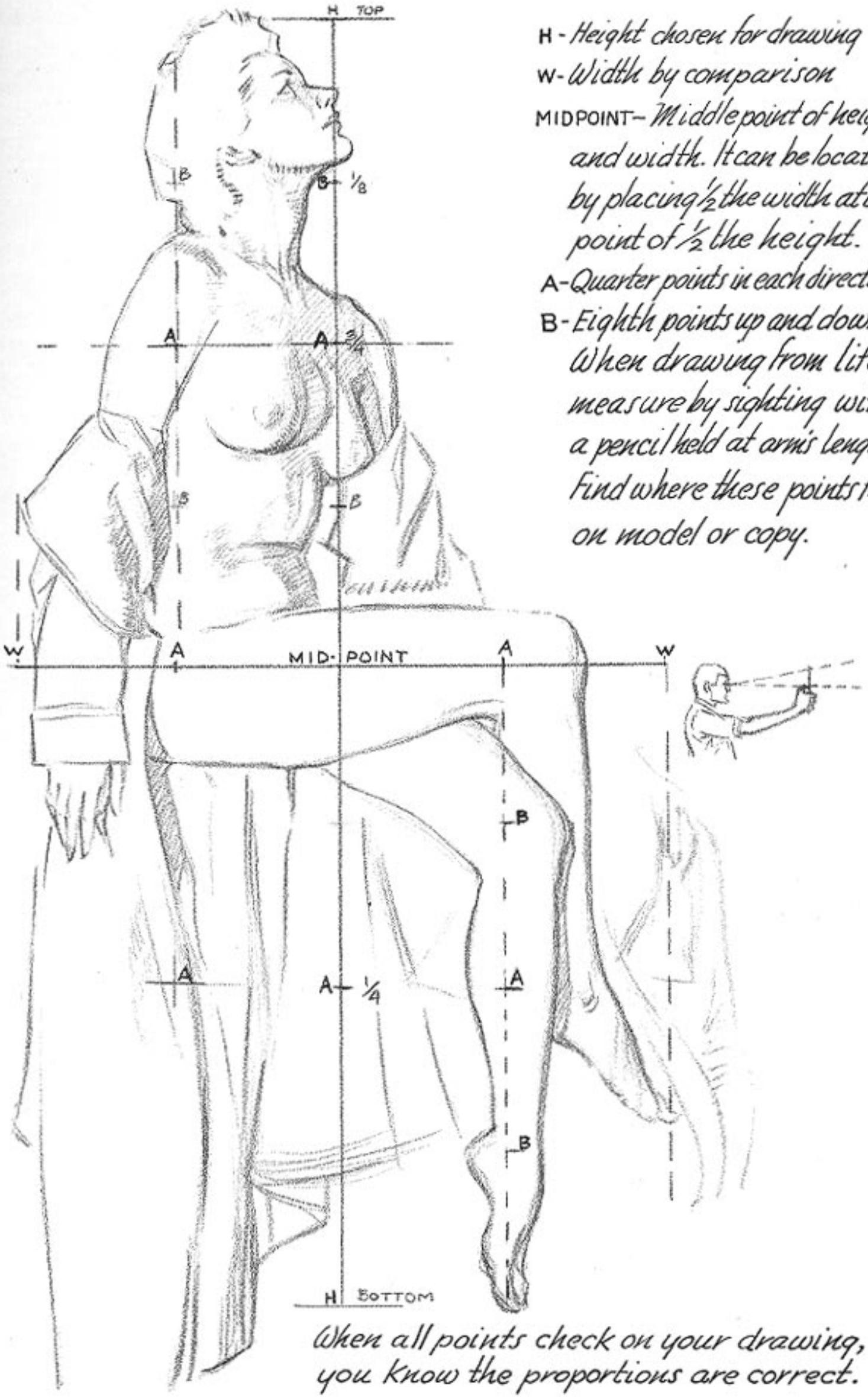






Anything we draw, no matter what it is, is affected by the eye level and viewpoint from which we draw it. The eye level is the horizon of the picture. It may be above or below the picture plane or may cross it at any point. We must know how to relate all forms and their contours to an eye level. In a photograph, everything is related to the camera lens in the same way, but the artist cannot depend upon the camera. He must know perspective.

EVERY DRAWING IS A PROBLEM OF DIMENSIONS



H - *Height chosen for drawing*

W - *Width by comparison*

MIDPOINT - *Middle point of height and width. It can be located by placing ½ the width at the point of ½ the height.*

A - *Quarter points in each direction*

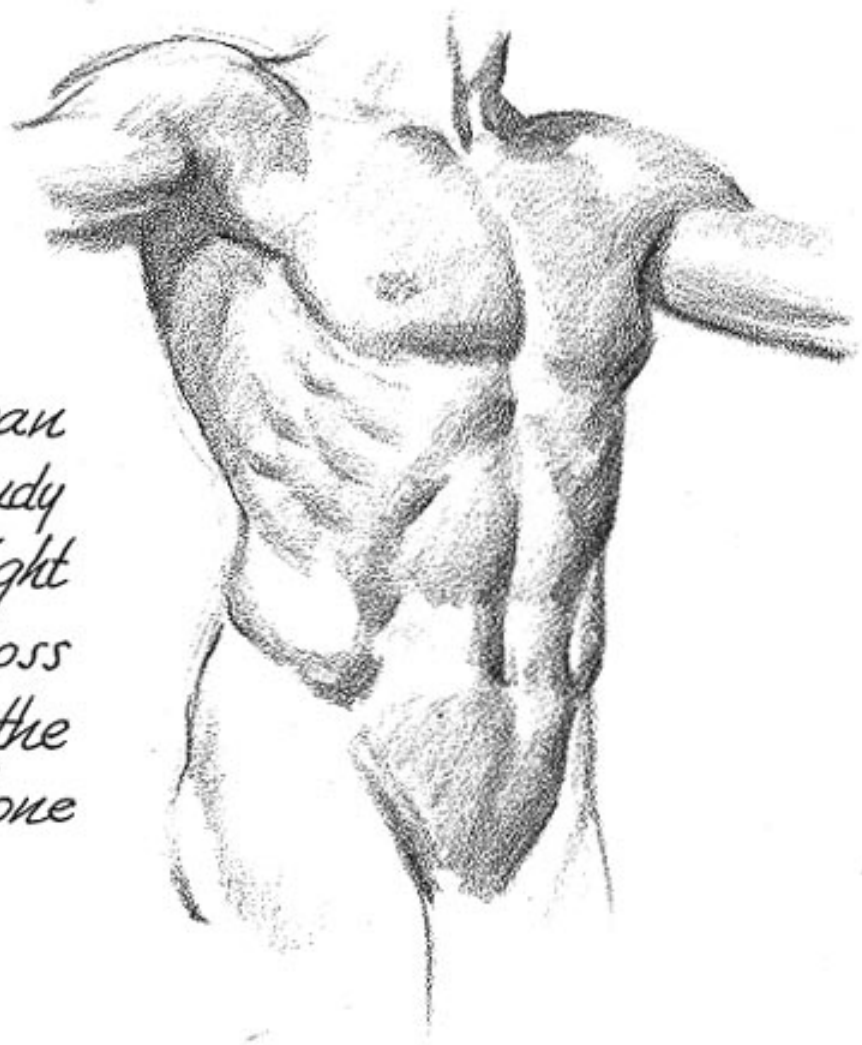
B - *Eighth points up and down. When drawing from life, measure by sighting with a pencil held at arm's length. Find where these points fall on model or copy.*

When all points check on your drawing, you know the proportions are correct.

SIDE-OF-THE-LEAD STROKES

Good drawing begins with a search for simple basic forms.

With the basic forms established, we can then build on the surface forms.



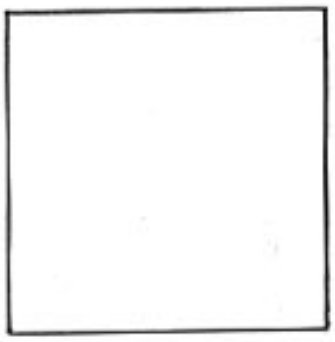
Then, since only light can define form, we must study carefully what the light does as it travels across the surfaces, noting the areas of light, halftone and shadow.

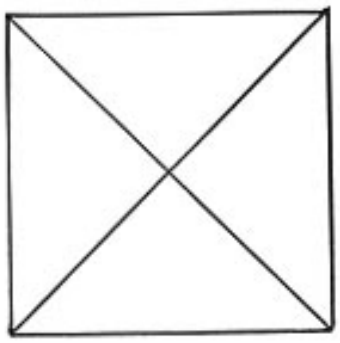
As the form turns away from the light it produces halftone and shadow. The lightness or darkness of the halftone is the result of the angle of the plane in relation to the direction of the light. Shadows occur only when the light cannot reach the plane.

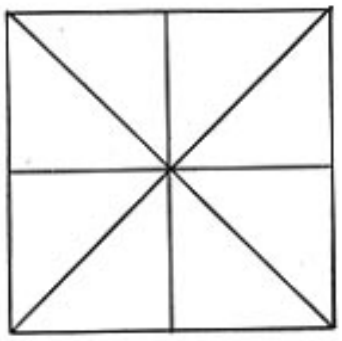
There is hidden perspective in everything that we will ever draw, large or small.

THE SQUARE AND THE CUBE

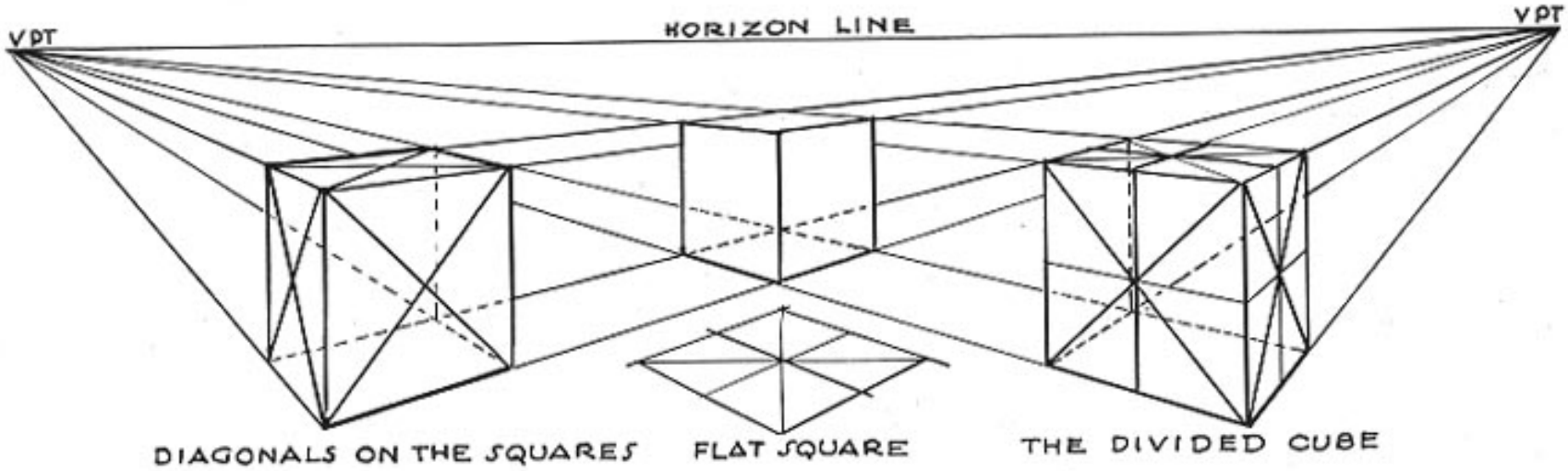
Let us start with the beginning of all good drawing, proportion and dimension. The square with its equal dimensions is extremely important, as the following pages show. From the square we can construct nearly all other forms in perspective. The square is a basic means of measurement. We must first learn to divide the square.







We observe that two diagonals will locate the middle point of the square. Then a horizontal and a perpendicular line at the same point of crossing will divide a square (or any rectangle) into four equal parts. From this, many things will develop. First we construct the cube from the square.

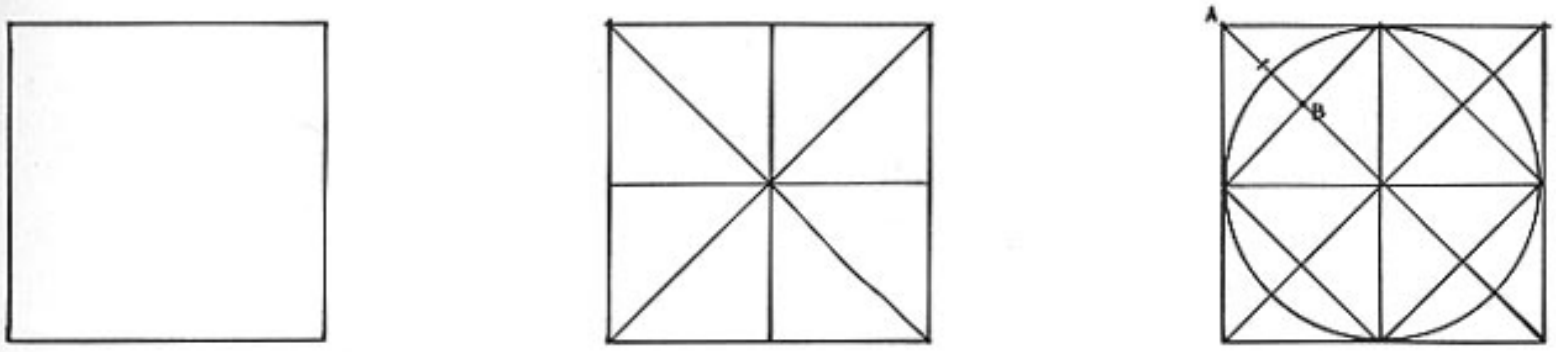


Since all objects will fit into a box, we must know how to construct the cube or block in perspective. Knowing the overall dimensions of any object, we construct a box which would fit around it. Then we build the object within it. Even round objects fit the cube or block. To draw the cube, we must establish a horizon (or eyelevel) and two vanishing points. All sides of the cubes recede toward these vanishing points.

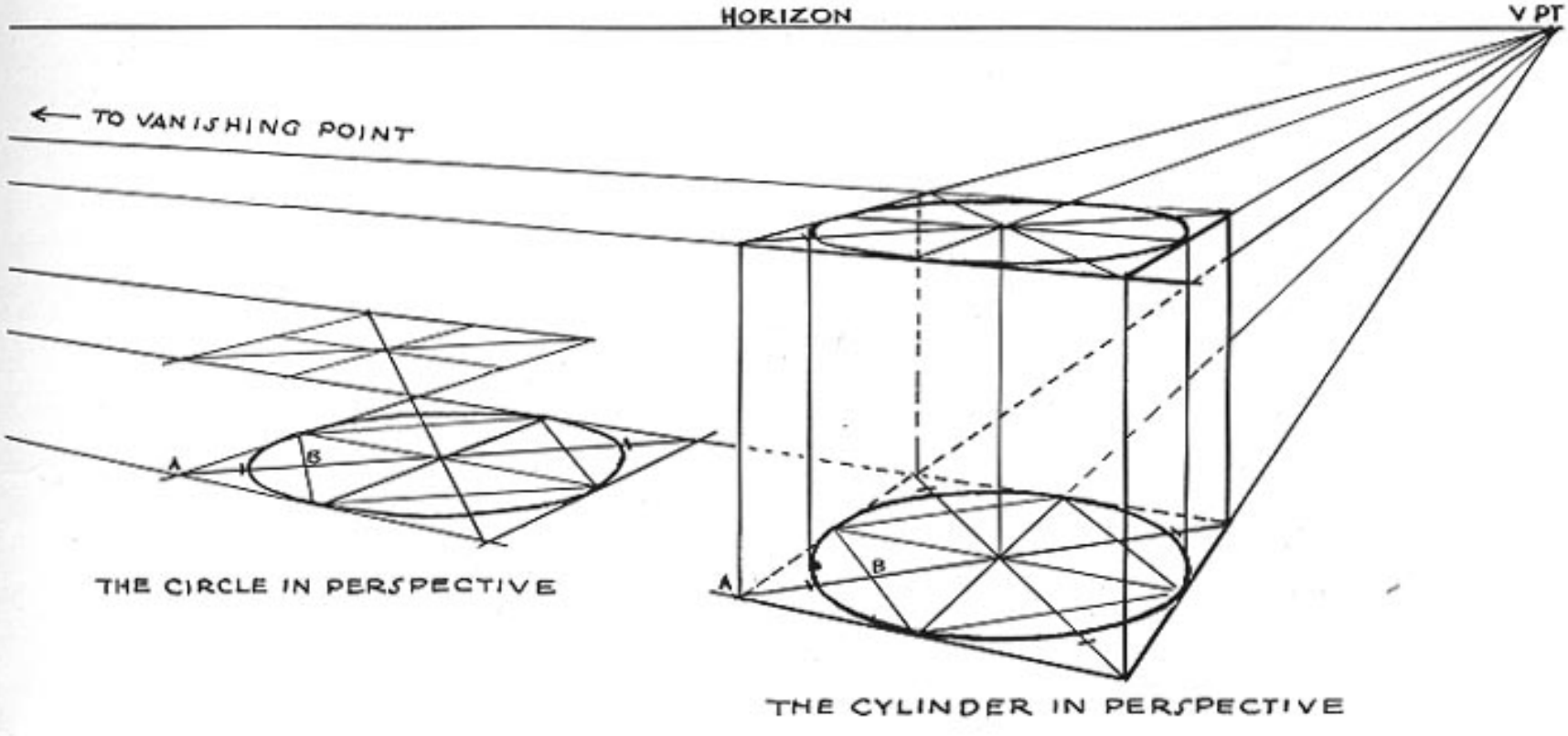
The drawing above shows the square laid flat on the ground. All ground plans begin with this. We can now build the cube on the square. The sides of the cube are divided like the squares at the top of the page, but now are shown in perspective. In the drawing above there is some distortion because the vanishing points had to be placed a little too close in order to show them both on the page. Try drawing some cubes correctly.

THE CIRCLE AND THE CYLINDER

By means of the divided square and the cube, we can draw the circle and the cylinder. We use a compass to draw the circle. The circle in perspective becomes an ellipse. We can draw the ellipse quite accurately by using the divided square drawn in perspective. This is valuable in drawing all round or cylindrical forms.



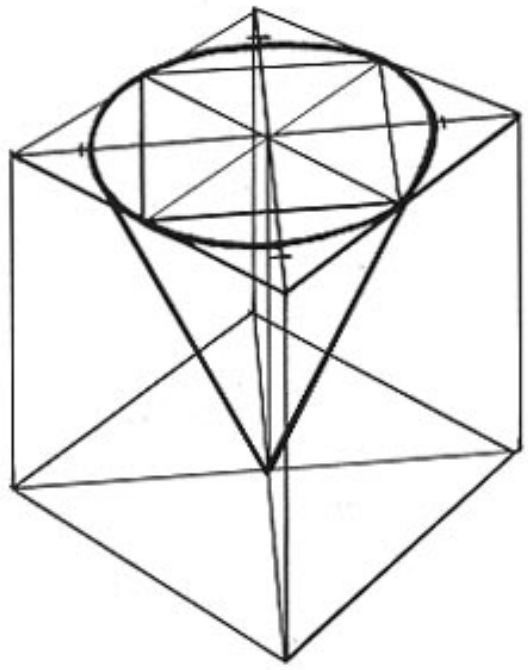
By adding diagonals to the quarters of the square, we construct another square whose corners touch the middle of the four sides. By placing a point halfway between A and B, we can judge about where the arc of the circle cuts across the diagonals, which helps us to draw the ellipse.

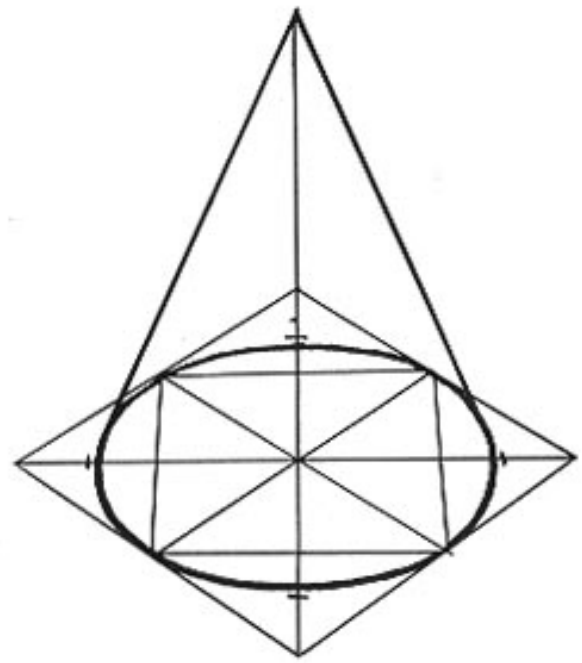


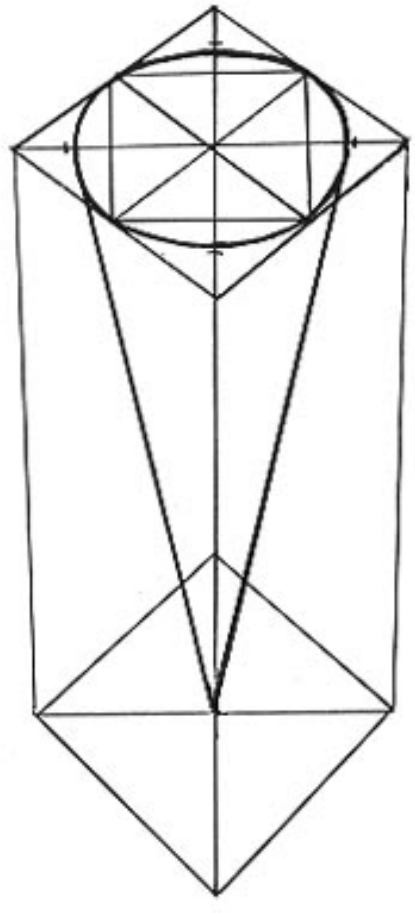
To draw a circle in perspective, we first lay out a divided square. We draw the arcs around the four sides, making the arcs cut just short of the halfway points between A and B. Now by drawing ellipses on the top and bottom sides of a cube or block, we construct a cylinder in perspective. The vanishing points for a small object should be spaced wide apart. For large objects, they can be spaced closer.

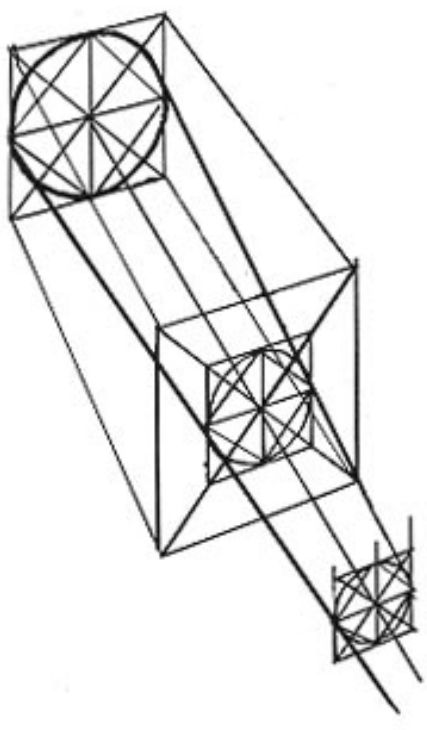
THE CIRCLE AND THE CONE

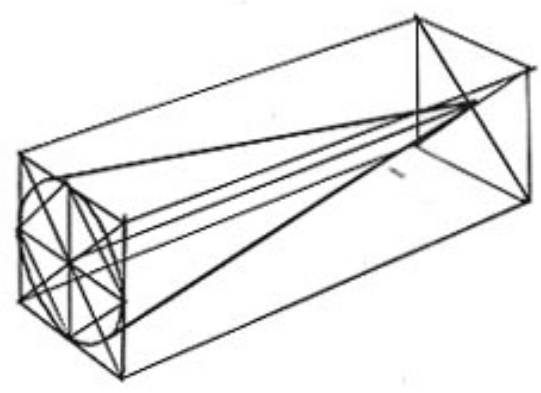
The cone is built on the circle in perspective, and the circle in perspective is of course constructed within the square. Many objects are built with the cone as the basic form, such as the wine glass, horn, etc.





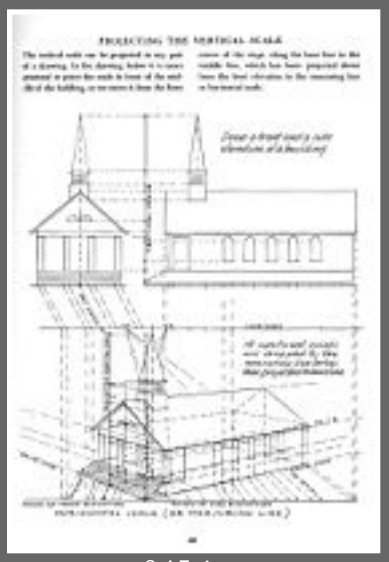






Remember that both vanishing points must be located on the same truly level horizon.

Later you will draw freehand, but at first, when you are learning the basic principles of drawing, you will always need a straight-edge to get correct perspective. So get a T square and a triangle and make all the lines true and straight. Careless drawing is the sure sign of the amateur.



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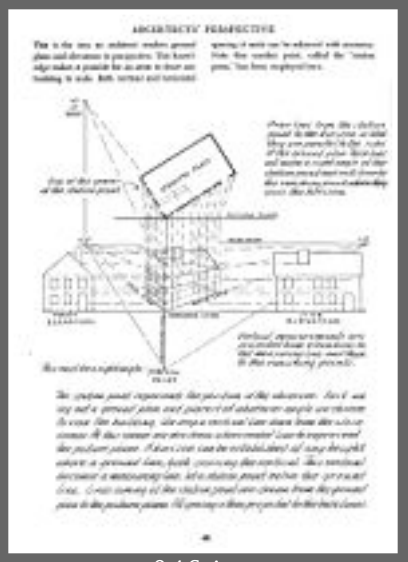

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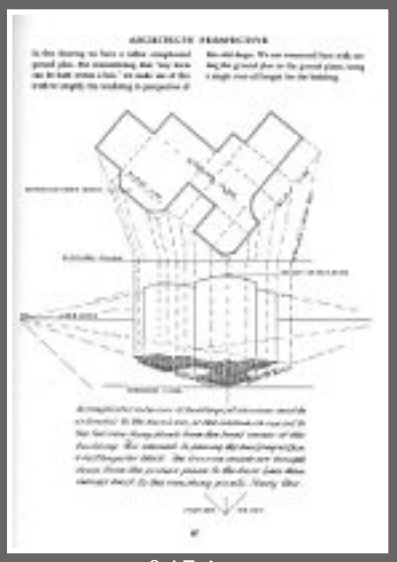

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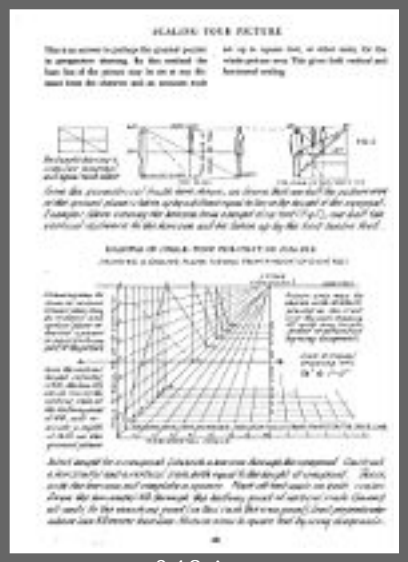

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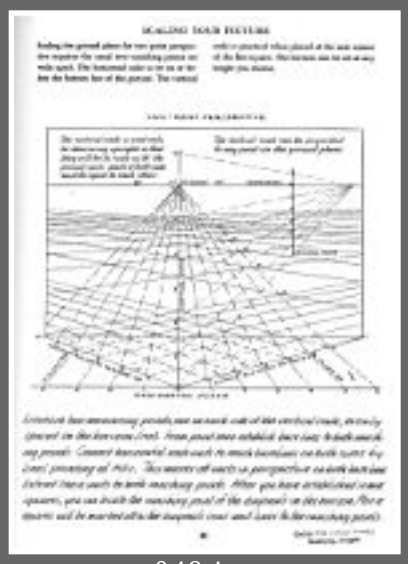

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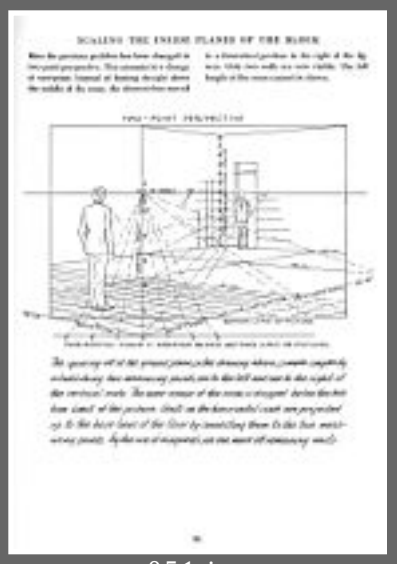

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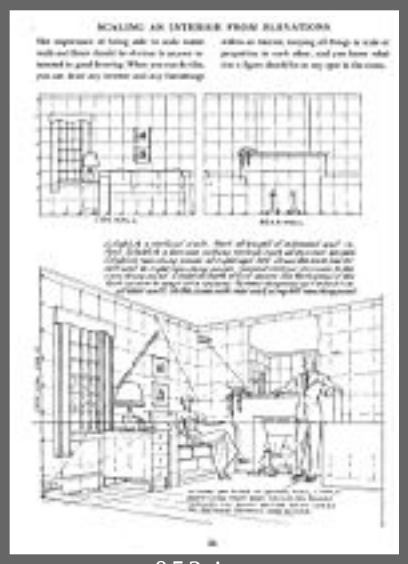

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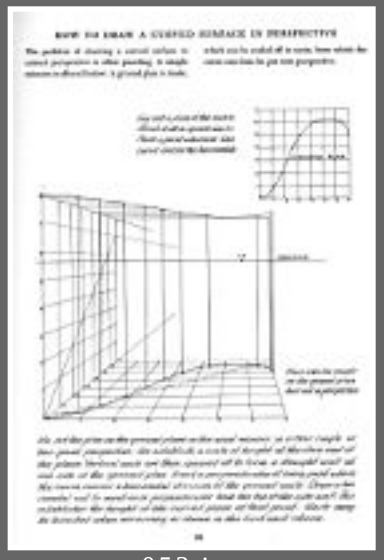

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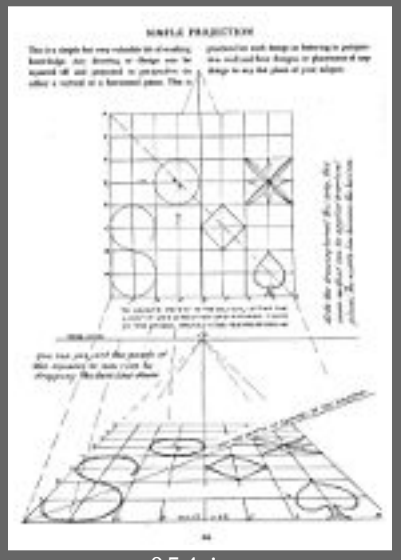

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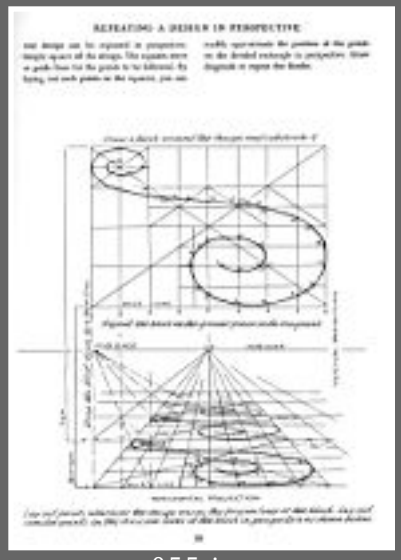

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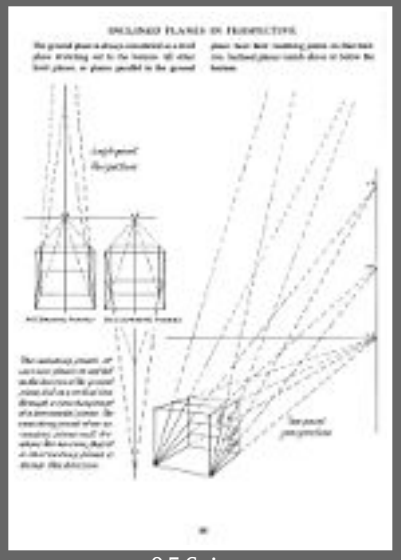

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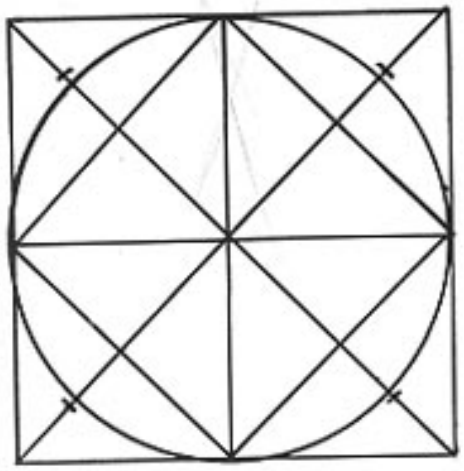
THE CIRCLE AND THE SPHERE

Since a circle fits within a square, a sphere will fit within a cube. First divide the cube, then draw the circle plan in perspective horizontally across the middle section of the cube (Fig. 1).



THE CIRCLE PLAN

THE DRAWING BELOW SHOWS
THE CIRCLE PLAN LAID OUT ON
THE MID-HORIZONTAL PLANE
AND ONE OF THE DIAGONAL PLANES

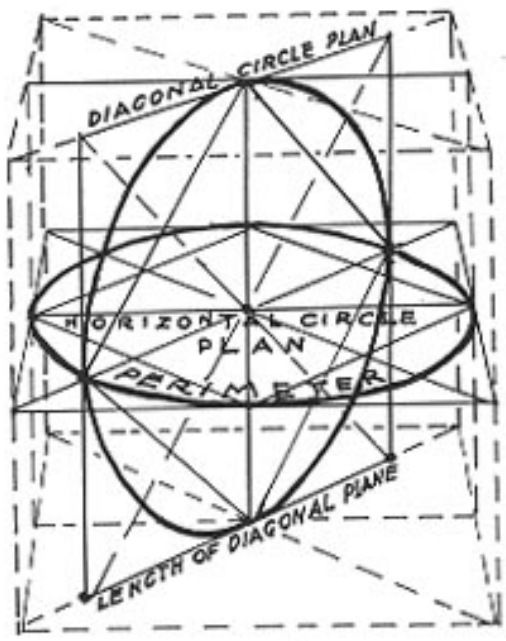


FIGURE ONE

Then draw the circle plan on the upright diagonal planes. The length of these planes is determined by the perimeter of the horizontal circle.

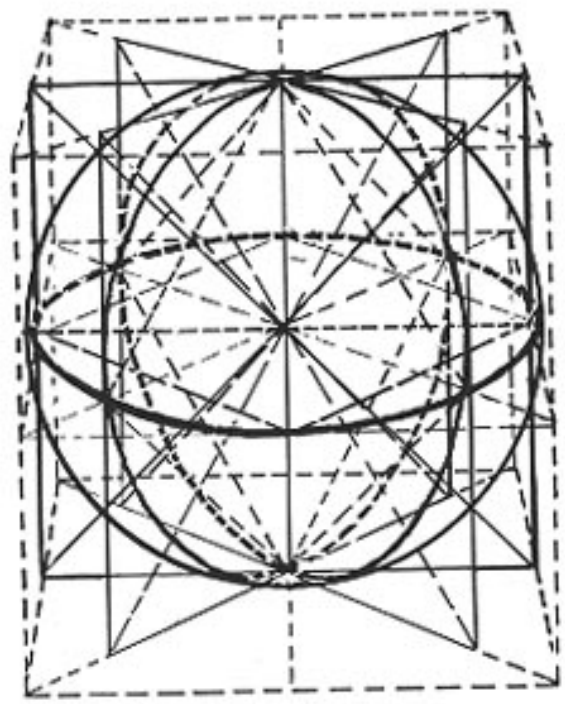
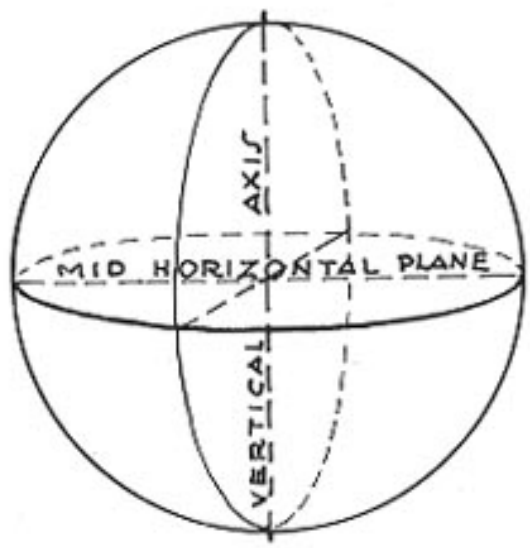


FIGURE TWO

THE CIRCLE PLAN LAID ON ALL PLANES
THUS PRODUCING A DIVIDED SPHERE

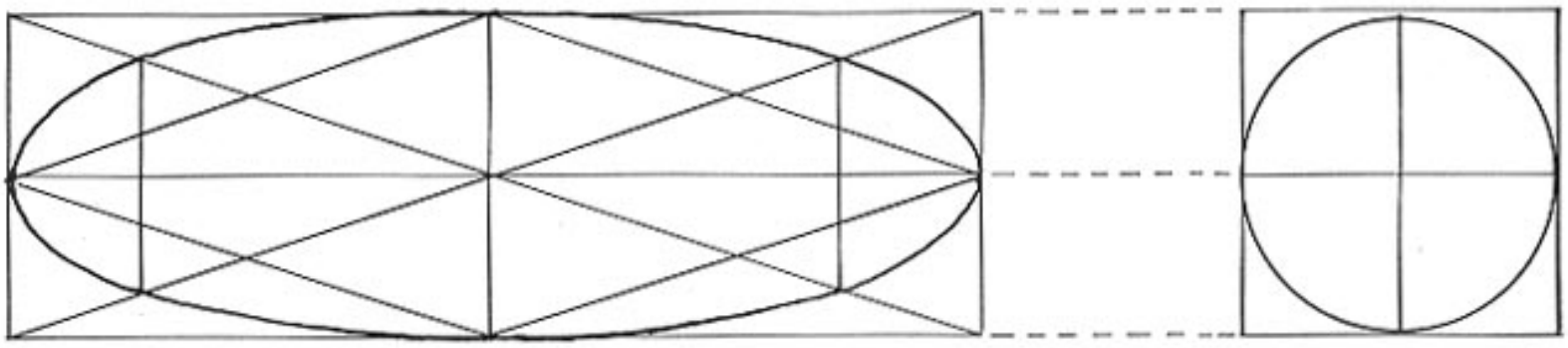


TWO INTERSECTING CIRCLES
WITHIN A SPHERE

When the circle plan has been laid out on the mid-horizontal plane as well as on all vertical planes which pass through the vertical axis, a perfectly divided sphere will result. The contour of a sphere never changes, though the lines of division are affected by perspective (Fig. 2).

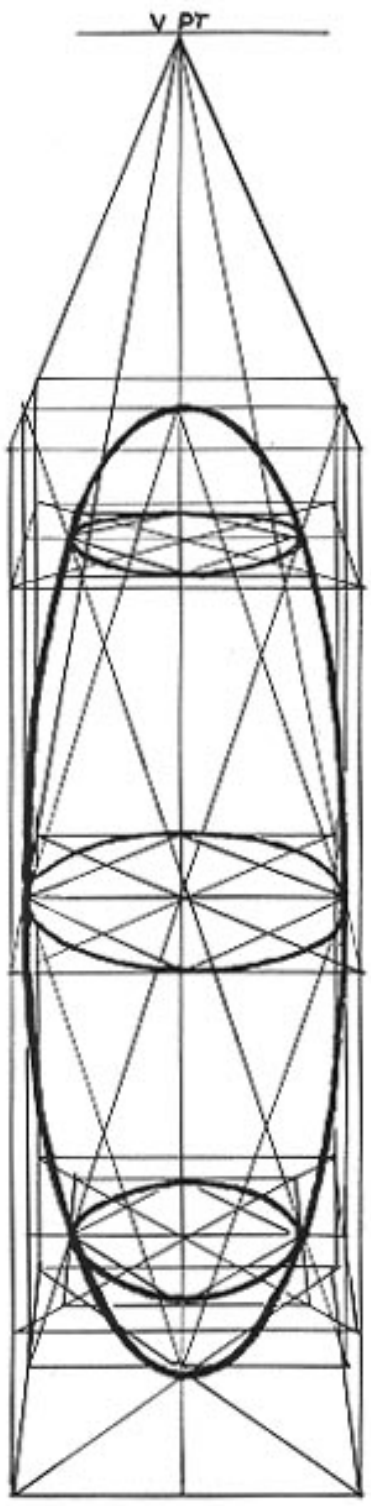
ROUND FORMS WITHIN THE BLOCK

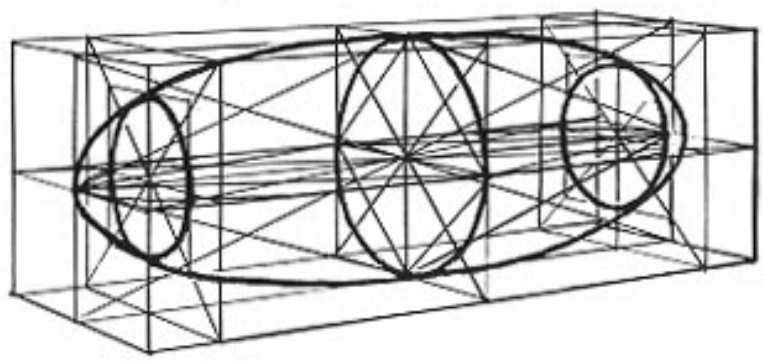
What is true of the cube and the sphere is also true of any elongated block that will fit around any rounded form. Any such form can be drawn in accurate perspective by using this basic approach. First draw plans of the middle planes of the block.



THE MIDDLE PLANE LENGTHWISE

THE MIDDLE PLANE CROSSWISE

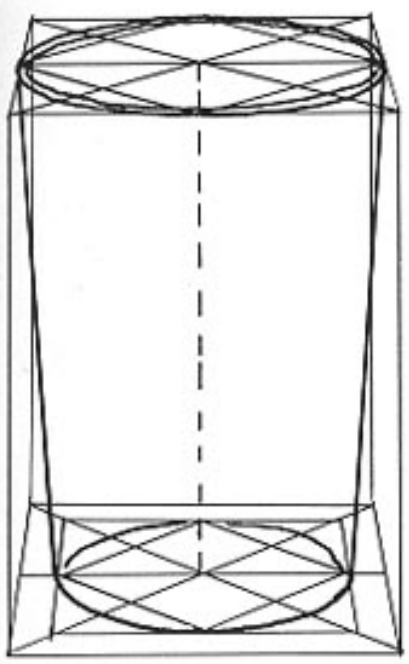


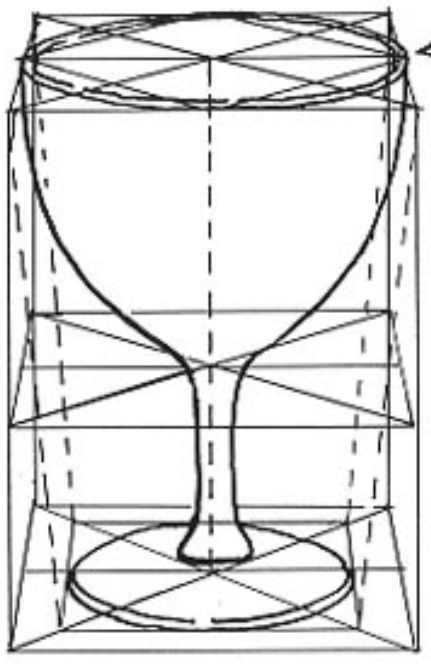


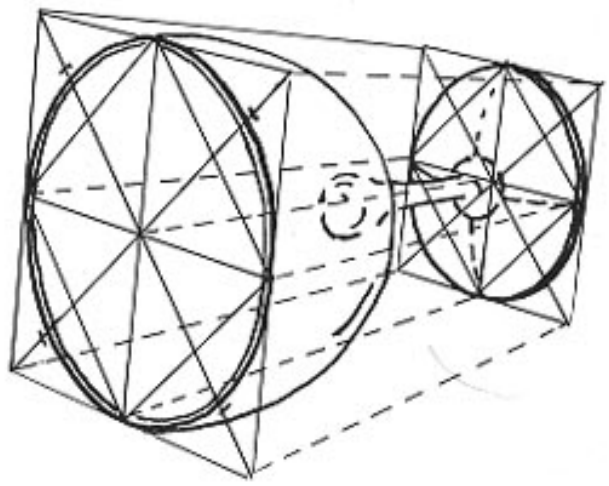
The drawings here indicate the soundness of this approach to good drawing. The whole principle of perspective drawing is to enable the draftsman to get at the inner construction and to relate all sections or parts to a single viewpoint. The mechanic builds from plans which are cross sections through the object. These are usually flat plans like the two at the top of this page. Having such plans, we can draw them to a horizon and vanishing points, showing the object in three dimensions.

THE BLOCK APPLIED TO ROUND OBJECTS

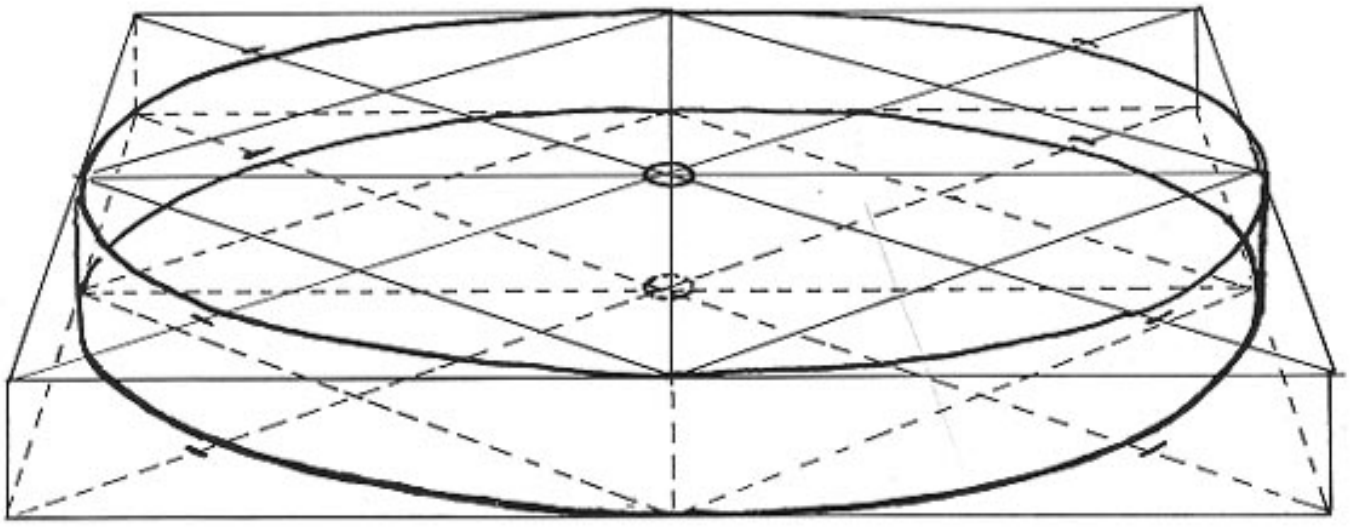
The circle and the block can be applied in drawing many different objects. If you can draw the block in perspective, you can draw almost any object in any position within your subject. Draw the block to equal the height, width, and depth of the form.

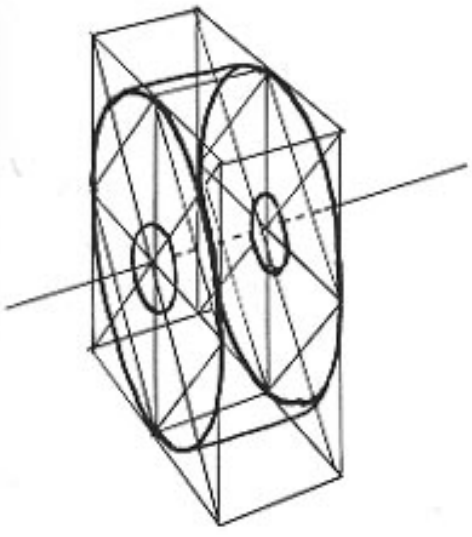






Draw the ellipses freehand

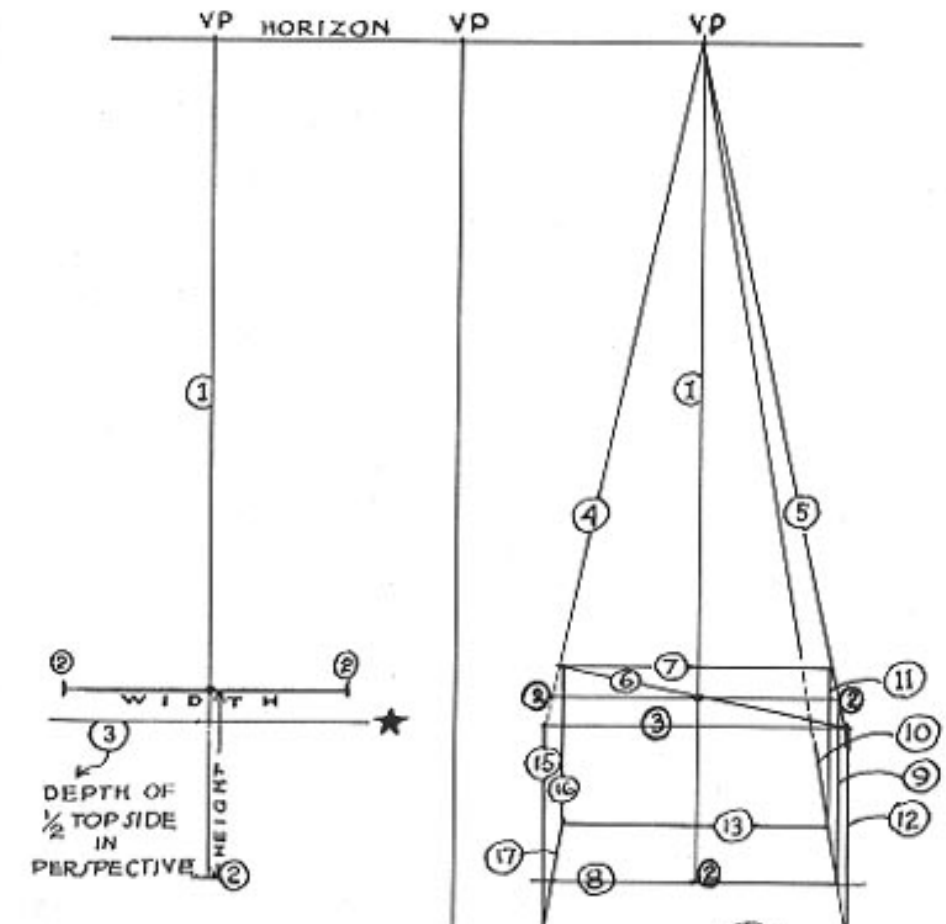




The disk is a flat version of the cylinder. Since it has many uses, it is well to know just how the ellipses should be drawn to fit any object at any viewpoint and from any eyelevel.

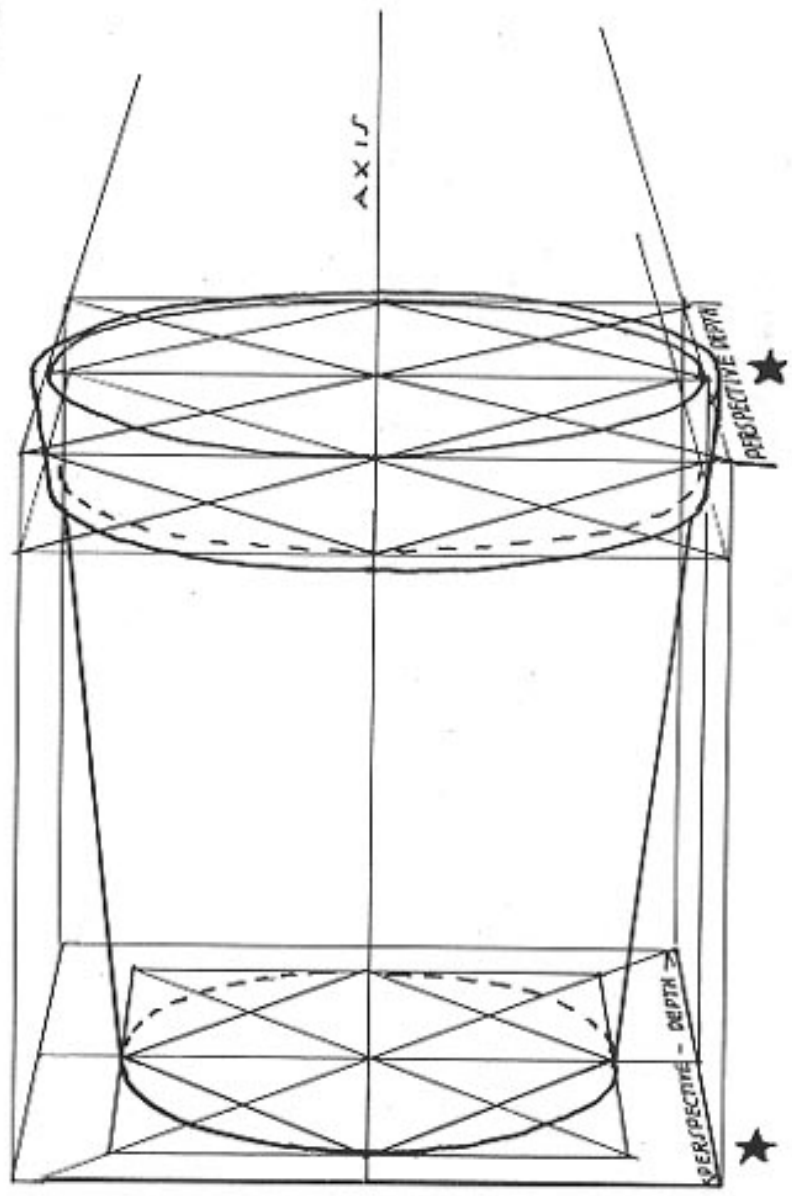
HOW TO CONSTRUCT THE BLOCK CORRECTLY

In case you are having trouble in drawing blocks correctly, the drawings below will help you. Remember that ellipses narrow as they near the eye level. Studying a real object will help you approximate this. The perspective depth* of the top side of the block determines the perspective depth of the bottom side.



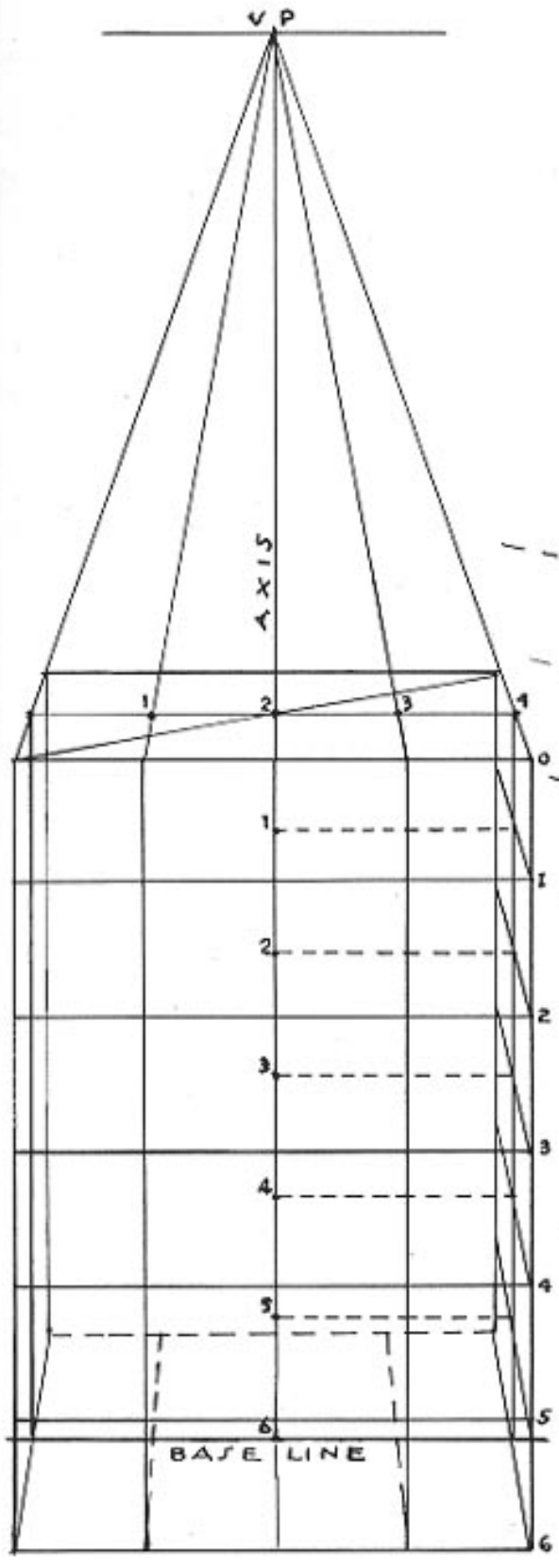
How to construct a block of given or desired dimensions

You need a T square and a triangle. Establish a horizon or eyelevel. Draw a perpendicular ①. Establish height and width of block ② on the perpendicular. The depth of ½ of the top side in perspective ③ is optional. Through the points established at ends of line ② draw connecting lines ④ and ⑤ to the vanishing point above. Then draw the other lines in the order indicated by their numbers.*

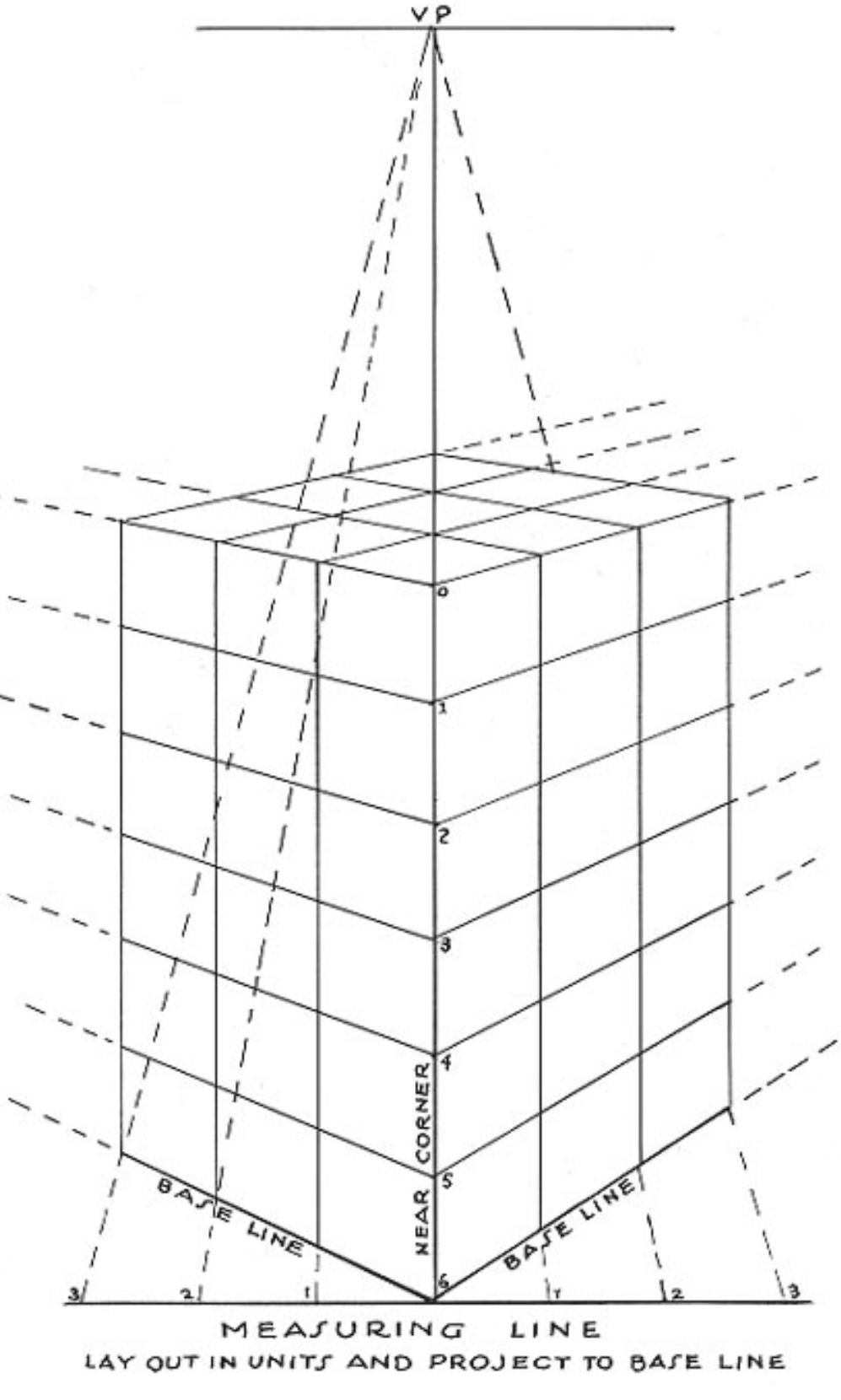


BLOCKS OF SPECIFIED DIMENSIONS

Here are two ways of constructing blocks of specified dimensions. In the drawing at the left, the dimensions are laid out on the middle line or axis, using the procedure shown on the preceding page. In the one on the right, we establish a measuring line touching the near corner, then carry the units to the base line.



UNITS ARE PROJECTED TO THE FRONT PLANE OF THE BLOCK

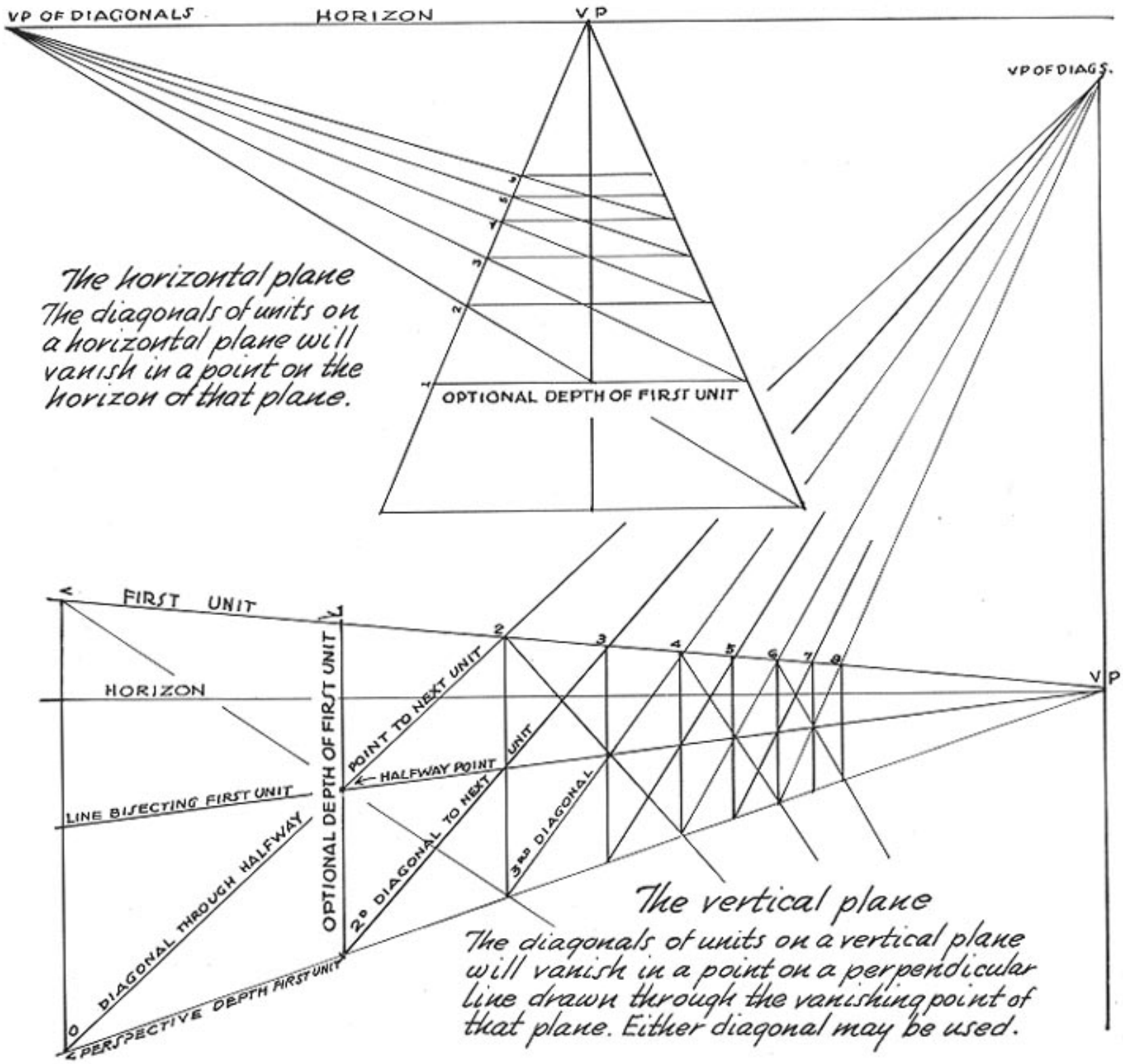


LAY OUT IN UNITS AND PROJECT TO BASE LINE

When you can produce a block of specified dimensions, you have the basis for drawing any object accurately. You are urged to practice this until you can do it, because it is a procedure that you will use for the rest of your life. We progress from this to other methods of measurement in perspective.

MEASURING DEPTH BY MEANS OF DIAGONALS

The drawings below show how to space off equal units in perspective within both horizontal and vertical planes. This is valuable in drawing evenly spaced units that recede toward the horizon. It will enable you to space correctly such things as units of rug designs, fence posts, telephone poles, trains, window panes, blocks in sidewalks, building blocks, bricks, roofing, wallpapers, etc.



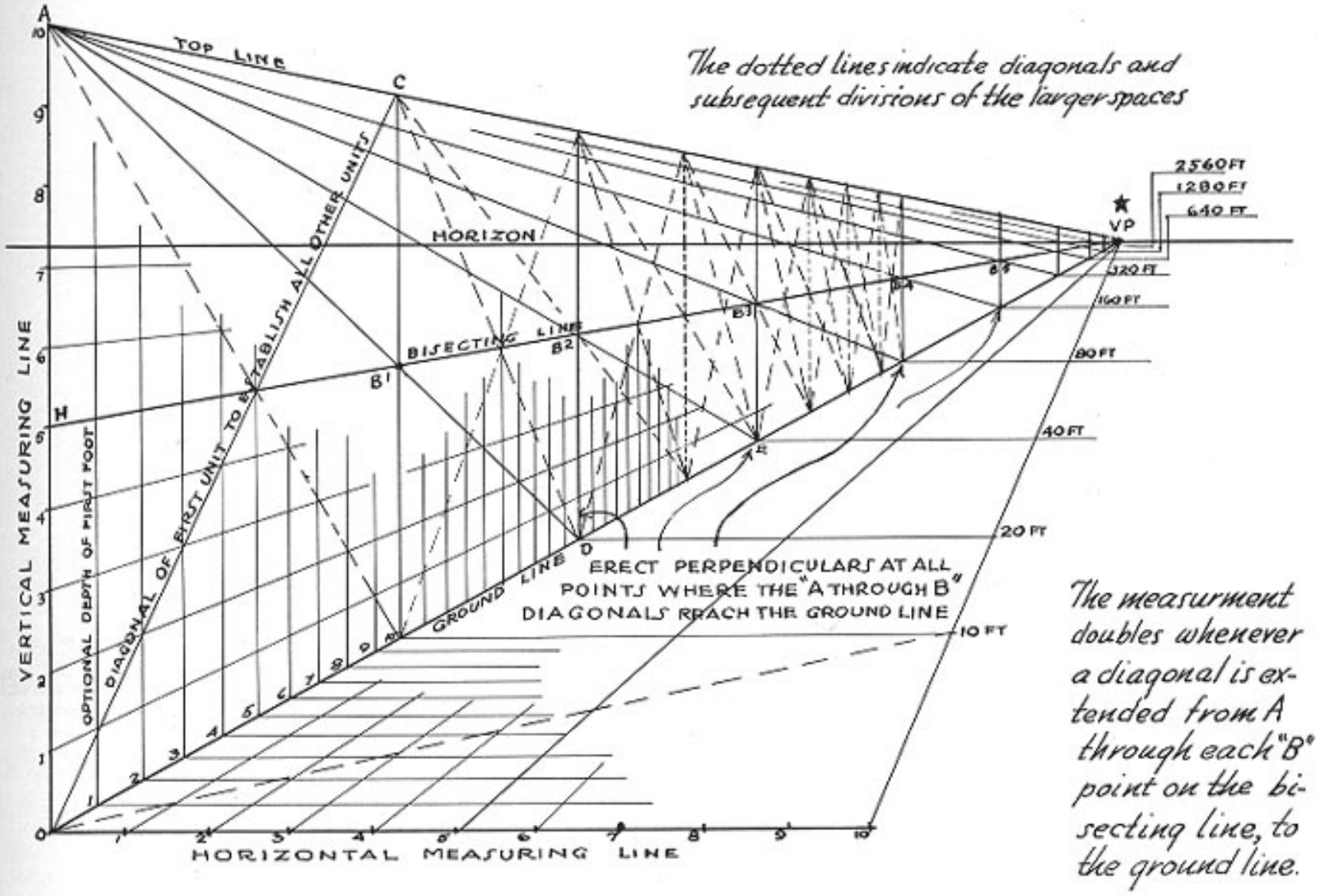
The horizontal plane
The diagonals of units on a horizontal plane will vanish in a point on the horizon of that plane.

The vertical plane
The diagonals of units on a vertical plane will vanish in a point on a perpendicular line drawn through the vanishing point of that plane. Either diagonal may be used.

In any perspective drawing we must set the perspective depth of a first unit, because it's appearance is affected by the distance from which we are viewing it. It's perspective depth changes with every step we take toward or away from such a unit or area. When the first unit is established, we repeat it by running a diagonal through a halfway point of the unit to either the top line or the baseline. This marks off the next unit, as o through 1 to 2, 2 to 3, etc.

DRAWING TO SCALE

Every artist should know how to draw to a scale. Scale drawings usually require the division of vertical and horizontal planes into square feet or square units. By the plan shown here, we can quickly divide such planes into squares of any dimension. Here we take a unit of 10 by 10 feet. We measure with this unit as far back as 2500 feet, which is as much as you will ever need. This is very valuable to you.

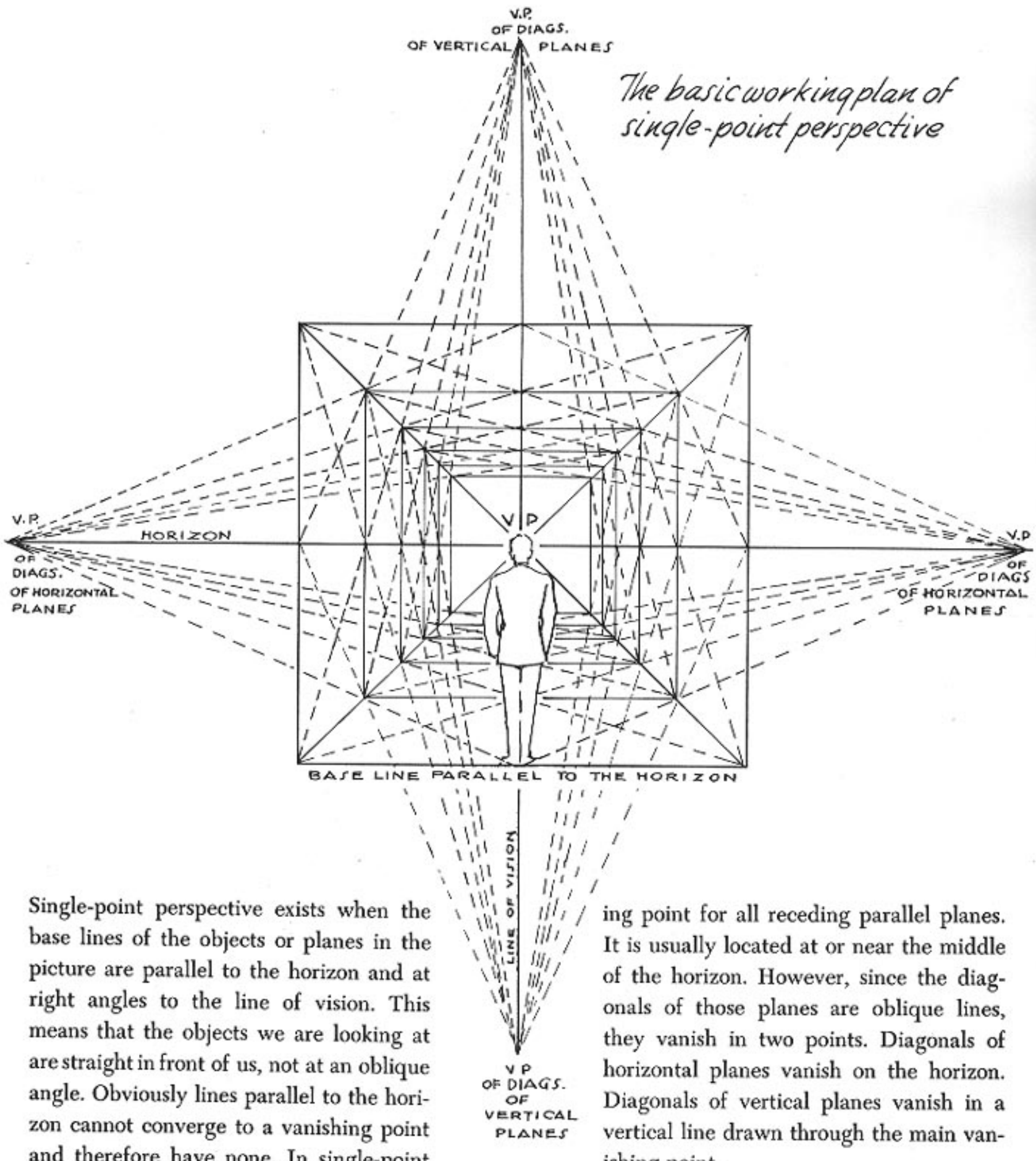


How to scale a vertical and a horizontal plane

We must first establish a vertical and a horizontal measuring line, touching each other at right angles, (point zero). On both lines we lay out 10 equal units to represent 10 feet. The size of a unit is optional. The horizon is then set at any desired height on the vertical measuring line. We then establish a vanishing point anywhere on the horizon. Connect points O, H and A to VP. Establish optional depth of the first foot. Then draw lines from all foot units toward VP. Diagonal of first foot (OC) marks off vertical divisions of foot units and also the first 10 ft. unit at point C. Diagonal "A through B' (on the bisecting line) to D," marks off 20ft. on the ground line. Then AB² to E is 40 ft, and so on to infinity.★

DIAGONALS IN SINGLE-POINT PERSPECTIVE

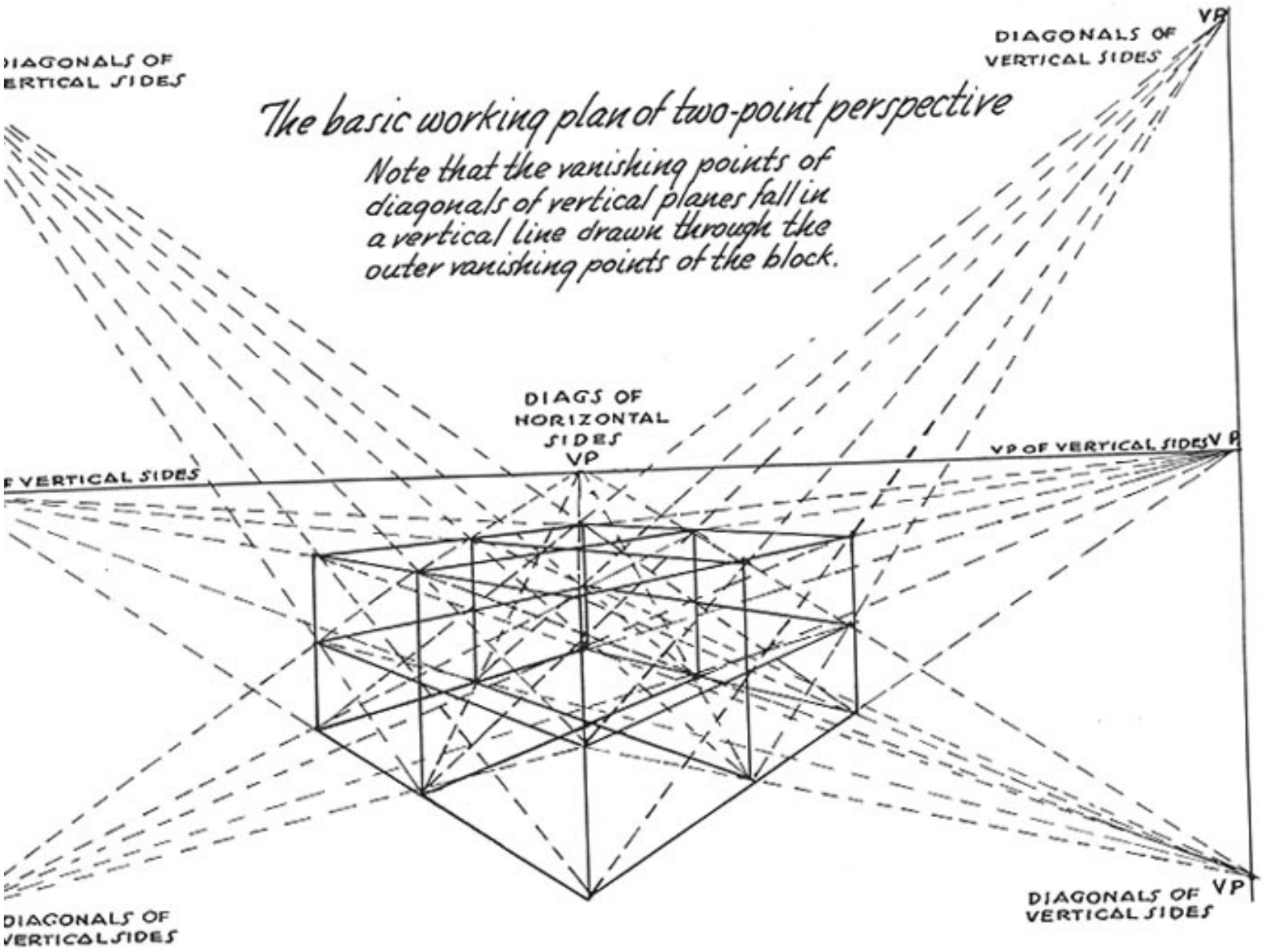
It is very important to understand what is meant by a single-point perspective and two-point perspective and how the planes and their diagonals operate in each. The basic plan for single-point perspective is shown below. Although we do not need all the diagonals for purposes of measurement, we should know how to choose the ones we need.



The basic working plan of single-point perspective

Single-point perspective exists when the base lines of the objects or planes in the picture are parallel to the horizon and at right angles to the line of vision. This means that the objects we are looking at are straight in front of us, not at an oblique angle. Obviously lines parallel to the horizon cannot converge to a vanishing point and therefore have none. In single-point perspective there is only one main vanishing point for all receding parallel planes. It is usually located at or near the middle of the horizon. However, since the diagonals of those planes are oblique lines, they vanish in two points. Diagonals of horizontal planes vanish on the horizon. Diagonals of vertical planes vanish in a vertical line drawn through the main vanishing point.

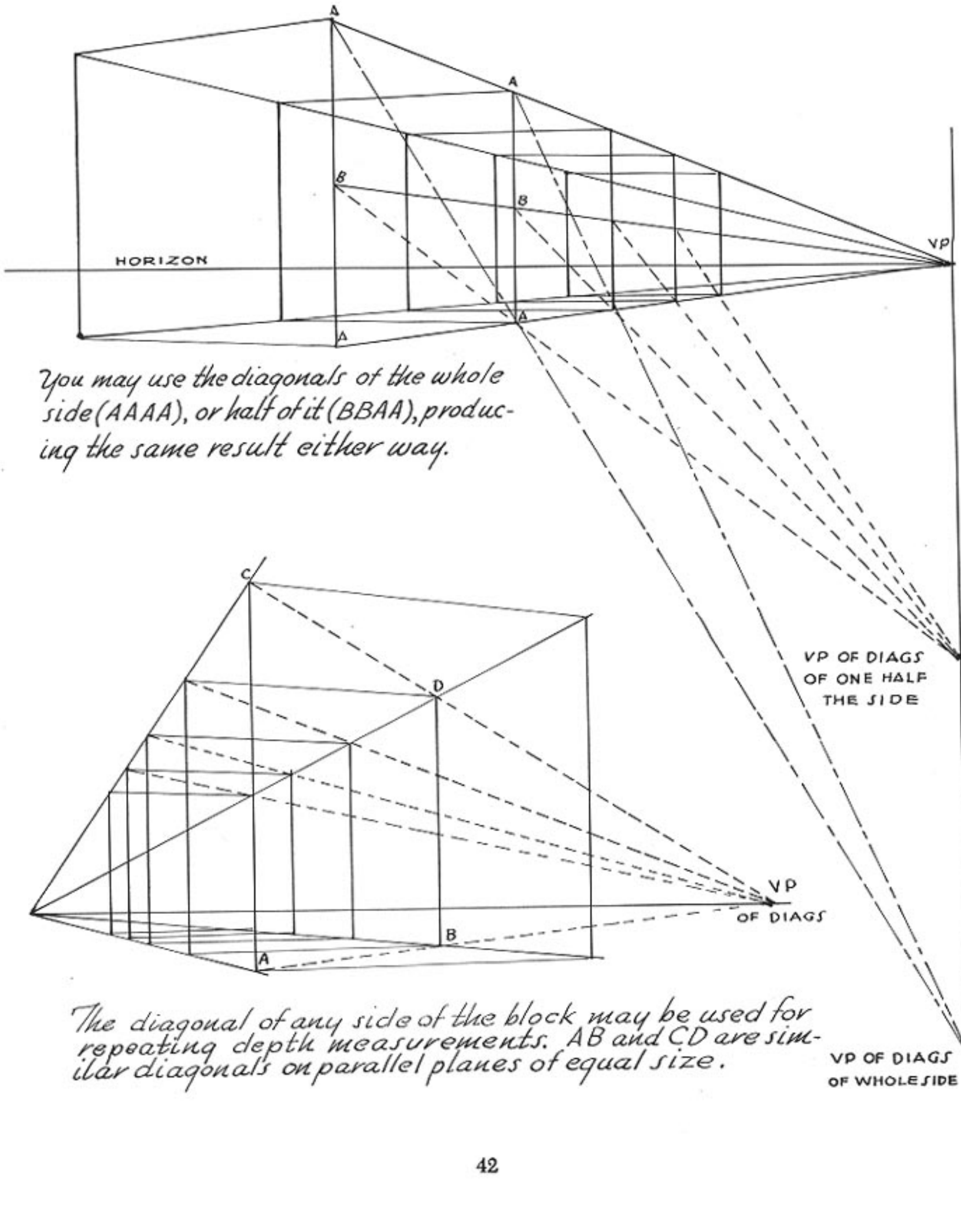
drawing below, while it appears to be com-
ated, is simple when you understand it. We
e divided a block into sections of four units
side and carried all the diagonals to their proper vanishing points. This is seldom necessary, but it illustrates the basic plan for diagonals in two-point perspective, and is important to know.



The vanishing point of the diagonals of the horizontal planes is located on the horizon. What is true of diagonals on vertical planes also applies to inclined planes, as we learn later, for their vanishing points also fall on a vertical line through the vanishing points of the vertical planes. It is necessary to study the drawing carefully to locate the diagonals of any particular section. Try drawing this.

EQUAL SPACING OF SOLIDS IN PERSPECTIVE

By the same method of measuring depth by means of diagonals we can also repeat a solid block, as shown below. This is valuable in drawing buildings of repeating dimensions or any row of objects that are constructed within equal blocks. Remember that all objects can be drawn within blocks.

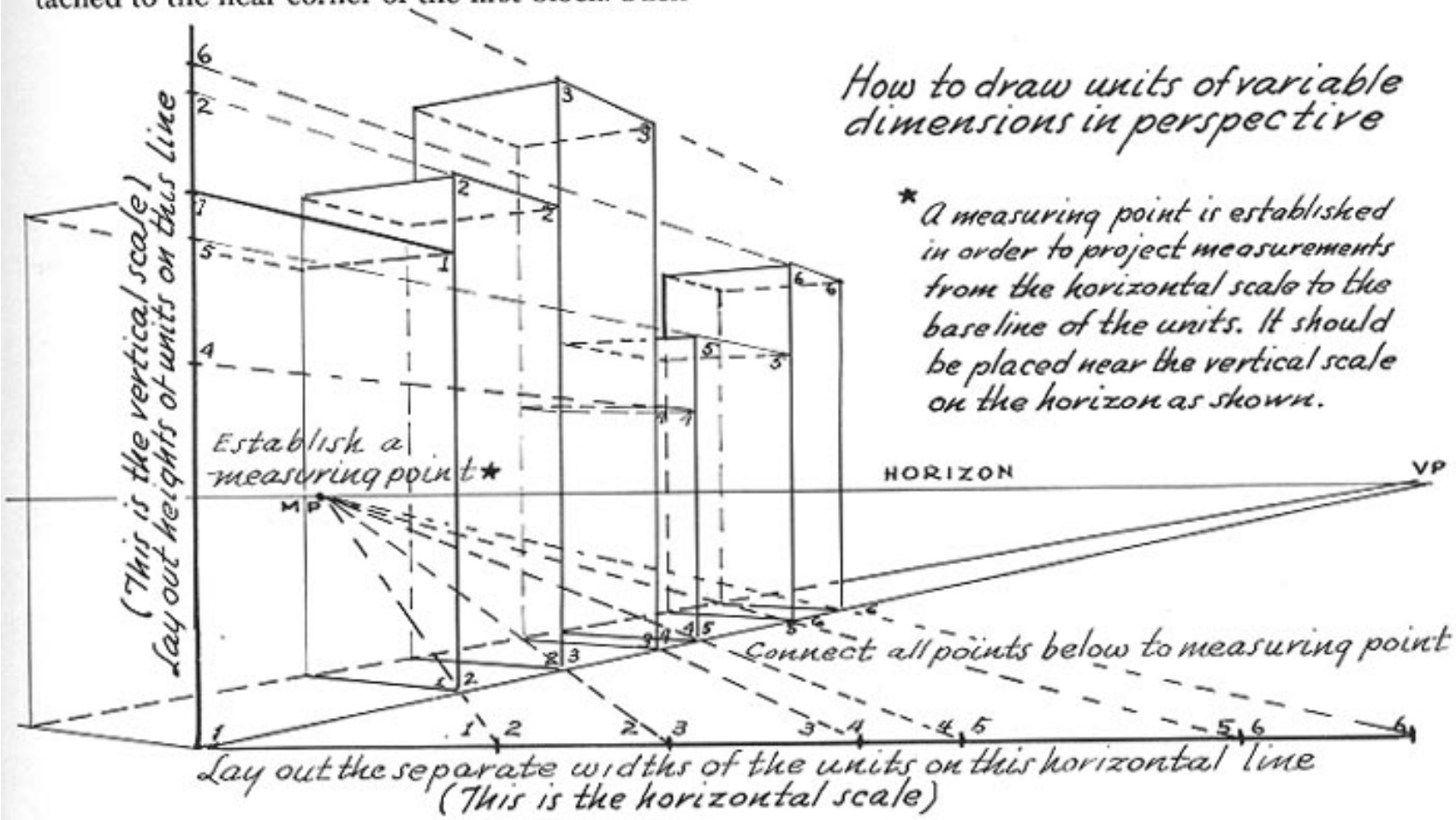


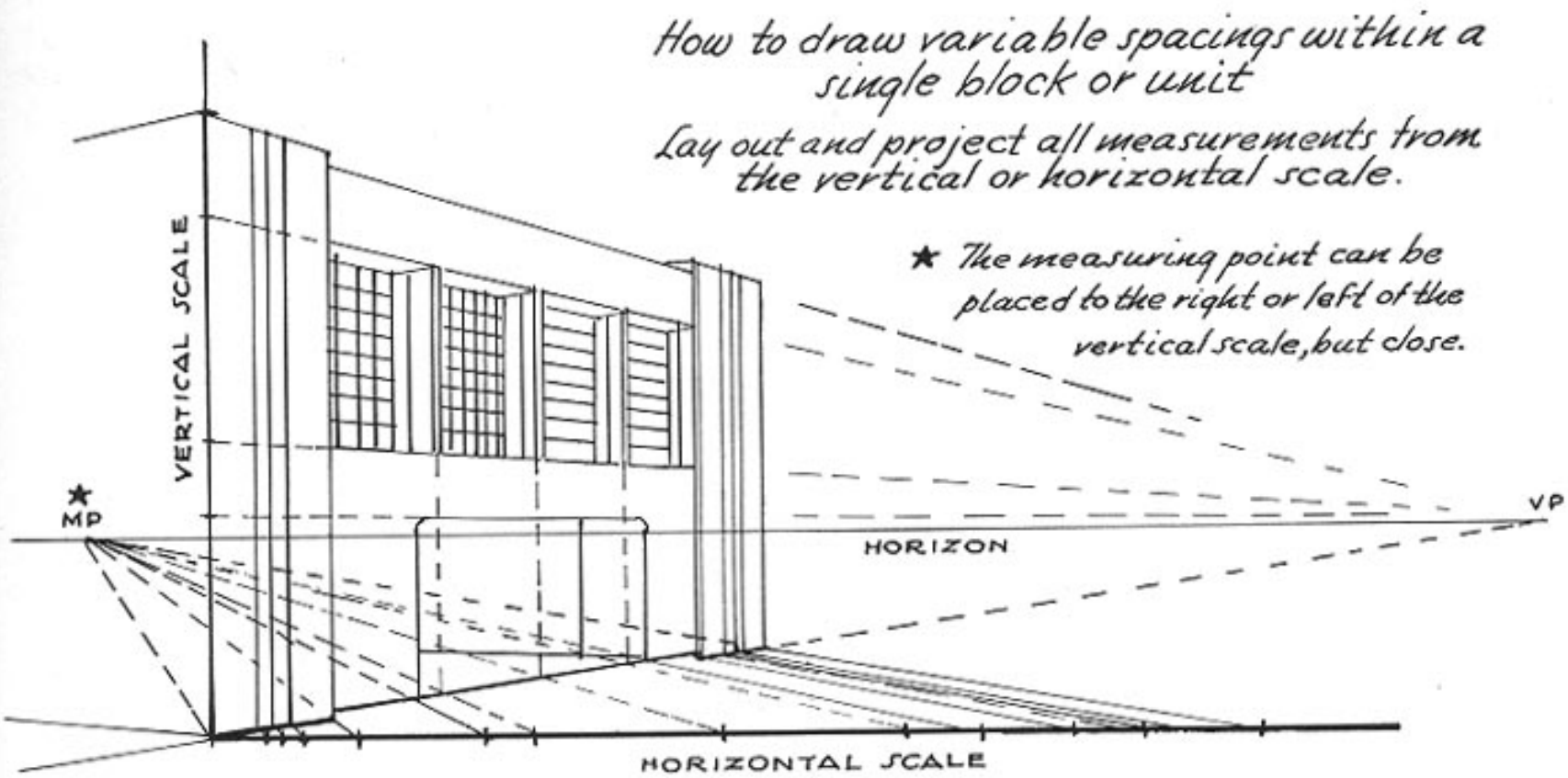
You may use the diagonals of the whole side (AAAA), or half of it (BBAA), producing the same result either way.

The diagonal of any side of the block may be used for repeating depth measurements. AB and CD are similar diagonals on parallel planes of equal size.

UNEQUAL SPACING OF SOLIDS IN PERSPECTIVE

Measurement of unequal depths in perspective becomes very simple if we use a vertical and a horizontal scale. The scale is a right angle attached to the near corner of the first block. Such an angle can be attached to any object, thus setting up a scale of measurement for all variable heights and widths.

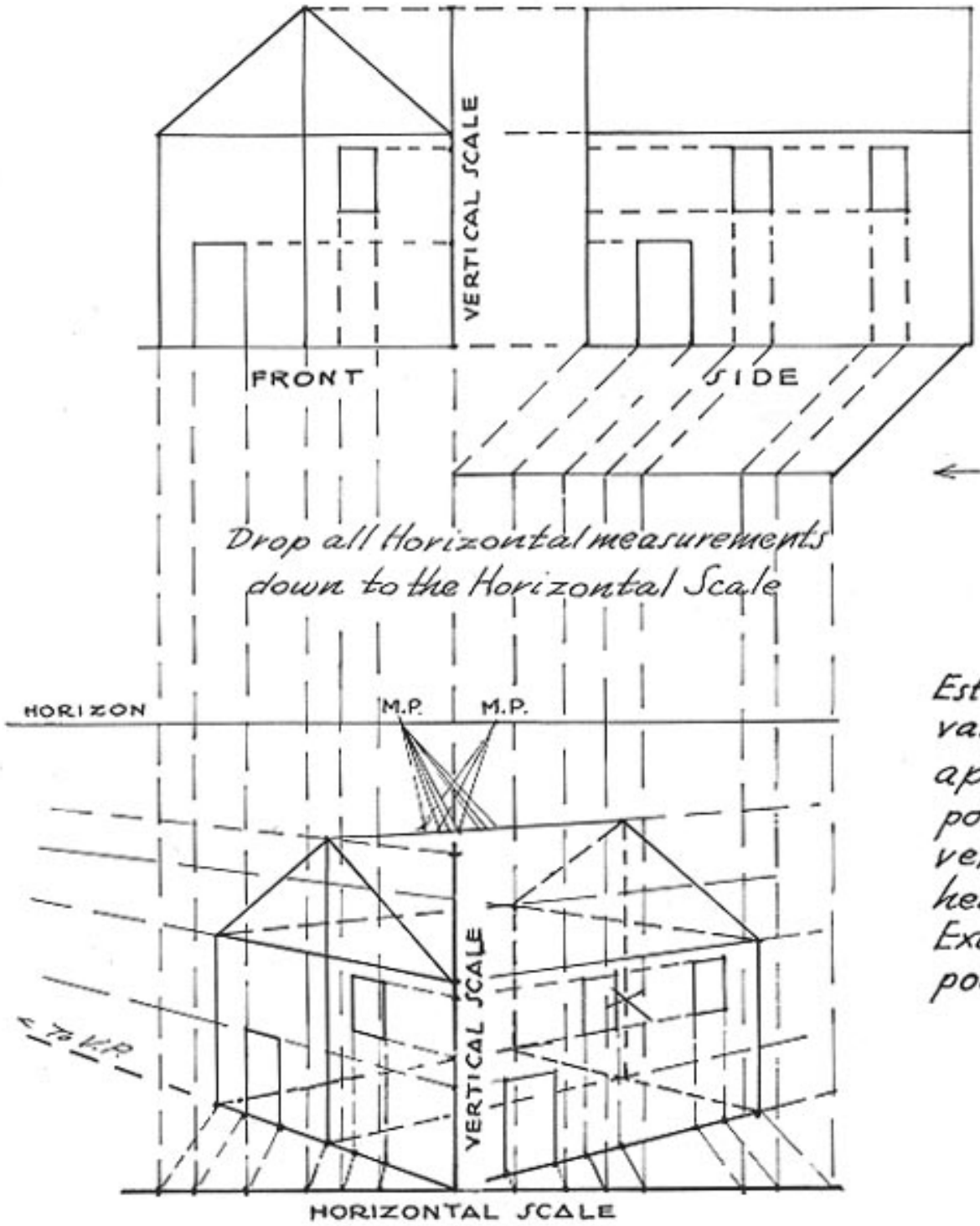




Measurements for all spaces may be set by choice or taken from a plan or scale elevation and laid out on the vertical and horizontal scale. They are then projected in perspective in the manner shown in this drawing.

SIMPLE PROJECTION IN PERSPECTIVE

Here is a very simple method of projecting dimensions and spacings in perspective. The top drawing shows the front and side elevations of a house. The dimensions of these create a vertical and a horizontal scale. The horizontal spacings are projected to the base lines by means of two measuring points. The vertical spacings are transferred to the vertical scale of the perspective drawing and projected to the vanishing points.



First draw the front and side elevations of a building of any dimensions or design, to a scale.

Bring the corners together with parallel lines.

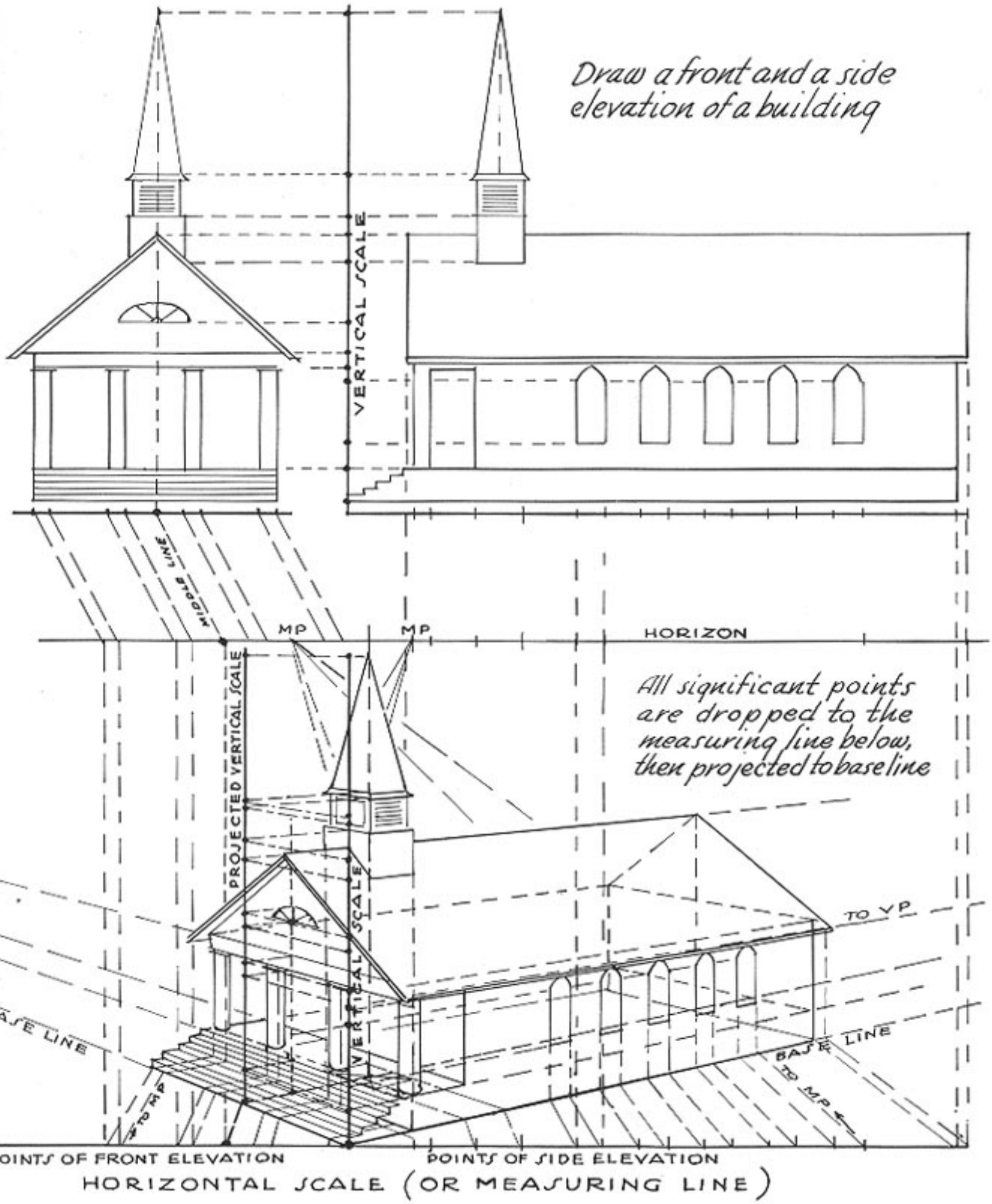
Drop all Horizontal measurements down to the Horizontal Scale

Establish a horizon with two vanishing points set well apart. Place a measuring point on each side of the vertical scale. Lay out the heights on the vertical scale. Extend base lines to vanishing points at both right and left.

The points on the horizontal scale are all connected to the two measuring points through the base lines. In this way the spacings are carried back to the building. Then by running perpendiculars up the walls at these points, we determine the lateral spacings in perspective. The points of the vertical scale are carried out to the vanishing points, thus establishing the vertical spacings on the perpendiculars brought up from the base lines.

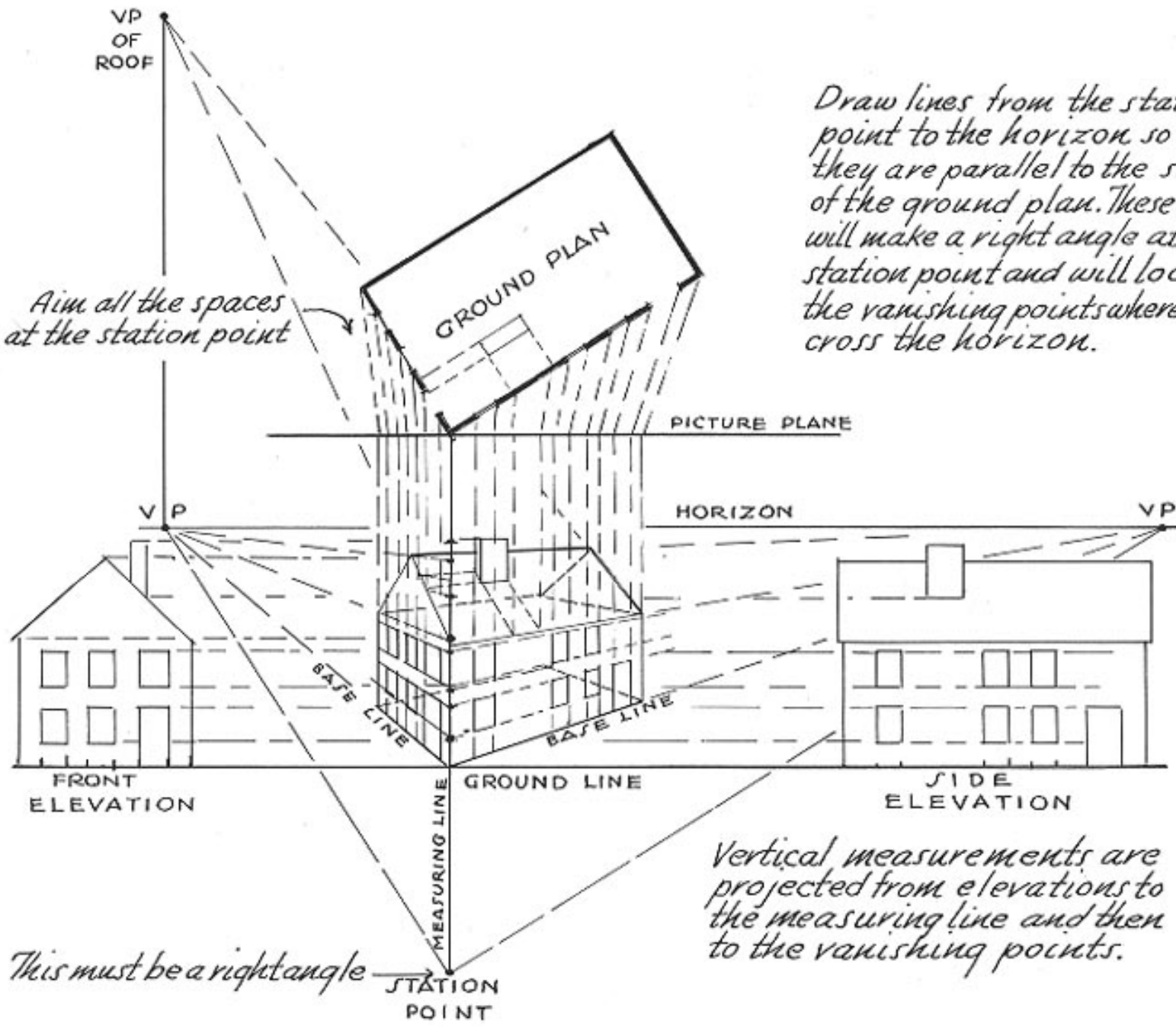
PROJECTING THE VERTICAL SCALE

The vertical scale can be projected to any part of a drawing. In the drawing below it is more practical to place the scale in front of the middle of the building, so we move it from the front corner of the steps, along the base line to the middle line, which has been projected down from the front elevation to the measuring line or horizontal scale.



ARCHITECTS' PERSPECTIVE

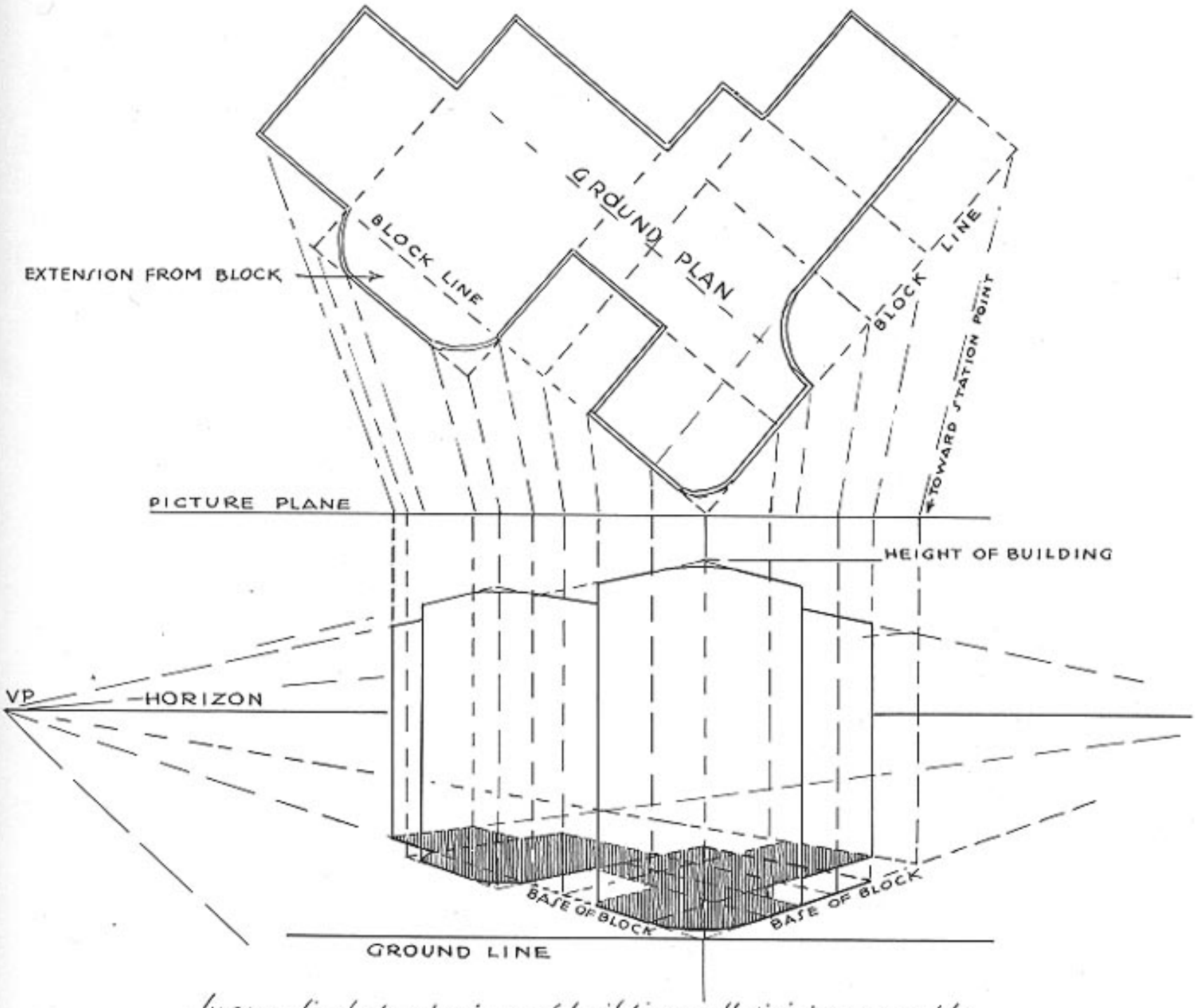
This is the way an architect renders ground plans and elevations in perspective. This knowledge makes it possible for an artist to draw any building to scale. Both vertical and horizontal spacing of units can be achieved with accuracy. Note that another point, called the "station point," has been employed here.



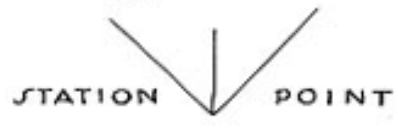
The station point represents the position of the observer. First we lay out a ground plan and place it at whatever angle we choose to view the building. We drop a vertical line down from the close corner. At this corner we also draw a horizontal line to represent the picture plane. A horizon can be established at any height above a ground line, both crossing the vertical. This vertical becomes a measuring line. Set a station point below the ground line. Lines aiming at the station point are drawn from the ground plan to the picture plane. All spacing is then projected to the base lines.

ARCHITECTS' PERSPECTIVE

In this drawing we have a rather complicated ground plan. But remembering that "any form can be built within a box," we make use of this truth to simplify the rendering in perspective of this odd shape. We are concerned here with setting the ground plan on the ground plane, using a single over-all height for the building.

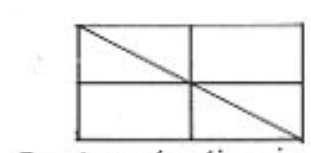


In complicated exteriors of buildings, all divisions must be extended to the baselines, or the lines which run out to the two vanishing points from the front corner of the building. This amounts to placing the building within a rectangular block. The division points are brought down from the picture plane to the base lines then carried back to the vanishing points. Study this.



SCALING YOUR PICTURE

This is an answer to perhaps the greatest puzzler in perspective drawing. By this method the base line of the picture may be set at any distance from the observer and an accurate scale set up in square feet, or other units, for the whole picture area. This gives both vertical and horizontal scaling.



Rectangles having a similar diagonal will equal each other.

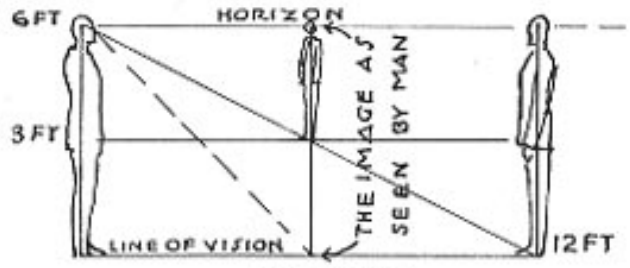
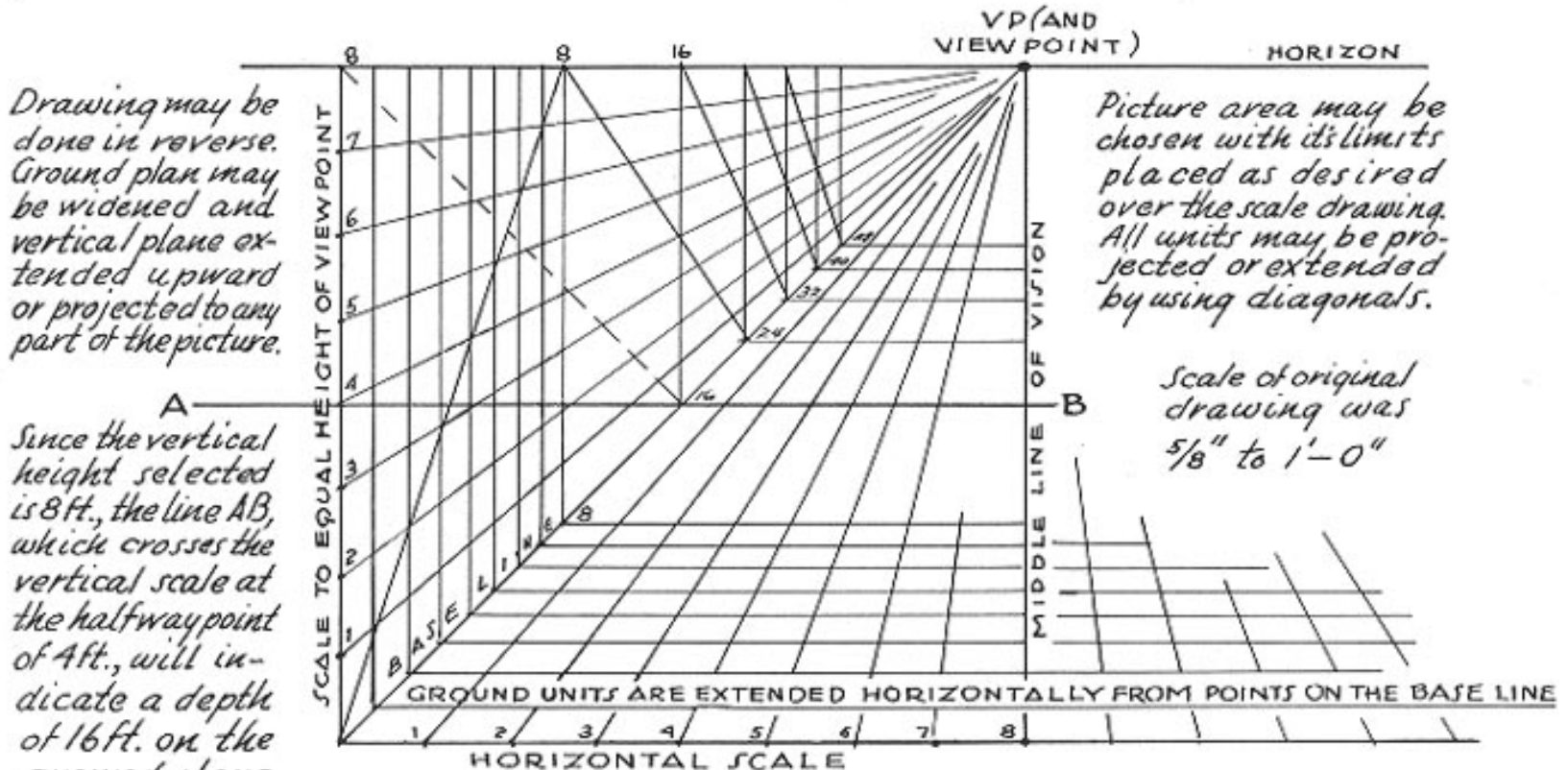


FIG. I

From the geometrical truth here shown, we learn that one half the picture area of the ground plane is taken up by a distance equal to twice the height of the viewpoint. Example: When viewing the horizon from a height of six feet (Fig. I), one half the vertical distance to the horizon will be taken up by the first twelve feet.

EXAMPLE OF SINGLE-POINT PERSPECTIVE SCALING

SHOWING A GROUND PLANE VIEWED FROM A HEIGHT OF EIGHT FEET



Drawing may be done in reverse. Ground plan may be widened and vertical plane extended upward or projected to any part of the picture.

Since the vertical height selected is 8 ft., the line AB, which crosses the vertical scale at the halfway point of 4 ft., will indicate a depth of 16 ft. on the ground plane.

Picture area may be chosen with its limits placed as desired over the scale drawing. All units may be projected or extended by using diagonals.

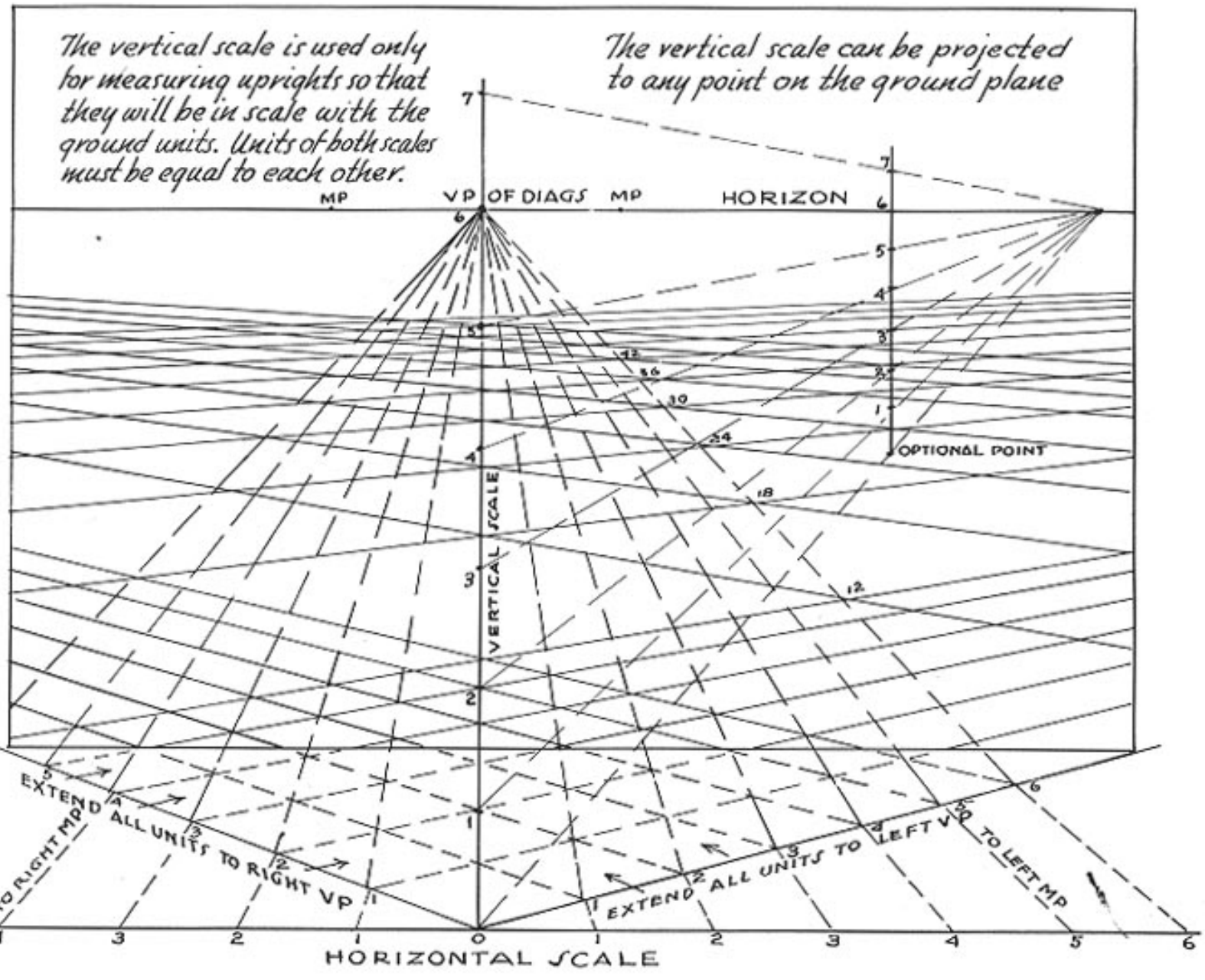
Scale of original drawing was 5/8" to 1'-0"

Select height for a viewpoint. Establish a horizon through the viewpoint. Construct a horizontal and a vertical scale, both equal to the height of viewpoint. These, with the horizon, will complete a square. Mark off feet units on both scales. Draw the horizontal AB through the halfway point of vertical scale. Connect all units to the vanishing point (in this case, the viewpoint). Erect perpendicular where line AB crosses base line. Reduce areas to square feet by using diagonals.

SCALING YOUR PICTURE

Scaling the ground plane for two-point perspective requires the usual two vanishing points set wide apart. The horizontal scale is set on or below the bottom line of the picture. The vertical scale is practical when placed at the near corner of the first square. The horizon can be set at any height you choose.

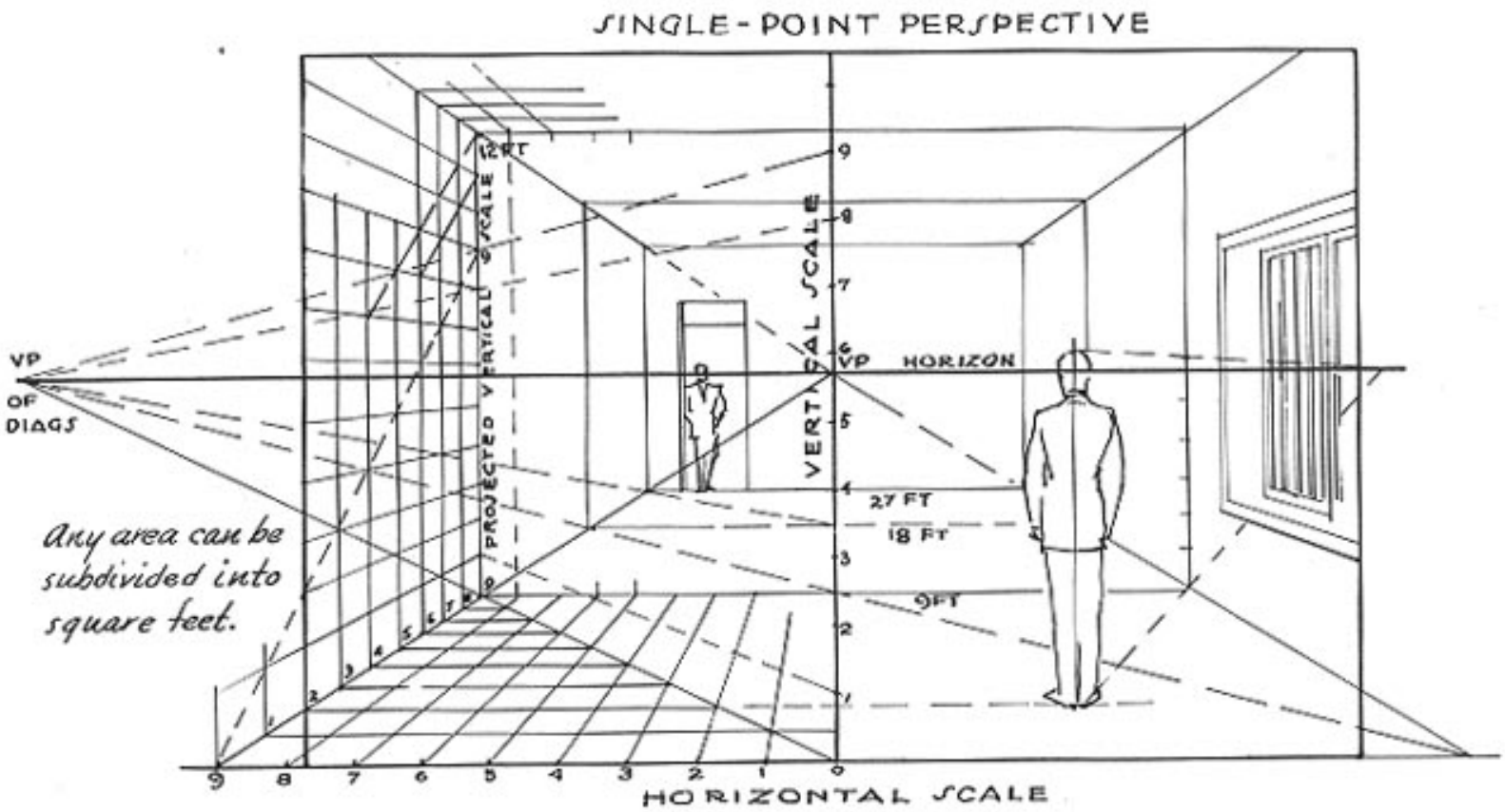
TWO-POINT PERSPECTIVE



Establish two measuring points, one on each side of the vertical scale, evenly spaced on the horizon, (MP). From point zero establish base lines to both vanishing points. Connect horizontal scale units to reach baselines on both sides by lines pointing at MP's. This marks off units in perspective on both base lines Extend these units to both vanishing points. After you have established some squares, you can locate the vanishing point of the diagonals on the horizon. More squares will be marked off as the diagonals cross unit lines to the vanishing points.

SCALING THE INSIDE PLANES OF THE BLOCK

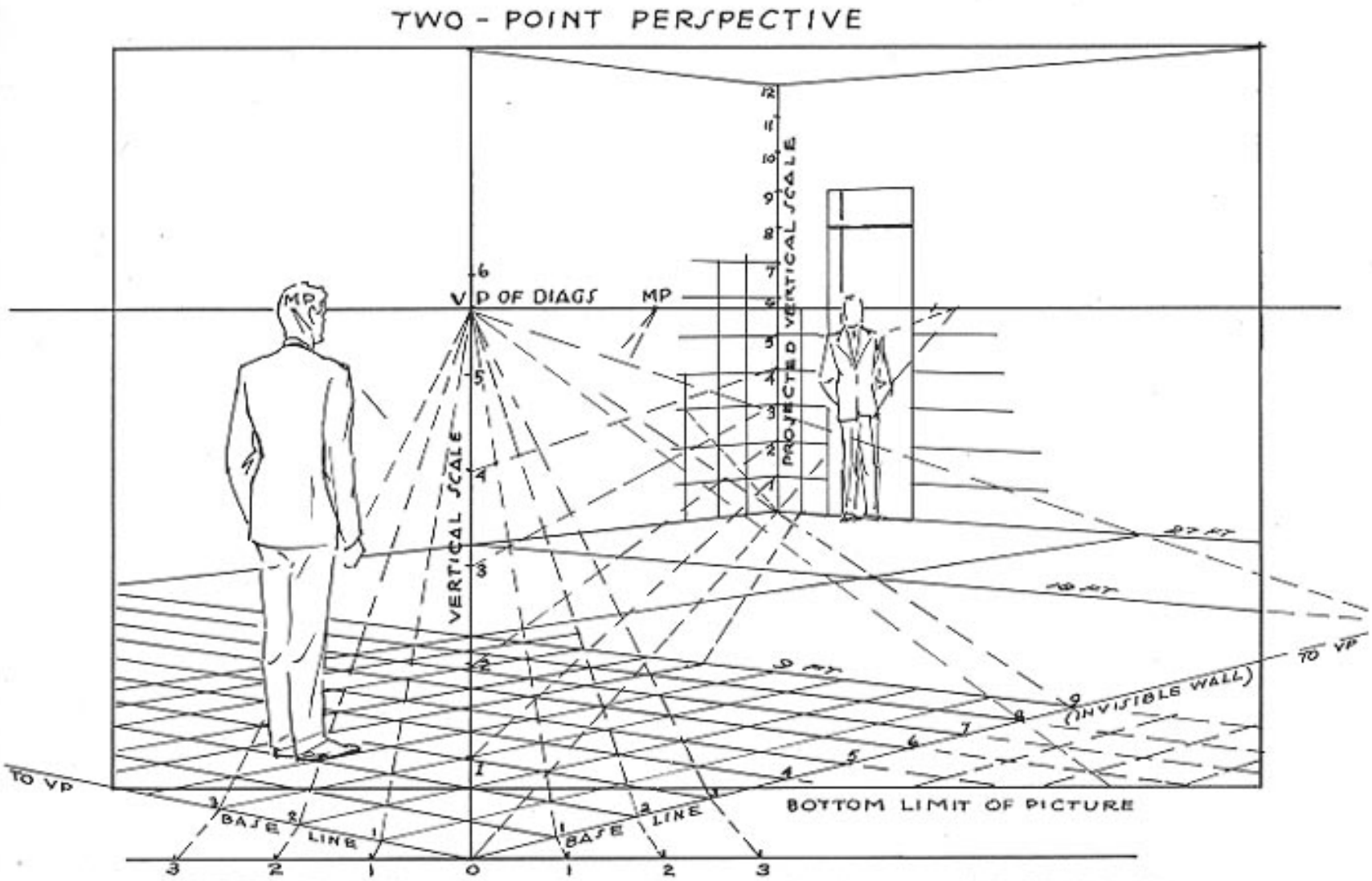
The vertical and horizontal scales can be used to scale any plane. Once we have the unit lines running in one direction, the diagonal of any square in crossing these lines marks off the units running in the other direction, for width or depth as the case may be. All diagonals of similar squares or units will have the same vanishing point.



In the drawing above the following problem is worked out. Draw a room 18 by 27 by 12 ft. at normal eyelevel, with two figures standing 25 ft. apart, in single-point perspective. Solution: Establish a vertical scale on a horizontal scale. Mark these off in foot units to be equal on both scales. Set the horizon at slightly less than 6 vertical feet. Set vanishing point at intersection of horizon and vertical scale. Connect horizontal units to VP. Establish depth of first square foot. Draw diagonal to horizon. This establishes VP of the diagonals for all receding units and also creates a unit 9 by 9 ft. Repeat this unit with diagonals as shown.

SCALING THE INSIDE PLANES OF THE BLOCK

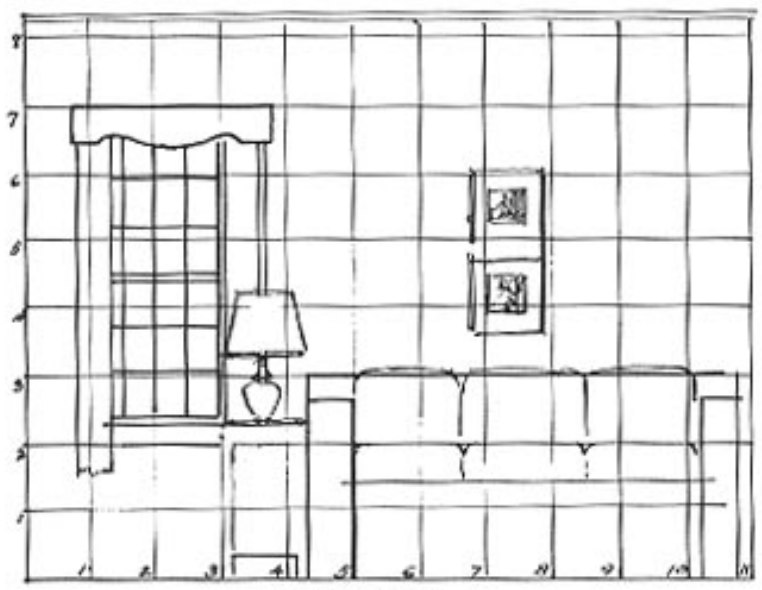
Here the previous problem has been changed to two-point perspective. This amounts to a change of viewpoint. Instead of looking straight down the middle of the room, the observer has moved to a theoretical position to the right of the figures. Only two walls are now visible. The full length of the room cannot be shown.



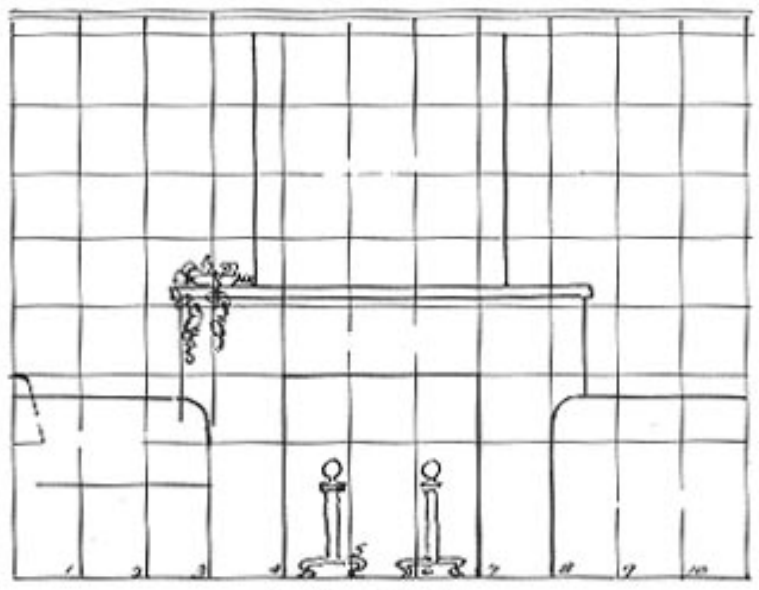
The squaring off of the ground plane, in the drawing above, is made simpler by establishing two measuring points, one to the left and one to the right of the vertical scale. The near corner of the room is dropped below the bottom limit of the picture. Units on the horizontal scale are projected up to the base lines of the floor by connecting them to the two measuring points. By the use of diagonals, we can mark off remaining units.

SCALING AN INTERIOR FROM ELEVATIONS

The importance of being able to scale inside walls and floors should be obvious to anyone interested in good drawing. When you can do this, you can draw any interior and any furnishings within an interior, keeping all things in scale or proportion to each other, and you know what size a figure should be at any spot in the room.

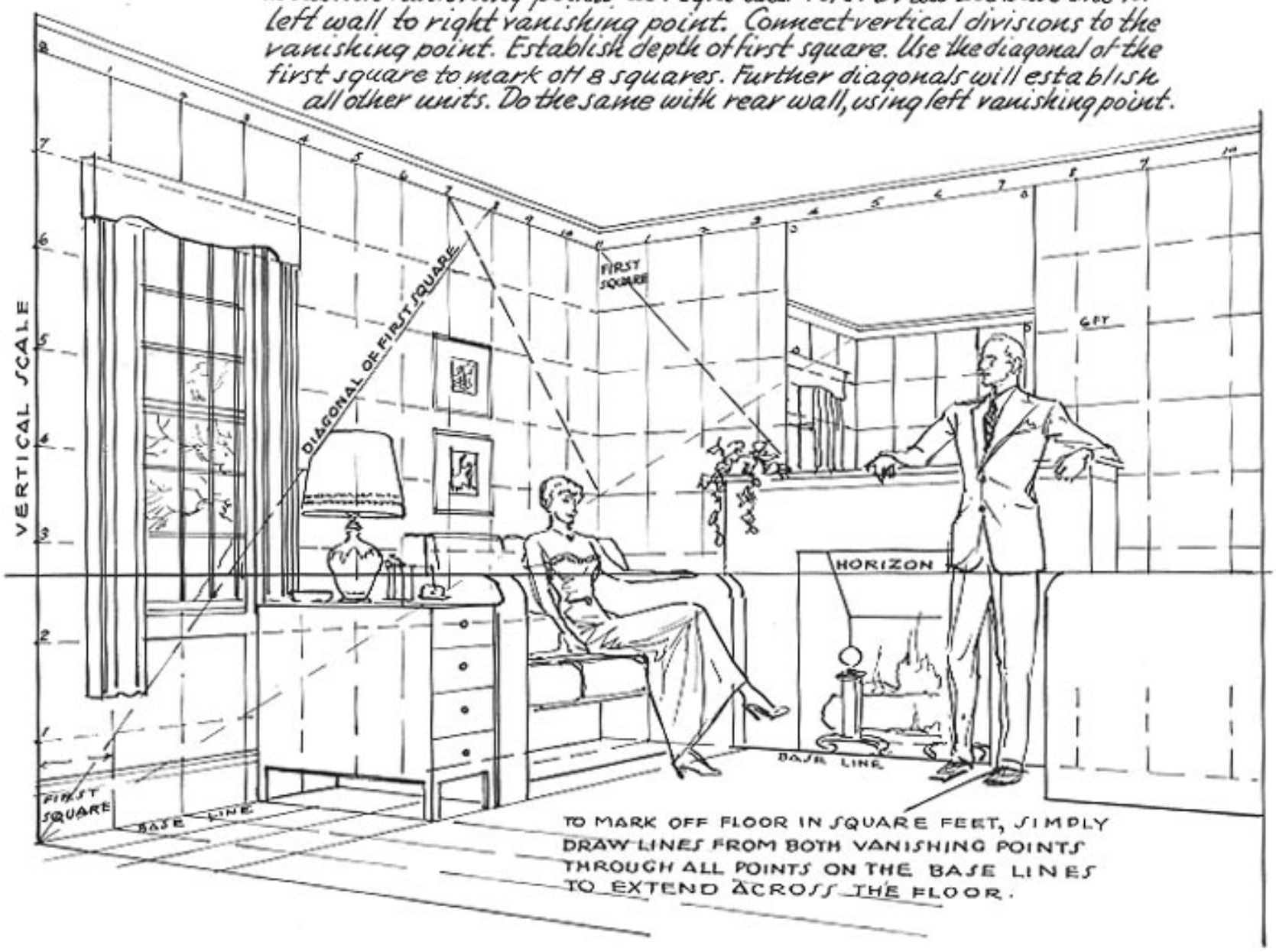


SIDE WALL



REAR WALL

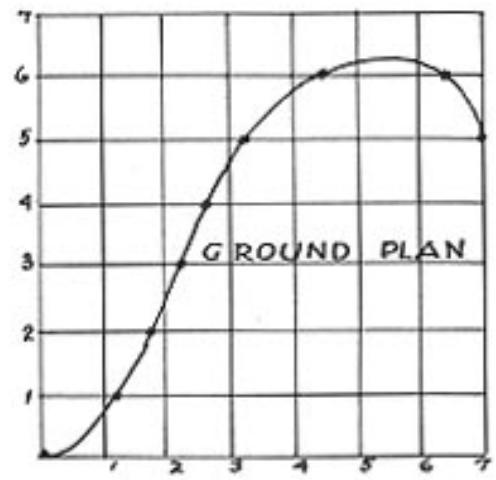
Establish a vertical scale. Mark off height of intended wall in feet. Establish a horizon cutting vertical scale at desired height. Establish vanishing points at right and left. Draw the base line for left wall to right vanishing point. Connect vertical divisions to the vanishing point. Establish depth of first square. Use the diagonal of the first square to mark off 8 squares. Further diagonals will establish all other units. Do the same with rear wall, using left vanishing point.

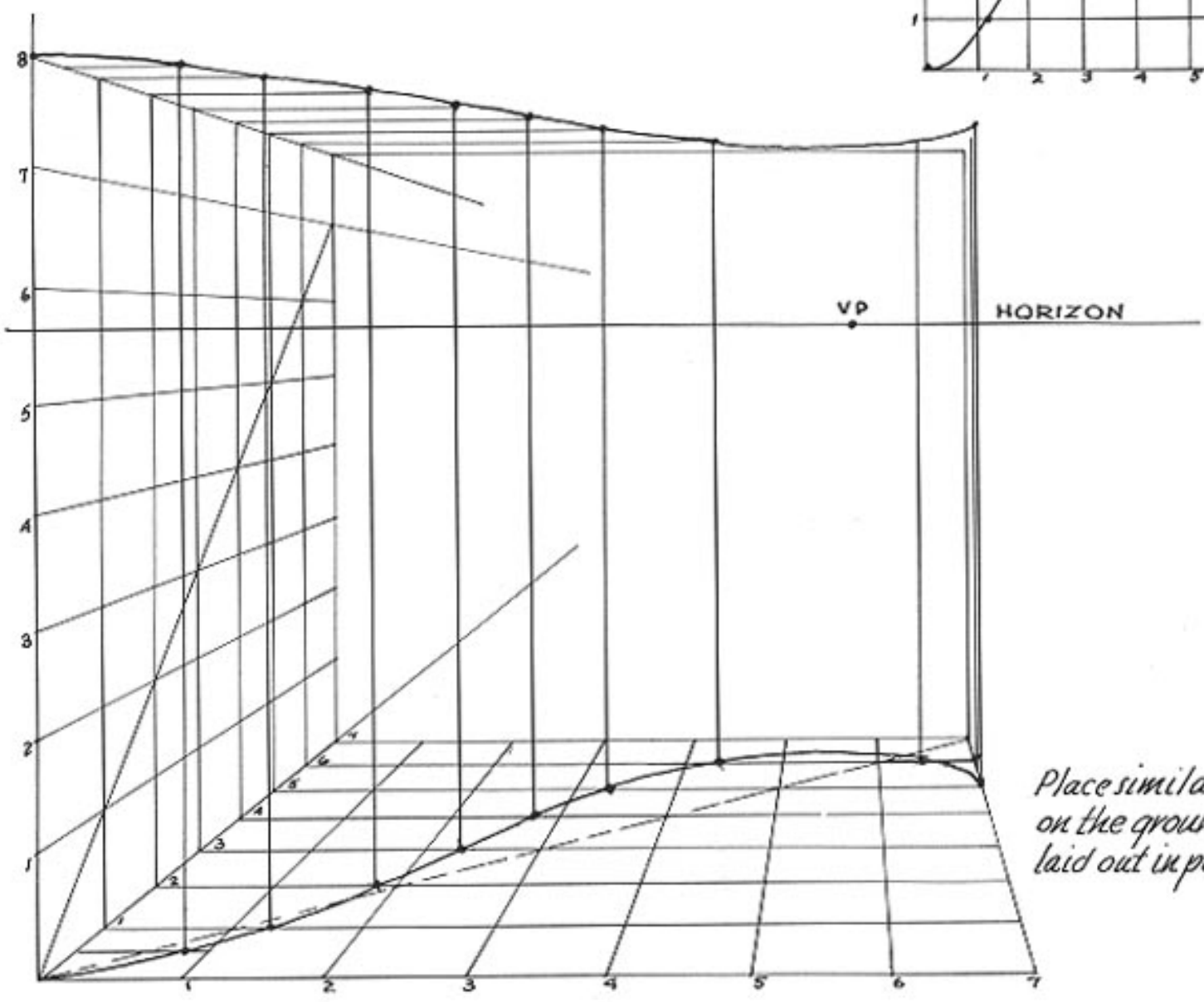


HOW TO DRAW A CURVED SURFACE IN PERSPECTIVE

The problem of drawing a curved surface in correct perspective is often puzzling. A simple solution is offered below. A ground plan is made, which can be scaled off in units, from which the curve can then be put into perspective.

Lay out a plan of the curve. Block it off in square units. Mark a point wherever the curve crosses the horizontals.



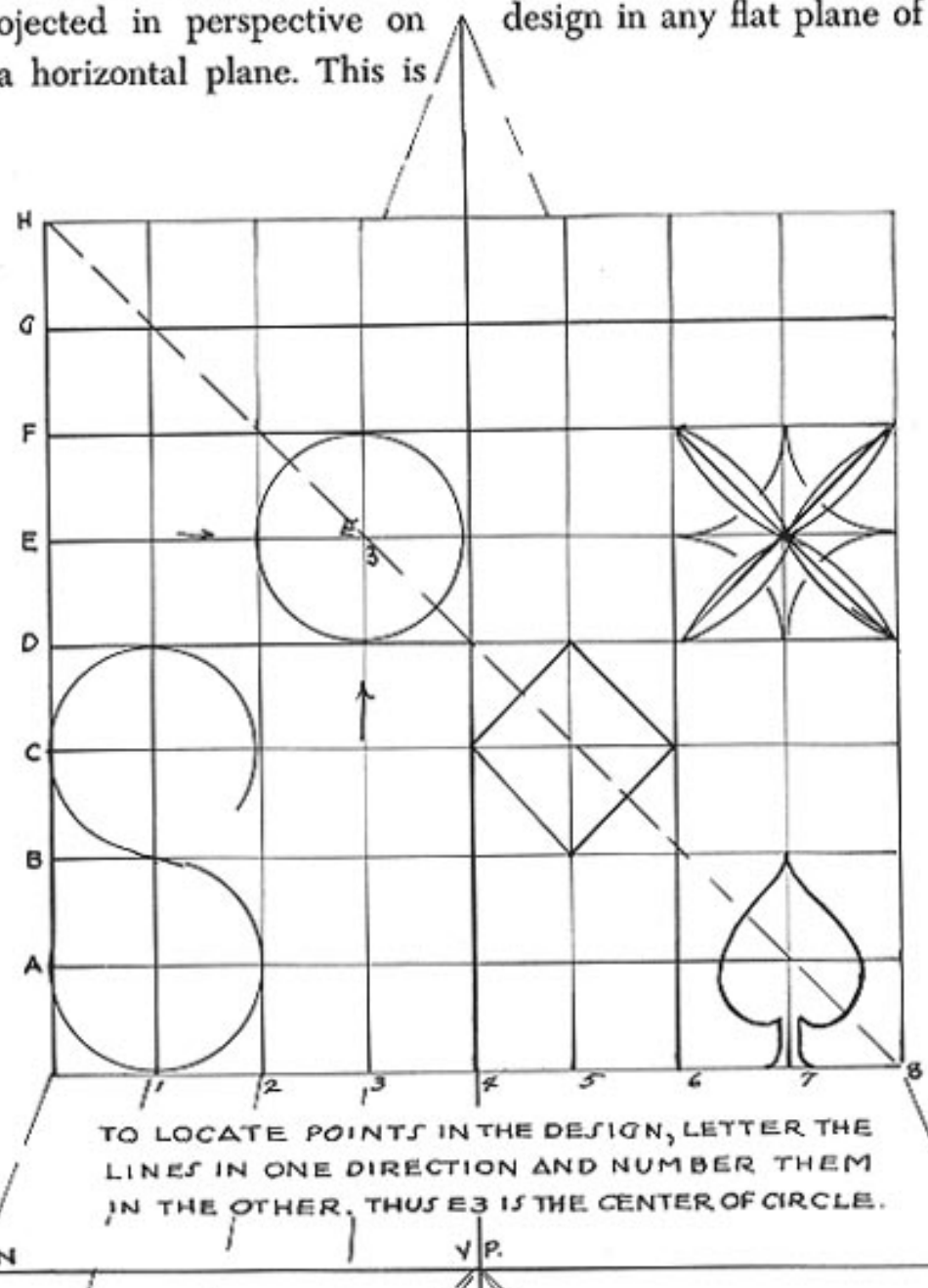


Place similar points on the ground plan laid out in perspective.

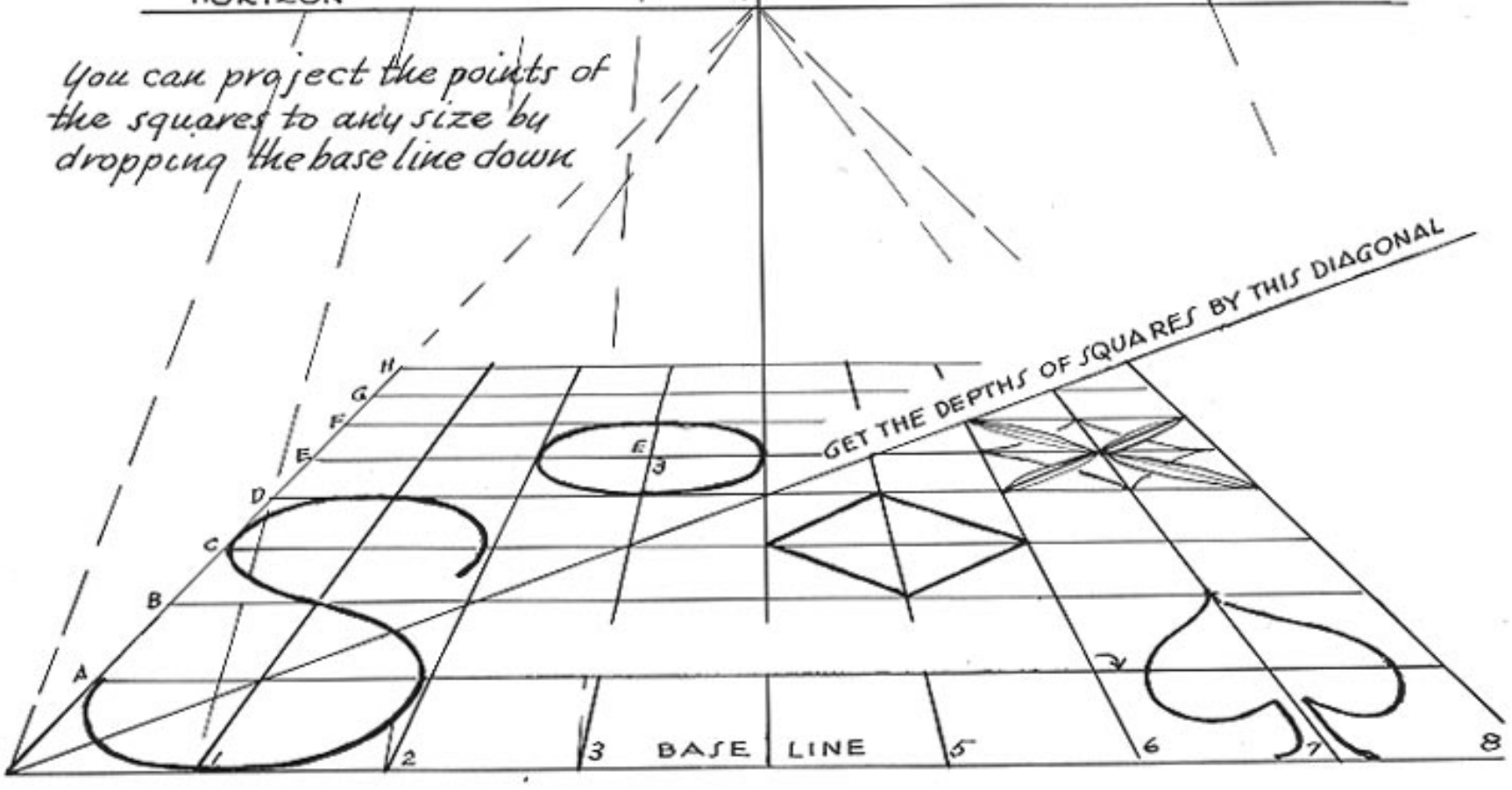
We set the plan on the ground plane in the usual manner, in either single or two-point perspective. We establish a scale of height at the close end of the plane. Vertical units are then squared off to form a straight wall at one side of the ground plan. Erect a perpendicular at every point where the curve crosses a horizontal division of the ground units. Draw a horizontal out to meet each perpendicular from the top of the side wall. This establishes the height of the curved plane at that point. Units may be bisected when necessary as shown in the first unit above.

SIMPLE PROJECTION

This is a simple but very valuable bit of working knowledge. Any drawing or design can be squared off and projected in perspective on either a vertical or a horizontal plane. This is practical for such things as lettering in perspective, wall and floor designs, or placement of any design in any flat plane of your subject.

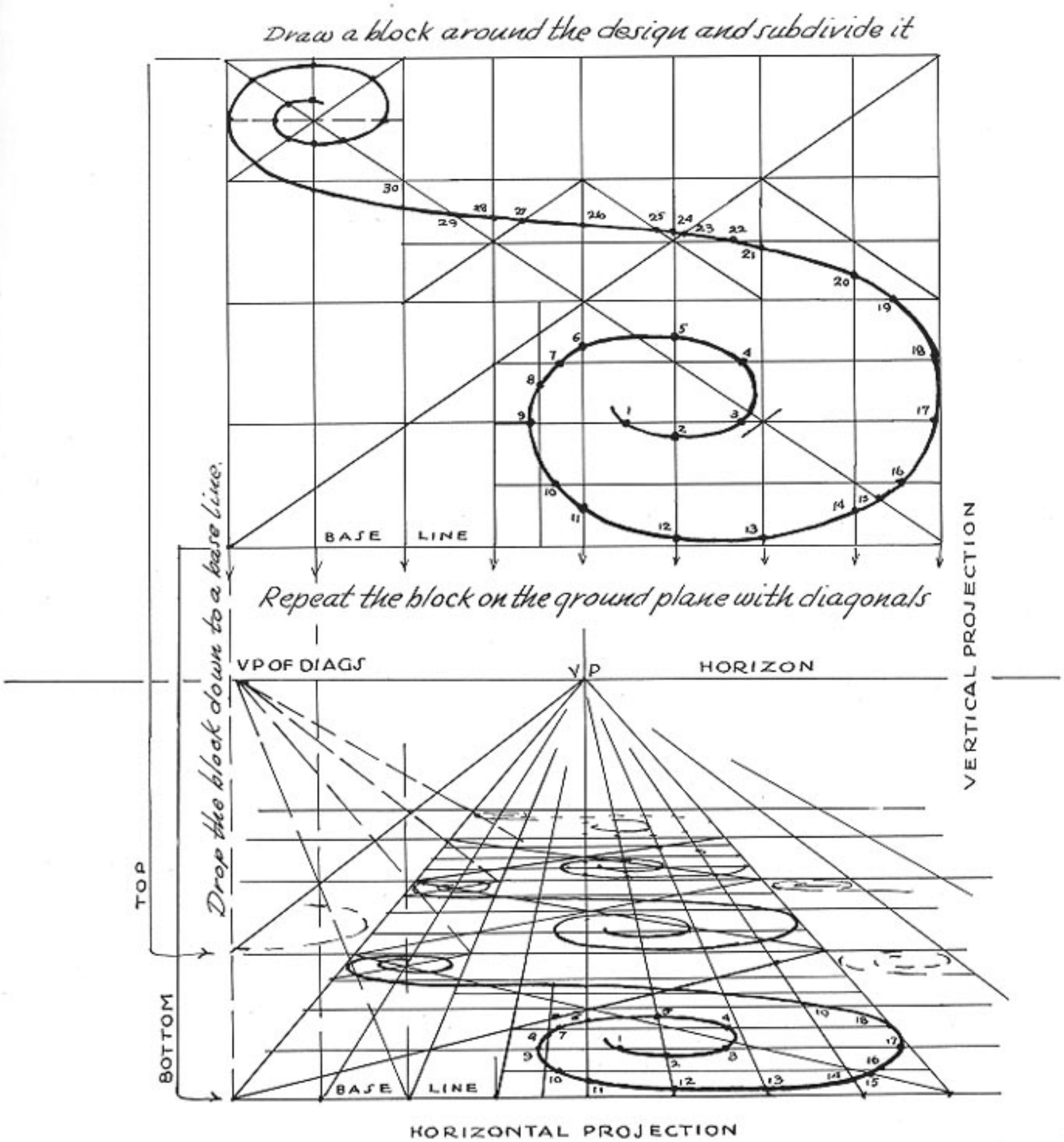


With the drawing turned this way, the same method can be applied to vertical planes. The middle line becomes the horizon.



REPEATING A DESIGN IN PERSPECTIVE

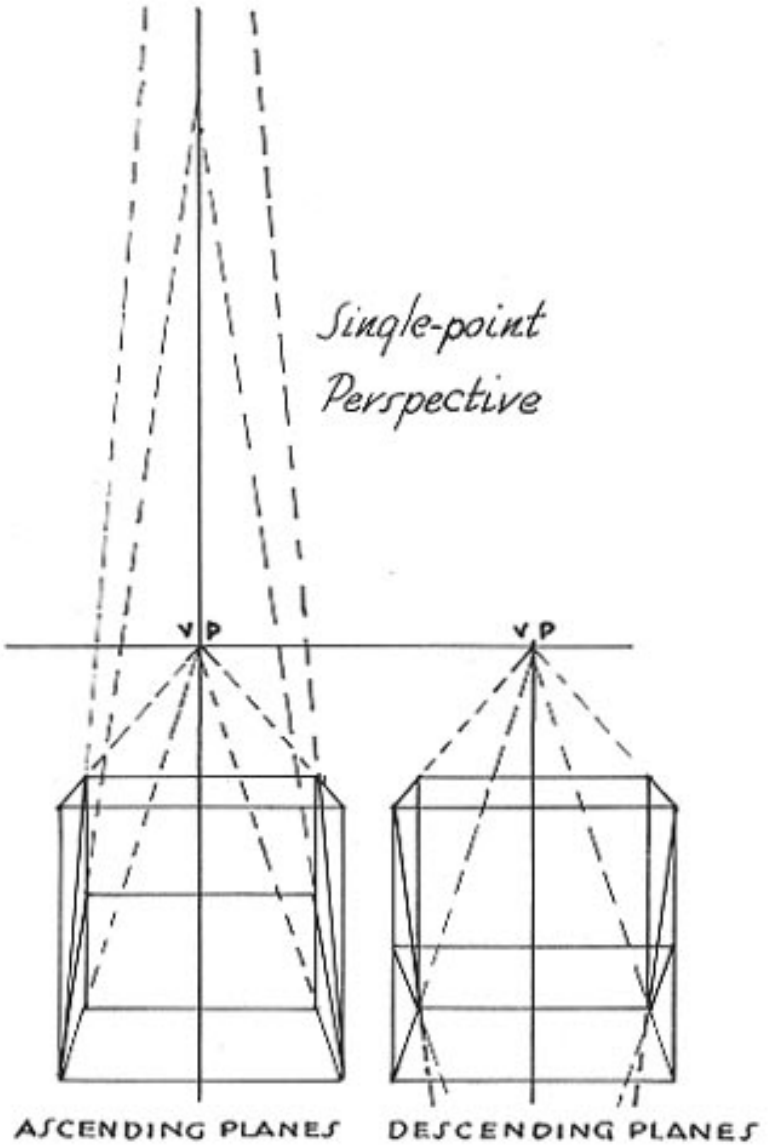
Any design can be repeated in perspective. Simply square off the design. The squares serve as guide lines for the points to be followed. By laying out such points on the squares, you can readily approximate the position of the points on the divided rectangle in perspective. Draw diagonals to repeat the blocks.

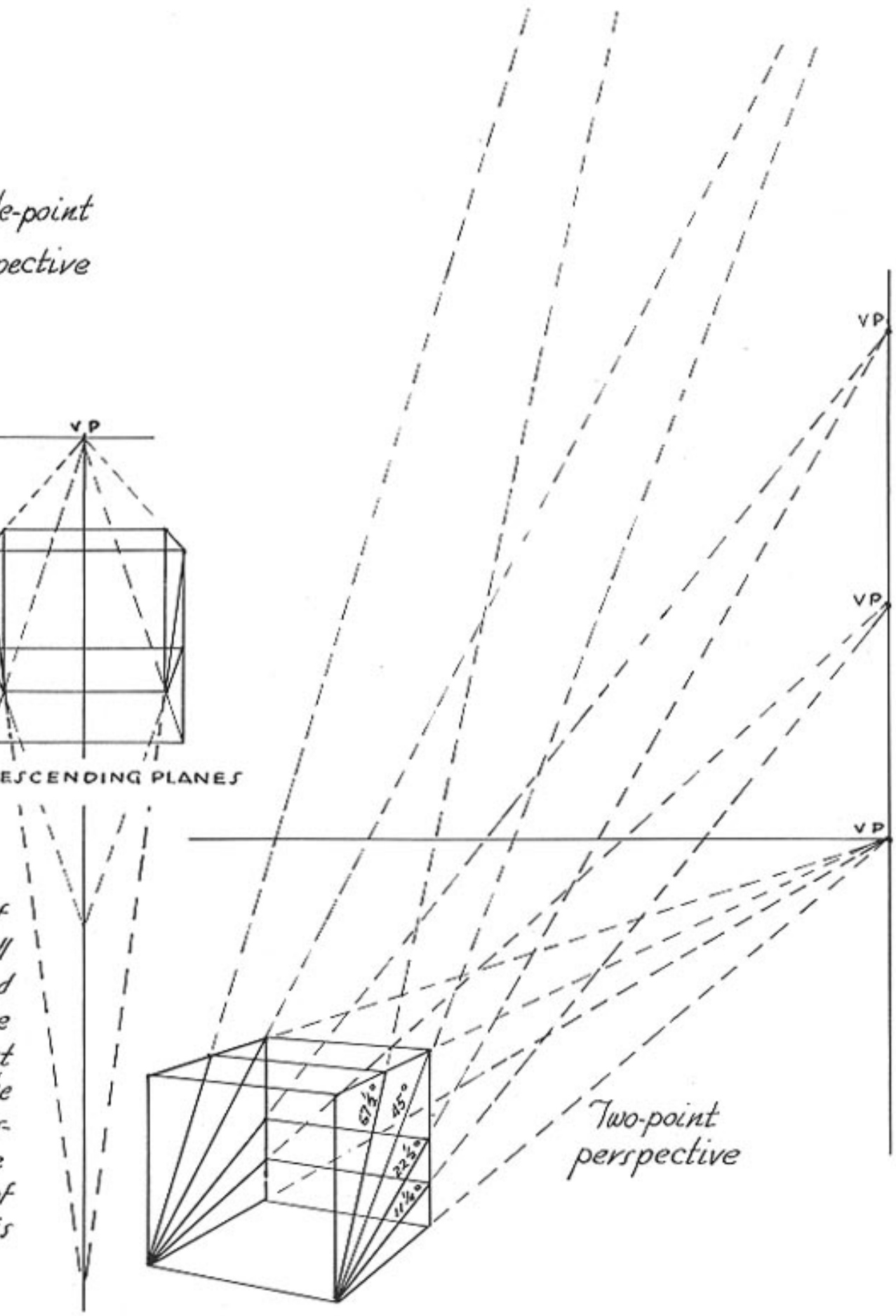


Lay out points wherever the design crosses the division lines of the block. Lay out similar points on the division lines of the block in perspective as shown below.

INCLINED PLANES IN PERSPECTIVE

The ground plane is always considered as a level plane stretching out to the horizon. All other level planes, or planes parallel to the ground plane, have their vanishing points on that horizon. Inclined planes vanish above or below the horizon.

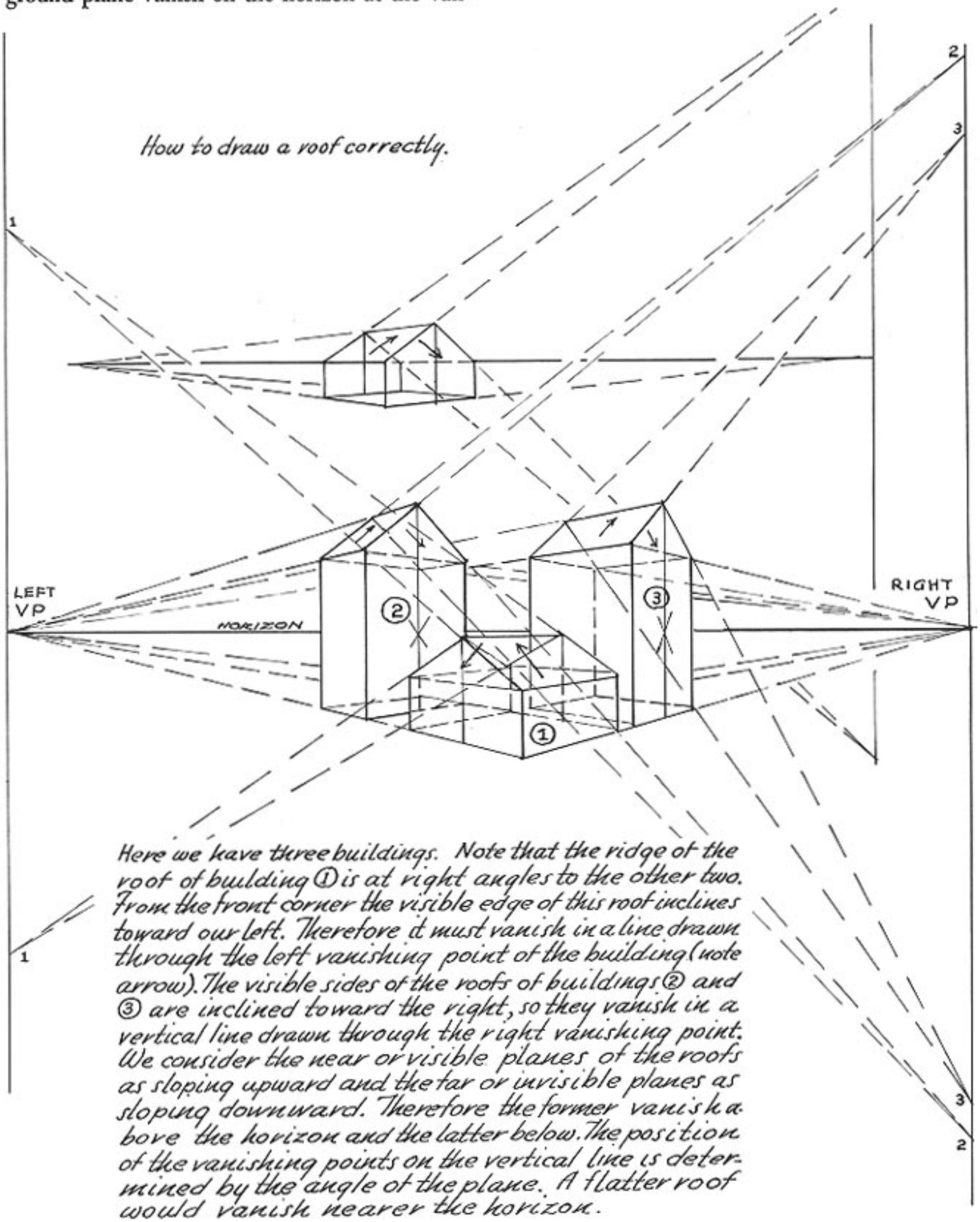




The vanishing points of inclined planes do not fall on the horizon of the ground plane, but on a vertical line through a vanishing point of a horizontal plane. The vanishing point of an ascending plane will be above the horizon, that of a descending plane is below the horizon.

INCLINED PLANES IN PERSPECTIVE

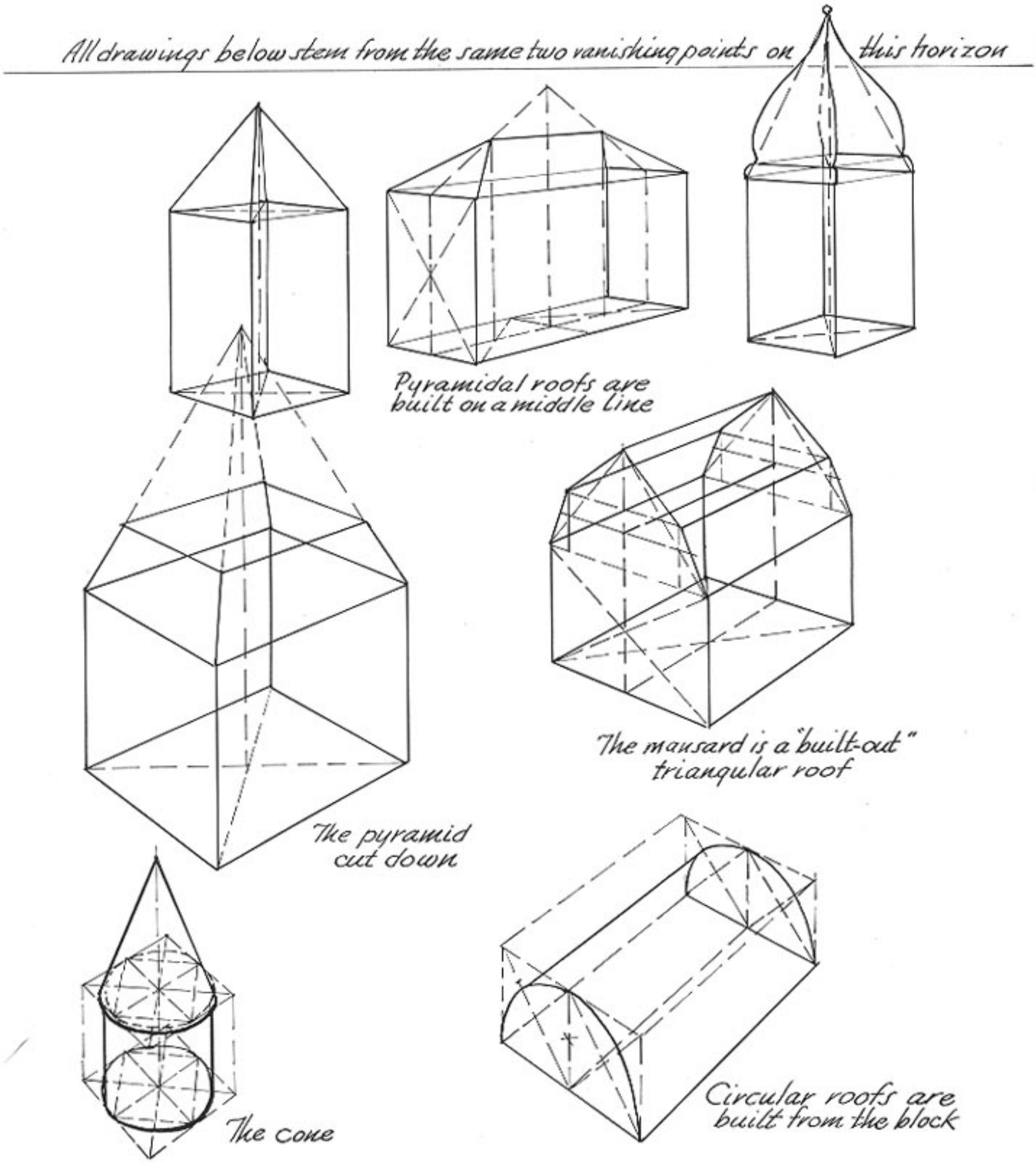
Drawing roofs is a problem to one who does not know perspective. A roof, being an inclined plane with two edges parallel to the ground, has two vanishing points. The edges parallel to the ground plane vanish on the horizon at the vanishing point of the building. The inclined edges vanish above or below the horizon on a vertical line drawn through the vanishing point of the building. Many artists do not know this.



Here we have three buildings. Note that the ridge of the roof of building ① is at right angles to the other two. From the front corner the visible edge of this roof inclines toward our left. Therefore it must vanish in a line drawn through the left vanishing point of the building (note arrow). The visible sides of the roofs of buildings ② and ③ are inclined toward the right, so they vanish in a vertical line drawn through the right vanishing point. We consider the near or visible planes of the roofs as sloping upward and the far or invisible planes as sloping downward. Therefore the former vanish above the horizon and the latter below. The position of the vanishing points on the vertical line is determined by the angle of the plane. A flatter roof would vanish nearer the horizon.

INCLINED PLANES IN PERSPECTIVE

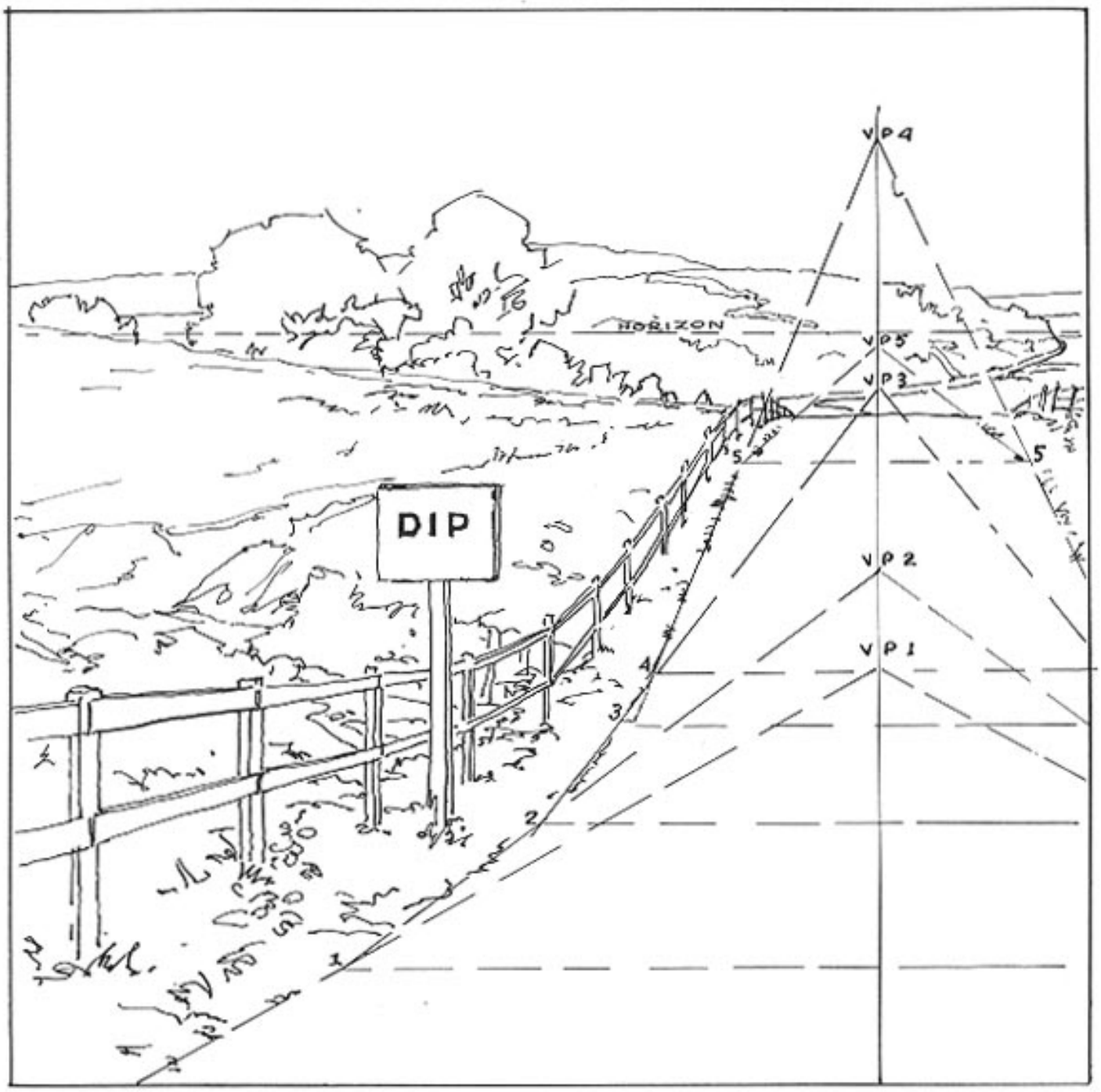
The pyramid and similar forms are exceptions to the general rule, in that they have no vanishing points except those for the base lines. A conical form has no vanishing points except those for the block inside which the form is constructed. We must always build such forms from a block in correct perspective, since there is no other way to relate them to the horizon.



INCLINED PLANES IN PERSPECTIVE

We must understand that inclined planes do not vanish at the eye level or on the picture horizon. The horizon has only to do with level planes and planes with edges parallel to the level ground plane. This is confusing to the average student. Ascending planes always vanish above the horizon. Descending planes always vanish below the horizon. Try to remember this.

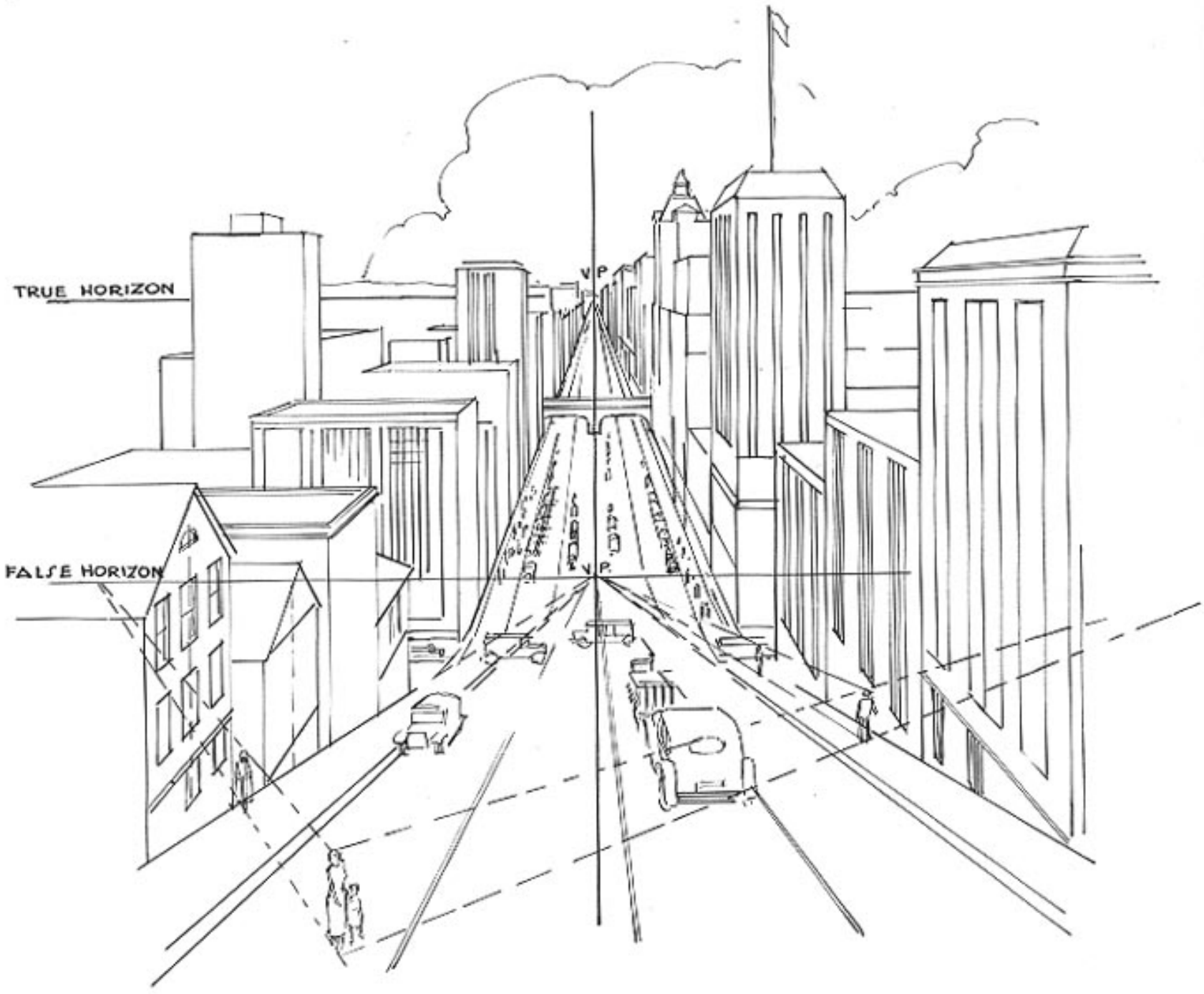
What to do when the ground plane is not level



In the drawing above, the road descends and then rises over a hillside. It then appears to drop over a crest into a valley below. This is accomplished by drawing the road in sections, each with a different vanishing point. As the angle of each section changes, the vanishing points are raised, then dropped, to follow the contours of the ground plane.

INCLINED PLANES IN PERSPECTIVE

The problem of drawing a downgrade in perspective becomes simple once you know the basic principle. A downgrade has its vanishing point below the horizon in a perpendicular line drawn through the vanishing point of the level planes. Note that there are two horizons. The upper one is the "true horizon." The lower one, not being an eye level, is a "false horizon."

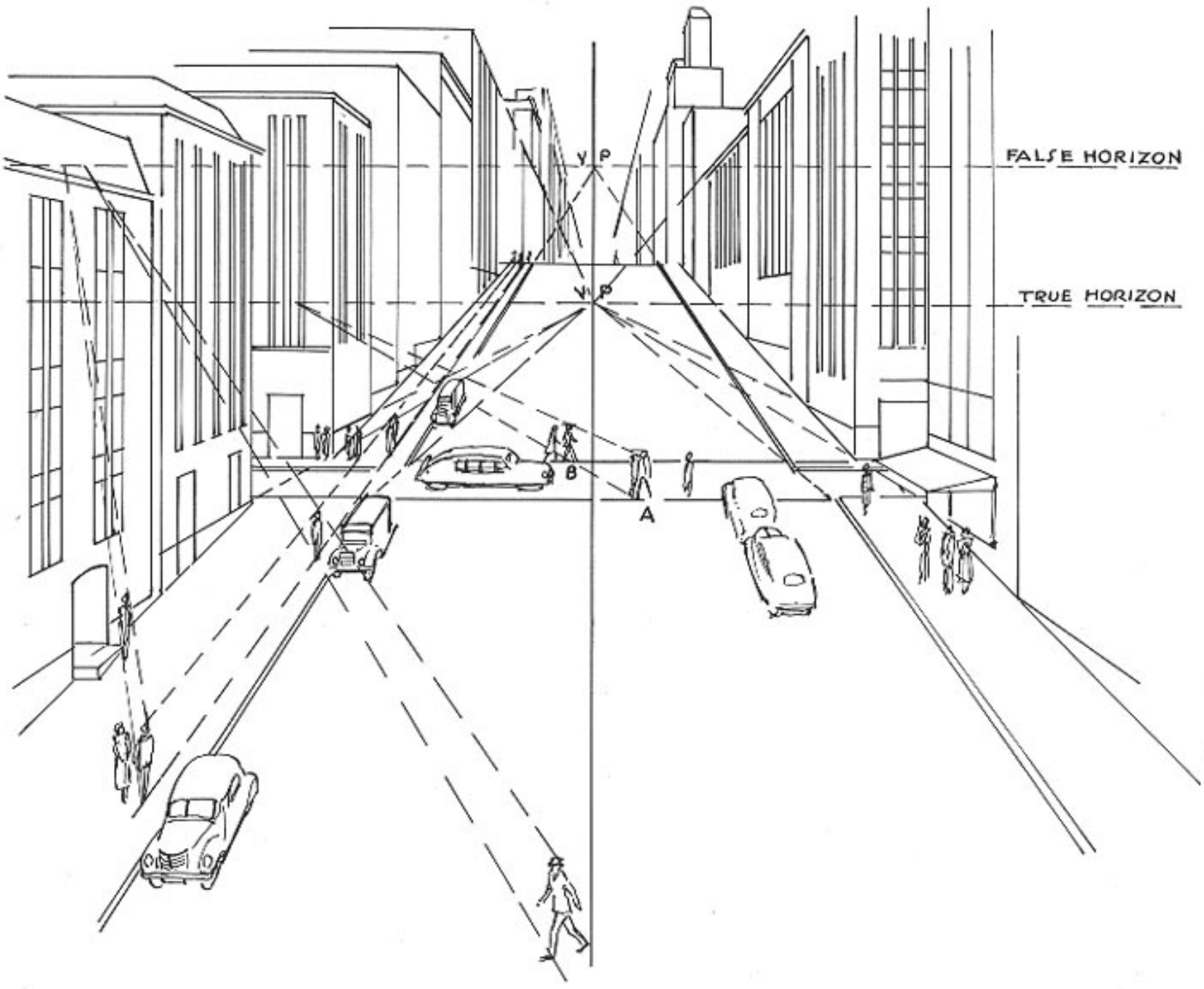


Looking Downhill

Since the roofs and floors of buildings are built on level planes, they vanish in a point on the level horizon. The sloping planes vanish in a "false horizon," above or below the ground level. The "true horizon" is always at eye level. Note that figures on the hill have been scaled to the lower horizon since they are affected by the slope.

INCLINED PLANES IN PERSPECTIVE

For an upgrade view, the perspective principle is the opposite of that for a downgrade, in that the false horizon is above the true horizon. The vanishing point of the slope falls on a vertical line drawn through the vanishing point on the true horizon.

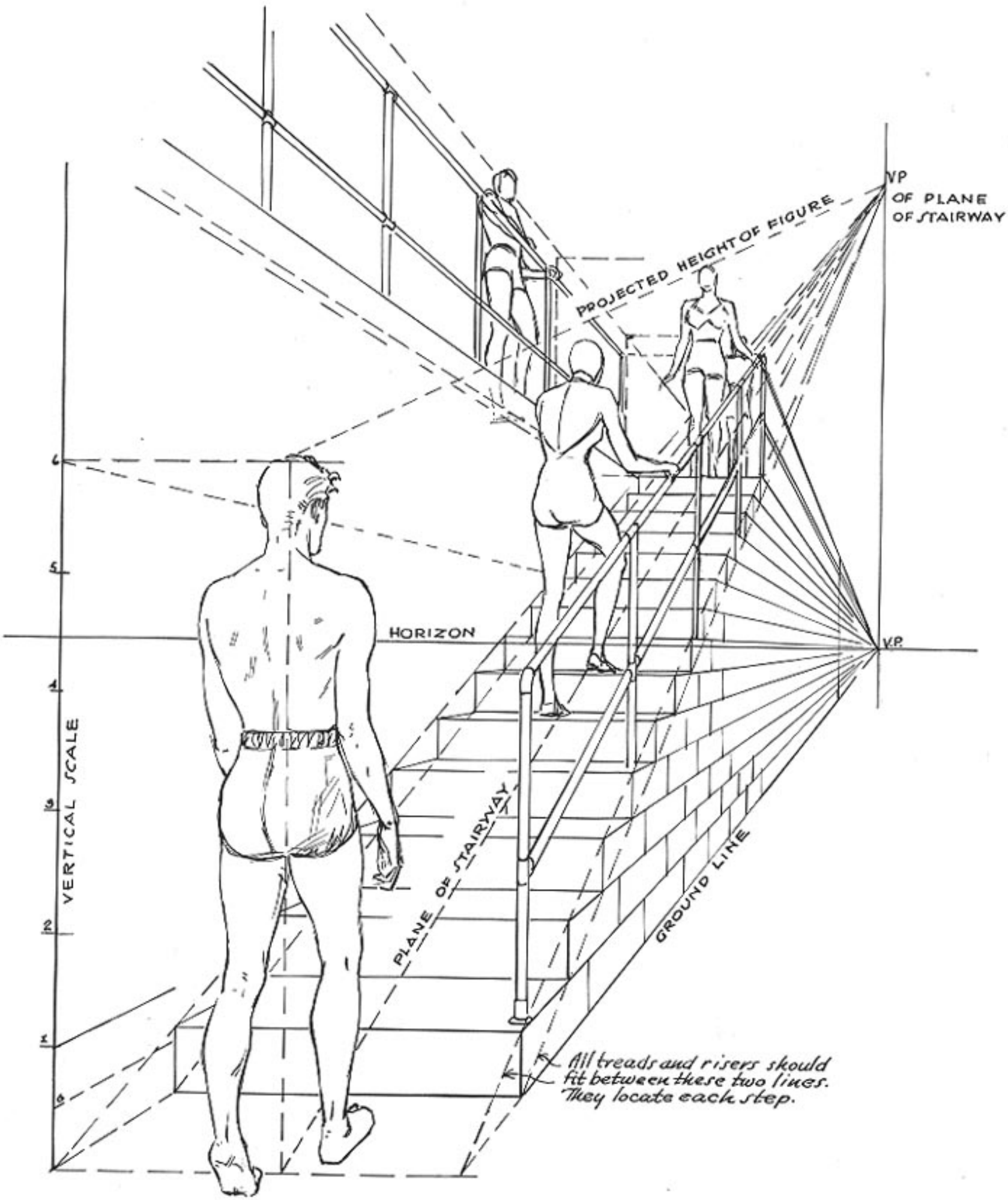


Looking Uphill

The roofs, floors, windows, base lines, and all other level planes vanish in a point on the true horizon. Any plane that is a part of the slope vanishes in the point above on the false horizon. As before, the figures are scaled to the horizon of the slope since they are stationed on an inclined plane. Figures on level planes are always scaled to the true horizon, as shown at A and B where the figures are stationed on a level crossing. Figures in windows or on balconies are scaled the same way.

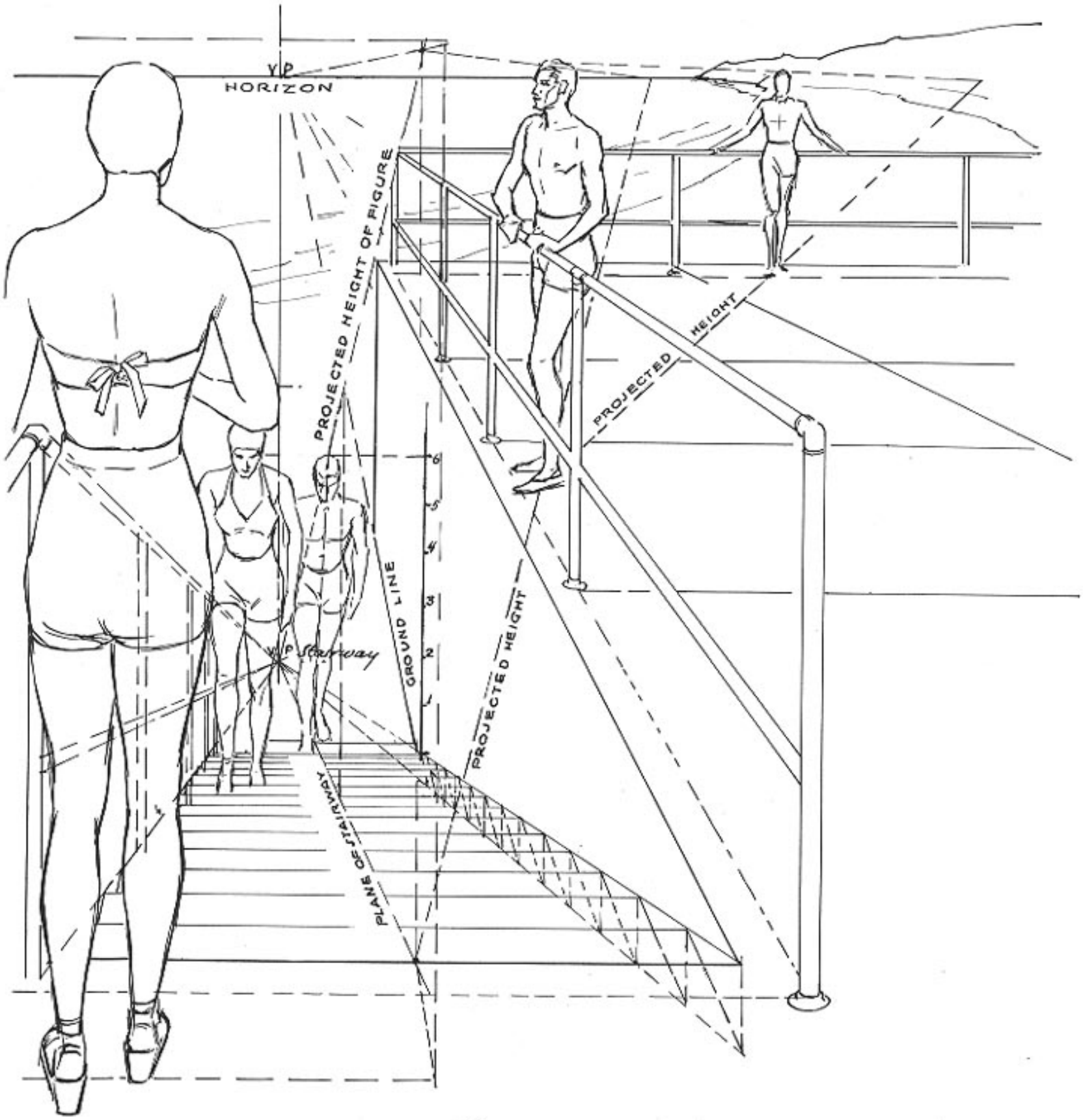
INCLINED PLANES IN PERSPECTIVE

It is important to know how to draw a stairway in correct perspective and how to project figures upon any step. This is not difficult to do. The plane of the stairway locates all the points of the risers. The treads all have the same vanishing point on the horizon. Scale the height of the risers to the figure, as shown in the drawing below.



INCLINED PLANES IN PERSPECTIVE

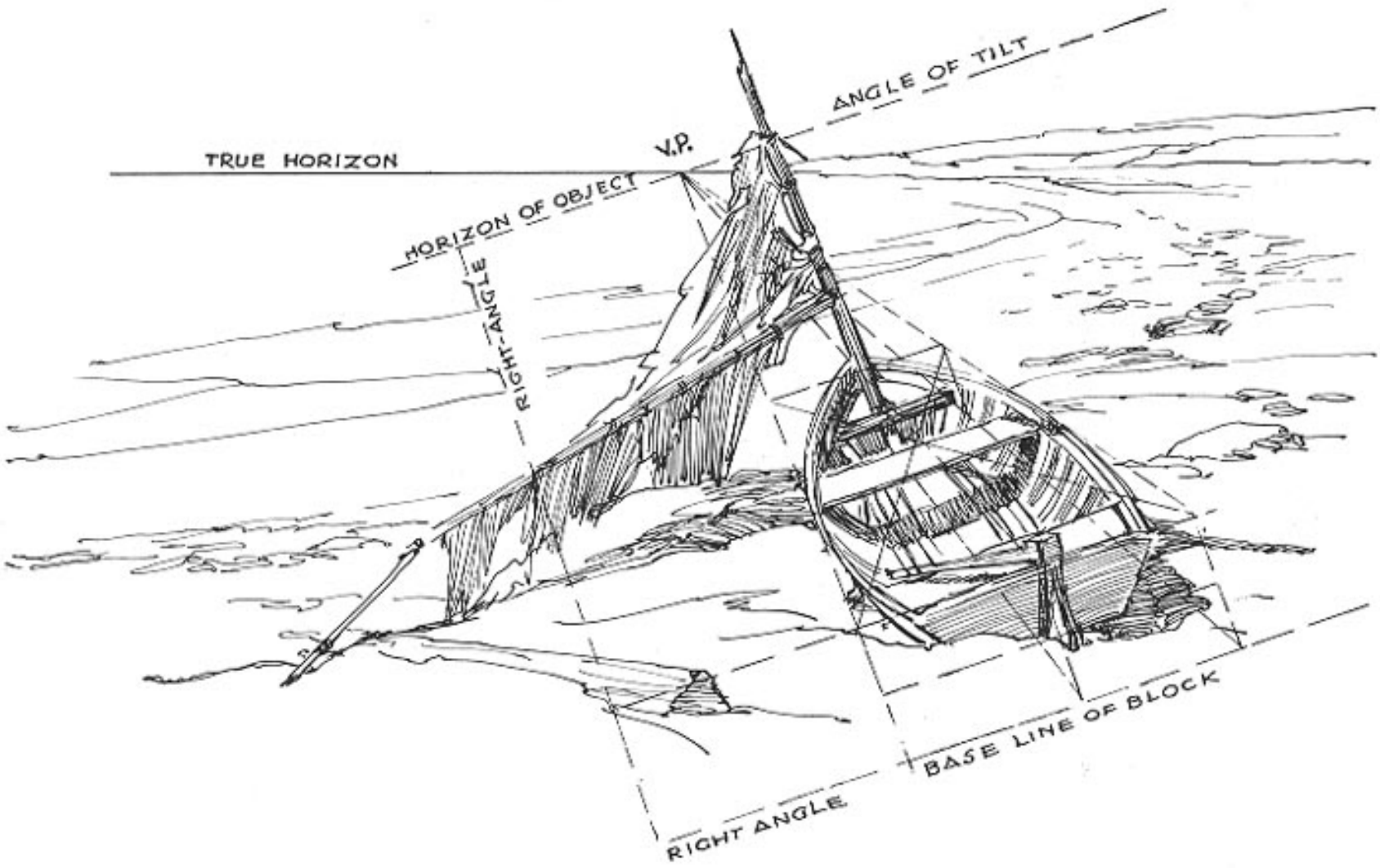
Here we reverse the problem on the preceding page, but we can still scale all the figures from the one at the bottom of the stairway. Note that we still have the two lines which give us the size of the risers and treads as they come up the plane of the stairway. The figures are in approximately the same positions.



The observers position now appears to be at the top of the stairway looking down upon the same scene. How important is perspective!

INCLINED PLANES IN PERSPECTIVE

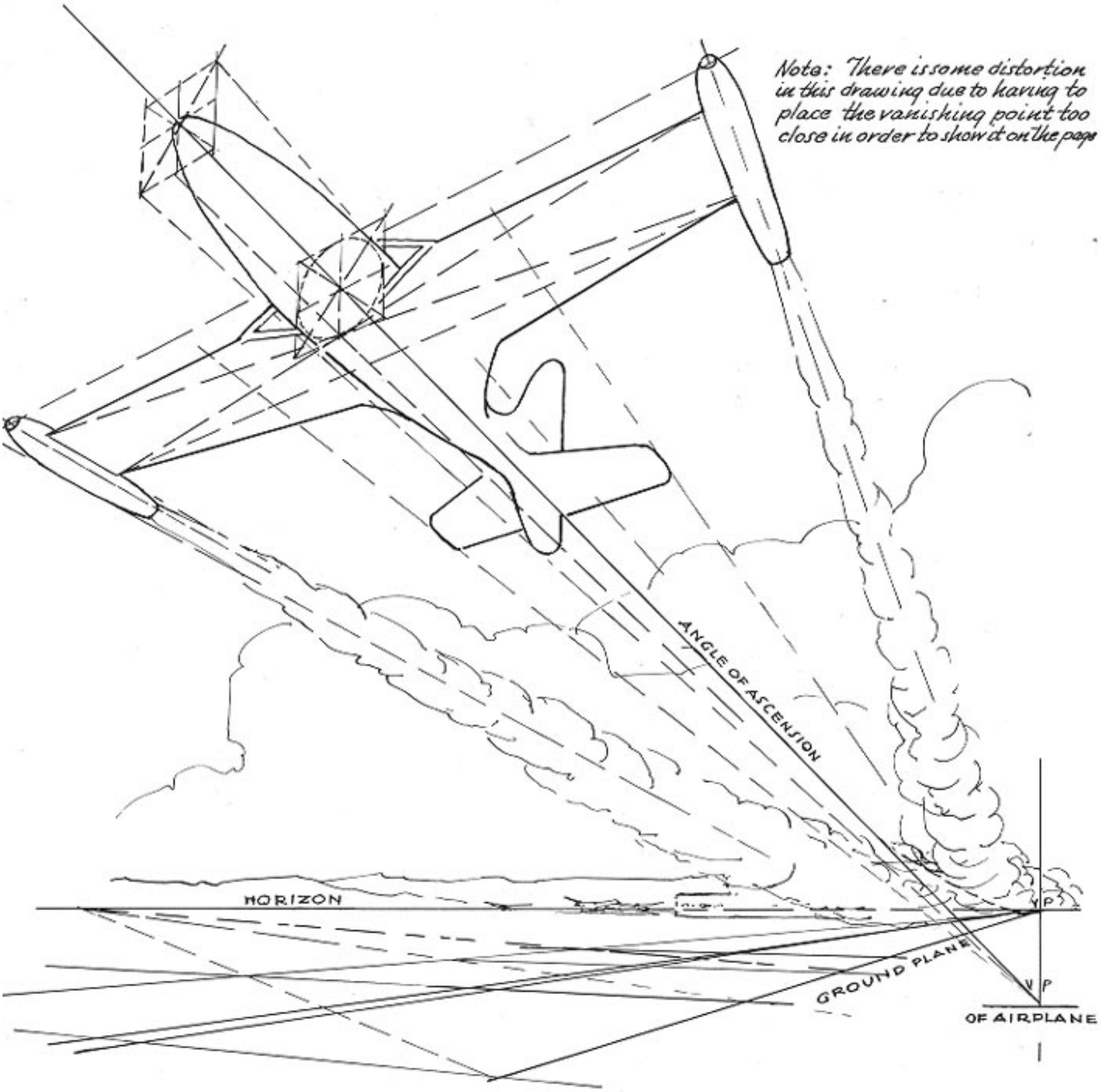
An artist may be faced with the problem of drawing a tilted object. The object may be falling, blown over, a squared object resting on an inclined plane, or for any reason not be in alignment with the horizon. There is a simple technique for solving this problem.



First establish a vanishing point on the true horizon. Through that point draw the angle at which the object is to be tilted. This line will be the horizon of the tilted object. Now turn the drawing and draw a right-angle down from the new horizon. From that draw another line at right-angles to establish a base line for a block. Complete the dimensions of the block within which the object is to be drawn in perspective. Draw the object to its horizon as if it were on a level plane. The vanishing point should be at the point of crossing of the two horizons.

INCLINED PLANES IN PERSPECTIVE

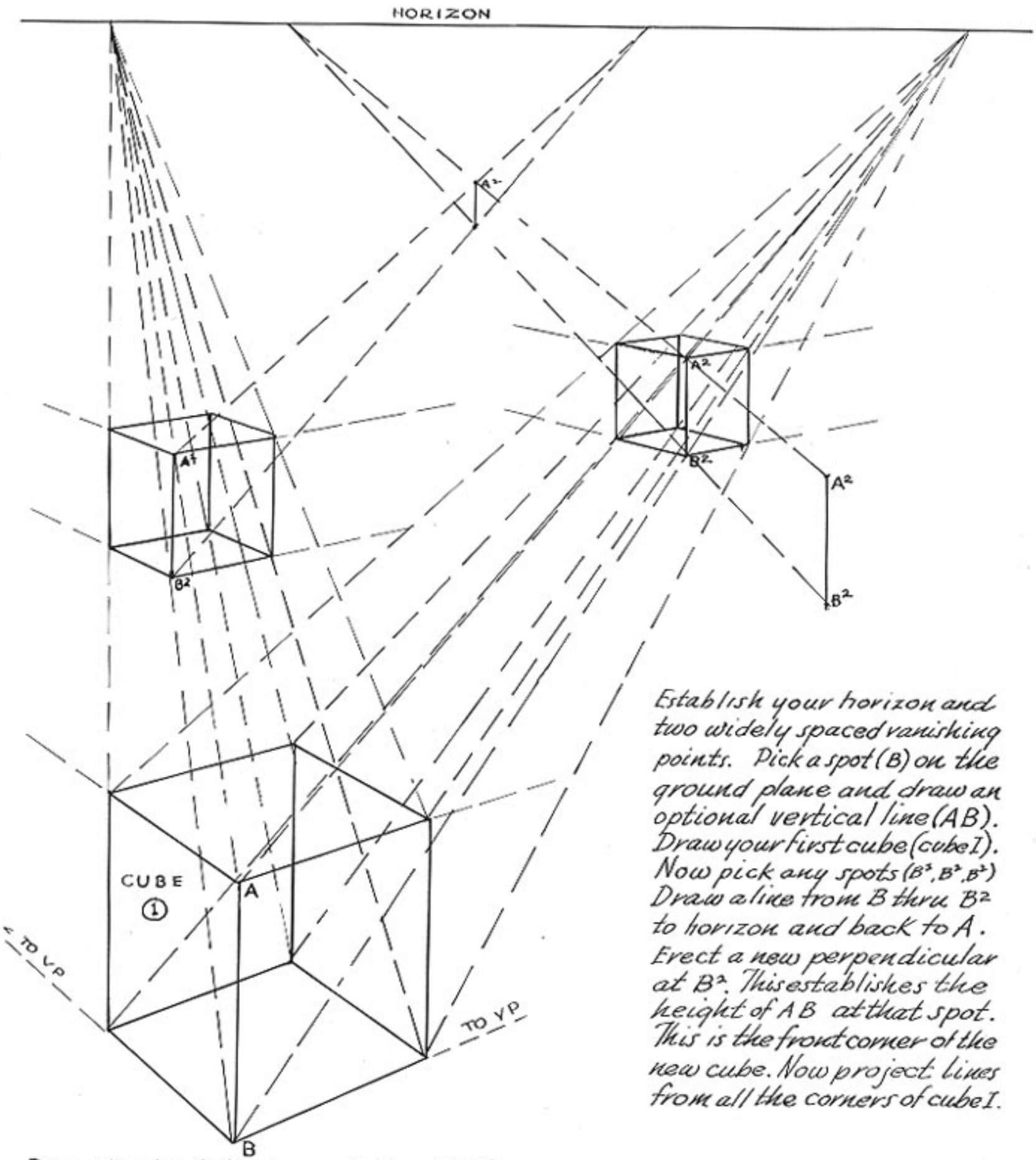
It is important to know that any object which is not parallel to the ground plane has its vanishing point either above or below the horizon. The drawing below shows an ascending airplane. The angle of ascension starts below the horizon and comes up through the ground plane and through the center of the object.



The airplane is drawn to a vanishing point placed below the horizon. The wings vanish in a point on the horizon since their edges are parallel to the ground plane.

PROJECTING A SOLID TO ANY POINT ON THE GROUND PLANE

Since any object can be constructed within a block, the method shown on this page will enable you to duplicate any object for placement at any other spot on the ground plane. The proportions will be correct according to position and distance from the first object. The plan is to draw the block first and then the object within the block.

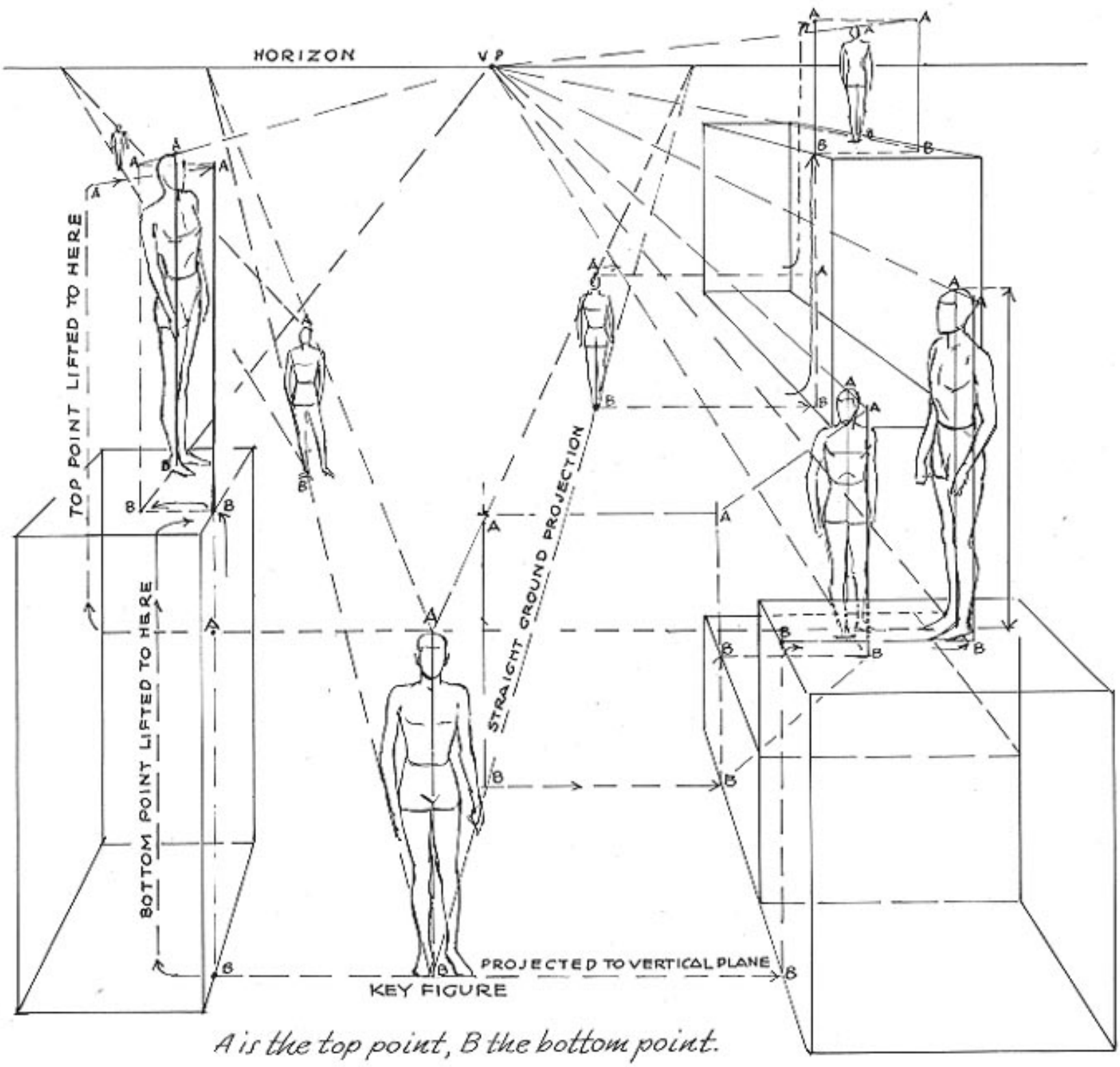


Establish your horizon and two widely spaced vanishing points. Pick a spot (B) on the ground plane and draw an optional vertical line (AB). Draw your first cube (cube I). Now pick any spots (B^1, B^2, B^3) Draw a line from B thru B^2 to horizon and back to A. Erect a new perpendicular at B^2. This establishes the height of AB at that spot. This is the front corner of the new cube. Now project lines from all the corners of cube I.

Draw all cubes to the same right and left vanishing points (not shown on this page).

PROJECTION OF FIGURES

Any vertical measurement, including the height of a figure, can be projected to any point in the picture. If the measurement or figure is to be shown on a plane higher than the ground plane, it must be elevated to that plane. This is done by projecting the measurement (A and B) to a spot against the elevation and lifting that measurement to the elevated plane above. Use a pair of dividers to lift the measurement.

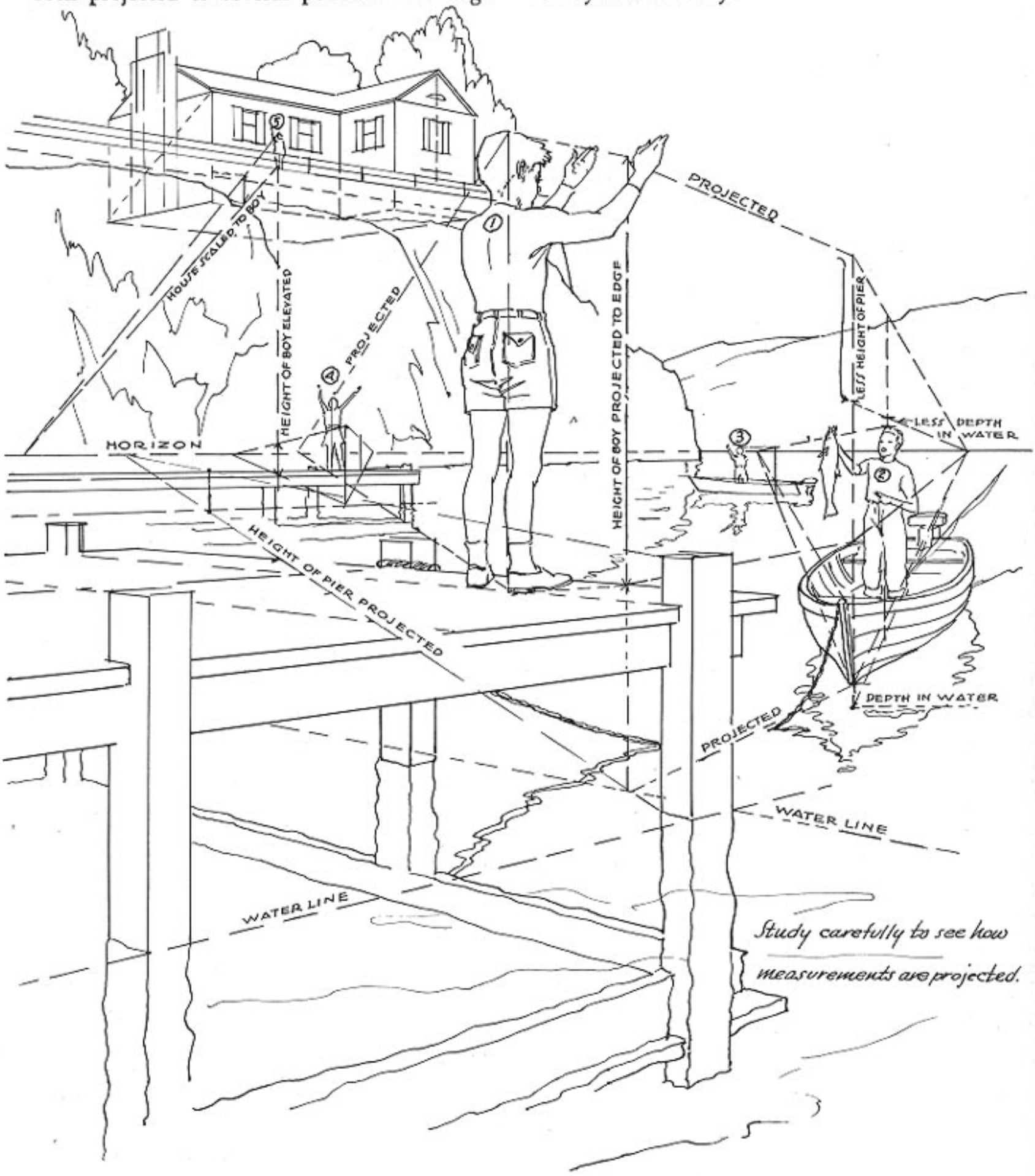


A is the top point, B the bottom point.

Author's Note: Especial attention should be given to this page, because the principles of projecting measurements as applied here are of extreme value to every illustrator or commercial artist. The following page shows how the principles apply to subjects in which the figures are at different levels. Figures must be in correct proportion to one another.

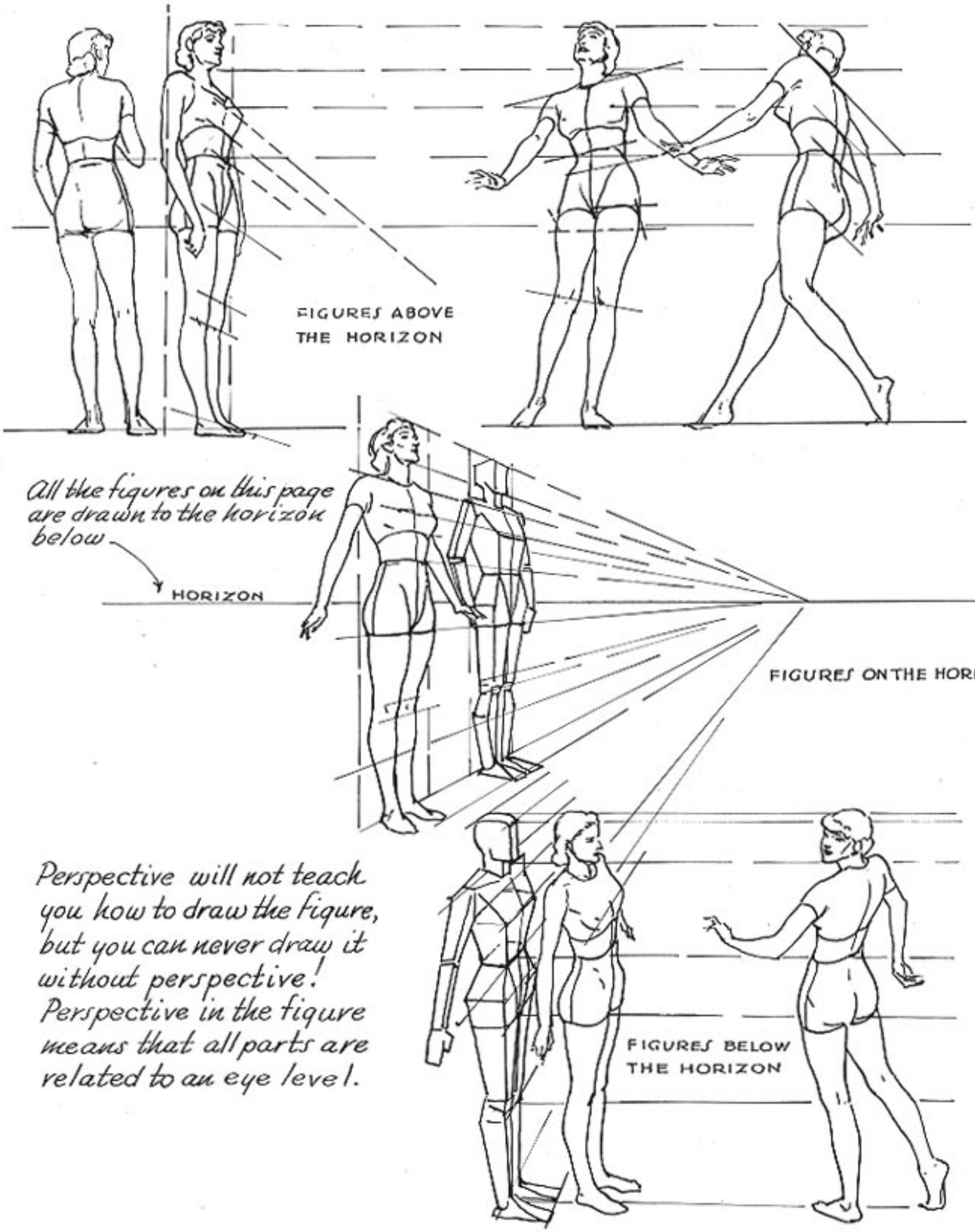
PROJECTION OF MEASUREMENTS

Everything in a picture has a relative size according to its position in perspective. In the drawing below, the height of the boy (1) has been projected to several positions. Although this drawing was made without models or copy, the relative sizes of figures and other units are convincing because the perspective is correct. Study this carefully.



PERSPECTIVE IN THE FIGURE

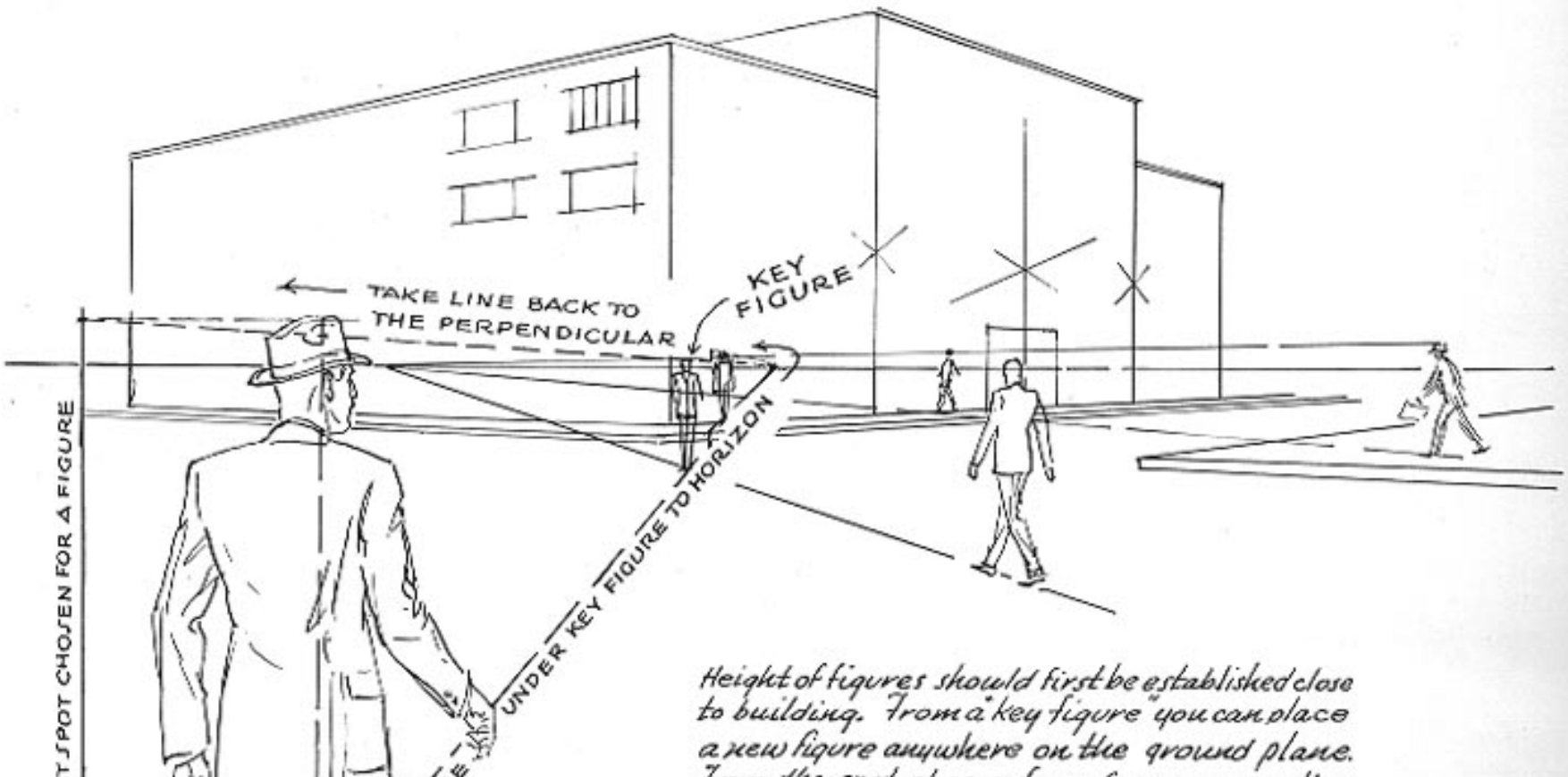
No matter how much you know of anatomy and the construction of the figure, you will not be able to draw figures from imagination until you can relate the different parts of the figure to a horizon or eye level. Sometimes it is helpful to think of the various forms as they would appear as blocks — square instead of round. Then round them out.

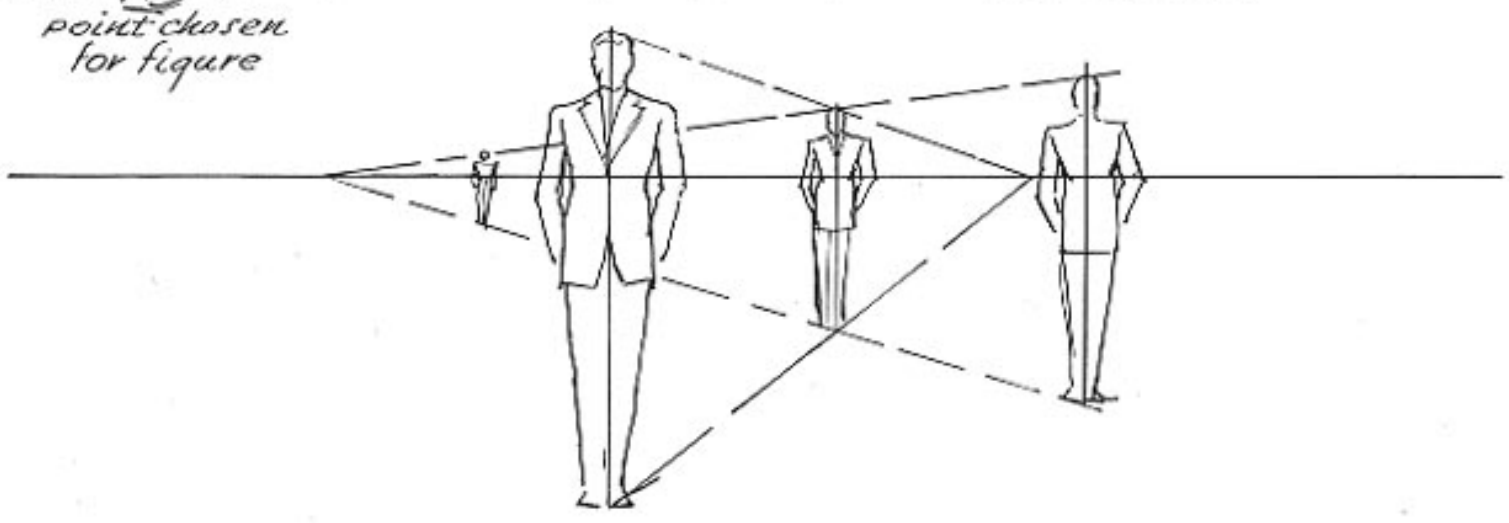


Perspective will not teach you how to draw the figure, but you can never draw it without perspective! Perspective in the figure means that all parts are related to an eye level.

PROJECTION OF FIGURES

One of the simplest and yet least observed rules of perspective is that all figures on the same ground plane must be related in size. To be sure of the correct relation, establish the height of a "key" figure and scale all others from that height. To do this, draw a line from the feet of one figure under the feet of another to the horizon. Then carry a line back to the first figure.



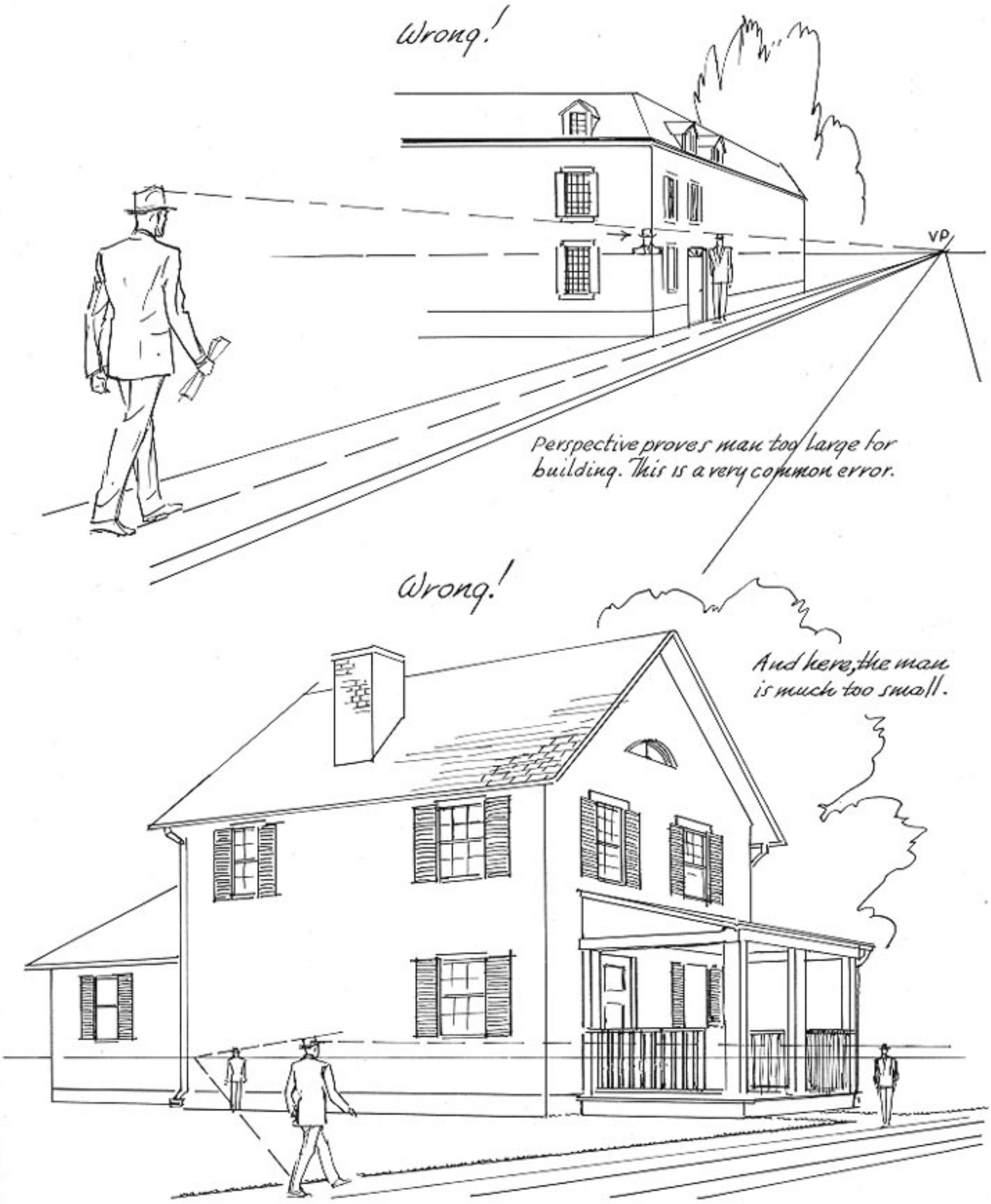


The Rule for Scaling Figures on the Ground Plane

All figures of the same height, when standing on the same ground plane, will be crossed by the horizon at the same vertical point on the figure.

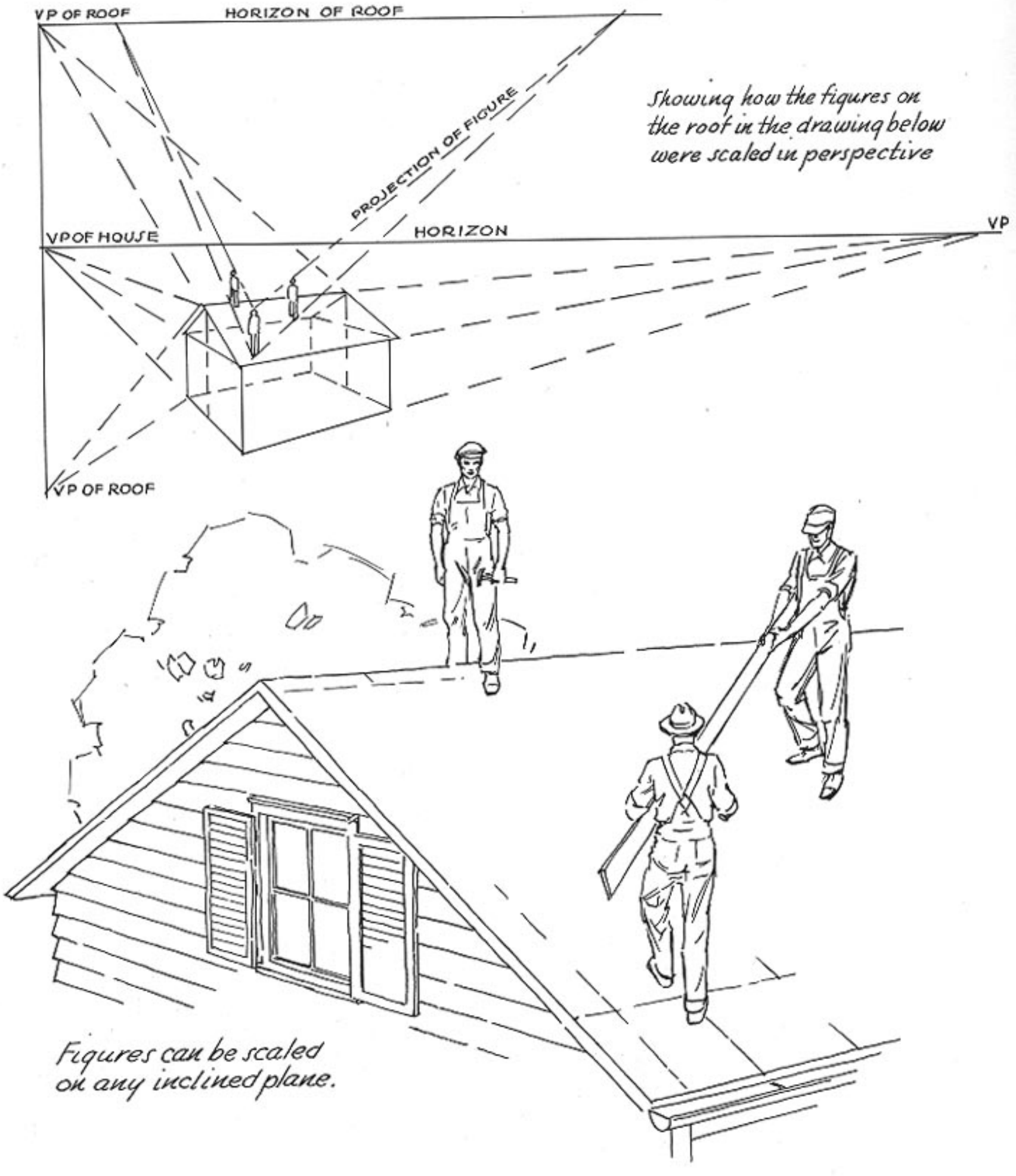
PROJECTION OF FIGURES

When it is so easy to scale a figure to any spot on the ground plane, such errors as those shown below are unforgivable. If the feet of a figure do not show, any portion of a figure may be projected, as, for example, the head and shoulders of the man in the drawing below. Remember always to scale your figures. Don't guess — you can't.



FIGURES ON INCLINED PLANES

When we know that an inclined plane has a horizon and vanishing points which are used in the same manner as those of a level plane, scaling figures on an inclined plane becomes much simpler. So long as the entire plane has the same slant, the perspective is worked out in the manner shown in the diagram below. The diagram shows all the necessary vanishing points.

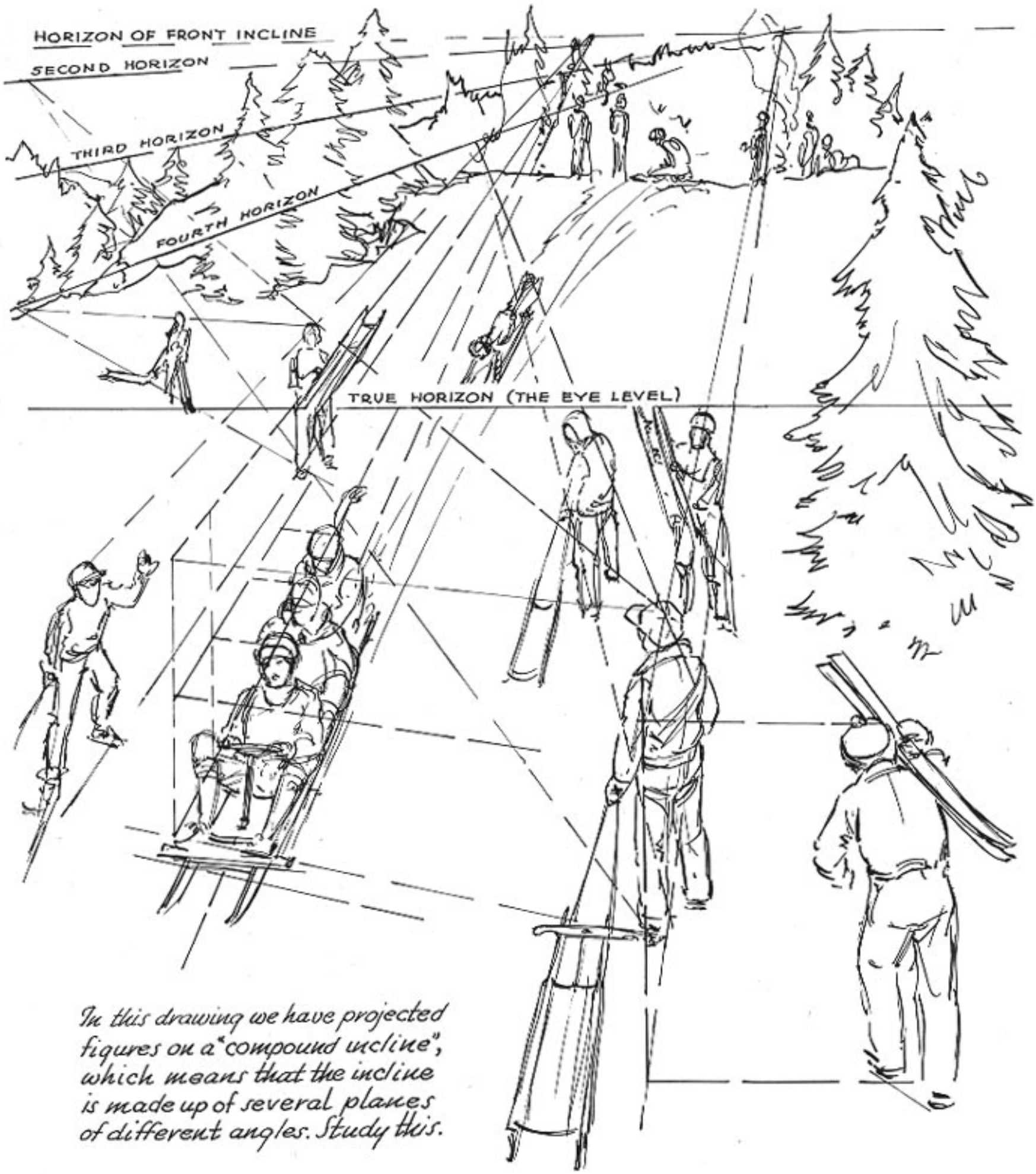


Showing how the figures on the roof in the drawing below were scaled in perspective

Figures can be scaled on any inclined plane.

FIGURES ON INCLINED PLANES

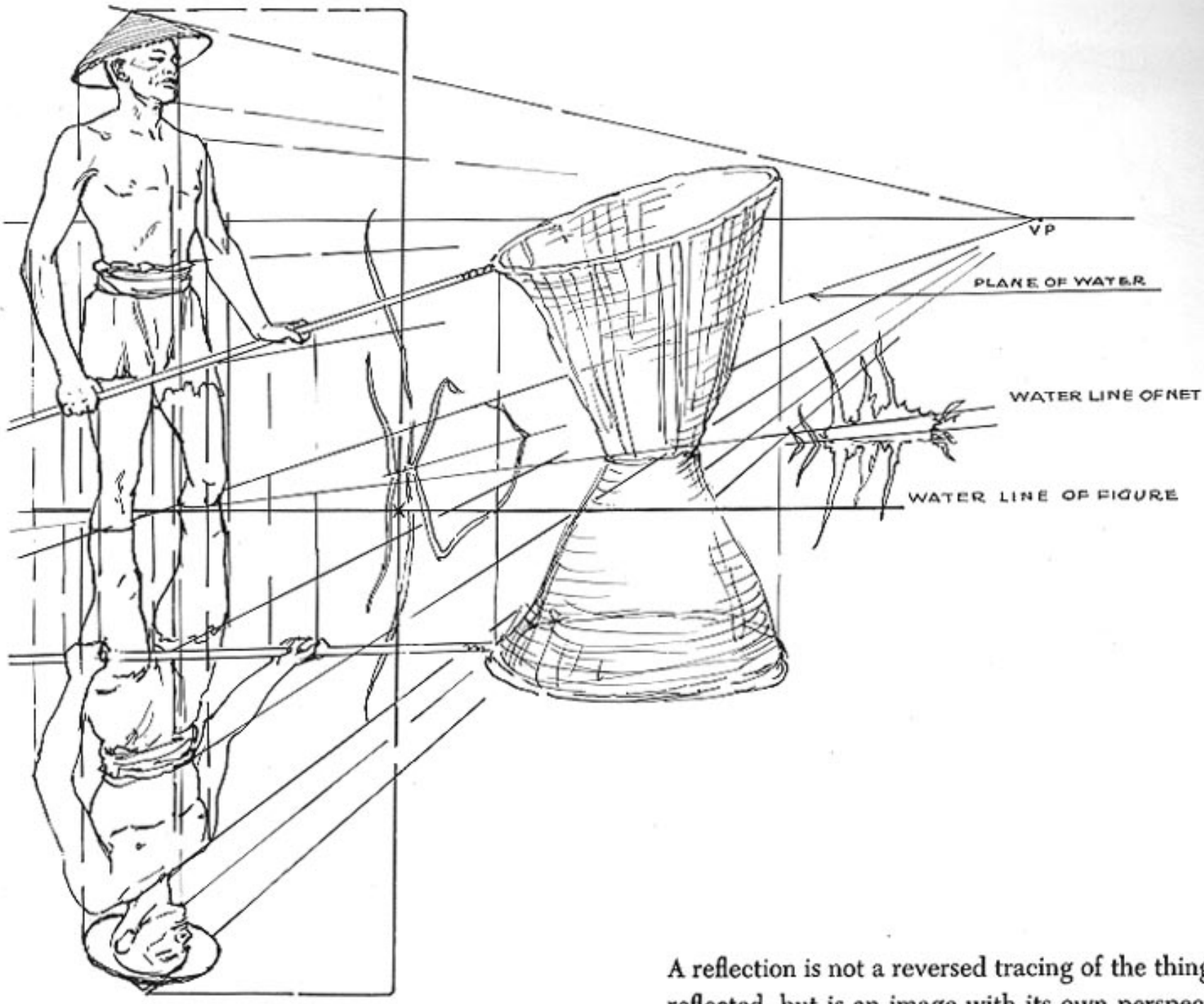
The projection of figures on hillsides can be very puzzling if the principle is not understood. The drawing below offers a simple solution. Whenever the plane changes as it goes around the hill, we draw to a new horizon. To keep only one horizon would continue the same plane at the same incline to infinity.



In this drawing we have projected figures on a "compound incline", which means that the incline is made up of several planes of different angles. Study this.

REFLECTION

Many artists do not realize that a reflection does not duplicate the perspective of the original. The perspective of the reflection is that which the actual object would have if it were inverted and placed in the position of the image. Though the proportions are duplicated, the actual drawing is quite different.

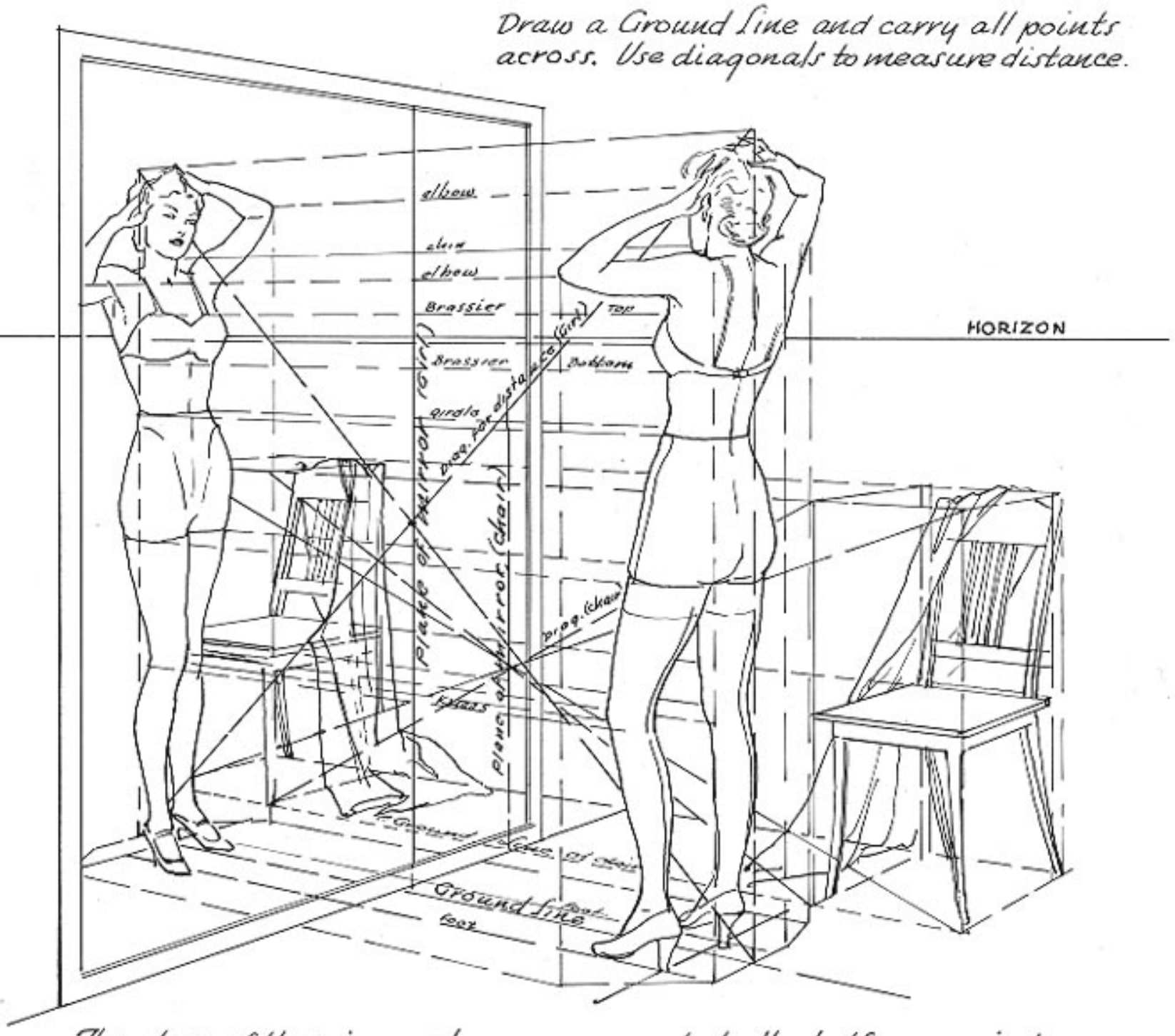


Depth of reflection is equal to height of figure above water

A reflection is not a reversed tracing of the thing reflected, but is an image with its own perspective. If you turn the drawing around, the difference in the angle of view becomes apparent. The figure and its image attach at the water line. All points of the figure must be projected down to a similar point on the image, which is directly below. Both the figure and its reflection are drawn to one vanishing point on the horizon. Any movement of the water affects the reflection.

REFLECTION

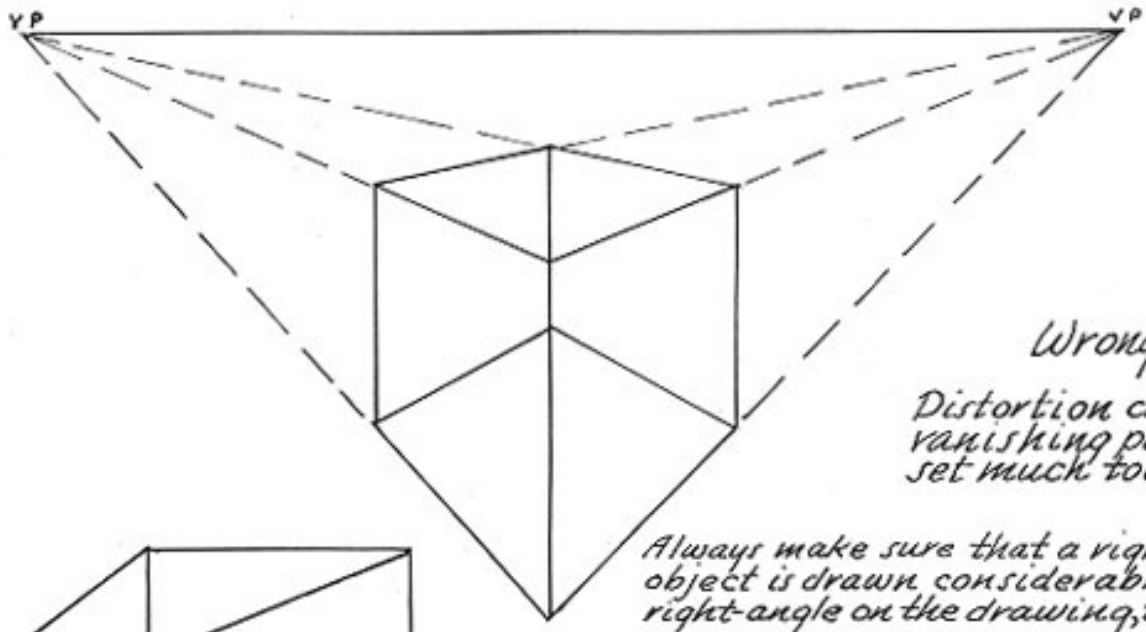
The artist who is not skilled in perspective may have difficulty in drawing a reflection in a mirror. The drawing below makes the process simple. With a fair knowledge of the figure a reflection can be drawn without copy. Study this drawing carefully to see how all parts of the figure have been projected.



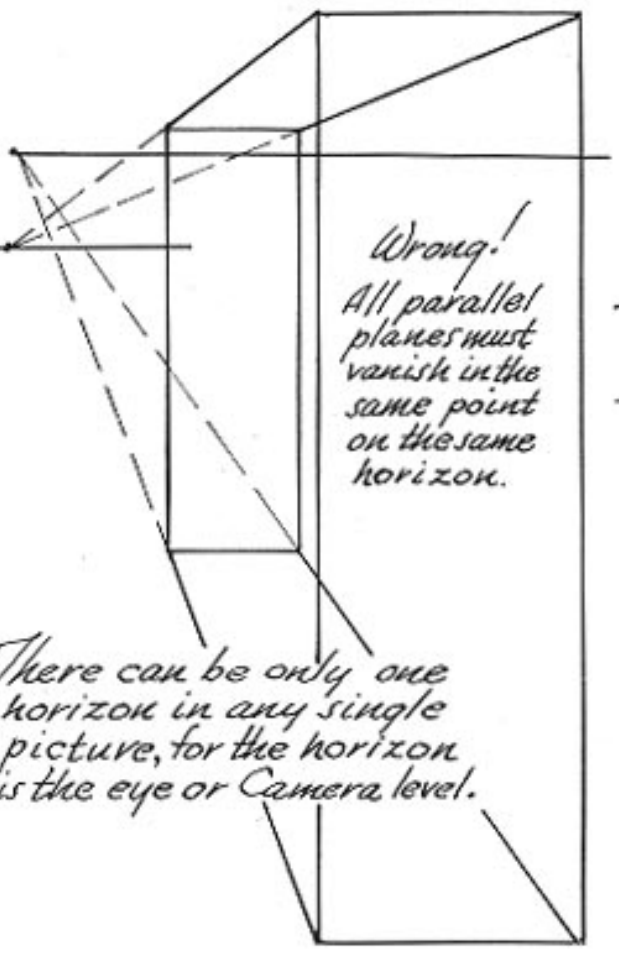
The plane of the mirror always appears to be the halfway point between the reflected image and the figure or object reflected.

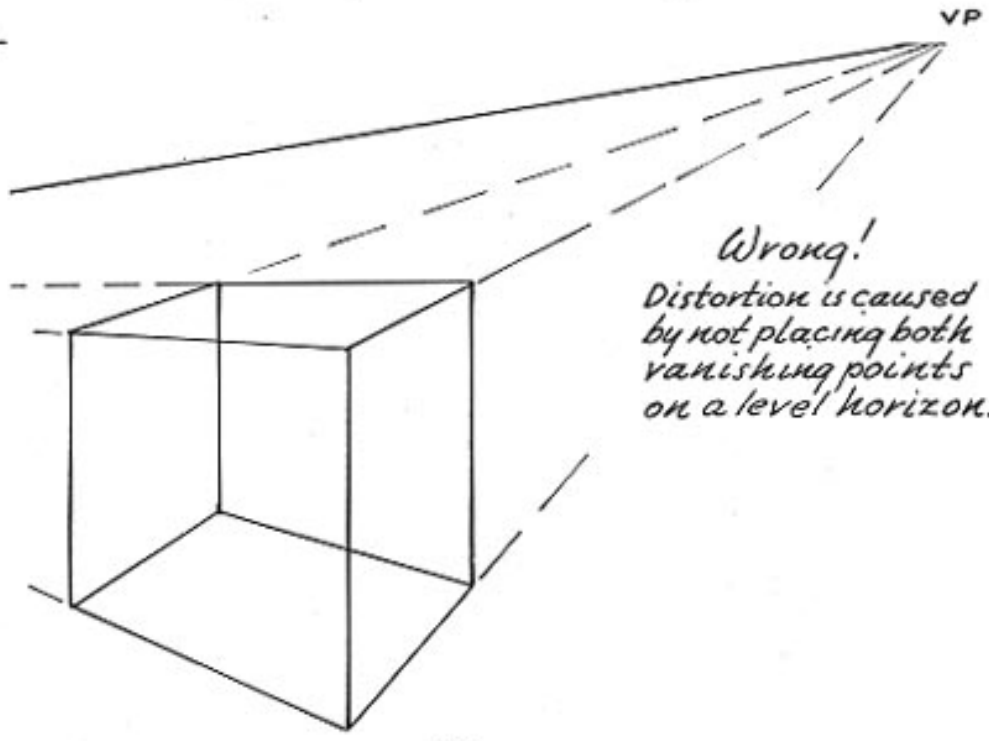
COMMON ERRORS IN PERSPECTIVE

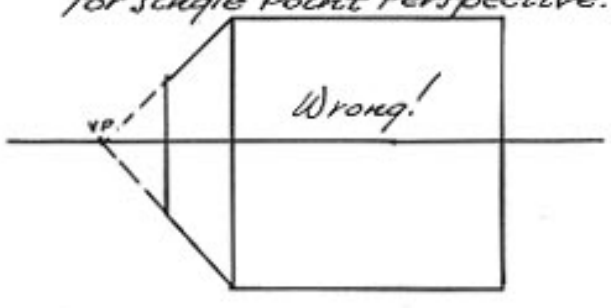
Distortion results from having both vanishing points within the field of vision, or too close to the object. If the object has a right angle at the near corner, the base lines must make an angle greater than a right angle on the drawing, since a right angle can not be represented by anything less than a right angle. The drawing below shows this common error.

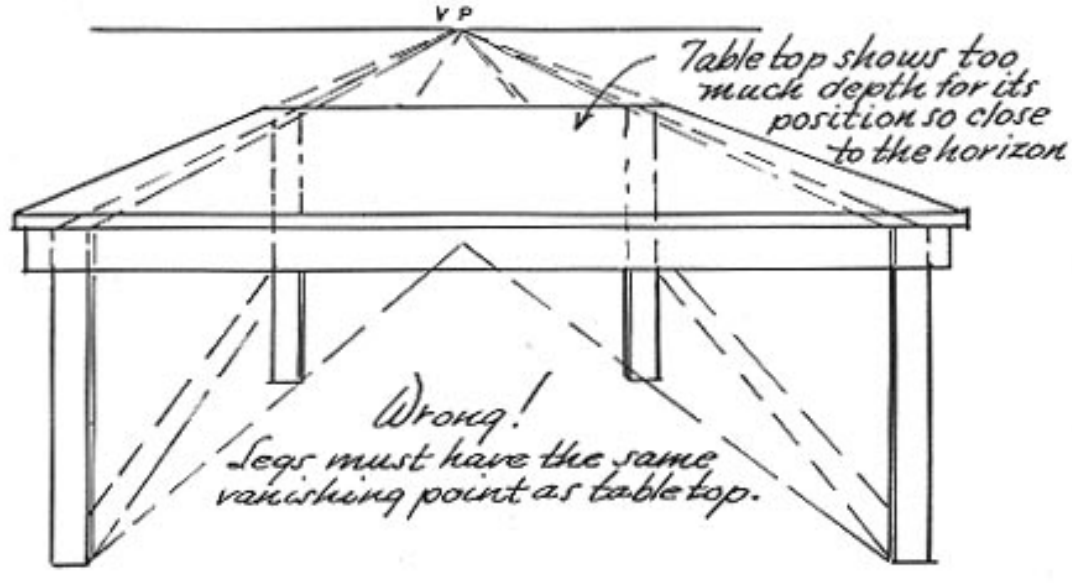


Always make sure that a right-angle on the object is drawn considerably wider than a right-angle on the drawing, to avoid distortion.



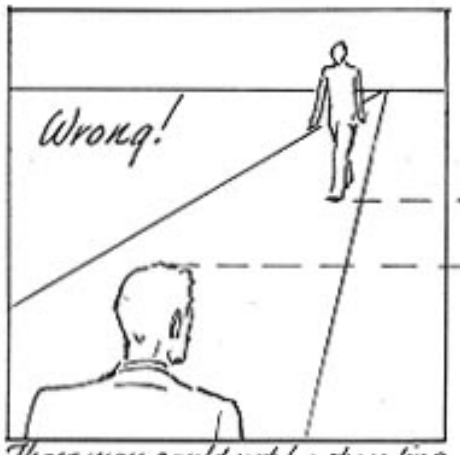




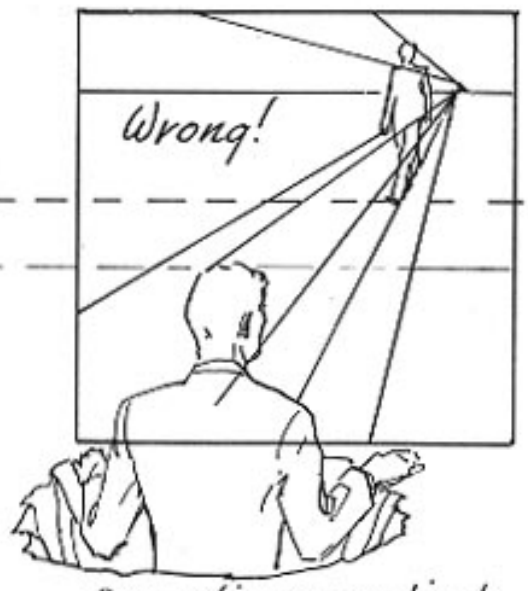


COMMON ERRORS IN PERSPECTIVE

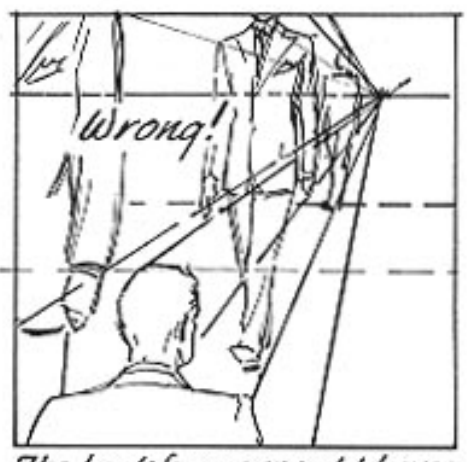
Too few artists follow the simple plan of projecting figures to a horizon and a vanishing point. In perspective, figures are no different from fence-posts and no harder to scale correctly. It is easy to scale any vertical unit or measurement to a horizon, but the failure to do so occurs again and again in otherwise good work.



These men could not be standing on the same Ground Plane.

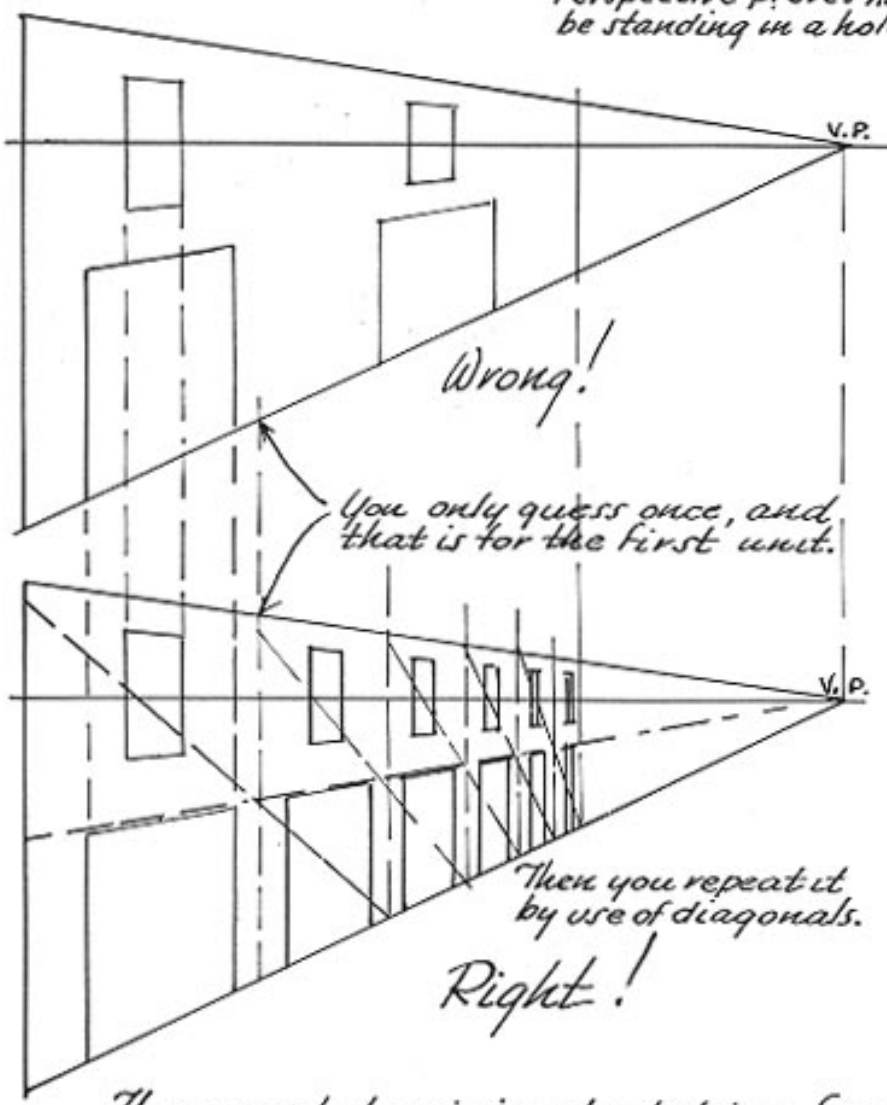


Perspective proves him to be standing in a hole!



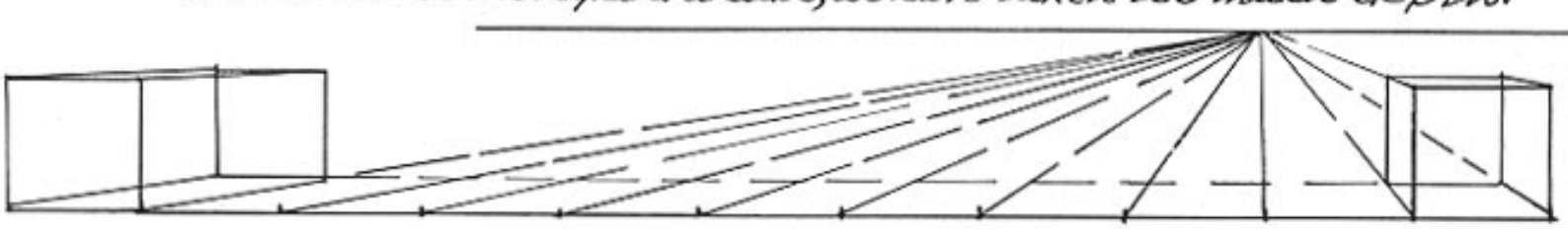
The back figure would tower over him in reaching the spot.

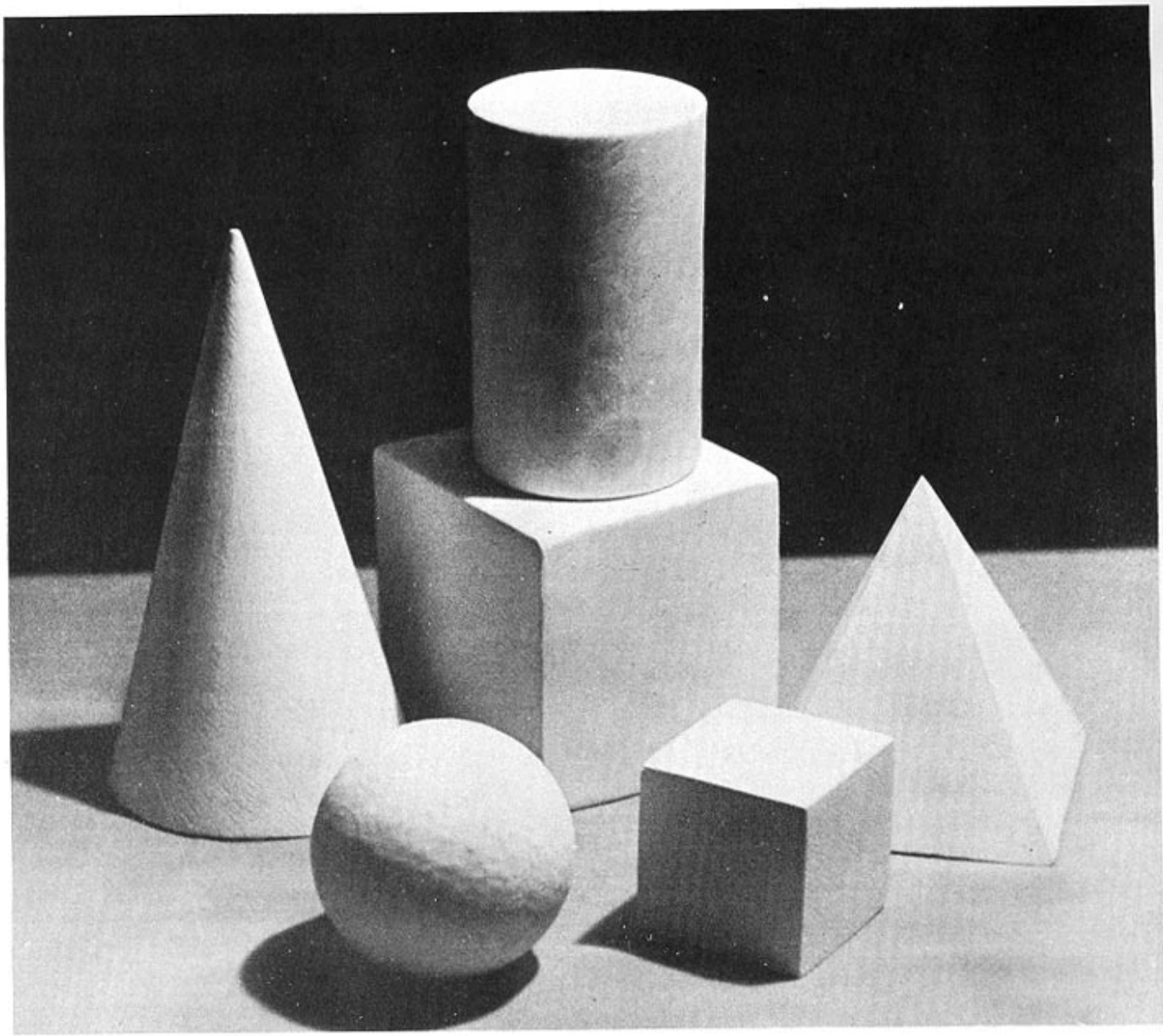
To correct: Make sure that the horizon crosses all similar figures on the same ground plane at the same vertical height on each figure.

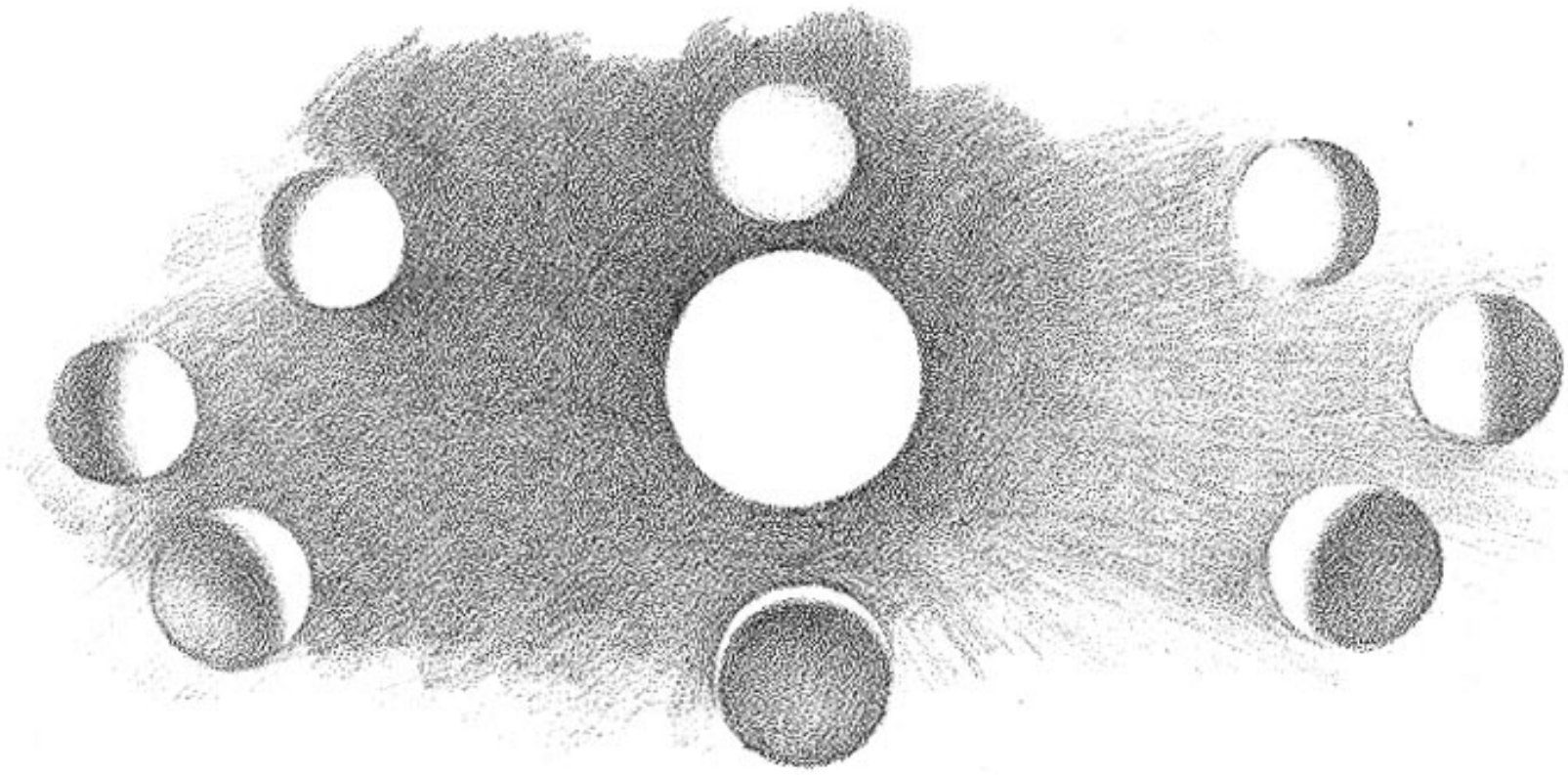


The most common error of all is "guessing at perspective depths." This immediately stamps an artist as a novice and ignorant of the basic principles of good drawing. At the left we have taken the first door and window as a unit and, by the use of diagonals, proved that the drawing above would have enough depth to repeat the unit six times! Until the artist knows how to measure depth, it is quite impossible for him to produce a correct three-dimensional effect.

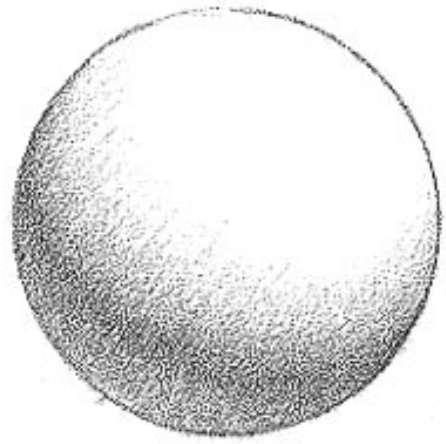
The error below is in stretching Single Point Perspective too far. If the unit at the right is a cube, we have taken too much depth.

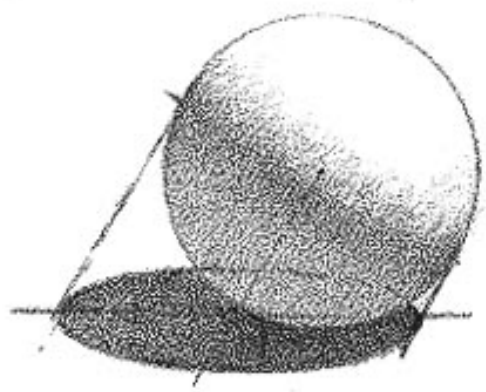


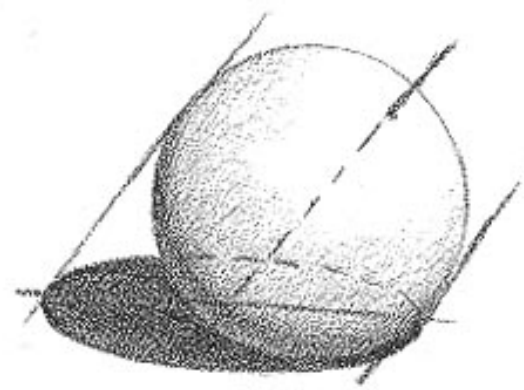


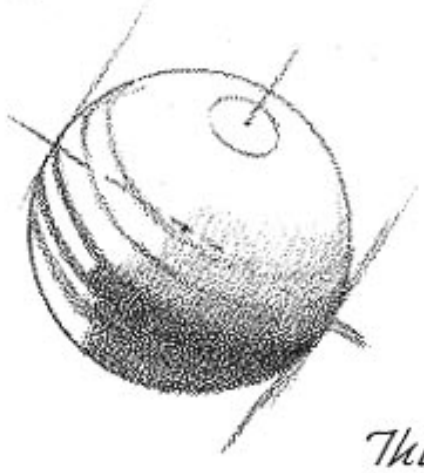


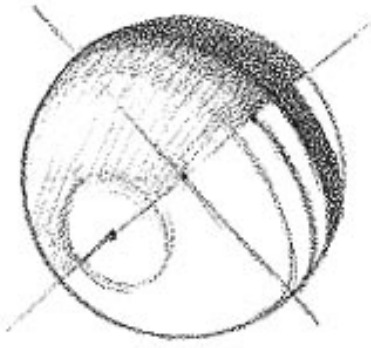
LIGHT ON THE SPHERE

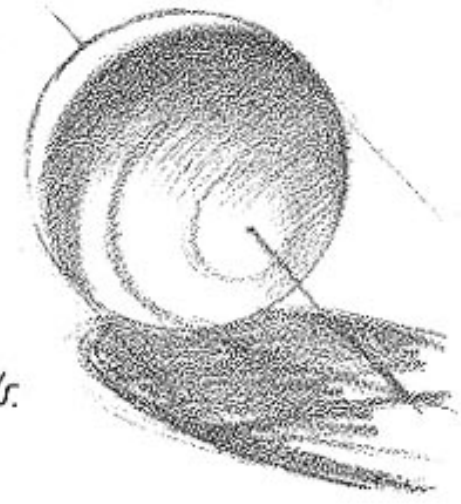








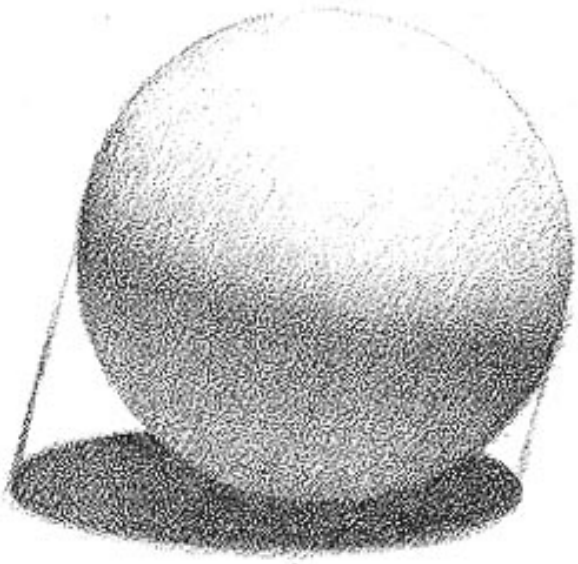




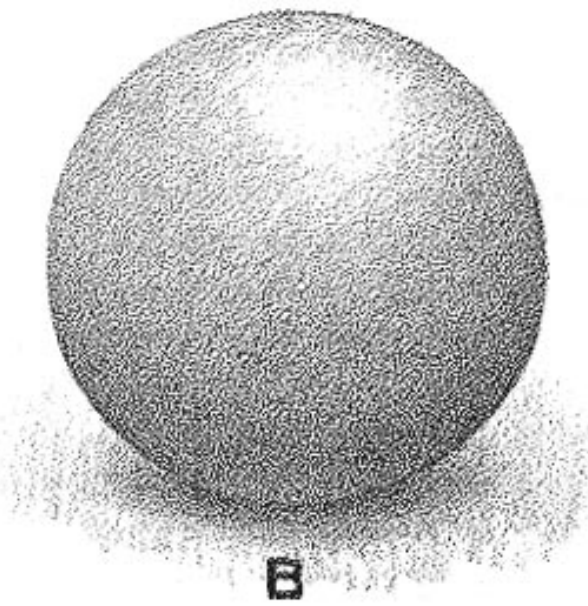
Think of the values as occuring in bands.

Note the band of darker shadow that appears between the halftone of the light and the reflected light within the shadow. The cast shadow on the ground plane starts from this band

SHADOW FROM A SPHERE IN PERSPECTIVE



A



B

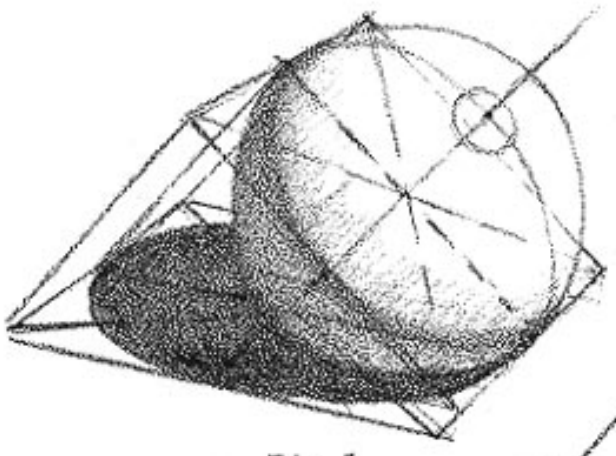


Fig 1

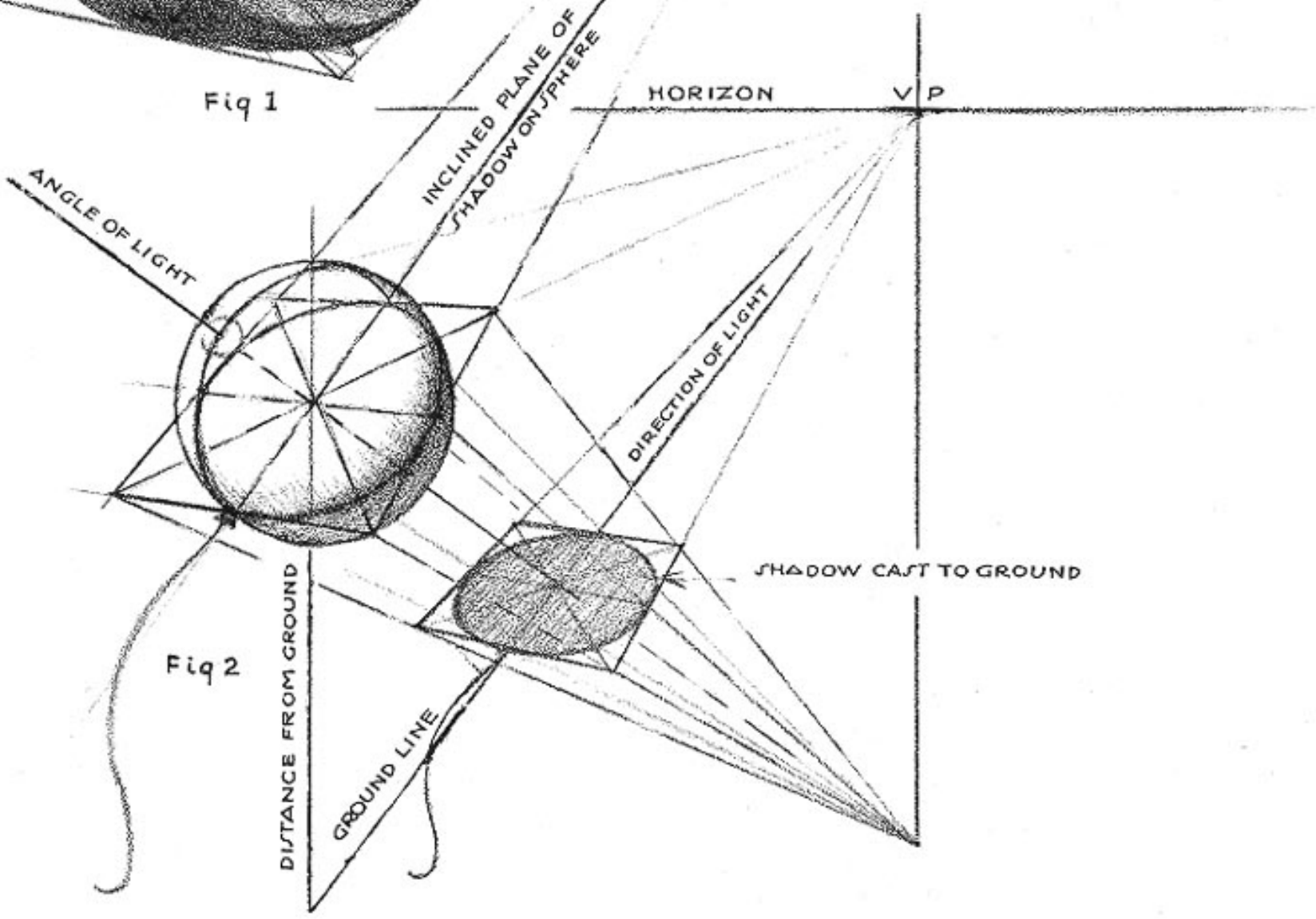
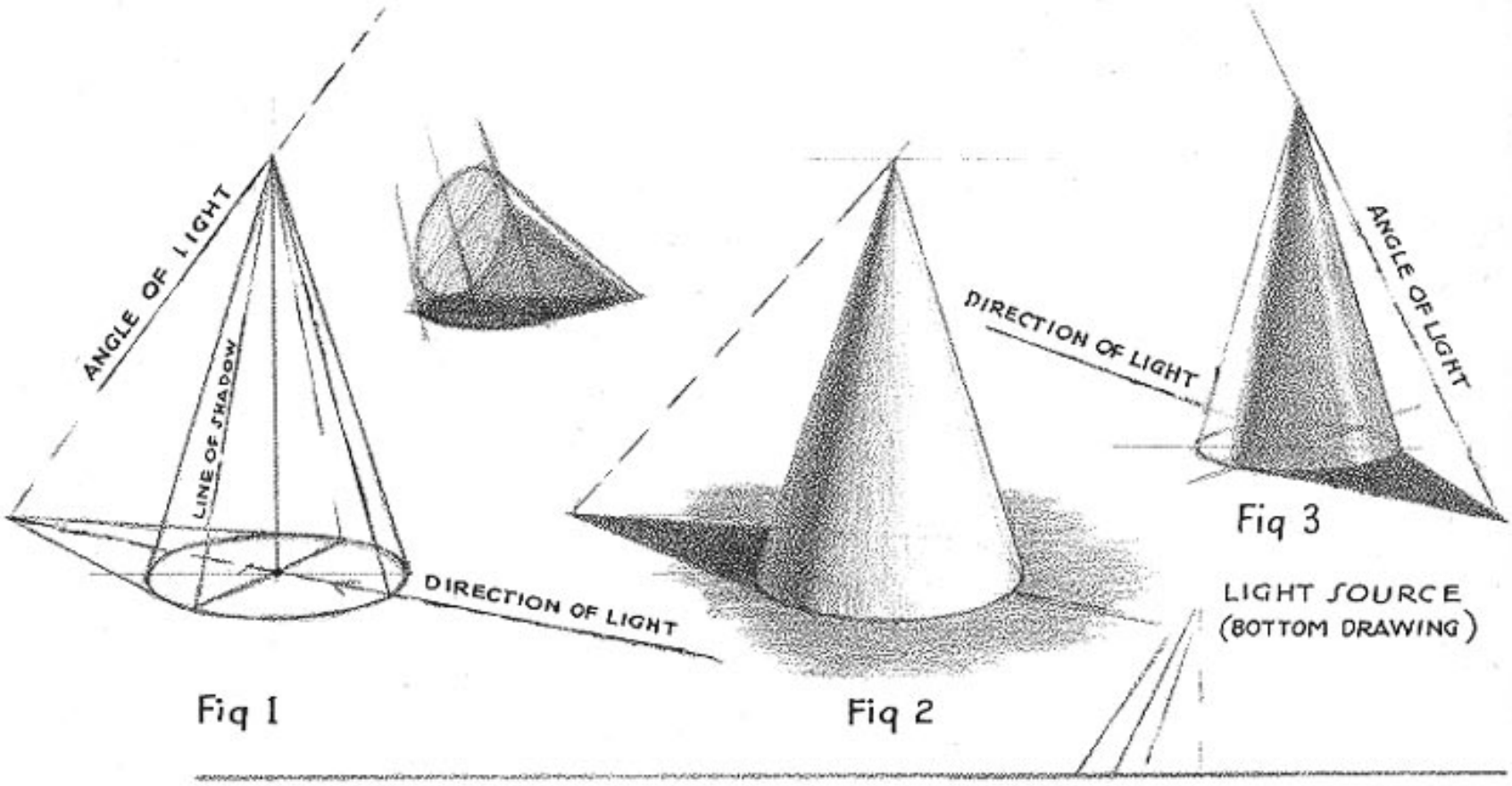
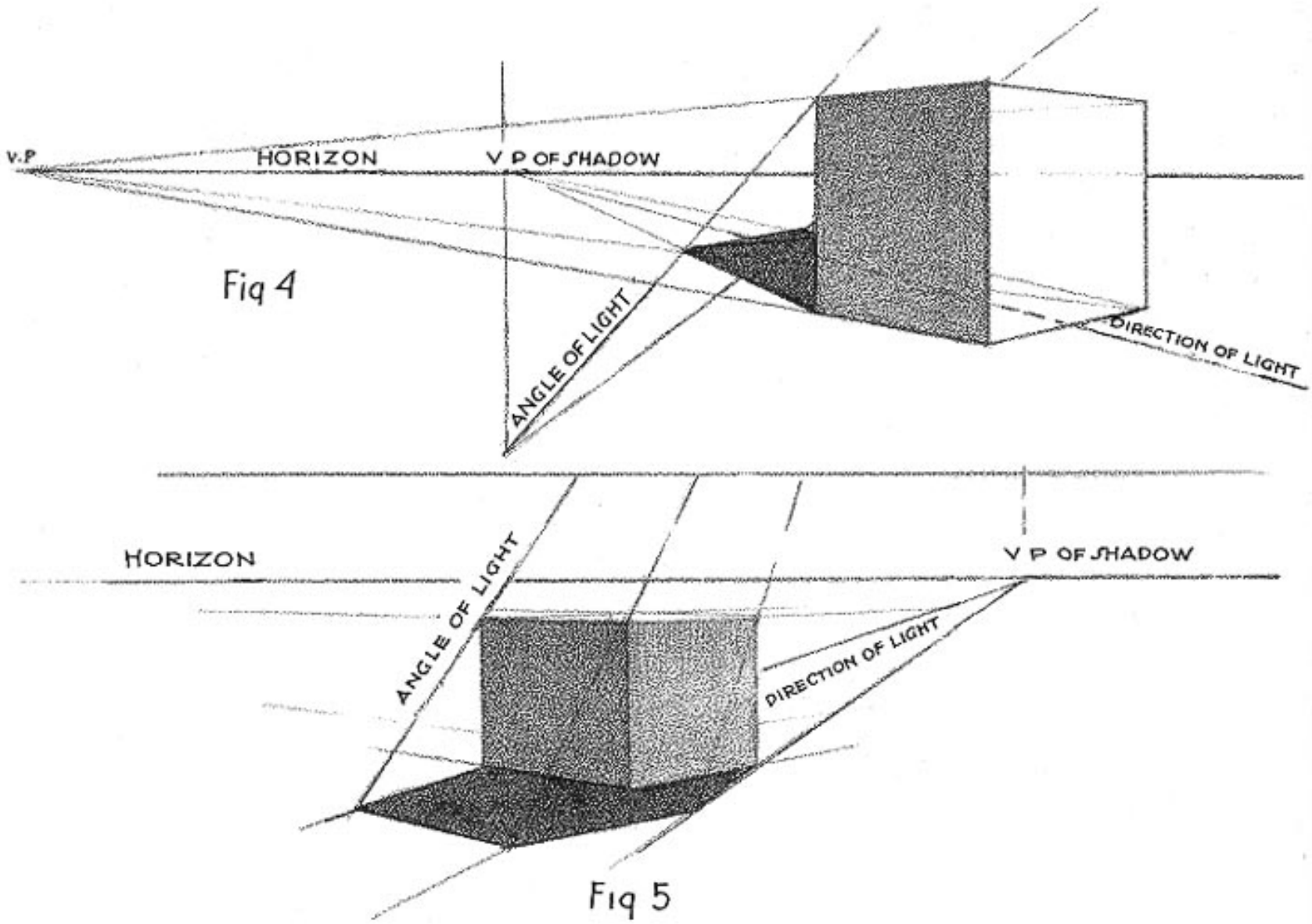


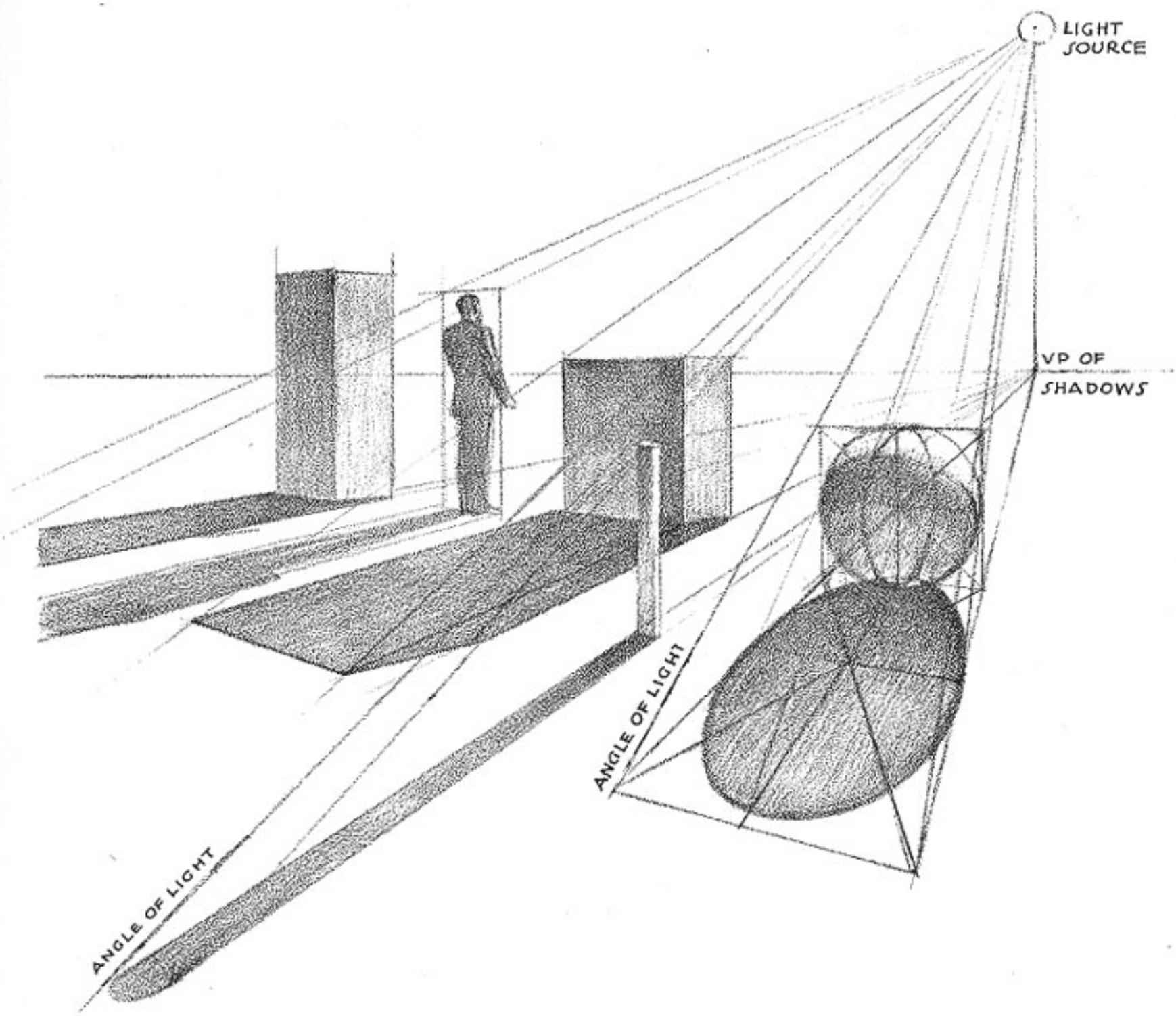
Fig 2

PERSPECTIVE OF SHADOWS





PERSPECTIVE OF SHADOWS



Looking into the Light Source

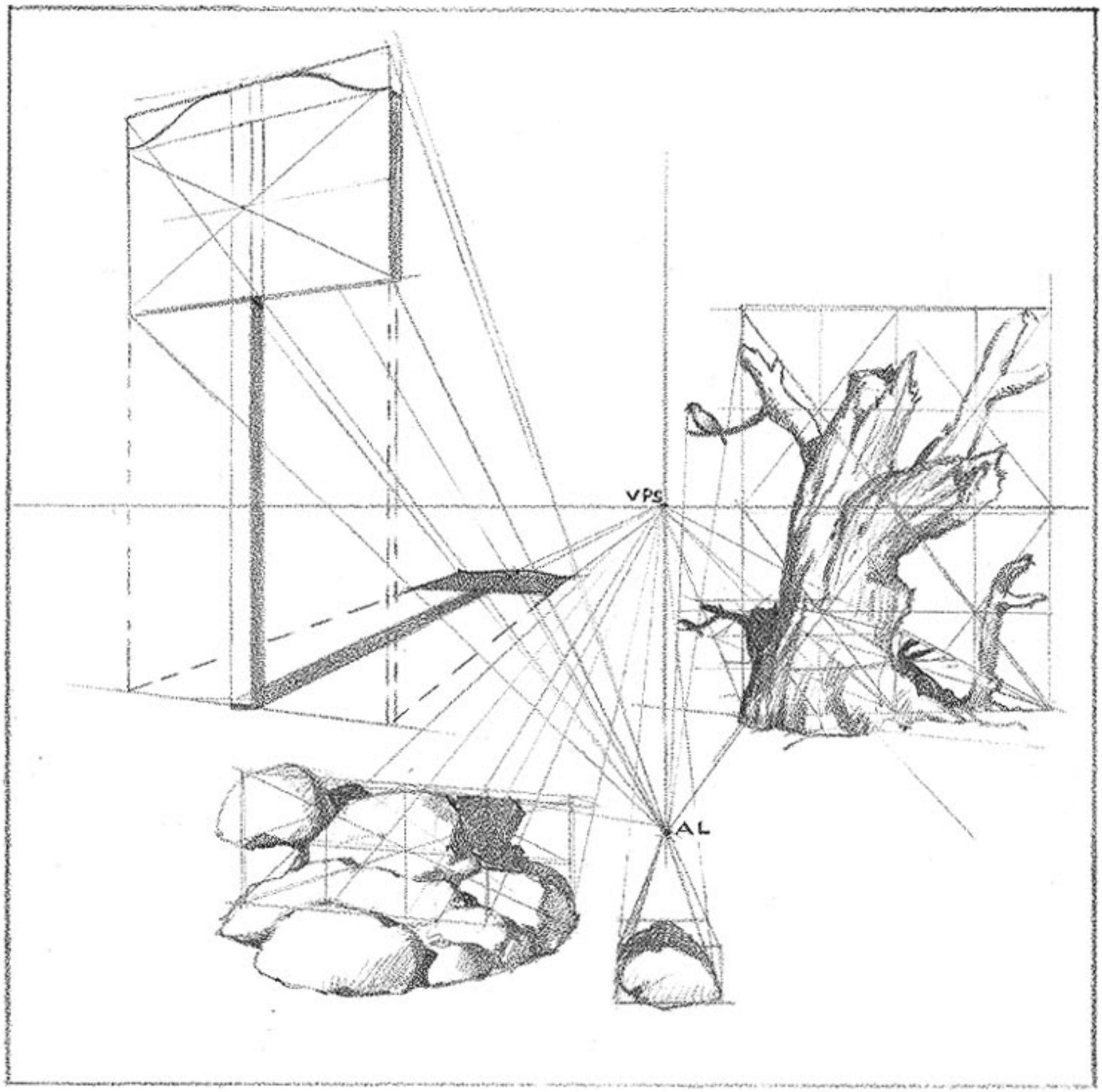
Note that all shadows recede to the same vanishing point. The vanishing point of shadows falls on the horizon directly below the light source. By connecting any spot on the ground plane to the light source we get the angle of light at that particular point.

PERSPECTIVE OF SHADOWS

Looking toward the Light Source

The small drawing at the lower right illustrates the procedure that was followed in the main drawing. The lines from LS (light source) through A, and from VPS (vanishing point of shadows) through B, meet at the point of C. Thus C is the point of the cast shadow. Always think of a triangle composed of light source, angle of light, and vanishing point.

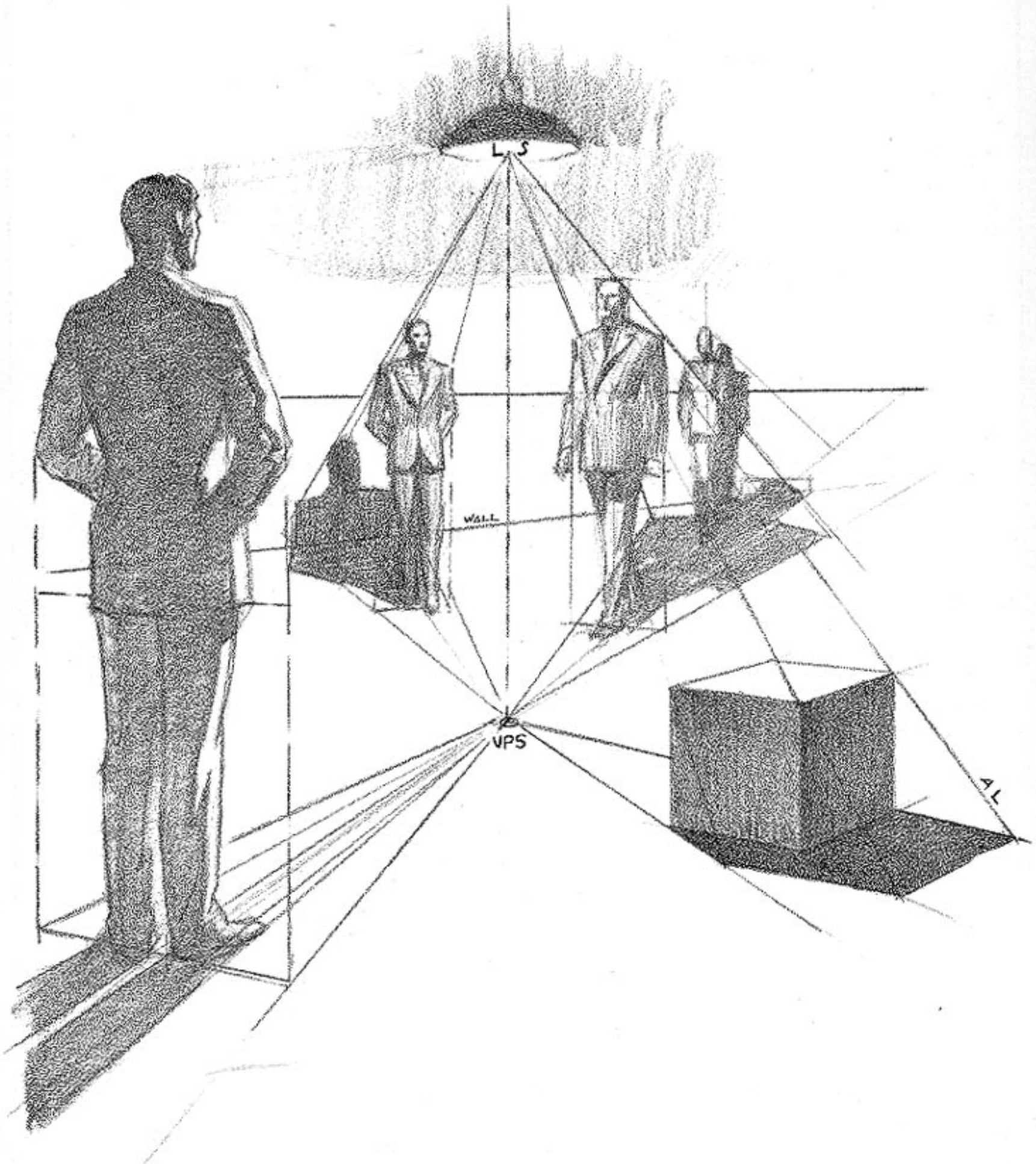
PERSPECTIVE OF SHADOWS



Looking away from the Light Source

The angle of light is determined by lines drawn to a point placed directly below the vanishing point of shadows. Any object may be squared off in the way shown in the picture of the tree at the right above and the squares projected to the ground plane. If you consider the tree as a flat design in a squared-off block, the contours of the tree are projected to the ground plane. These define the shadow.

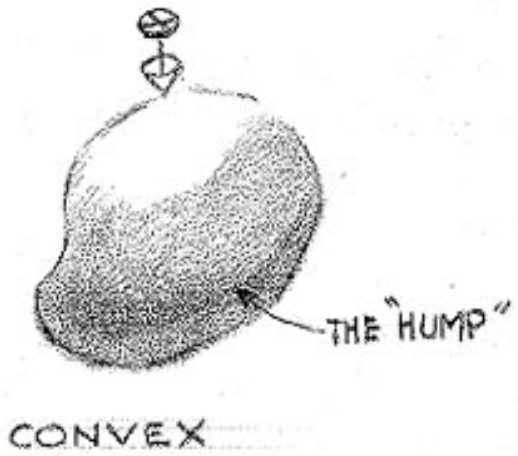
PERSPECTIVE OF SHADOWS



Shadows from an Artificial Light Source

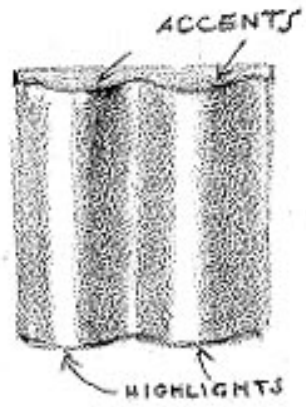
Note that the shadows all radiate from a point on the ground plane directly beneath the light source. This is called the vanishing point of shadows (VPS), even though it is not on the horizon. Such shadows do not diminish as they recede toward the horizon. Their length on the ground plane is determined by the angle of light.

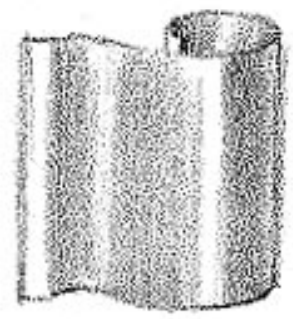
COMPLEX FORMS IN LIGHT

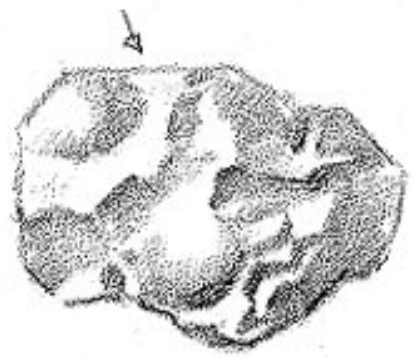


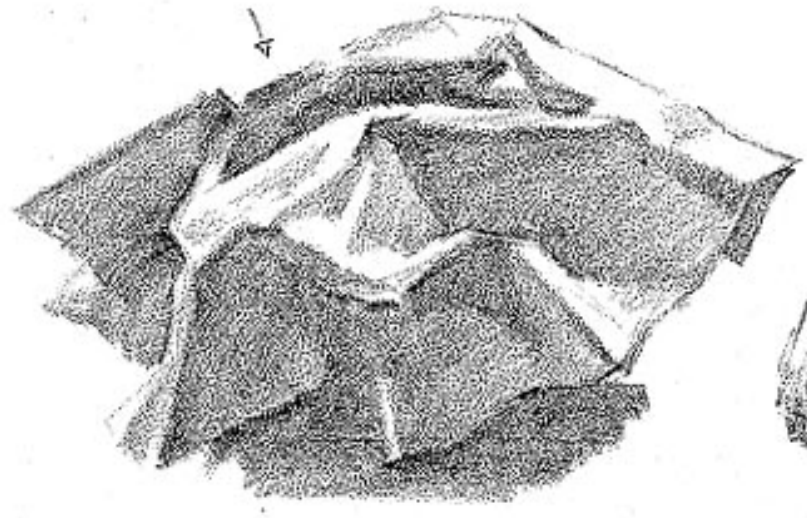
CONVEX

CONCAVE



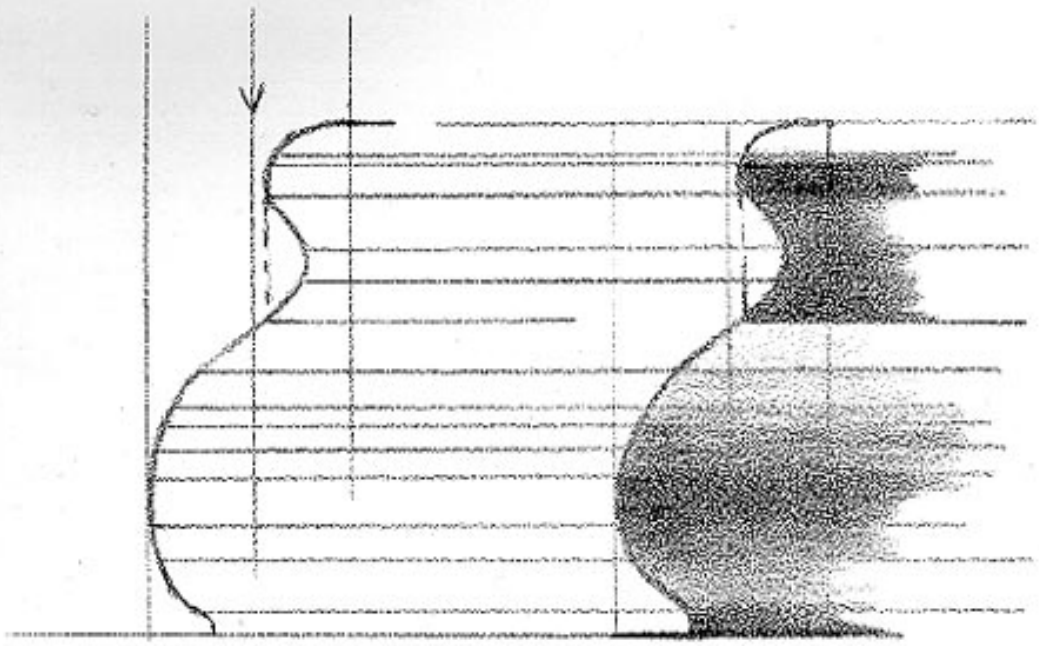


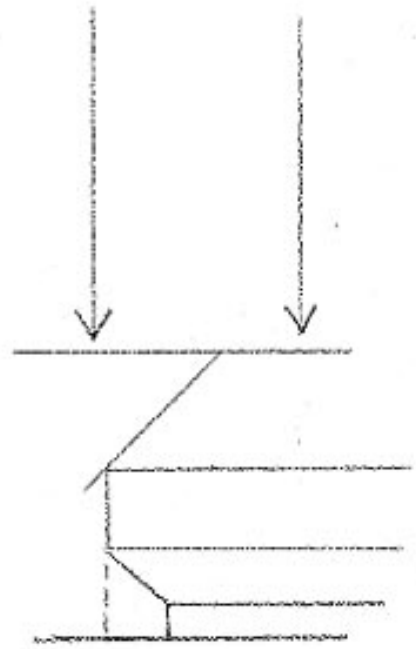


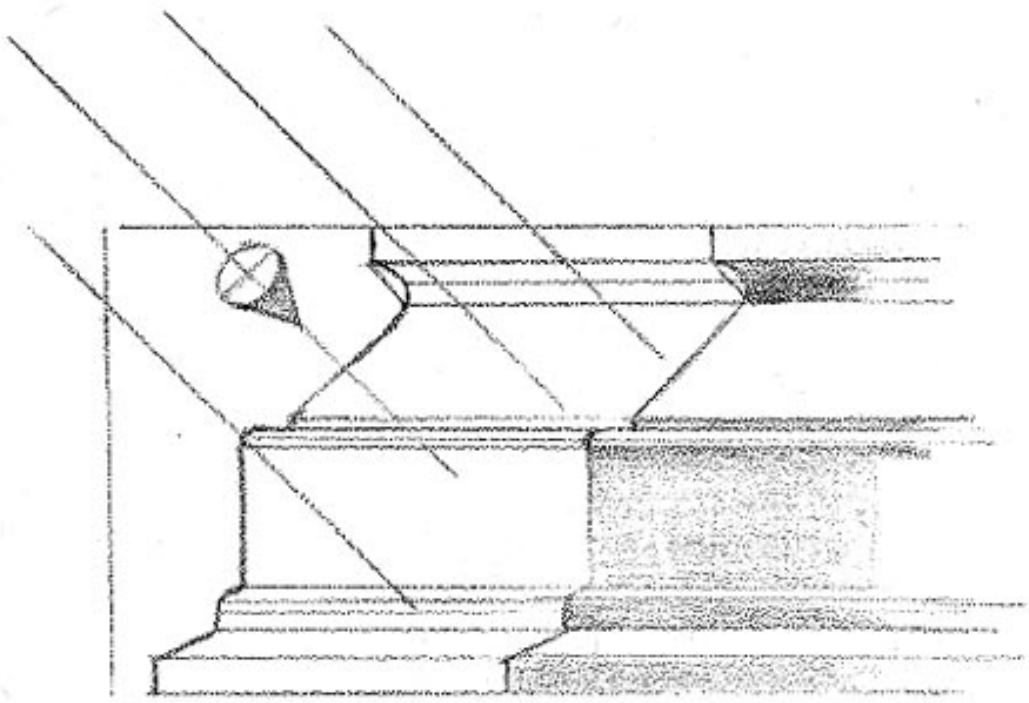


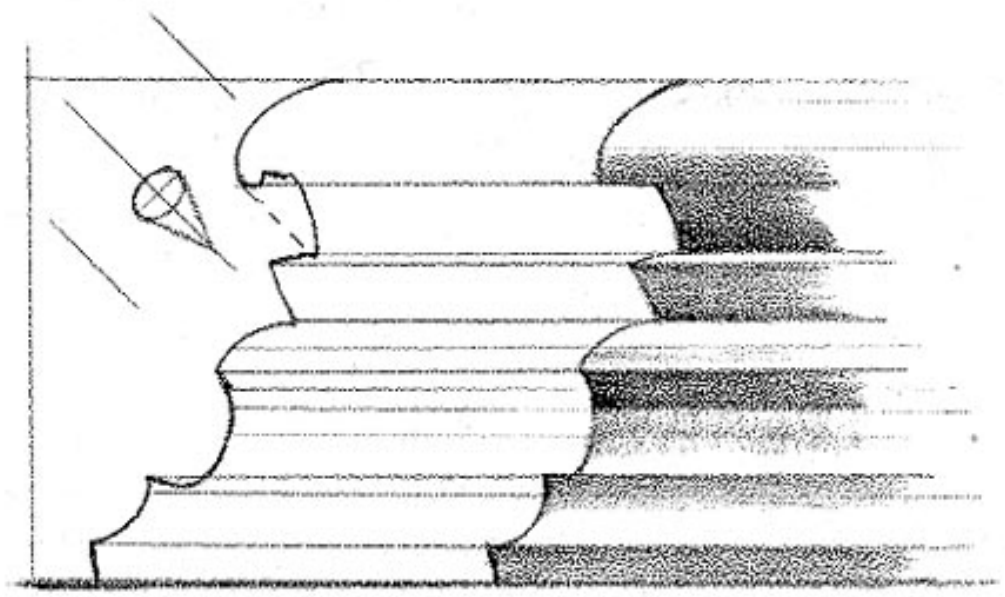
Careful study of this page will reveal the fact that any type of surface form can be rendered by duplicating the effect of light and shadow as they occur across that form. Every material or surface has a characteristic effect at any given moment. Every effect is made up of light, halftone, and shadow. If we study the subject and can define those elements clearly and can then fit them properly within the contours, we will have re-created the form and also the effect of the material of which it is composed. In the drawings above, arrows indicate the direction of the light. Set up a number of subjects composed of a variety of materials and render the effects.

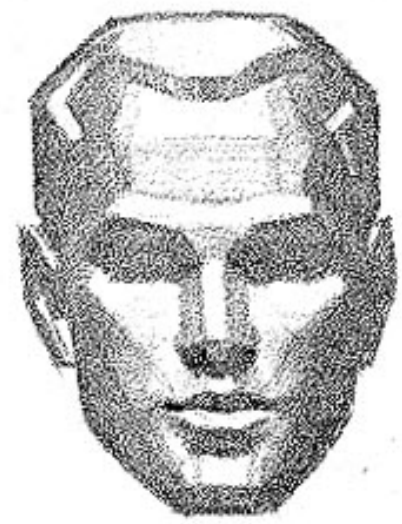
PLANES



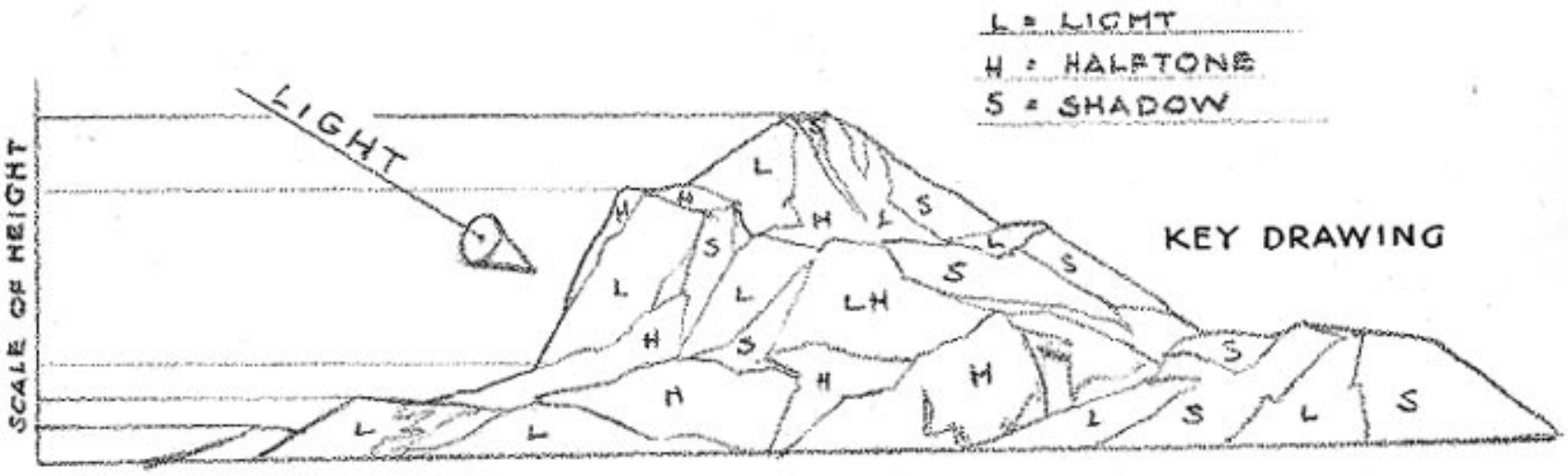


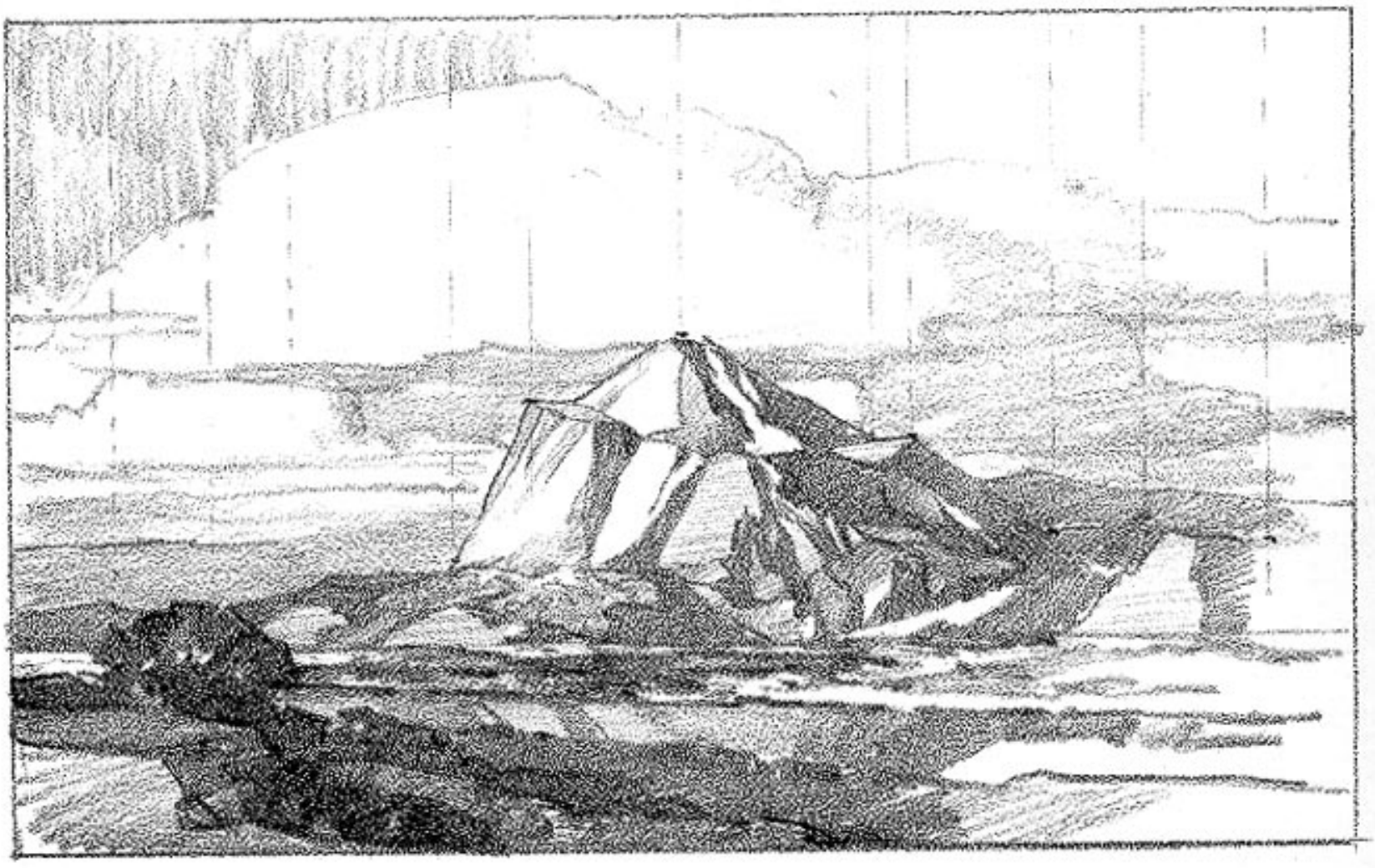






PLANES



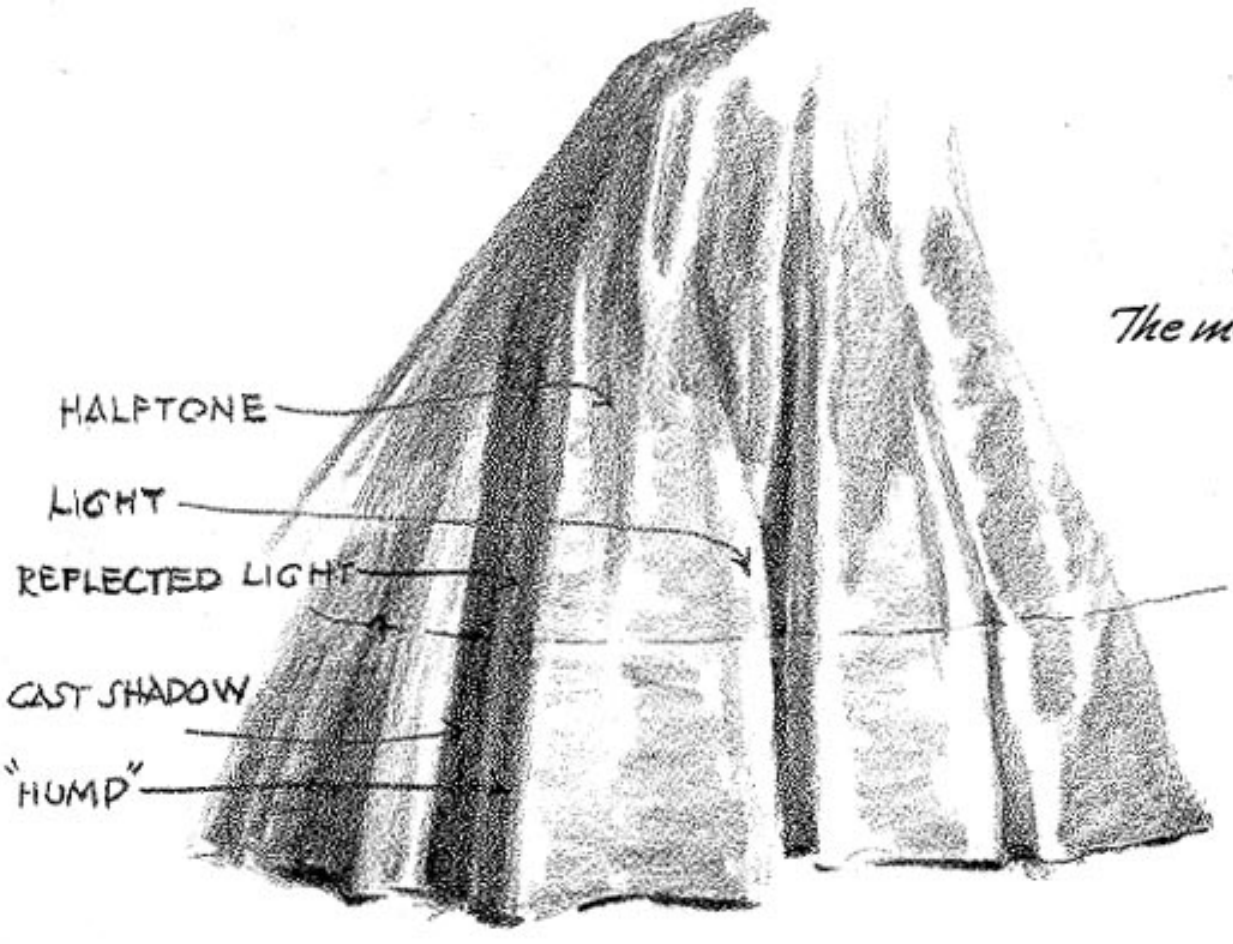


Changing Light on Complex Planes

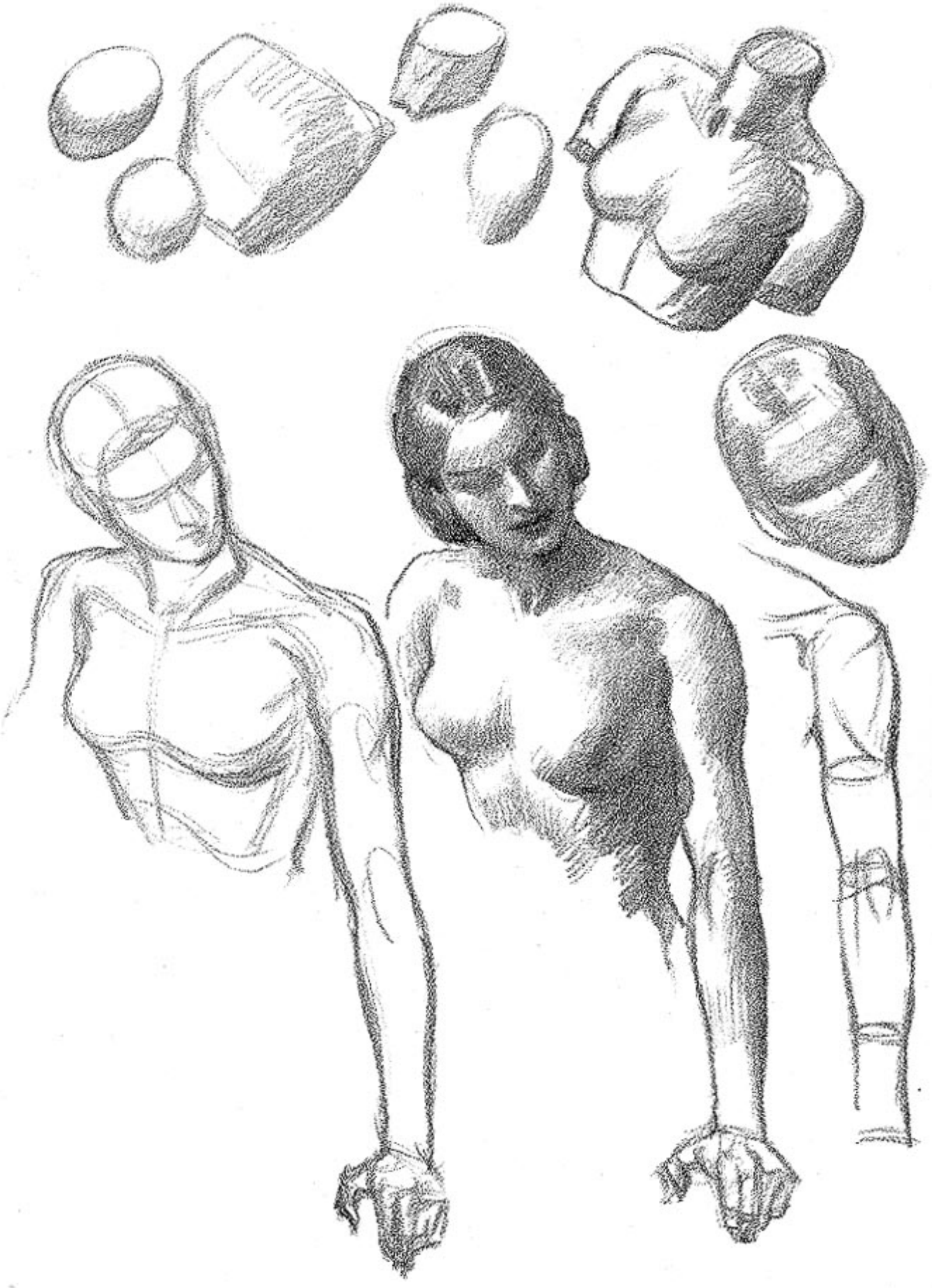
A subject like the one shown above cannot be drawn or painted convincingly without a study of the light on its planes. The camera can give only the intricate superficial effects. We must always search for the broader planes upon which this confusing detail lies. Since light changes so rapidly, it is often practical to make a quick key drawing like the one at the top of the page, to record the main planes of light, halftone, and shadow. This gives a basis for building the solid effects later.

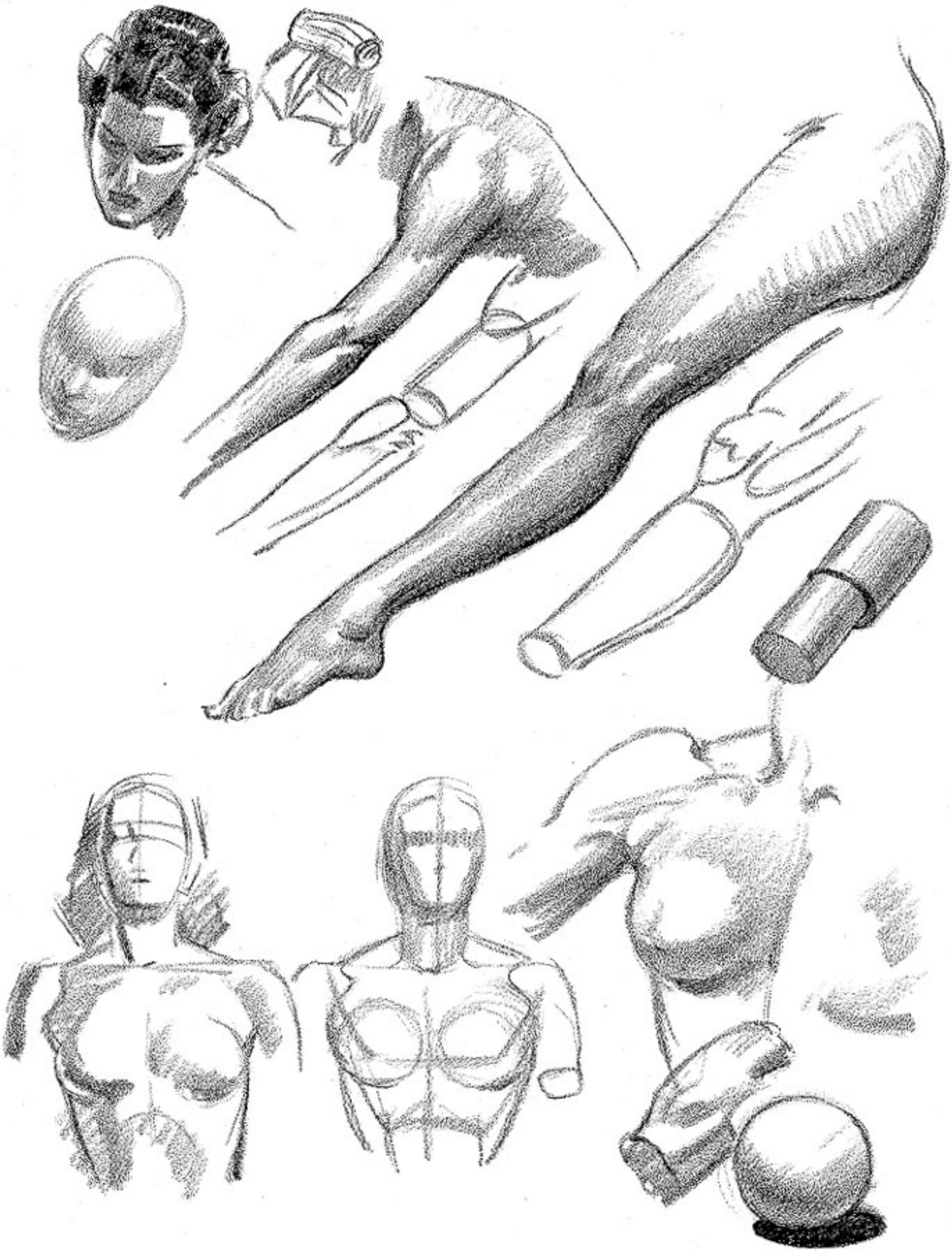
PLANES

A face is drawn as any other surface is drawn by following the angles of the surface and with each change of plane, noting the change of value.



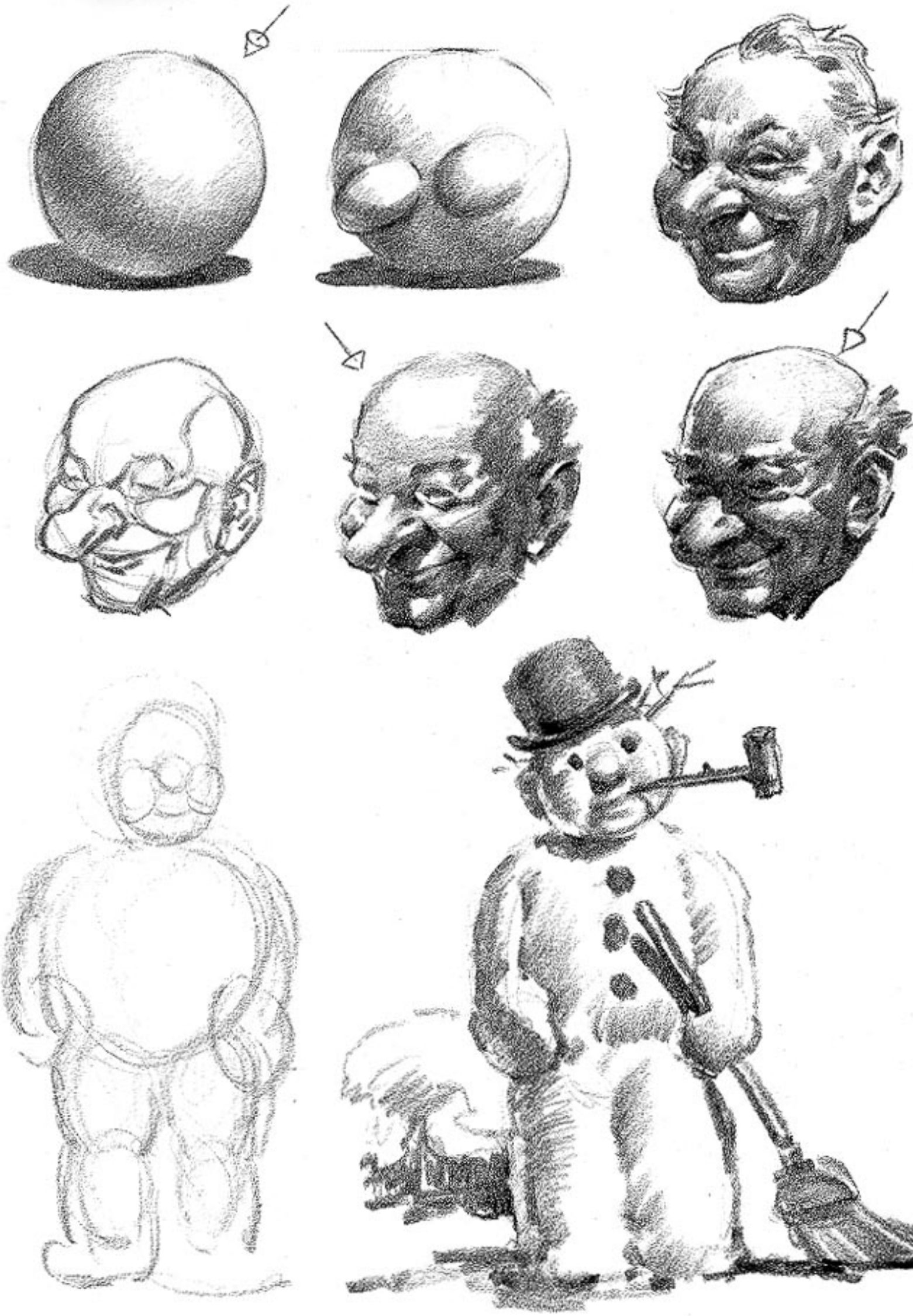
Drapery
The method is the same.

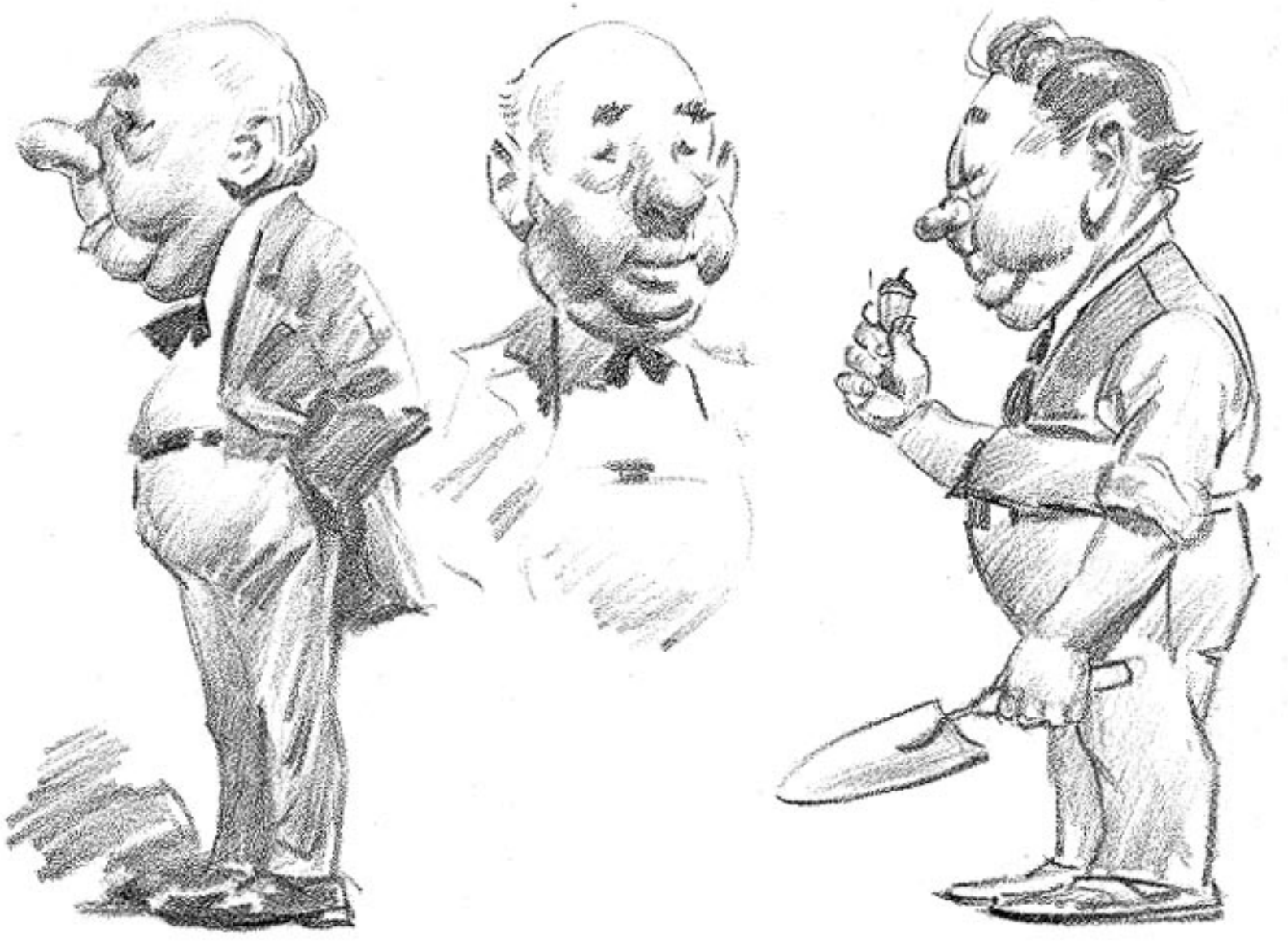


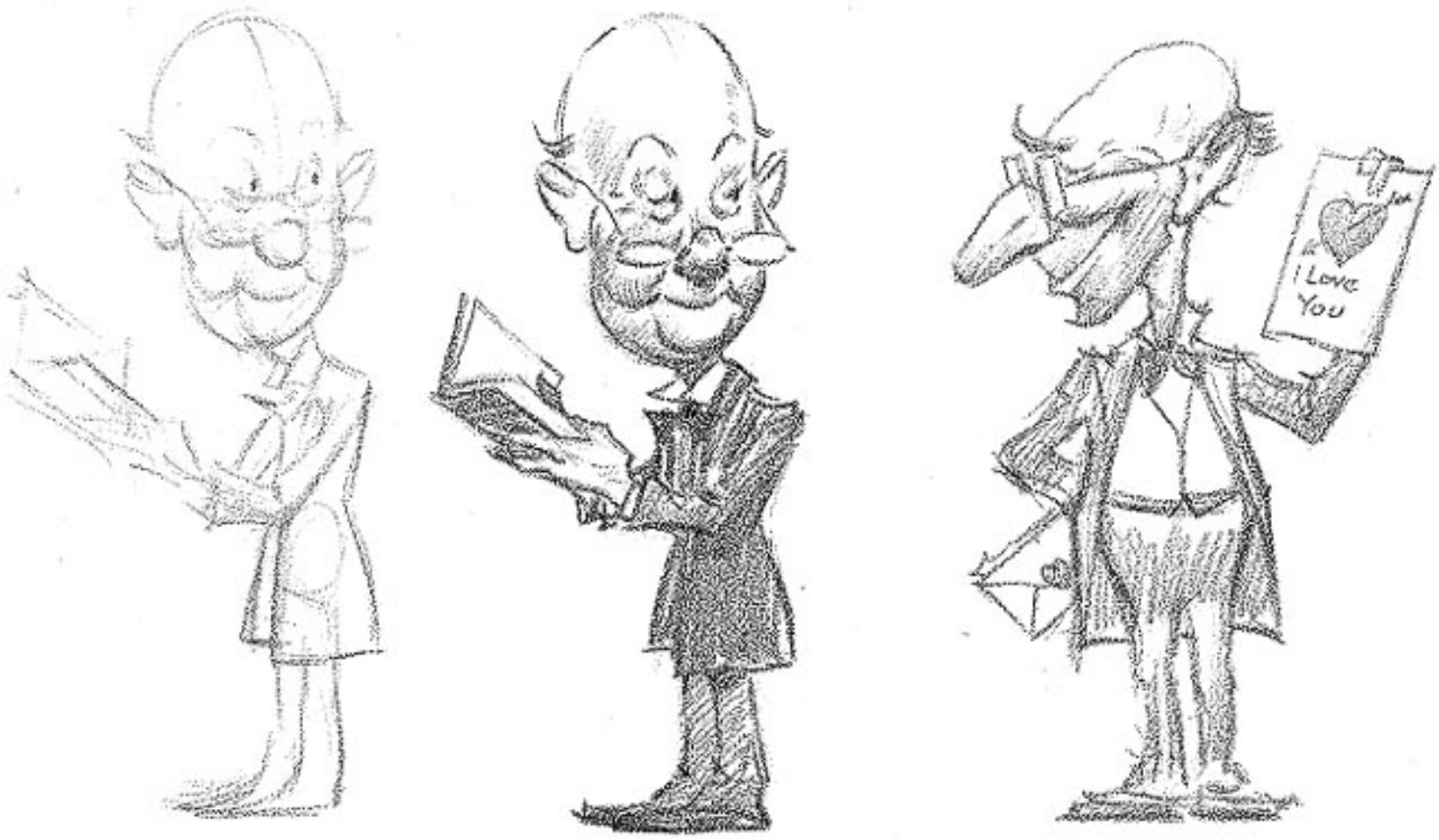


Light on forms related to the basic forms of sphere and cylinder

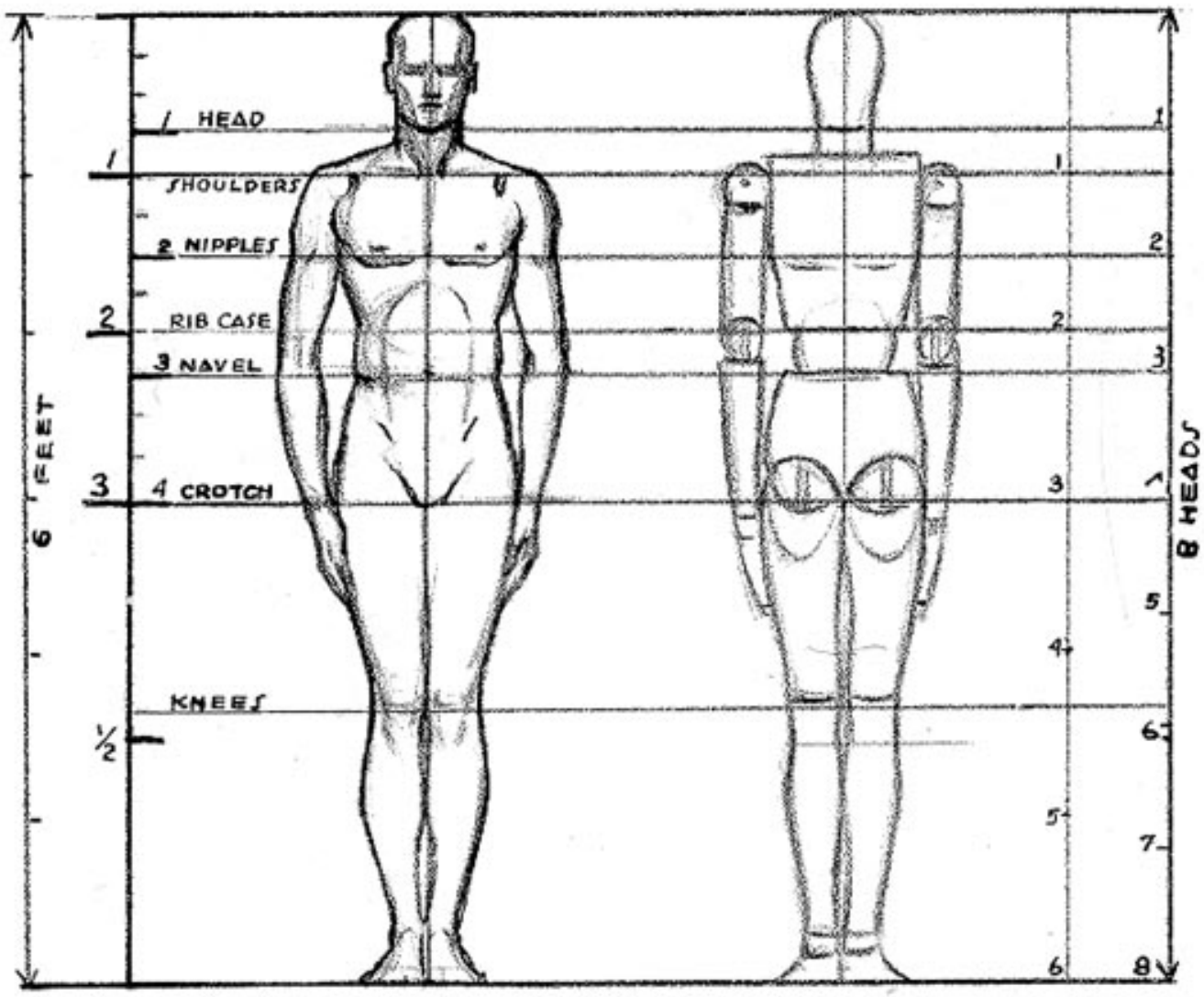
The study of still-life is one of the best ways of learning to draw. Light the objects from one source. Try to separate all the areas of light, halftone and shadow in everything you draw. Sometimes these areas are very merged and delicate, so that it will test your observation and skill to define them.



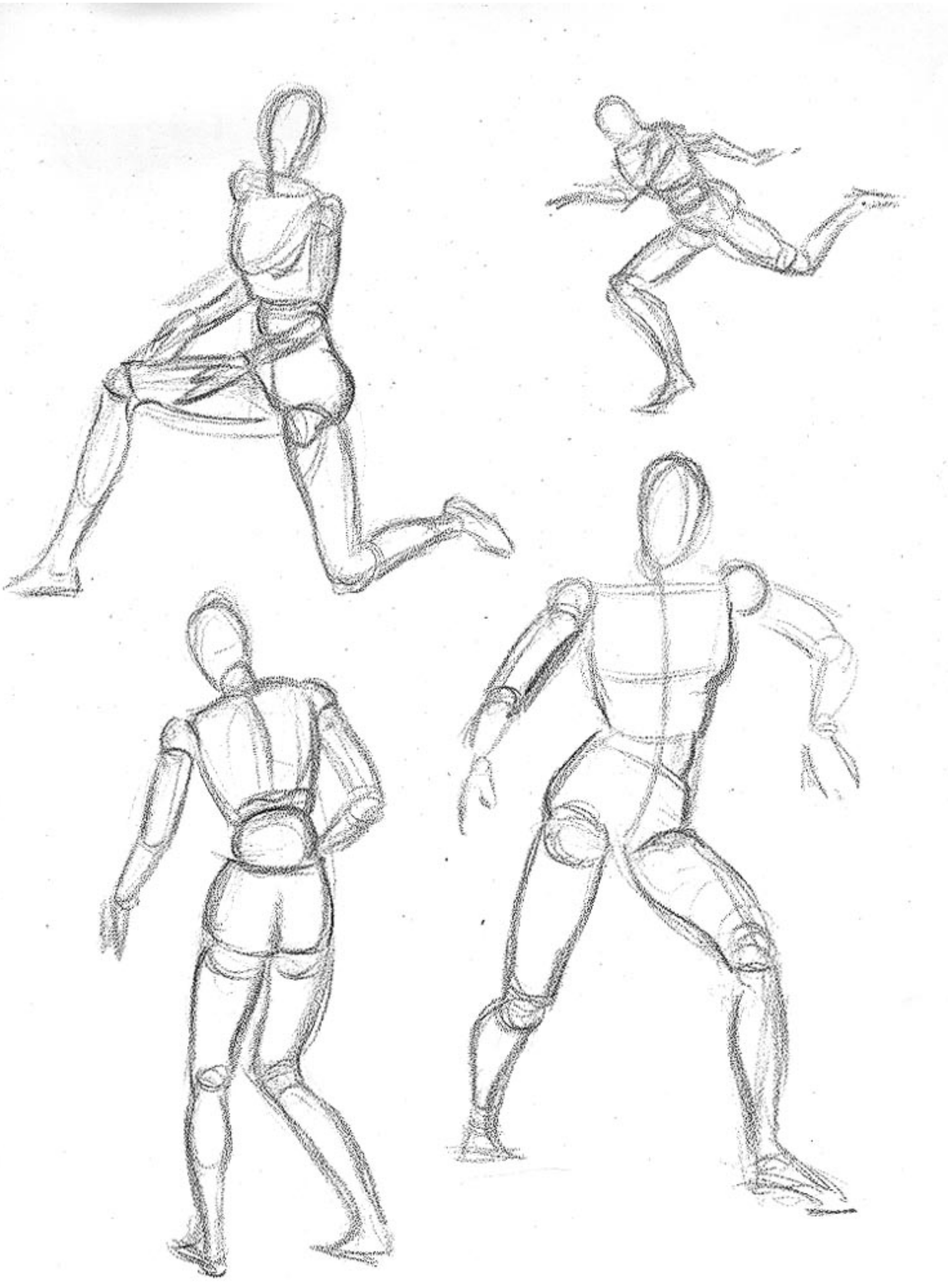


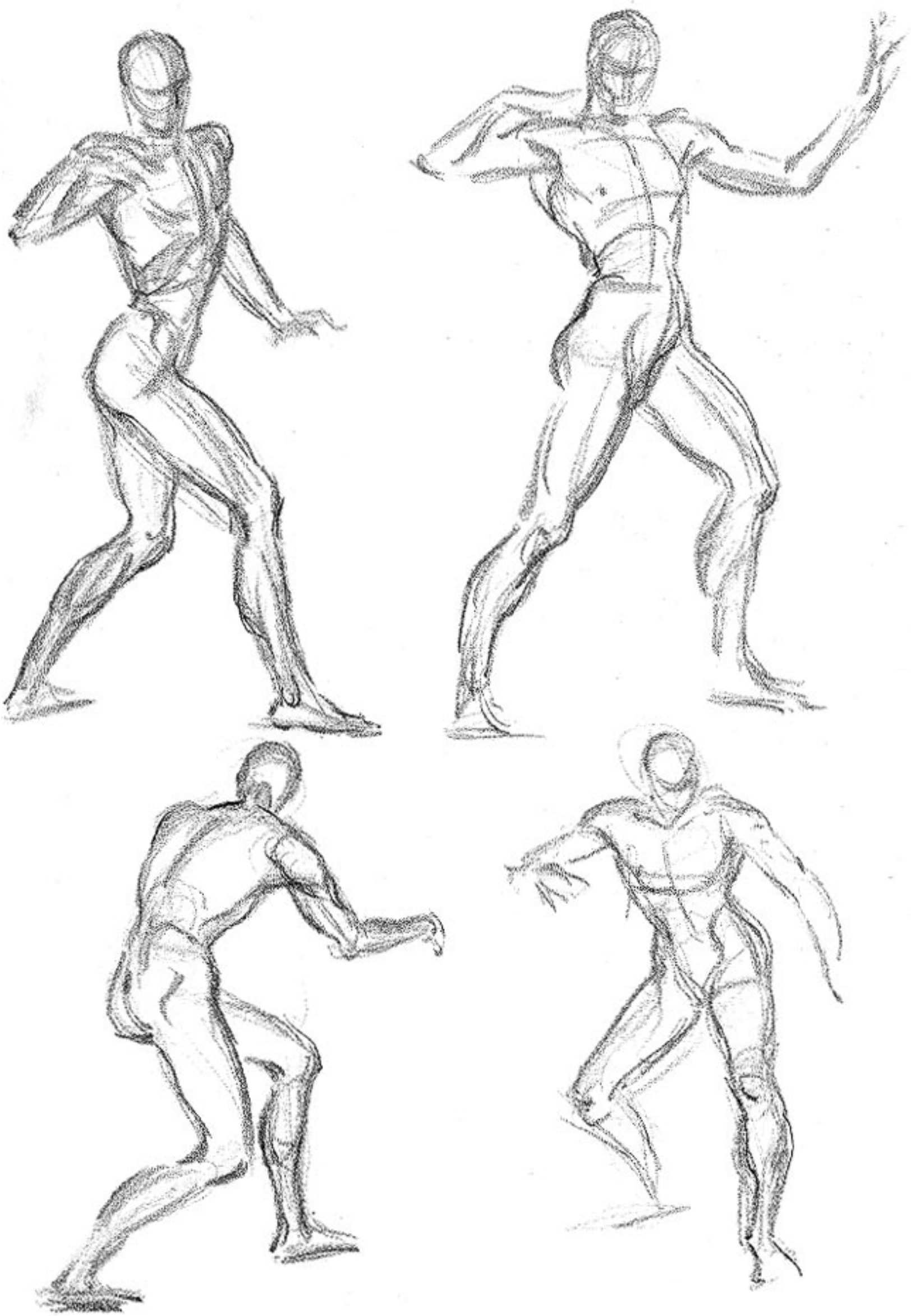

I LOVE
YOU

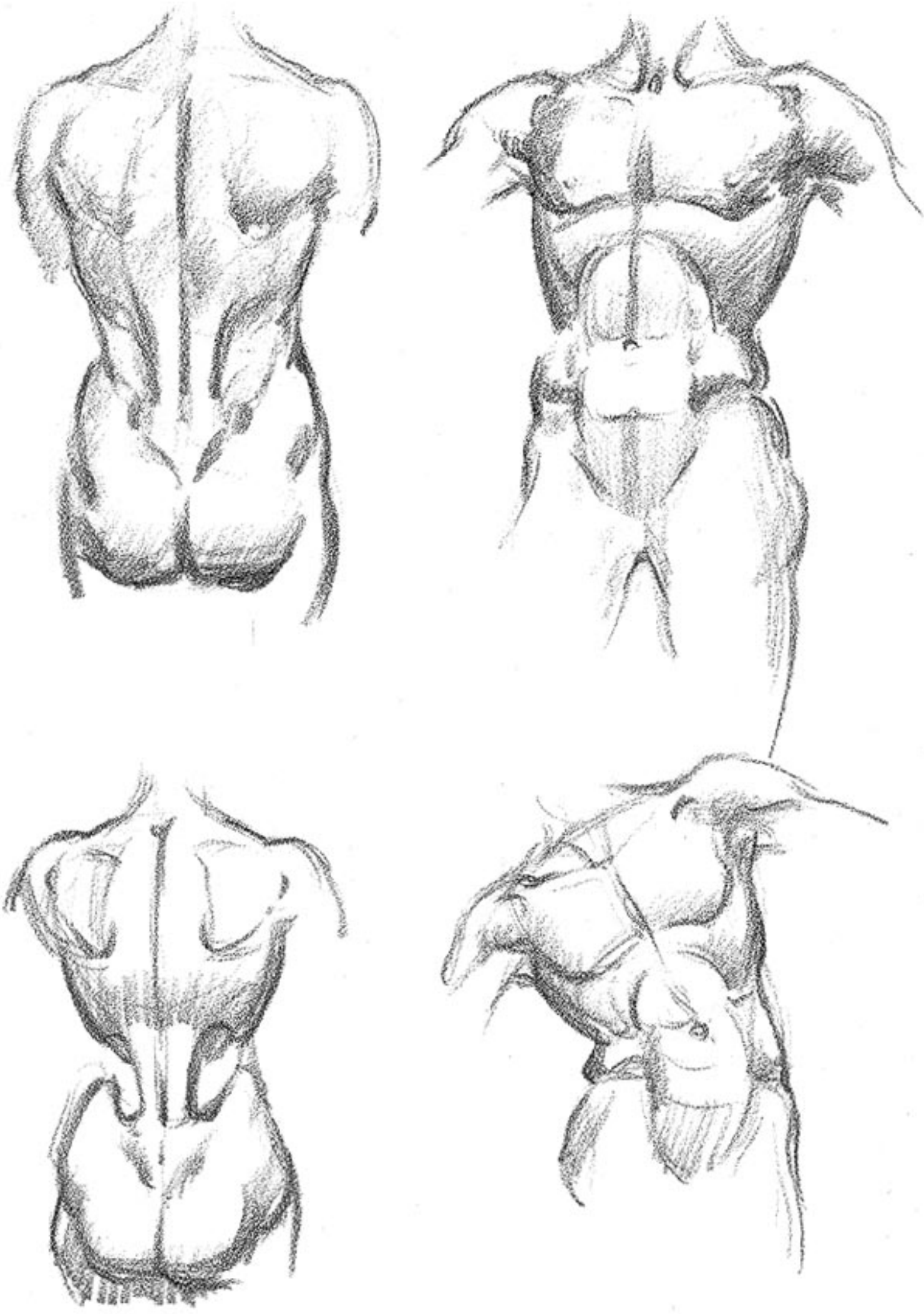
DRAWING FROM THE MANIKIN

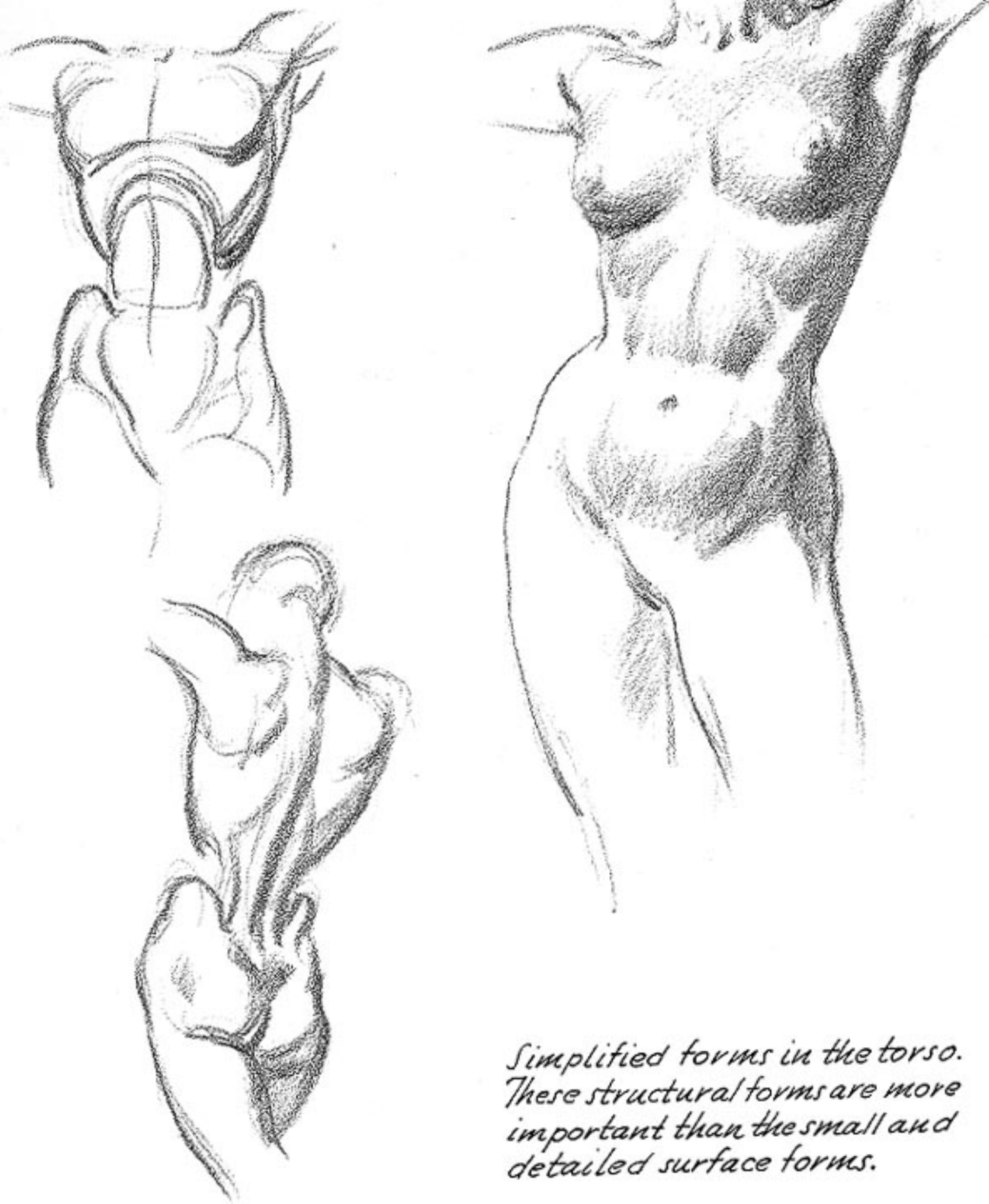


Manikins are a great help in developing action in figure drawing, in that they can be put into "still" poses no live model could hold. They can be purchased at most art dealers. Their approximate construction is shown by the figure at the right. For comparison, the figure at the left shows the ideal proportions of the male human figure. The line at the extreme left shows divisions of the height of the figure of ideal proportions. One side of the line is divided into sixths and the other side into eighths. These two sets of divisions indicate the important points of the figure. Memorize these scales.

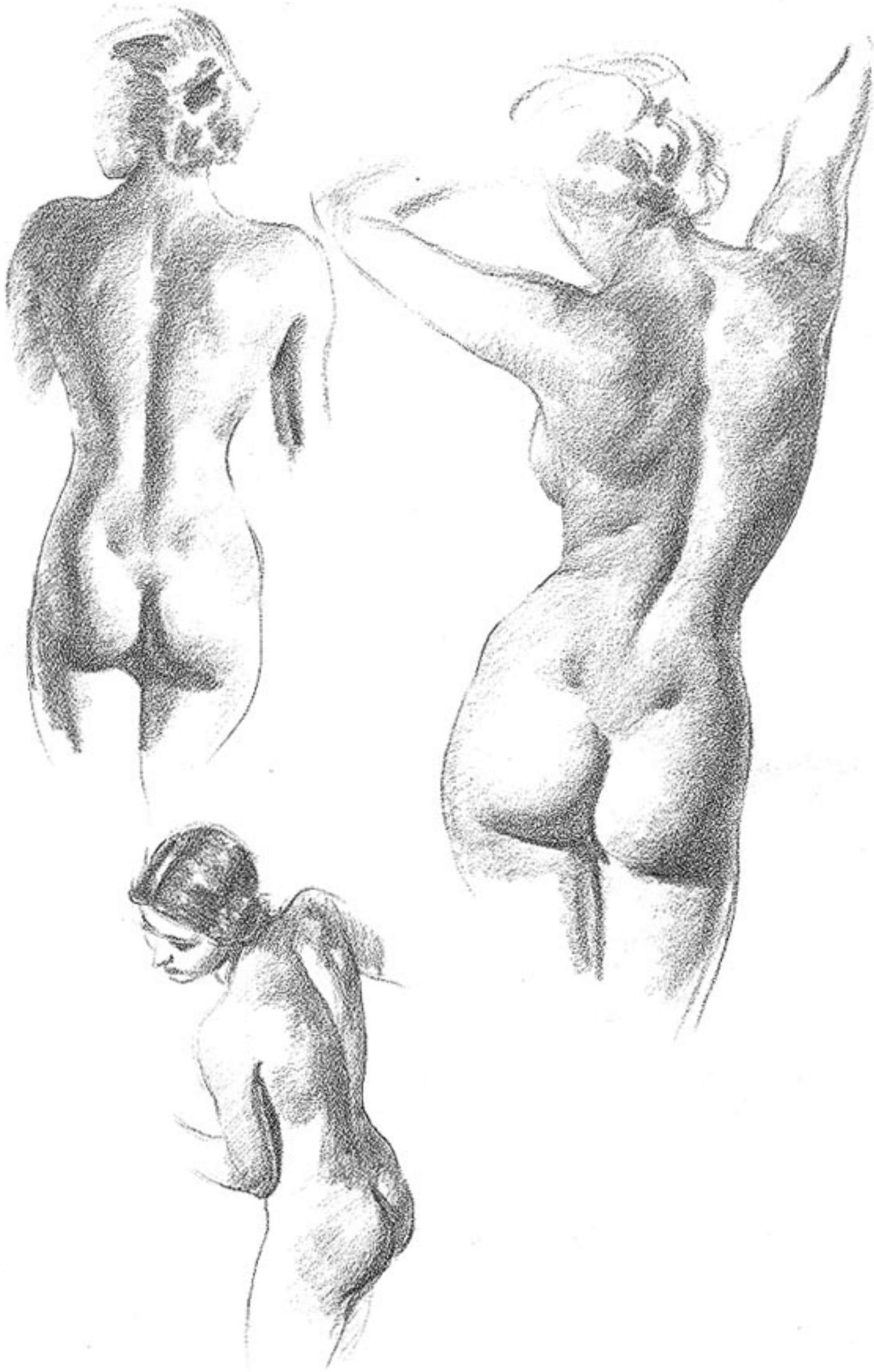


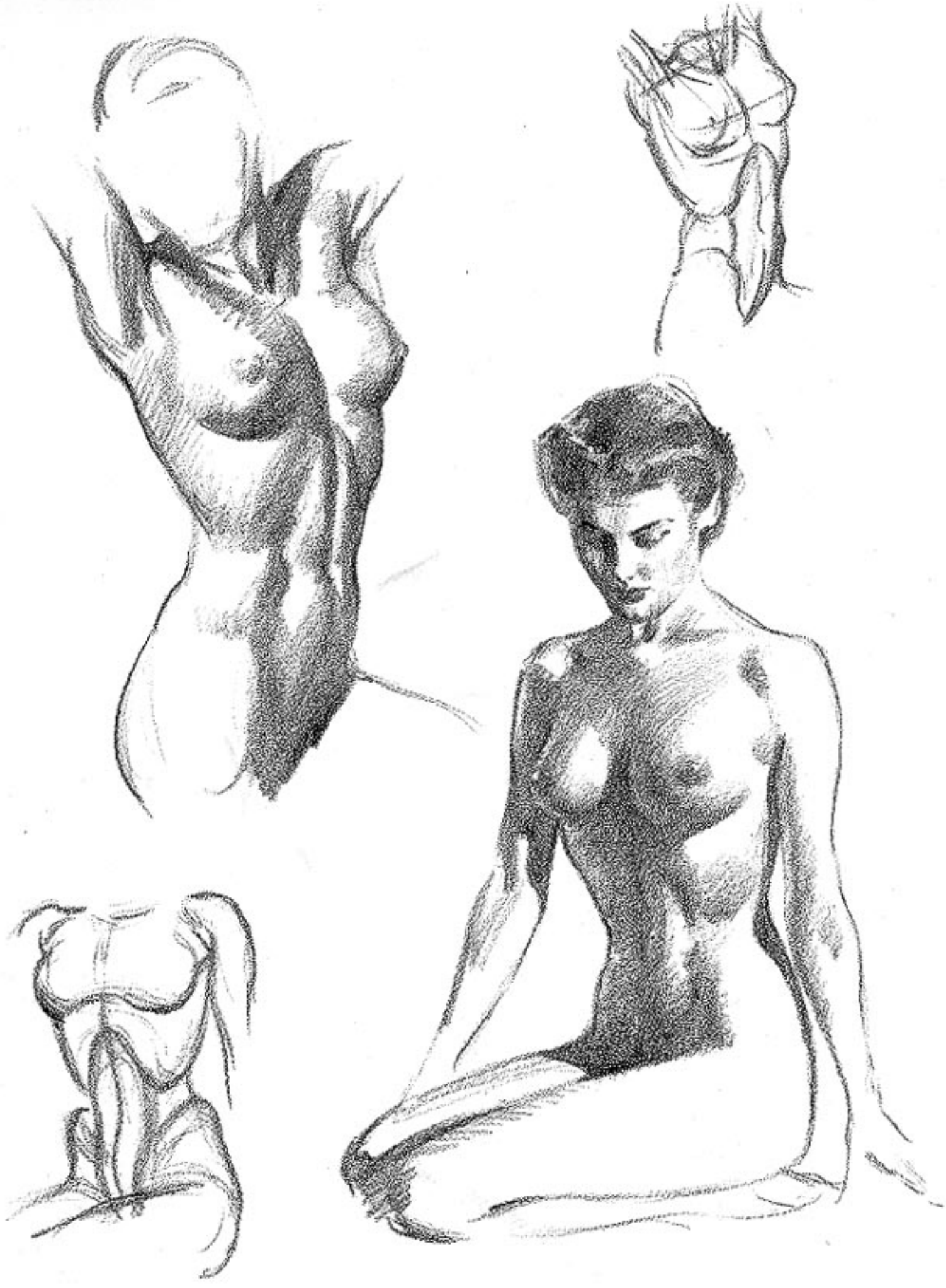


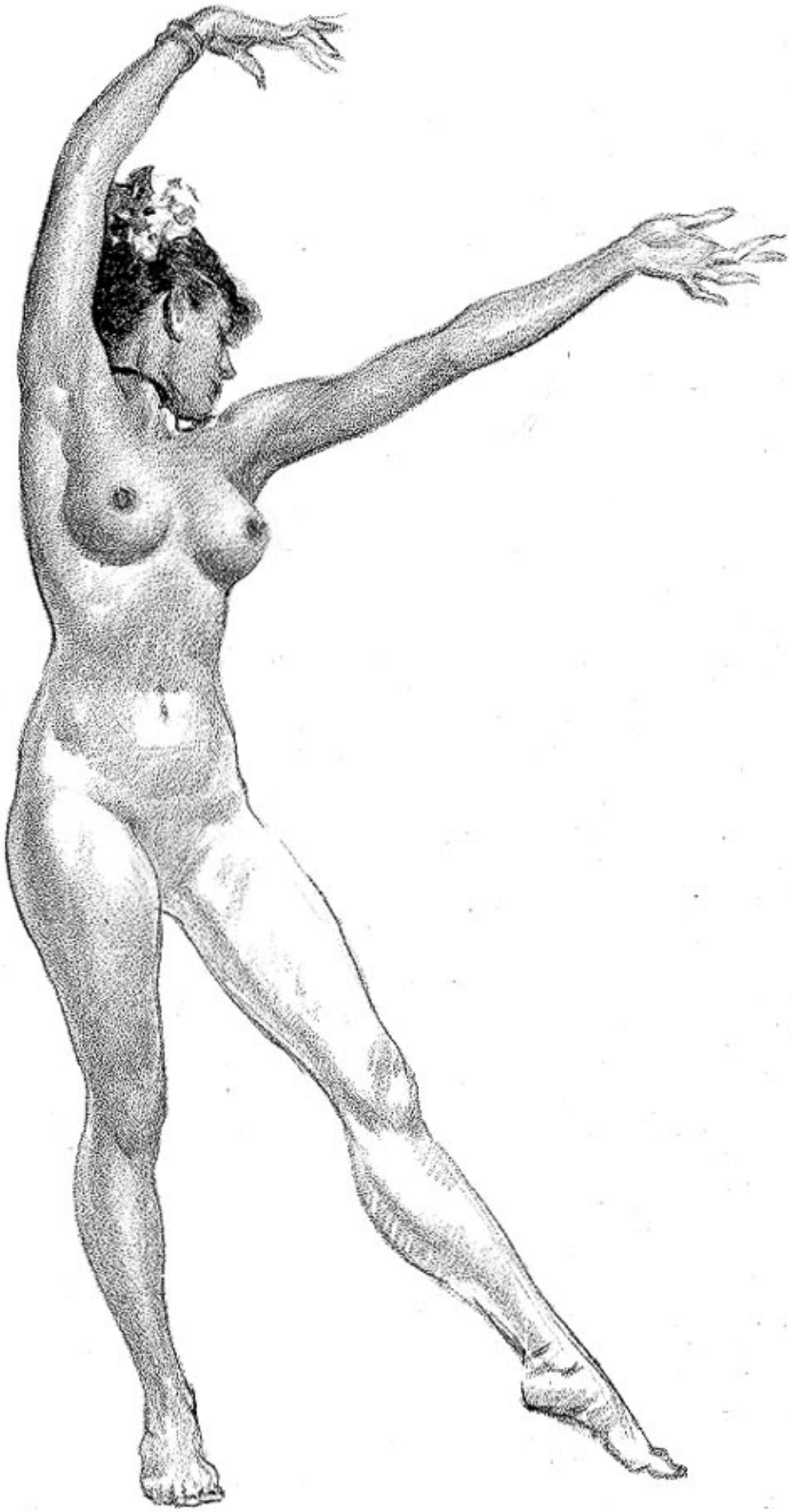


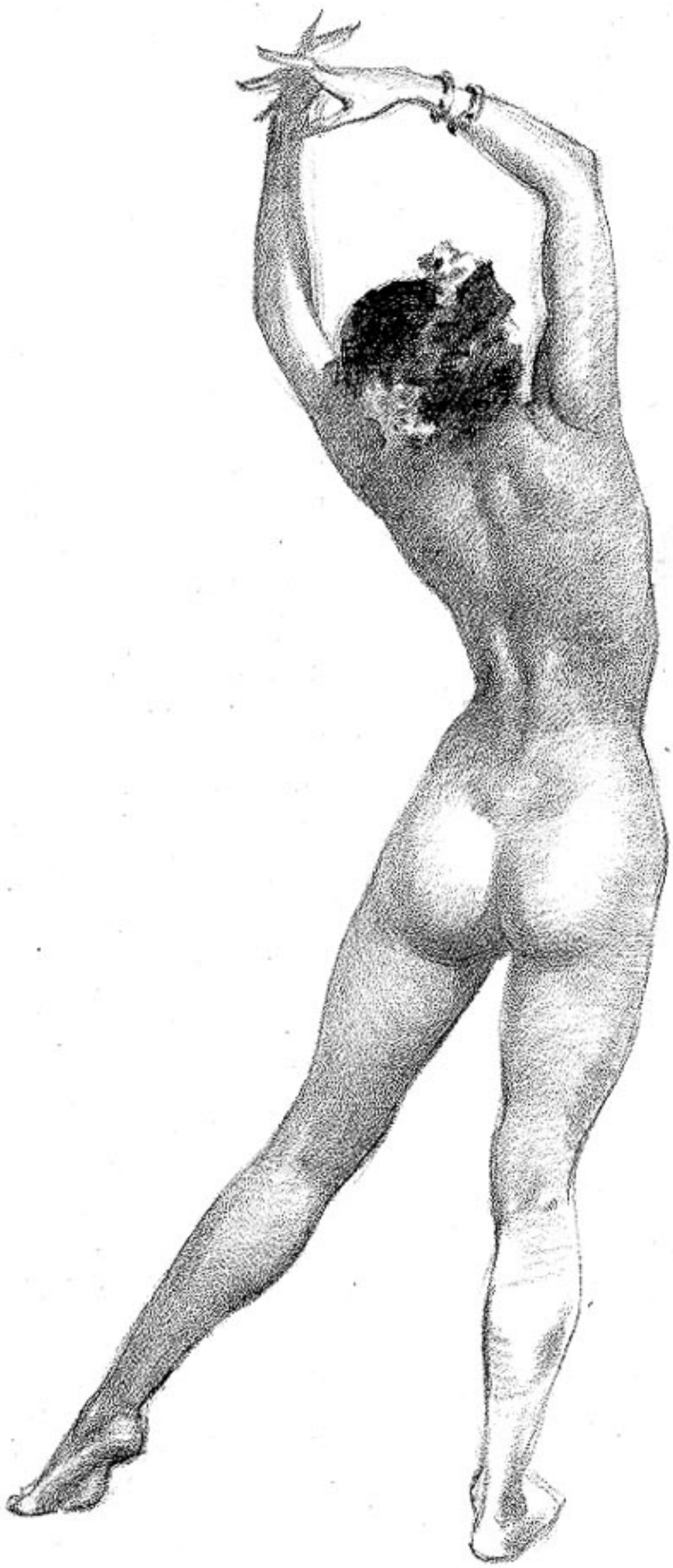


Simplified forms in the torso. These structural forms are more important than the small and detailed surface forms.



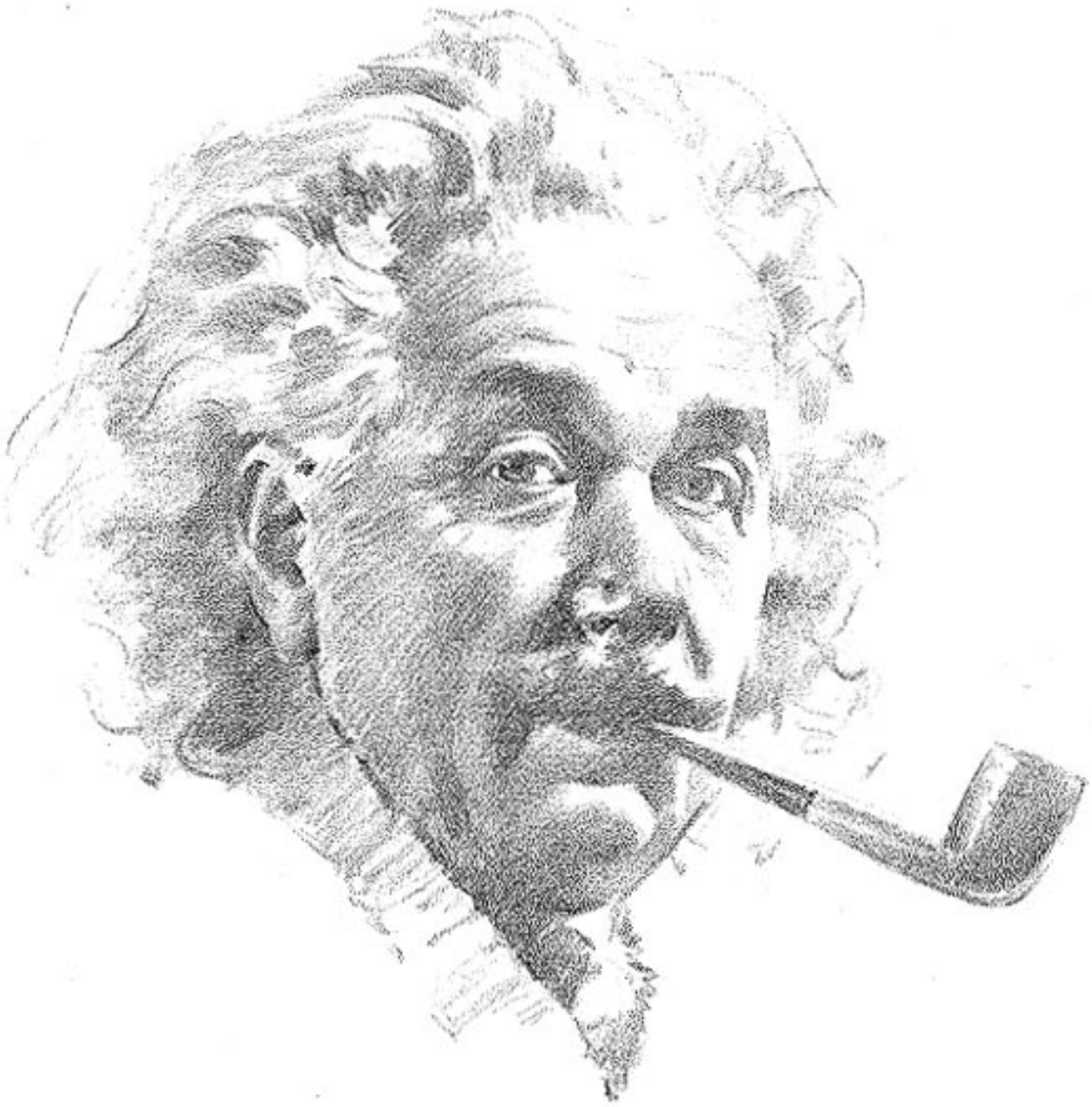




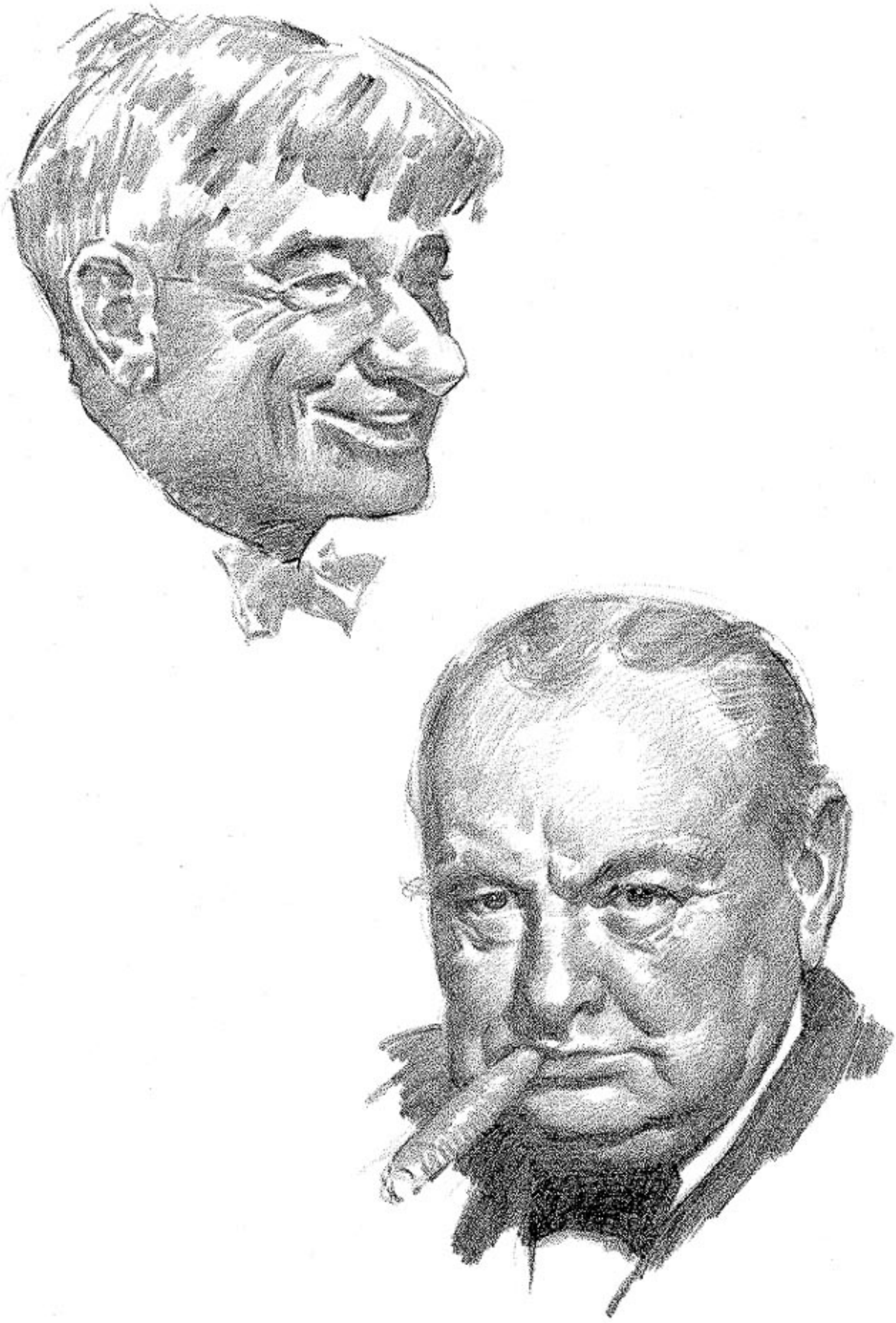


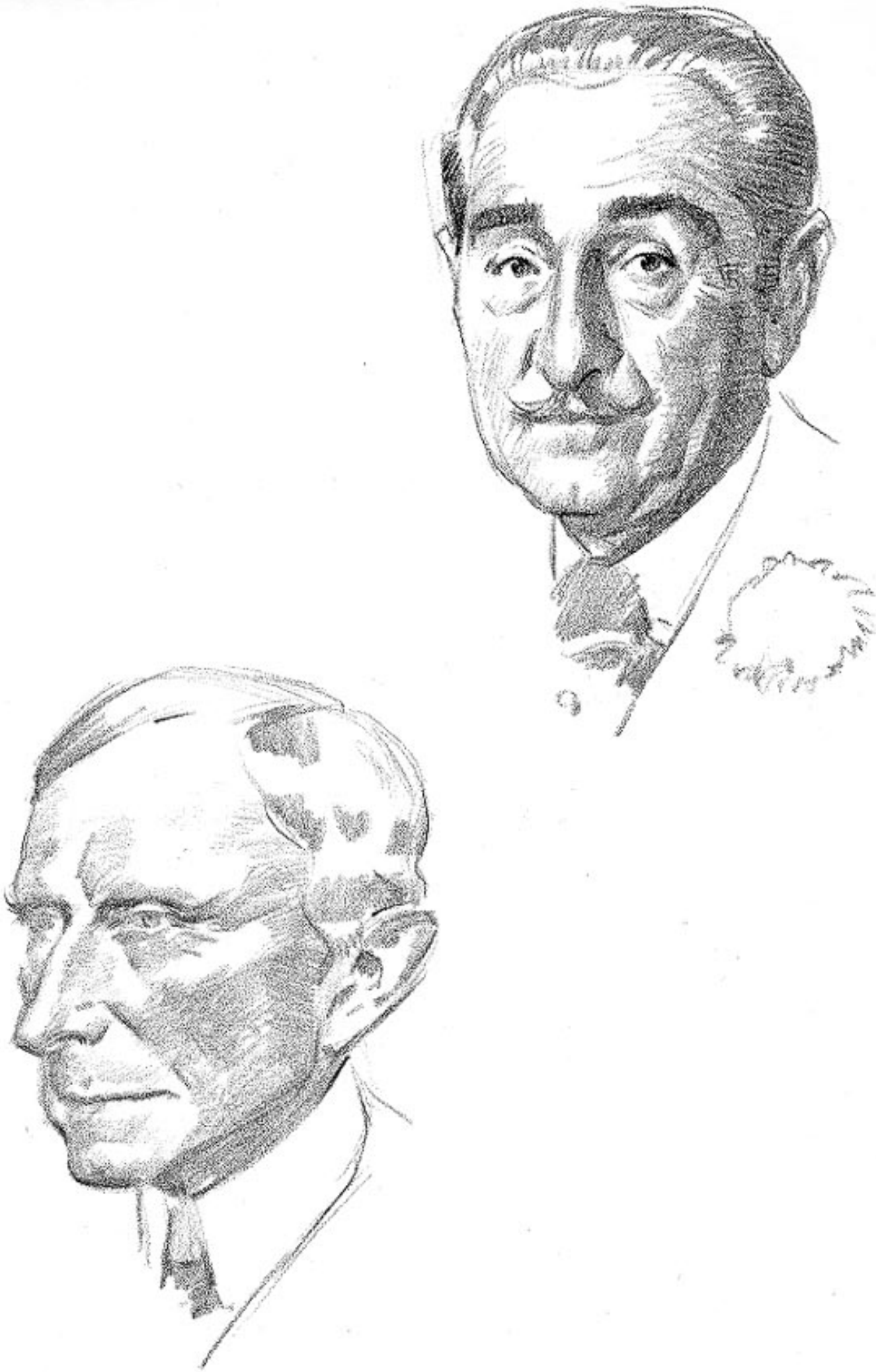
A study in diffused light

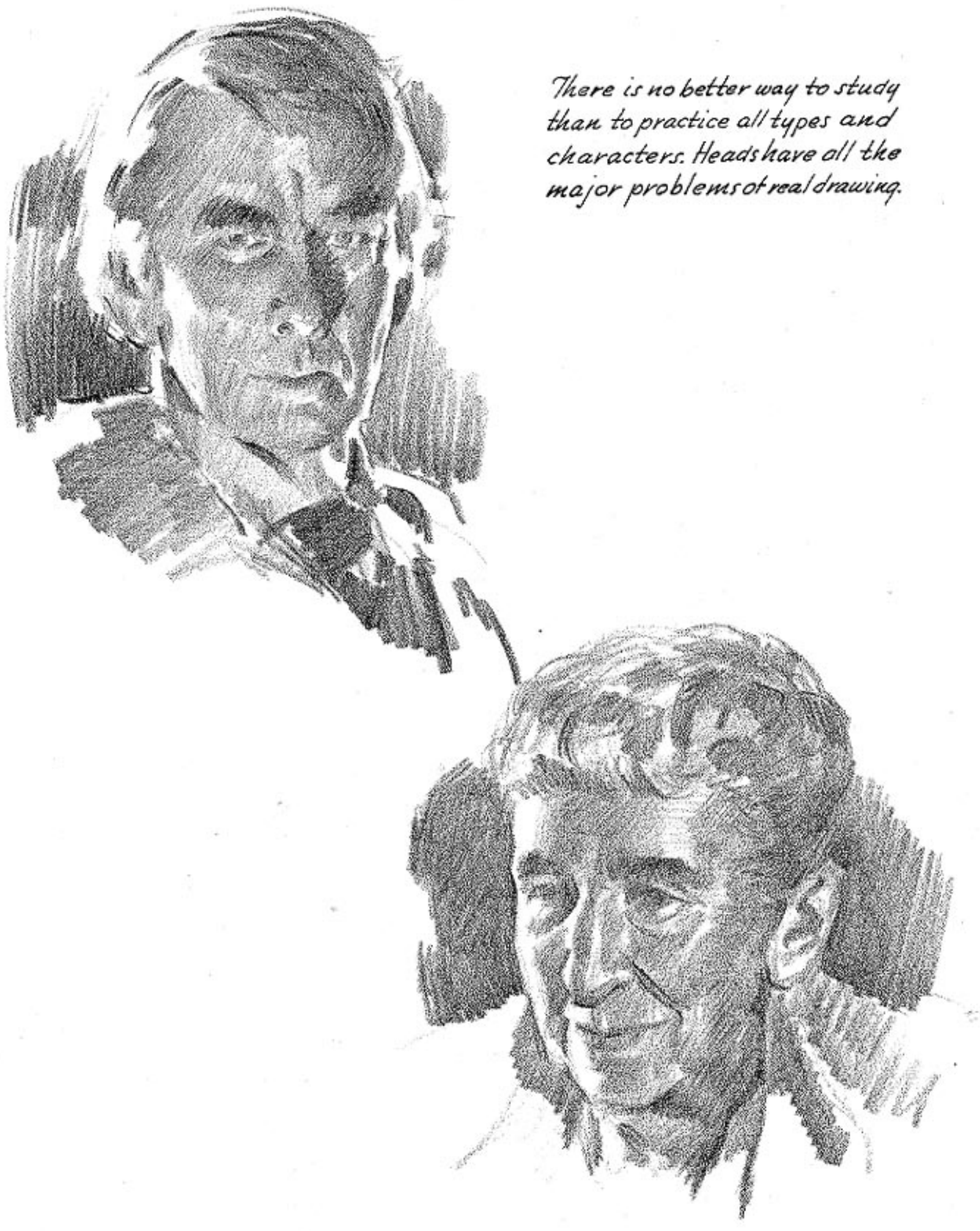
A study in direct light



Every head has its own combination of forms which will identify it.

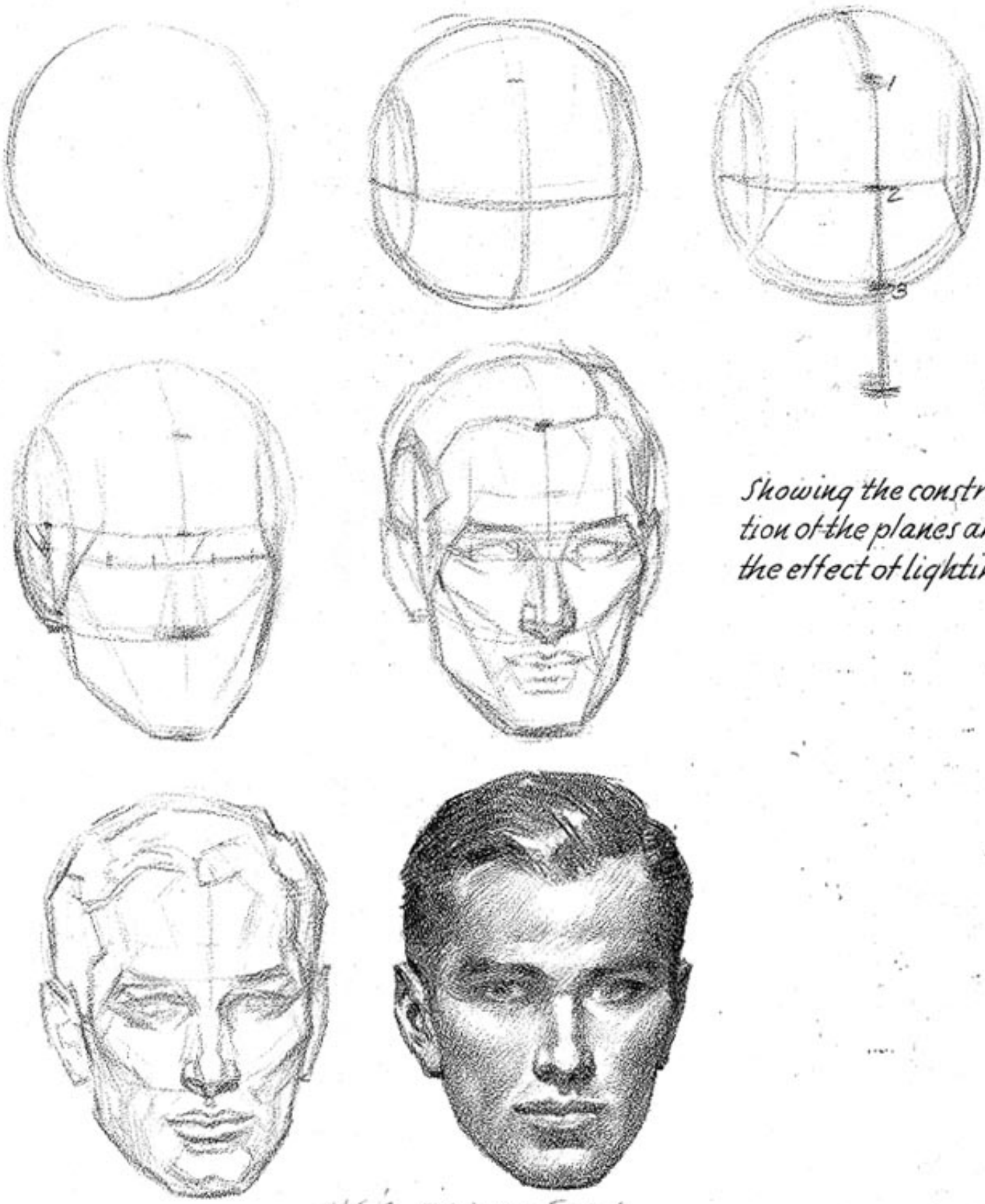






There is no better way to study than to practice all types and characters. Heads have all the major problems of real drawing.

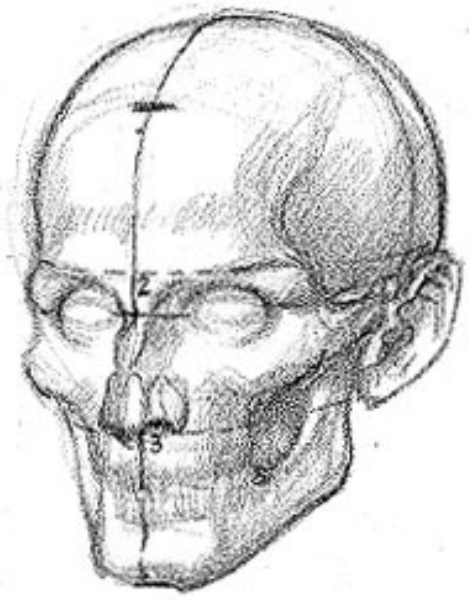
Exaggeration of the form



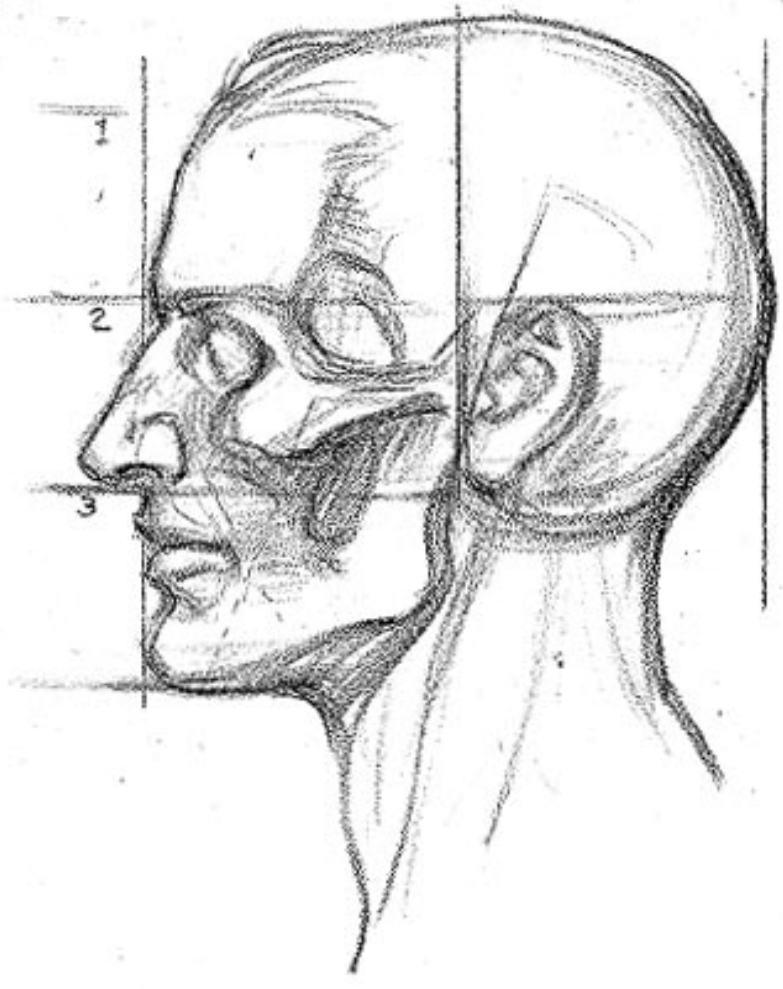
Showing the construction of the planes and the effect of lighting

HE'S BEAUTIFUL!

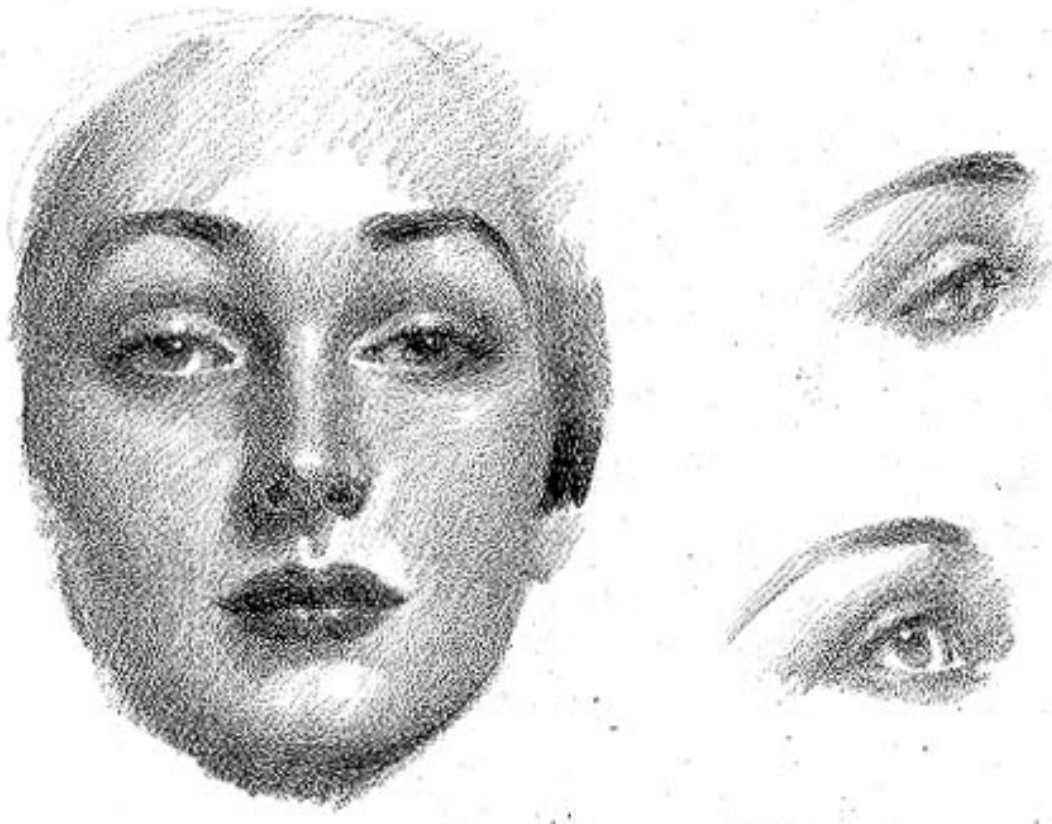
Drawing the head without model or copy



Study the skull forms



Your skill in drawing heads depends upon your ability to understand the forms and then to space them in correct proportion.



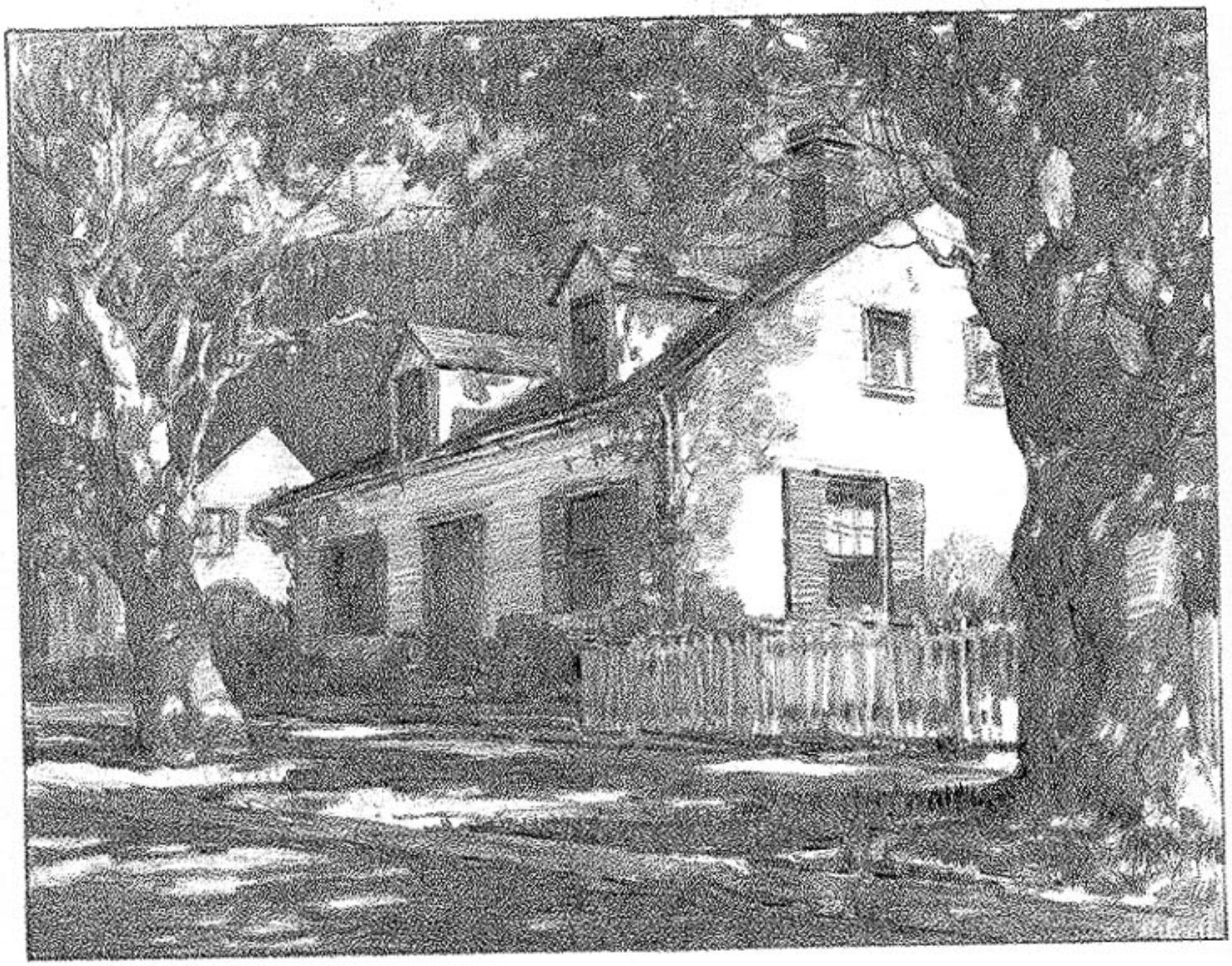
TONE

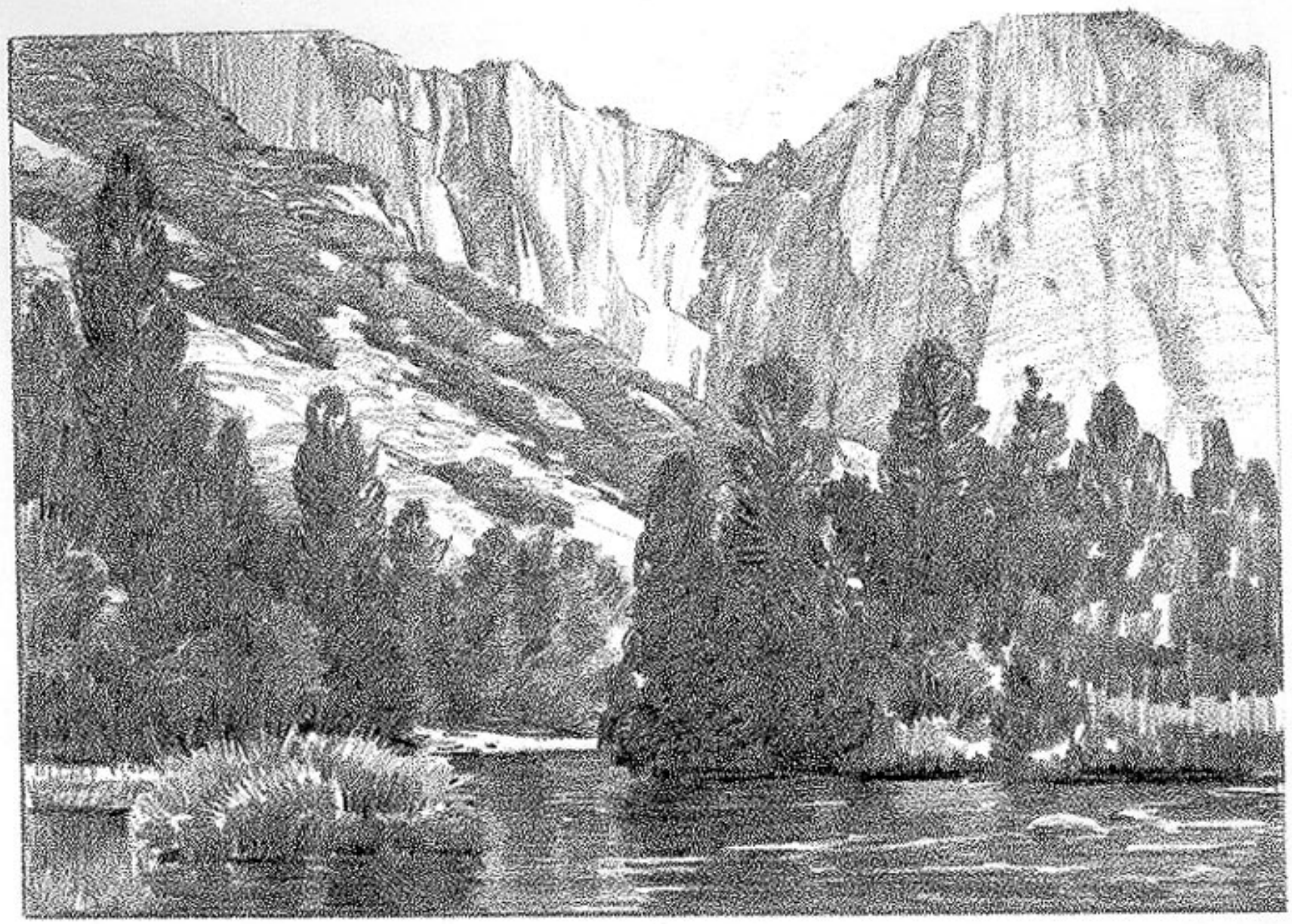
It is valuable training to make many practice studies of the features, striving more for the effects of tone than line. This is a sound approach for painting. Tone is form, line is definition.

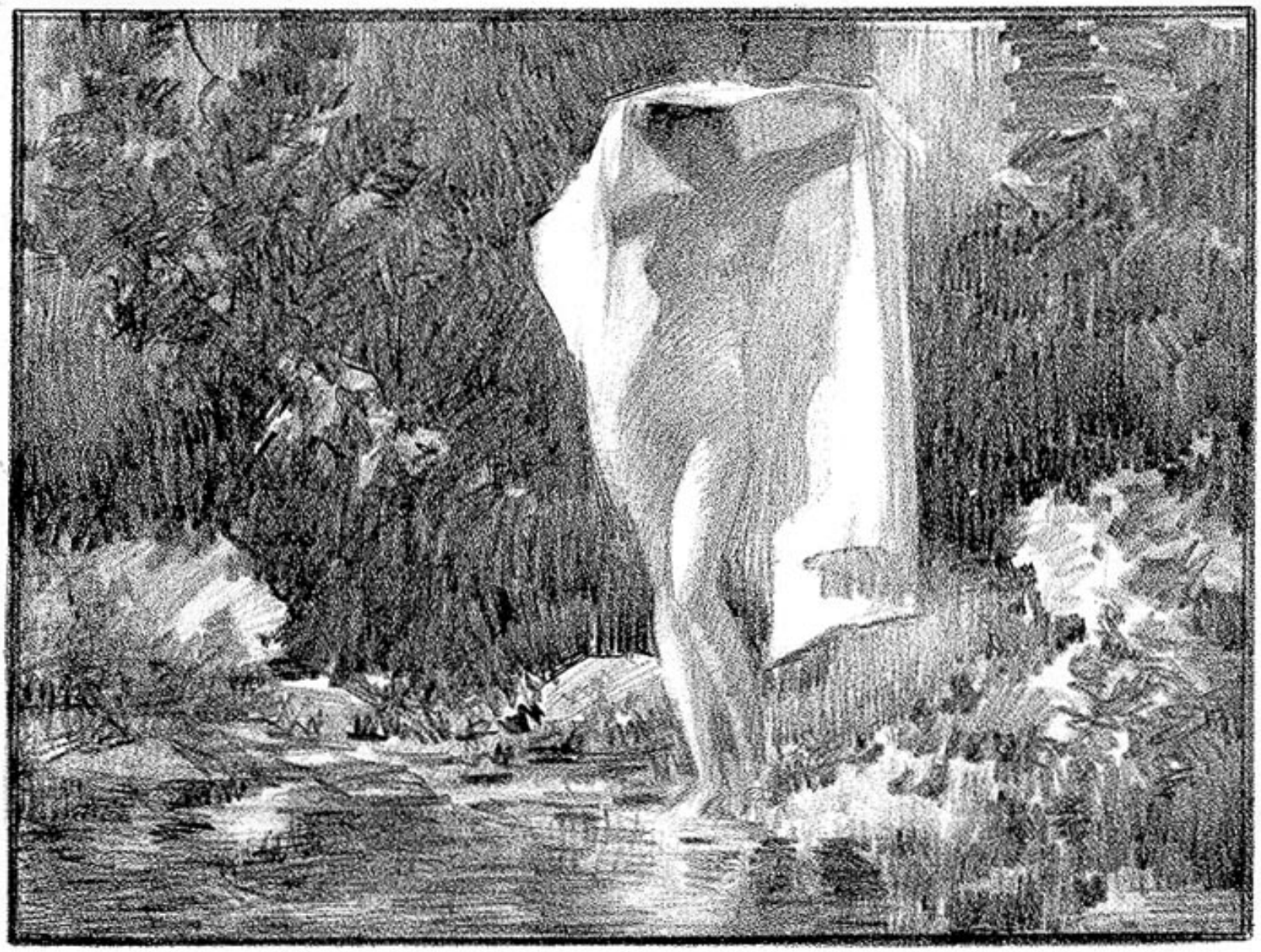
The success of illustrators in America seems to depend largely on their ability to draw a well-constructed head. Study!

A Gallery of Drawings

Every artist should subscribe to the fashion magazines. They are the best possible sources for practice material. At the same time you are learning drawing and values, you are familiarizing yourself with the very important elements of style which mark the era of which your art must be a part.







Tonal plan for a figure painting