# Scaling Furniture From Photos

## Apply the laws of perspective to create working drawings from photographs

**BY MIGUEL GOMEZ-IBANEZ**

Thumbing through magazines and books, you may see furniture that you would like to make. But to do that, you need a set of working drawings. To evaluate proportions and details accurately, you need to draw the piece to scale.

Published photos usually provide overall dimensions: depth, width, and height. While helpful, they do not provide enough information on which to base a detailed drawing.
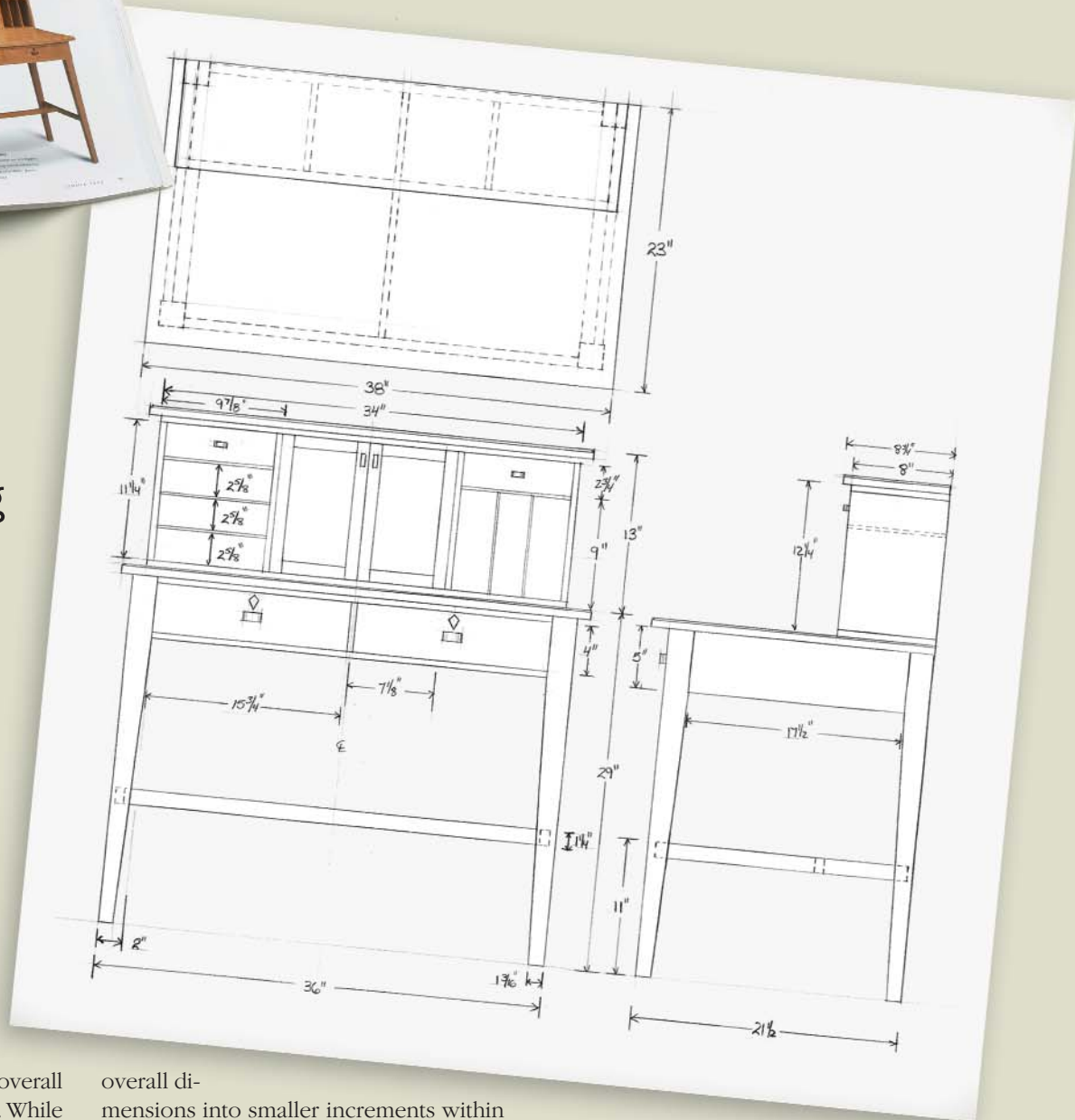
Using a copy of the photo of the furniture piece, string, a straightedge, an architect's scale, a sharp pencil, a bench or table with a sheet of plywood, and a T-square, it's possible to generate lines on each plane of the image beginning with one known dimension. Then you can break down the

overall dimensions into smaller increments within that framework. This technique opens up a lot of opportunity to build projects without plans yet remain faithful to the originals.
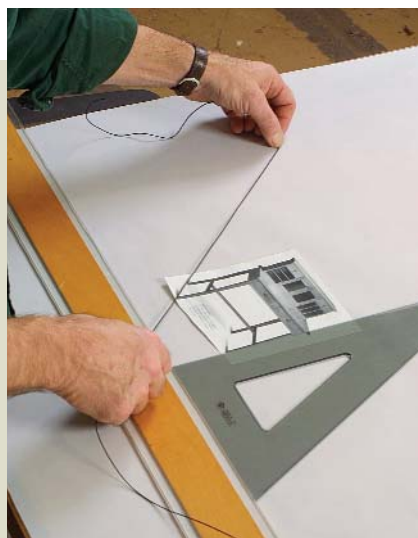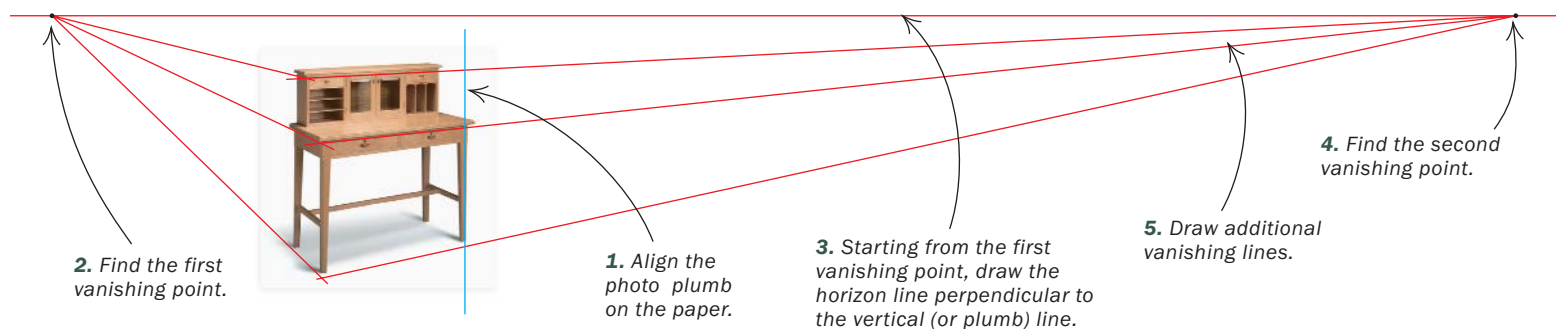
### Perspective-drawing basics

During the 15th century, artists in Florence, Italy, developed a process for perspective drawing that allowed them to depict accurately three-dimensional ob-

jects on a two-dimensional canvas using simple principles. These artists realized that objects that are closer to you appear larger than those that are farther away. Additionally, parallel lines on each face appear to converge as they recede into the distance and, ultimately, appear to vanish altogether at a single point on the horizon. The viewer's

Take the time to locate the vanishing points accurately. Hurrying at this stage will result in many inaccuracies down the line. Begin by taping a photocopy of the piece to the drawing paper, making sure that it is plumb to the baseline. The front and side each has a vanishing point.

**2.** *Find the first vanishing point.*

**1.** *Align the photo plumb on the paper.*

**3.** *Starting from the first vanishing point, draw the horizon line perpendicular to the vertical (or plumb) line.*

**4.** *Find the second vanishing point.*

**5.** *Draw additional vanishing lines.*

***Locate the first vanishing point.*** *Pivot a taut string from your thumb until it aligns with the top and bottom of the piece.*

eye level then is denoted by a horizon line. Finally, lines constructed to form (or partially form) an image will converge to a point on the horizon line—known as the vanishing point.

Applying perspective-drawing principles to photographs is perspective drawing in reverse. Here, you begin with a completed drawing (the photocopy of your photo), and the task is to determine the horizon line and vanishing points.

## Draw the vanishing points based on the photograph

Start by taping paper onto your drafting table, making sure the paper extends to both ends of the table. You'll need the

room because the vanishing points of the perspective drawing will carry well beyond the photograph on each side.

Next, think about where the vanishing points will land. Usually, one will be close by, and the other much farther away. If the vanishing points are too far apart to fit on the drafting table, bring them closer together by reducing the scale of the photocopied image. Then, situate the photocopy so that the vertical lines that define the sides of the piece are perpendicular to the parallel rule or T-square, and tape the photocopy to the paper.

**Establish the first vanishing point—**To the front and sides of the piece of furniture
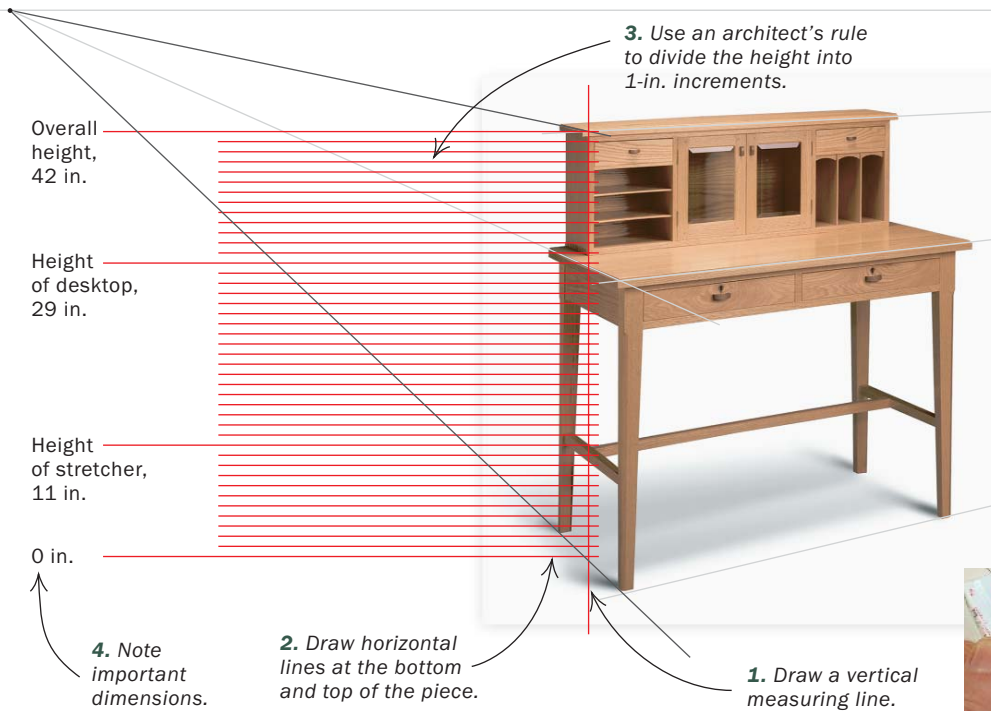
***Find the second vanishing point.*** *Once the horizon line has been drawn from the first vanishing point, use the string method to find the second vanishing point upon the horizon line.*

***Push-pin pivot.*** *Stick a push pin into each vanishing point and use it to pivot a straightedge to draw accurate vanishing lines.*

Because the upper case holds crucial information to be measured, it's best to strike the vertical measuring line on the front corner of that plane.

**3.** Use an architect's rule to divide the height into 1-in. increments.

Overall height, 42 in.

Height of desktop, 29 in.

Height of stretcher, 11 in.

0 in.

**4.** Note important dimensions.

**2.** Draw horizontal lines at the bottom and top of the piece.

**1.** Draw a vertical measuring line.



**Mark the top and bottom of the piece.** *Draw horizontal lines outward from where the vertical measuring line intersects with the top and bottom vanishing lines.*



**Mark 1-in. increments.** *Find a face on the architect's rule that divides the overall height of the piece into the same number of increments as its height in inches. You will need to skew the rule to do so.*



**Complete the vertical scale.** *Use a T-square to draw horizontal lines from each mark back to the vertical measuring line to complete the vertical scale.*

are planes that recede to a vanishing point in the distance—one to the right and one to the left.

A string is a handy tool for finding a vanishing point. Hold down one end of the string with your thumb, pull it taut, and then pivot from that point. Move the string across the photocopy until it lines up with the top and bottom planes of the piece of furniture. The point at which the string aligns with the top and bottom of the piece, as well as with the other horizontal planes in the piece, is the vanishing point. Stick a push pin in that spot.

**Draw the horizon line—**Now draw a horizontal line through the first vanishing point to represent the horizon. The horizon is eye level—the point of view of the photocopy. The line drawn from the first vanishing point will be perpendicular to the vertical lines that describe the sides of the piece of furniture.

**Find the second vanishing point—**Once the horizon line has been established, finding the next vanishing point is easy because you already know it has to occur at some point along that line. Use
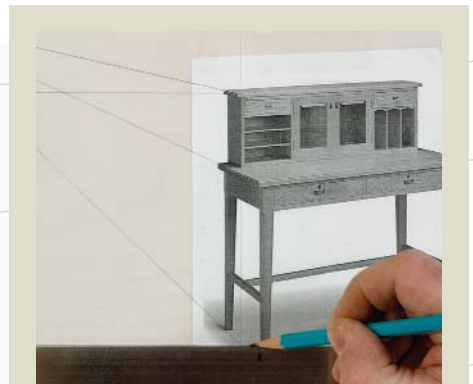
the string and your thumb to find the second vanishing point, just as you did to find the first one. Place a push pin at that point.

Once you have established both vanishing points, draw lines from each one, across the photocopy to define the top and bottom of the image. Use the push pin placed in each vanishing point to serve as a pivot for the straightedge. Maintaining contact with the pin as you swing the straightedge will keep the vanishing lines accurate as you draw. Once you've drawn the vanishing lines around the perimeter of the image, you are ready to determine the vertical dimensions of the piece.
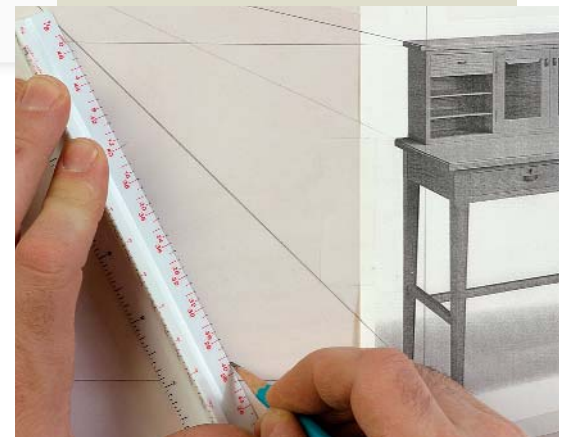
### Scale for the vertical dimensions

Establish a vertical measuring line on one of the corners of the piece of furniture in the photo. The line should extend beyond the top and bottom of the photo.
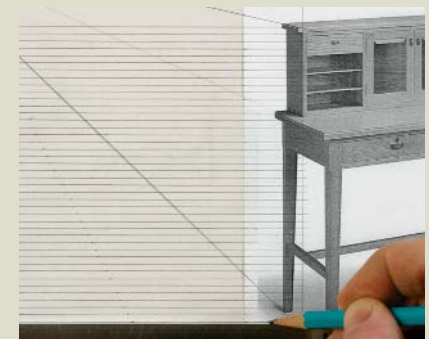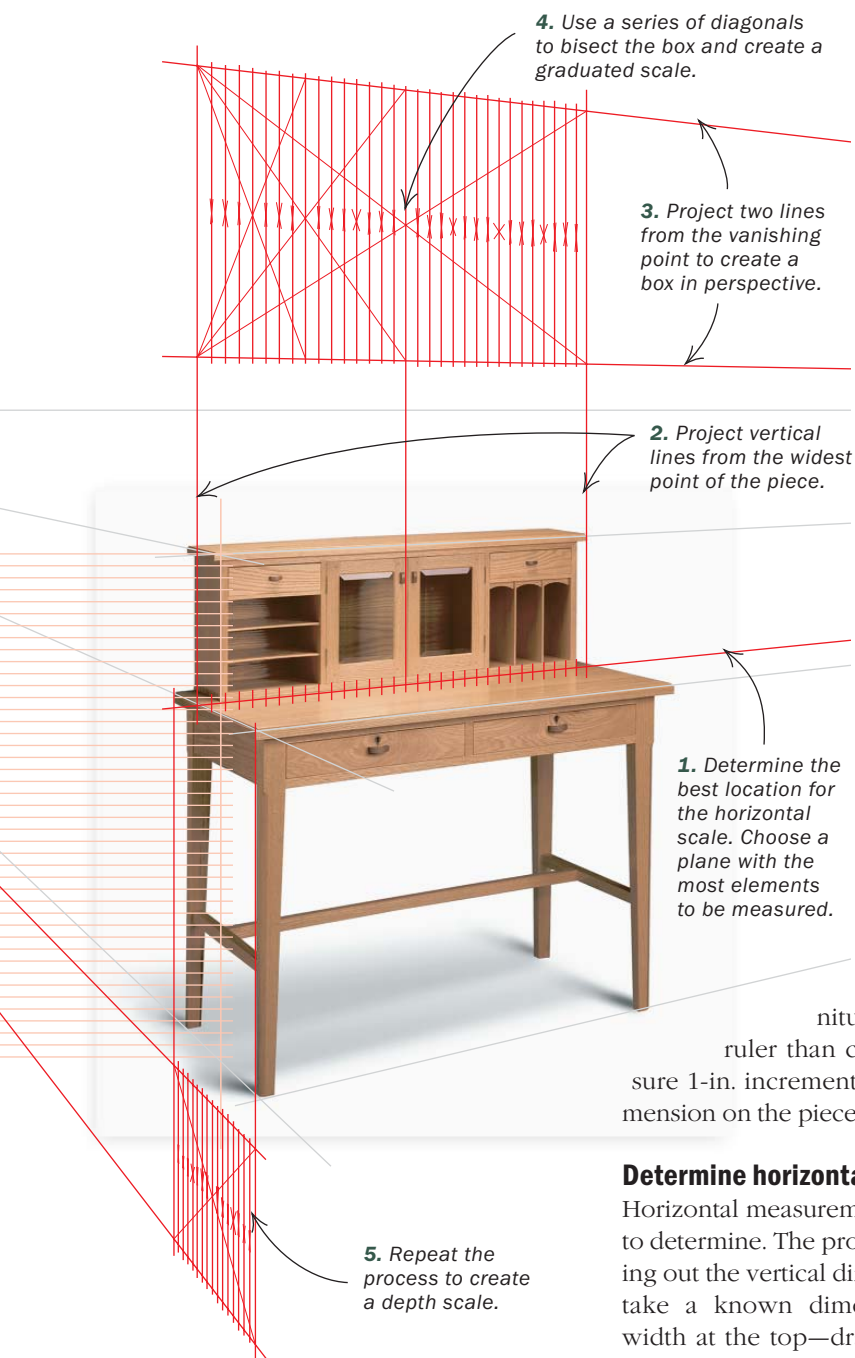
Draw perpendicular lines off to one side both from the top and bottom of the measuring line that establishes the height of the piece. These two lines will be parallel to each other. Now divide the measuring line into 1-in. increments. In this example, the

Width and depth are trickier to visualize because they are created in perspective. Still, there is an accurate graphic solution for plotting both views.

*4. Use a series of diagonals to bisect the box and create a graduated scale.*

*3. Project two lines from the vanishing point to create a box in perspective.*

*2. Project vertical lines from the widest point of the piece.*

*1. Determine the best location for the horizontal scale. Choose a plane with the most elements to be measured.*

*5. Repeat the process to create a depth scale.*



**1**

**Rectangle represents the width scale.** *Draw a measuring line to the vanishing point, along the width of the desk where it meets the upper case. Then draw vertical lines at each end. Draw lines from one vanishing point (above) to mark off a grid space in perspective.*
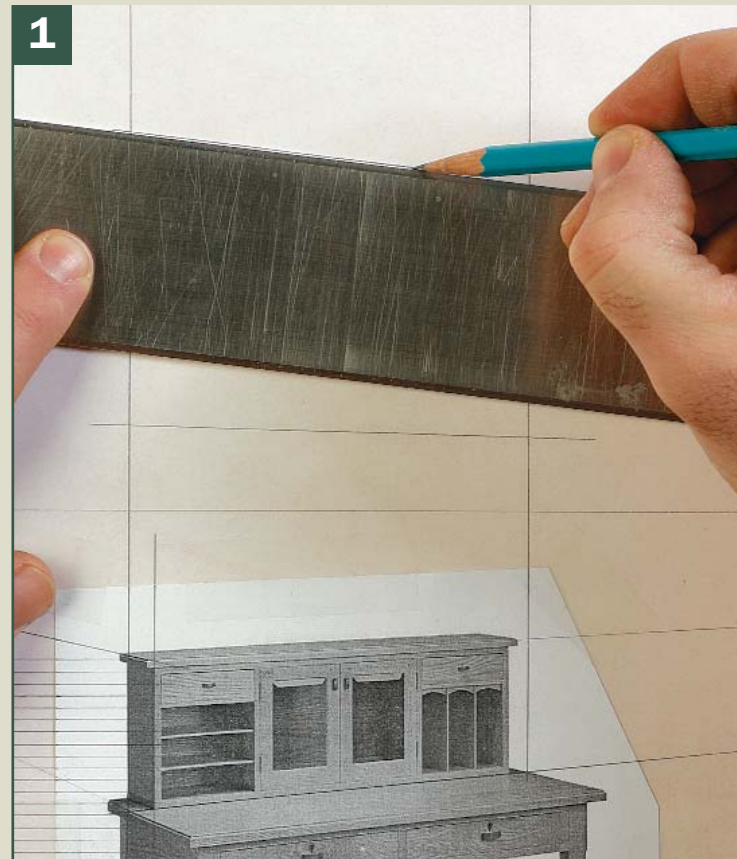
height is 42 in. Use the architect's rule to find a scale in which the distance from 0 in. to 42 in. is somewhat longer than the distance between the two parallel lines. Lay the scale at an angle so that the 0 point is on one line and the 42 in. is on the other. In this case, a scale of 1/8 in. = 1 ft. worked well. Mark the 1-in. increments along the scale on your drawing. Then extend each mark back to the measuring line on the corner of the piece of furniture. You now have a ruler than can be used to measure 1-in. increments on any vertical dimension on the piece.

## Determine horizontal dimensions

Horizontal measurements are a bit harder to determine. The process is similar to laying out the vertical dimensions in that you take a known dimension—usually the width at the top—draw parallel lines up from the two ends, then divide this distance into smaller, more useful increments. However, the width dimension that is provided with the photograph applies to a line that is receding into the background, so the increments on this line recede as well, getting smaller from foreground to background.

Dividing a receding line into accurate dimensions is done using the diagonals of a rectangle to divide the distance in half, and doing that as many times as necessary to reach a useful set of increments. The rectangle is formed by the two vertical lines extended from points that describe the width of the image, and another pair of lines that meet at a vanishing point. The four lines form a rectangle that recedes into the background.

**Bisect rectangles to find useful increments for measuring—**When you connect the opposite corners of this receding rectangle with diagonals, you have found its center. Drawing a vertical line from the center point onto the photocopy divides the distance between the two sides in half, according to the rules of perspective. Because the distance you are bisecting is receding, the two halves are not equal lengths, but they are accurate to the image in the photocopy.

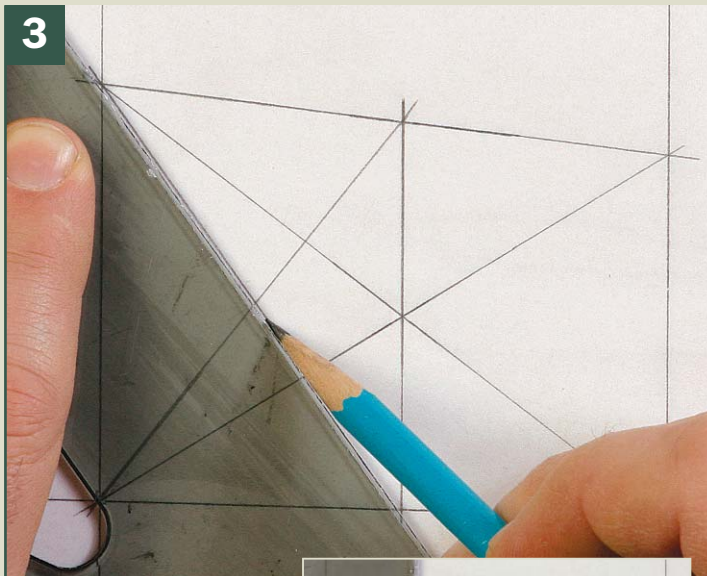This process of bisecting the width using diagonals is done as many times as neces-

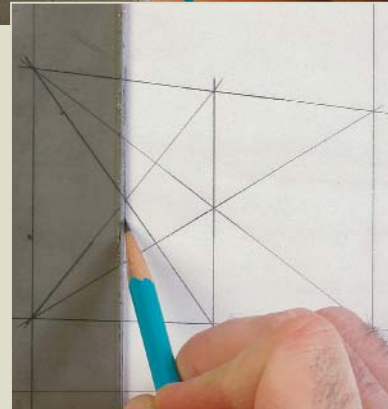**2**
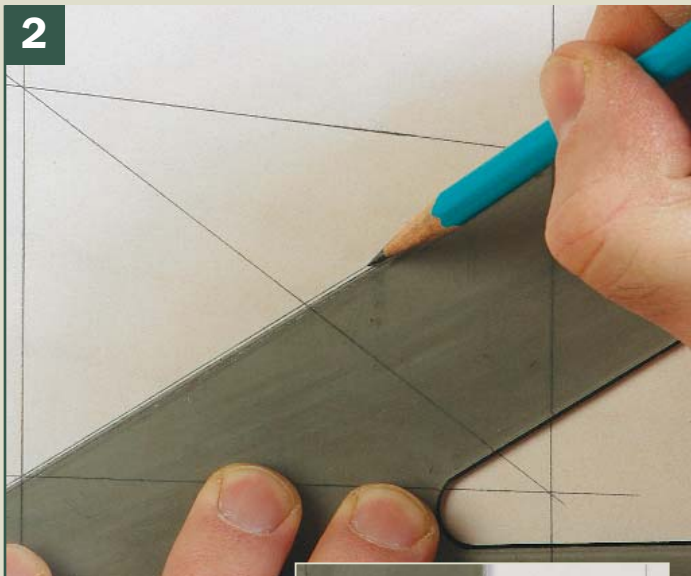


***Bisect the width-scale rectangle.*** *Draw diagonals from opposite corners of the rectangle to locate its center. Next, strike a vertical line at the intersection point to divide the area in two.*

**3**



***Continue to divide into smaller increments.*** *Bisect each grid area. Divisions appear to get smaller as they approach the vanishing point because they are in perspective.*

sary until you arrive at a set of useful increments. In the example, the known width is 38 in. Bisecting this dimension gives you two increments of 19 in. Do this four more times, and you have increments of 1³⁄₁₆ in.; fine enough for most measuring and similar to the 1-in. increments of the vertical scale.

Finally, create a depth scale, using the same procedure you used in developing the width scale. When you connect the sets of points, and extend those lines across the face, sides, and top of the piece of furniture, you will establish a complete and detailed grid. The grid will enable you to read any element on each of these defined planes. With this information, you will be able to draw your piece full scale and create an accurate working drawing from which to build.  □

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***Draw a scaled plan.*** *From the three scales you now can determine any dimension you need to draw an accurate measured plan.*