

## Appendix H, Part 1

### DESIGNING BY CHARTING

One of the great things about learning to use knitting charts is that they can help us create our own designs. If we start with a blank grid that's set up to match our stitch and row gauges, we have literally infinite possibilities.

- 🌀 We could just doodle on the grid, or we could be very methodical.
- 🌀 We can create a new texture pattern and make it as large as we want.
- 🌀 We can create a color design for intarsia or stranded knitting, making it repeat or not across the project.
- 🌀 We could create a design that fits exactly on a garment's front, back, and/or sleeve(s).
- 🌀 We could create a really big, non-repeating design as the pattern for a blanket.

### We Need a Proper Grid

Because we usually have more rows than stitches per inch, we'll run into trouble if we use typical graph paper from the office supply store, which has **square** grid cells. We can use such grids **only** if our stitch and row gauges are identical.

Instead, we need a **proportional** grid, which uses our stitch and row gauges to determine the cells' dimensions. Each cell will be as wide and as tall as one stitch. That way we can be sure our design when worked up in yarn will be the proper height compared to its width.

There are at least half a dozen ways to make a proportional grid.

- 🌀 We use the website described in part one's "Charting on Paper."
  - ✓ When we print the grid, the Print dialog box will contain a checkbox labeled something like "Fit to Page." That checkbox must be completely empty, because the PDF's page size is the European size A4, which is about 8.3 by 11.7 inches. If "Fit to Page" is checked, the grid will still be proportioned properly, but it will be squashed a bit smaller than life-size.
- 🌀 We use a drawing program to create a grid with the vertical and horizontal lines spaced properly.
- 🌀 We use a knitting or charting app with the ability to make a grid.
- 🌀 We use a spreadsheet program to make a sheet with columns and rows the same width and height, respectively, of one stitch.

- ☉ We create a word processor table whose columns and rows are the same width and height, respectively, of one stitch.
- ☉ In a word processor, we type up on ordinary lines (not in a table) a chart consisting entirely of knit symbols (the empty rectangle under the k, not the one under the comma containing the vertical line), then change two settings so that the “grid” of rectangles matches our stitch and row gauges.

We’ll work through the last two options in later sections.

Why would we ever want to create our own grid instead of always using the website?

- ☉ Perhaps our image fits exactly on a US legal-size piece of paper. We can’t select that page size at the website. We could always compress the website’s grid to fit enough rows on one page, but what if we want the grid cells to be life-size?
- ☉ If we have the image in the computer, there are certain advantages to creating one of two kinds of proportional grids in our word processor, as we’ll see later.<sup>1</sup>

## *Designing from Scratch*

If we want to create some kind of texture or an abstract design, we start with a grid with as many columns (for stitches) and rows as we need. Then we simply put marks in the cells that form our design.

- ☉ For a texture pattern, we would mark those cells that need to be purls instead of background knits.
- ☉ For a project made with easy lace, we mark all the places we want yarnover holes. When we work from the chart, each mark means “yo, K2tog.” Remember that in easy lace, we typically chart only the rows with lace action, and we work the in-between rows without lace action (as knits for garter-based lace and as purls for stock-inette-based lace).
- ☉ For intarsia, we can either fill in all the cells inside the various areas of color, or we can just mark the cells around the borders of each color area.
- ☉ For stranded knitting, we can make a non-repeating design large enough to fill the entire chart, or we can create a design that gets repeated across the width of a project.

## *Charting an Existing Image*

We may want to create a chart for a design that’s much more definite, like our child’s fa-

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<sup>1</sup> We have those same advantages if we create the grid in a drawing program (and possibly in a spreadsheet, which is left as an exercise for the reader).

favorite cartoon character, our sports team's logo, or even our grandchild's face.<sup>2</sup> The basic idea is to

1. prepare the image,
2. create the grid,
3. stack the grid on top of the image,
4. and mark the grid cells that contain a part of the image.

### *Image on Paper*

If the image is available only on paper, then we'll need a grid printed on paper.

We can make the grid paper at the website or in any of the computer programs listed earlier, then print it out. We stack the grid on the image, secure them to each other with a few small pieces of tape, then mark the cells that contain the various parts of the image.

If we can't see the image through the grid paper, we can hold the stack on a light box or against a sunny window. If we still can't see the image, or at least can't see it clearly enough to mark the grid accurately, then we have at least two options.

- ☉ We use tracing paper to get the image onto thinner paper. We then stack the grid on the tracing paper to mark its cells.
- ☉ If the image is too detailed to trace its outlines, we can get an electronic version of the image by taking a photo or using a scanner. We can then either print the image on regular paper, or we can chart directly in the computer.

### *Image in the Computer*

If we have an electronic version of the image, we have a few more options.

- ☉ We can print the image, then use the procedures for charting paper-only images.
- ☉ We can make a grid in the computer using any of the options listed at the beginning of the appendix, then put the electronic grid on top of the electronic image. The actual steps may in some cases be more correctly described as putting the image underneath the grid, but either way, we get the same end result.

### *Advanced Techniques*

If we want a chart we can work from, then there are practical limits to

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<sup>2</sup> **I am not a lawyer.** Incorporating a copyrighted or trademarked image (like a cartoon character or team logo) in a project might land us in court, even if the item we're making is for ourselves or will be given as a gift (that is, no money changes hands). Knitter beware.

☉ how big the chart itself can be and

☉ how small the grid cells can be.

We may want a chart that fits on a single piece of grid paper. If that's impossible, then we'll probably want it on as few sheets as possible. The fewer the sheets, the more portable the project is.

But fitting the chart on a single piece of paper may mean the grid cells are so small that we can't see them well enough to actually work from the chart. In that case, we need to enlarge the image just enough to match the minimum cell dimensions we're comfortable with. Yes, there is some arithmetic involved in optimizing the image size and the cell dimensions, but we'll look at the details thoroughly.

## ***For Any Image***

Here in the book, I of course must use an electronic grid over an electronic image, since I can't manipulate two physical sheets of paper. Despite this fact, the stacking and marking we'll see work the same for both paper and computer grids.

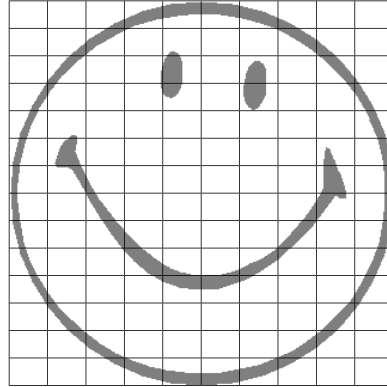
We'll start with an image and a grid already prepared and stacked, looking at issues involved with marking any kind of grid. Then when we look at the details for creating the grid and resizing the image, we'll be better able to understand the choices we can make and the strategies we can use.

## **Charting Mr. Smiley**

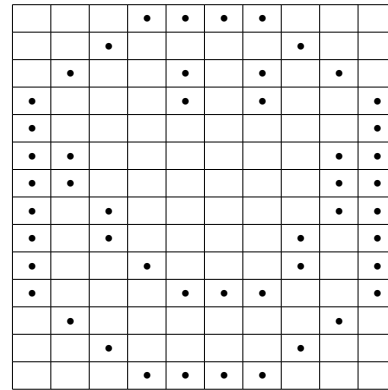
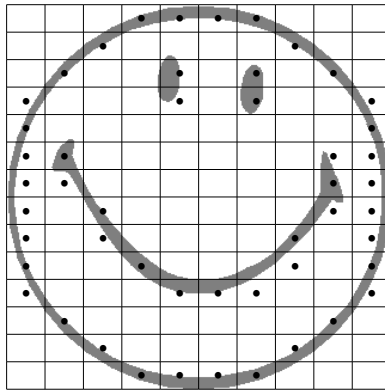
Mr. Smiley will work nicely as the image we want to put in a project. We won't need to mark many grid cells, but we'll still see some of the difficulties and options we'll have with our own image.



Mr. Smiley is two inches across. We'll say our gauges are five stitches and seven rows per inch, so in yarn a life-size Mr. Smiley will be ten stitches wide and fourteen rows tall.



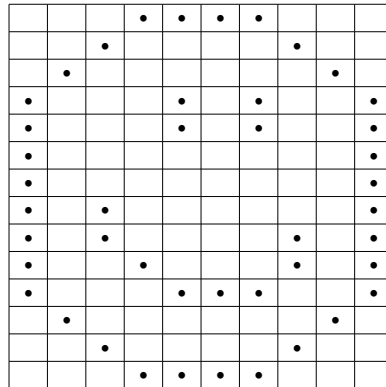
We put a mark in all the grid cells that contain any part of Mr. Smiley's lines. Let's compare how the grid appears still stacked on the image with the marked grid by itself.<sup>3</sup>



It may not be necessary, or even a good idea, to mark **every** cell that contains part of the image, and marking cells where there are curved lines will not be as neat and easy as we might like.

Once we remove the image from beneath the grid, we might remove some marks and add new ones. For example, we might want to remove some marks to leave a stitch and/or row between the various parts of the image. We'll just have to use our best judgment.

<sup>3</sup> Many of the grids in this appendix are blank tables in my word processor. Because the program must round dimensions to the nearest hundredth of an inch, the grids and images will not always be the exact sizes given in the text.



In this chart, the eyes have been moved down one row and the smile has lost its outermost columns. Those tweaks prevent Mr. Smiley's features from bumping up against his outline.

### ***If Life-Size Is Too Small***

Just from looking at this initial life-size chart, we decide that Mr. Smiley should be bigger than his life-size two inches so that we can better capture his details. Let's see what he looks like when we make him two times bigger.

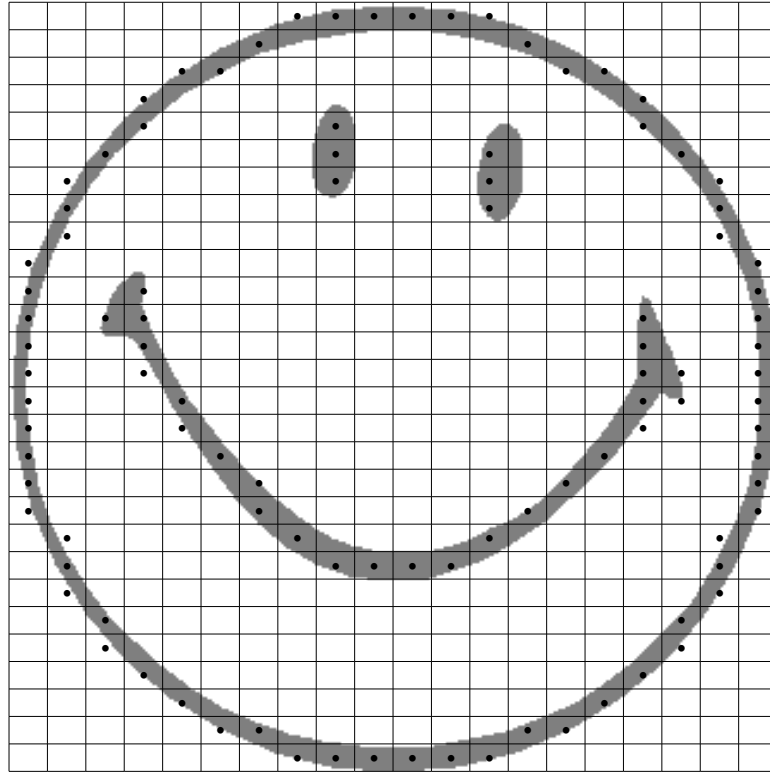
Since Mr. Smiley is only two inches across, how do we make him twice as big in yarn? We have two choices:

- 🌀 make the image of Mr. Smiley bigger
- 🌀 make the grid cells smaller

### **A Bigger Image**

For this option, we'll need a way to make our physical image larger. The most straightforward method is using a photocopier.

We enlarge the image to the size we want it to be in the project, create a life-size grid using our stitch and row gauges, stack the grid on the image, and mark the appropriate cells.

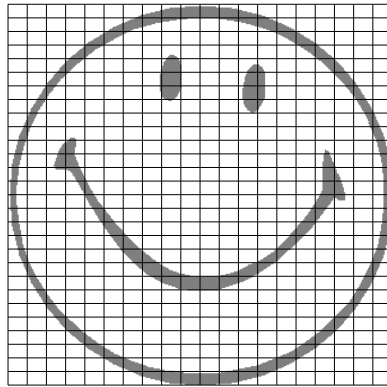


As before, some of the marks are judgment calls, and once we unstack the grid, we may want to tweak which cells are marked.

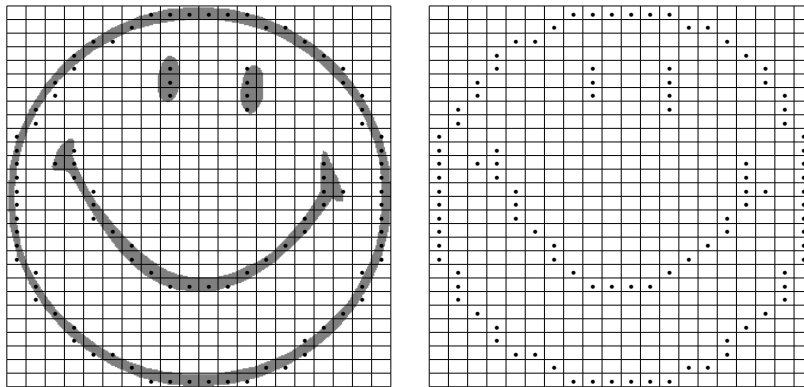
### ***A Grid with Smaller Cells***

We don't have to resort to a photocopier if we want the design to be bigger in yarn. What's the alternative? Making the grid cells smaller.

If we want the two-inch Mr. Smiley to be twice as big in yarn, we have to use twice as many stitches and rows as before. We need twenty columns and twenty-eight rows in a two-inch-square grid, no photocopier needed.



We mark the cells that contain any part of Mr. Smiley.



As before, some of the marks are judgment calls, and we can always tweak which cells are marked. Because we've got four inches' worth of stitches and rows in our grid, Mr. Smiley will also be four inches across in yarn.

## We Can Redefine the Mark

The four-inch version of Mr. Smiley would work very well in yarn in several ways. Even though we've made in all the needed cells what's interpreted elsewhere in the book as the purl mark, we can always redefine that particular mark to mean whatever we want.

- ☞ If we want a texture Mr. Smiley, we define the mark as a purl.<sup>4</sup> We would probably need to change every other stitch in the columns of purls on the left and right sides of his face to a knit, and perhaps also in the other shorter vertical lines, as we saw in the variations of the purl diamond project in part one.

<sup>4</sup> Would we get a smoother curve in yarn if we did a “reverse” two-stitch twist (making a foreground purl cross a background knit) when there's a purl diagonally to the right or left of a purl on the previous row?



- ☉ If we want a lacy Mr. Smiley, then we define the mark as “yo, K2tog.” If two or more adjacent cells on a row are marked, like at the bottom and top of his face, the result may not look good. Experimentation would be in order.
- ☉ If we wanted to make Mr. Smiley with stranded knitting, we say each dot represents a stitch in the foreground color amid a sea of stitches in the background color.<sup>5</sup>
- ☉ If we want an intarsia Mr. Smiley, we don’t even have to show either color in the chart since there’s a continuous line of stitches separating the two areas.<sup>6</sup> If we didn’t want to use a third color for Mr. Smiley’s outline, we would make its stitches be one of the two colors, the background color to make him smaller and the face color to make him bigger. For his eyes, we could
  - ✓ use the background color
  - ✓ do a tiny bit of intarsia with a third color
  - ✓ work them with the face color, then cover them with duplicate stitches

## Make a Copy of the Marked Grid

We need to make at least one copy of our finished hand-drawn chart. A quick picture with our smartphone or a photocopy at the library or local copy shop would be prudent just in case the dog eats the original or the cat throws up on it.

## Issues with Grid Cell Size

Generally speaking, if we want the image to be very large in the finished project, we will need a grid with small cells. If we want a small image in yarn, then a grid with larger cells will work.

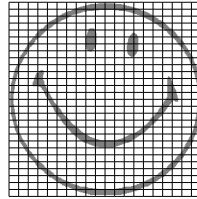
If the image we use to mark the grid is small, then the grid cells may have to be very small indeed to represent all the stitches and rows we’ll need in yarn. They may be too small for us to mark them without having the marks cross over into adjacent cells. And we would almost certainly not want to work from a chart with such tiny cells.

Suppose our Mr. Smiley image is only one inch across, but we want him to be four inches big in yarn. That means we need twenty columns and twenty-eight rows in a one-inch grid.

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<sup>5</sup> Our stranded gauge might be different than our single-color knitting. If it is, we need to re-chart Mr. Smiley on a new properly proportioned grid so he will be round in yarn, unless we don’t care if he’s round or not.

<sup>6</sup> Shaped intarsia might yield smoother curves (see part one’s “Colorwork”).

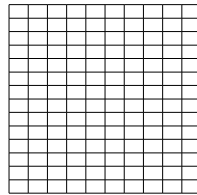


But in some cases we won't be able—or want—to enlarge the image to life-size, because then we'd have a chart split across umpteen sheets of paper. Imagine if we wanted a sixteen-inch Mr. Smiley. We'd need four sheets of paper to draw a life-size chart. That's just as bad as having teeny-tiny grid cells.

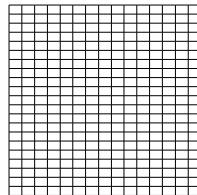
What we need to do is find a happy medium: the image should be large enough so that the grid cells and our marks inside them can be legible but not so big that we have to deal with a chart big enough to cover the living room floor.

### ***How Small Can the Grid Cells Be?***

Compressing the grid makes all the individual cells smaller, and there's probably a lower limit to how small they can be while remaining both easy to mark and then to work from. We already saw how small the cells are when we doubled the number of columns and rows to make Mr. Smiley twice as big in yarn as he was on paper.



If we want the image to be three times bigger in yarn (which means the image on paper is one-third life-size), then we have to squeeze three times the number of life-size columns and rows into each square inch of grid. At five stitches and seven rows per inch, that's fifteen columns and twenty-one rows per inch.



Seeing how small the grid cells will be may compel us to enlarge the image so that even a compressed grid can have correspondingly bigger, more legible cells.

## Lesson Learned

Compressing the grid is the same as enlarging the image. If necessary, we can do both at the same time.

Because of this equivalence, we might well be able to chart even the largest design on just one sheet of paper. We'll see some examples at the end of the appendix.

## Website Grid Lines May Be Hard to See

If we printed the website's grid paper on a color printer, we may not be able to see some—or any—of its light blue grid lines when the grid is stacked on the image. If we can't see the lines, it will be hard to mark the cells accurately.

We can force our color printer to print the website's PDF in black and white, which will make the grid lines a shade of gray. We can also make the grid lines wider by using bigger values in the Thick Line and Thin Line boxes, but if we're trying to squeeze lots of grid cells on the page, thicker lines will make the interior of the cells that much smaller and harder to mark.

But whatever width they are, the gray lines might still be too light to mark the grid cells accurately. We have at least two workarounds.

- 🌀 We could draw over **some** of the grid lines with a dark pen (not pencil, so that we don't erase parts of them as we tweak which cells are marked). It might be unnecessary to draw over every grid line (and I certainly would be too lazy to do so initially). Having a dark line every two or three inches might be enough. After we draw over a few grid lines at wide intervals, we put the grid back on top of the image to see if we need to add another line or two between the ones we already have.
- 🌀 We could very lightly trace the image instead of trying to mark individual grid cells. When we're done tracing, we unstack the sheets, then mark the cells based on the lines we traced.

We can also create a grid in the computer in several ways. Of the options listed at the beginning of the appendix, we'll look in detail at the two we can make with a word processor:

- 🌀 an empty table
- 🌀 ordinary lines of knit symbols

## Using a Word Processor Table

Many of the grids in this appendix are empty word processor tables with the needed number of columns and rows all set to the proper dimensions.

For those who have not really used tables, this procedure may seem difficult. And it doesn't help that different word processors (and new versions of the same word processor) may require slightly different steps, use different names for the same thing, or move the various options to different places, so the following explanations will in places give details (current as of the date in the page footer) that may not match your version of your word processor. Hopefully the details will be similar enough that you'll be able to determine the equivalent terms and find the locations where you'll specify the various settings.

### *Accuracy Limits on Cell Dimensions*

Even at the typical five stitches and seven rows per inch in worsted weight, each life-size grid cell will have a height and width that are fractions of an inch. Working at eight or ten stitches or rows per inch will require even smaller fractions. The two word processors I use only let me specify measurements down to hundredths of an inch, meaning we keep just two digits after the decimal point, exactly as we would with cents if we were dealing with money.

Since the two word processors will let us specify only the first two digits after the decimal point, we use the third digit after the decimal point to decide which way to round. We round down if the number at the rounding point is less than five, and we round up if it's five or larger.

### **Examples**

One inch divided by five stitches per inch gives an exact value of 0.2 inches, so no rounding is necessary.

Suppose we're using fingering yarn worked at six stitches per inch. When we use a calculator, one inch divided by six stitches per inch means we need each column to be 0.1666666666 inches wide. In reality, we have to round based on the third digit after the decimal point. Since the third digit is a six, we round up the column width to 0.17 inches.

Seven rows per inch means each row's height needs to be one inch divided by seven rows per inch, which is 0.1428571429 inches. Since the third digit is less than five, we round down, so we make each table row 0.14 inches tall.

### *Create the Basic Table*

We can use either a Table button on a toolbar, or we can select a menu entry.

### In LibreOffice Writer

We choose Table | Insert Table from the menu bar, which opens up a dialog box where we can set the exact number of columns and rows we need.

The Table button on the menu bar allows us to create the table with a limited number of columns and rows by click-dragging down and to the right, which is fine to get started with. We can always add more columns and rows later.

### In Microsoft Word

We click on the Insert tab of the ribbon and click on Table in the Tables area. Then we have two options. We can click on Insert Table, which opens a dialog box where we can set the exact number of columns and rows we need.

If we're not sure how many cells we need, we can click-drag down and to the right to create a table with a limited number of cells, then add columns and rows later.

### *Use Stitch Gauge to Set the Column Widths*

Now we have to set the column widths, which will all be the width of our individual stitches. At our example gauge, we divide one inch by five stitches per inch, so we need each column to be 0.2 inches wide.

With the entire table selected, we find the place to specify the width we need.

### In LibreOffice Writer

There doesn't appear to be a way to tell Writer to "make every column this wide" in one fell swoop. Instead, there's a place where we can set each column's width individually. That is quite useful in some situations, but for making a proportional grid, it's horribly slow.

What we do instead is put the proper number of columns in the table, which is our required stitch count. Then we set the width of the entire **table**, based on the number of stitches and our stitch gauge. So if we need thirty-four stitches and our gauge is five stitches per inch, we'll need thirty-four columns in the table, then we set the table's width to thirty-four stitches divided by five stitches per inch, which is 6.8 inches.

We select the entire table, then from the menu bar we select Table | Size | Distribute Columns Evenly. We can also right-click in the table, then select Size | Distribute Columns Evenly.

### In Microsoft Word

There are two ways to set the column widths. We first select the entire table.

- ☛ We click on Table Tools | Layout in the ribbon, then put the needed value in the Cell Size section's Width box.
- ☛ We right-click and select the menu entry Table Properties, which opens up a dialog box with several tabs. We click on the Column tab, click on the "Preferred width" checkbox until it has a check mark, put the calculated value in the box, and select the proper units from the "Measure in" pull-down if necessary.

## ***Use Row Gauge to Set the Row Height***

For our example gauge, one inch divided by seven rows per inch is 0.143 inches, so we round that value down to 0.14 inches.

With the entire table selected, we find the place where we can specify this exact value for the row height.

### **In LibreOffice Writer**

We can either right-click in the table and select Size | Row Height, or we can select Table | Size | Row Height from the menu bar.

The dialog box that opens has a checkbox and a typing box. We need to make sure there's no symbol of any kind in that checkbox, because we want to force every table row to be the exact value of our choosing. We click on the checkbox until it's empty.

We put the calculated row height in the typing box and click OK.

If the rows don't look right, we probably have to specify the units when we put the calculated row height in the box. We repeat the same steps, then type in the units abbreviation along with the numeric value.

### **In Microsoft Word**

We have essentially the same two choices we had for the column width. First, we select the entire table.

- ☛ We click on Table Tools | Layout on the ribbon, then put the needed value in the Cell Size section's Height box.
- ☛ We right-click in the table and select Table Properties, which opens up a dialog box with several tabs. We click on the Row tab, click on the "Specify height" checkbox until it has a check mark, select "Exactly" from the "Row height is" pull-down, and put the calculated value in the "Specify height" box. If the row heights don't seem correct, we probably need to include the units with the numeric value. We repeat the same steps, then type in the units abbreviation along with the value.

## ***If the Cells' Height Doesn't Shrink***

It's possible that our word processor will refuse to make the rows shorter, no matter how we try to set the row height. There may be two problems.

### **Shrink the Font Size**

One trick to try is changing the table's font size.

Even when there are no “real” characters anywhere in a table, there is always a hidden character in every cell (a ¶ in LibreOffice Writer and a □ in Microsoft Word). The font size of each of those hidden characters can be made smaller or larger just like any other character, and if the hidden characters' font size means the rows have to be taller than whatever numeric value we're trying to force, the rows simply will not shrink.

We select the entire table, then set the font size to one. That value probably won't be in the list of font sizes, so we double-click on or click-drag across the value already in the box, then type a one. Pressing Tab or Enter will complete the size change.

### **Remove the Cells' Internal Margins**

We may need to eliminate the cells' internal margins. Table cell internal margins function exactly like matting between a frame and a picture. However big the picture is, the mat means the frame must be that much bigger than the picture. What we need in our table is for the “frame” (each cell's borders) to be the exact size of the “picture” (the width and height of a single stitch) by removing entirely the unwanted “mat” (the internal margins).

- 🌀 In LibreOffice, we select the entire table, then we either select Table | Properties from the menu bar or we right-click and select Table Properties. We click on the Borders tab, then set all four values in “Spacing to contents” to zero.
- 🌀 In Microsoft Word, we select the entire table, click Table Tools | Layout on the ribbon, click Cell Margins in the Alignment area, then set all four internal margins to zero. We may also need to click in the “Allow spacing between cells” and “Automatically resize to fit contents” checkboxes until they are completely empty, with no symbols of any kind in them.

## ***Print the Table***

We print out the table, stack it on the image, and mark the grid cells as needed.

## **Creating a Proportional Grid with Knit Symbols**

The default way that a word processor uses the knitting font makes the symbols take up an

area that's essentially square, as we saw when we compared the chart for part one's purl diamond project to samples worked in different weights of yarn. So if we want to create a knit symbol grid **to gauge** in the computer, we can't let the rectangular symbols remain separated. To squash them together, we will have to do some simple arithmetic and change two settings.

While word processors can use a variety of measurement units, the easiest one to use to force a knit symbol grid to proportionality is points. There are seventy-two points per inch, both horizontally and vertically, and we'll use that value in a moment.<sup>7</sup>

### ***The Final Result Requires Ordinary Lines...***

This type of grid must have the knit symbols on ordinary lines, not in a table as has been recommended throughout the book. Having the symbols in a table, even with the table cell internal margins set to zero, is going to hinder how tightly we can force the knit symbols together. If we can't squeeze the symbols all the way together, our grid simply will not be proportional and our result in yarn will not be right.

### ***...But We'll Start with a Table***

We will, however, use a table to make sure each row of knit symbols is in what is technically its own paragraph. When we chart in a table, we don't have to worry about the natural thing that word processors do with ordinary characters, which is wrap them to the next line, exactly as this paragraph is several lines long because it has wrapped more than once at the page's right margin.

We create a table with the number of rows we need in our grid but with only one column. We type in the top table row the number of k characters that match the stitch count we need.<sup>8</sup>

### **If We Want Row Numbers**

We may want to include row numbers in our chart. If so, single digits will work fine and are much easier to type up at this point. We select the entire group of k characters, make a copy with Ctrl-c, select the nine empty table rows below the first row, and paste with Ctrl-v.

We now have ten rows of k characters. We add at one end of each row the digits zero through one, counting downwards. The zero will stand for the appropriate multiple of ten, and running them downwards will give us row numbering that starts with row one at the bottom of the chart.

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<sup>7</sup> Why seventy-two? Check out the history of point sizing at the Wikipedia article "[Point \(typography\)](#)."

<sup>8</sup> If you normally prefer the rectangle containing the vertical line, which is the symbol under the comma, you may want to use the plain rectangle under the k for this task to decrease clutter as you mark the chart.



We can put the numbers on whichever end we prefer. Traditional knitters may want the row numbers on the right end and mirror-image knitters on the left end, but it's completely based on our preference, so we can put them where we like.

Traditional Knitters	Mirror-Image Knitters
kkkkkkkkkkkkkkkkkkkkk0	0kkkkkkkkkkkkkkkkkkkkk
kkkkkkkkkkkkkkkkkkkkk9	9kkkkkkkkkkkkkkkkkkkkk
kkkkkkkkkkkkkkkkkkkkk8	8kkkkkkkkkkkkkkkkkkkkk
kkkkkkkkkkkkkkkkkkkkk7	7kkkkkkkkkkkkkkkkkkkkk
kkkkkkkkkkkkkkkkkkkkk6	6kkkkkkkkkkkkkkkkkkkkk
kkkkkkkkkkkkkkkkkkkkk5	5kkkkkkkkkkkkkkkkkkkkk
kkkkkkkkkkkkkkkkkkkkk4	4kkkkkkkkkkkkkkkkkkkkk
kkkkkkkkkkkkkkkkkkkkk3	3kkkkkkkkkkkkkkkkkkkkk
kkkkkkkkkkkkkkkkkkkkk2	2kkkkkkkkkkkkkkkkkkkkk
kkkkkkkkkkkkkkkkkkkkk1	1kkkkkkkkkkkkkkkkkkkkk

If we need lots of stitches, we can put the row numbers on both ends.

0kkk0
9kkk9
8kkk8
7kkk7
6kkk6
5kkk5
4kkk4
3kkk3
2kkk2
1kkk1

## *Fill In the Rest of the Cells*

Whether we have one table row or ten table rows filled in, we select those rows.

Now we select the entire column, which can include the row(s) that already have characters, with either a menu entry or by sliding the cursor up and down slightly above the top table row until it changes to a downward pointing arrow, then clicking. We paste with Ctrl-v.

If we had just one row of k characters without a row number, then all the rows should be filled in with k characters. If we had ten numbered rows of k characters, then there should be groups of ten rows in the rest of the table. If the table didn't already have some

multiple of ten rows, then our word processor probably added enough rows so that the final table row contains row one. If it didn't, we can add the proper number of rows to the bottom, copy the numbered rows that are missing, click in the highest empty row, and paste.

## If Most Cells Are Still Empty

If the empty rows were not all filled, we \* click in the next empty cell down, use Ctrl-v to paste, and repeat from \* a few times. Once we have a few plain rows or groups of numbered rows filled in, we can select the larger group, use Ctrl-c to make a copy of them, then \*\* put the cursor in the highest empty cell and use Ctrl-v to paste. We repeat from \*\* to fill the entire table. We can at any time select and copy an even larger group of cells to paste.

## If We Want Stitch Labels

To add stitch labels to the chart, we can save a lot of time by simply typing all the digits from one through zero as many times as needed to match our stitch count. Adding the boxed stitch labels we've seen elsewhere in the book is much more work, unless we copy and paste them from the knitting font catalog.

We add a blank row at the top and/or bottom of the table to hold the numbers. If we're traditional knitters, we start with zero and work backwards to one. If we're mirror-image knitters, we start with one and work upward to zero. In either case, the zero represents a multiple of ten.

Traditional Knitter	Mirror-Image Knitter
09876543210987654321	12345678901234567890
kkkkkkkkkkkkkkkkkkkkk2	2kkkkkkkkkkkkkkkkkkkkkk
kkkkkkkkkkkkkkkkkkkkk1	1kkkkkkkkkkkkkkkkkkkkkk
09876543210987654321	12345678901234567890

Note that the stitch labels are misaligned with the k characters. That's because the table columns are center-justified. We'll fix that in a moment.

## Change the Font

Once we have all table rows filled in, we select the entire table, then change the font to the knitting font. All the k characters should now be empty rectangles, and the optional stitch and row numbers will have their familiar wide form.

Here are the charts above with the symbol rows changed to the knitting font. The stitch labels are still not aligned with the knit symbols.

To get the numbers and symbols aligned, we set the column to be either left- or right-justified, depending on where the row numbers are.

If we used continuous row numbers instead of just repeating one through zero, left- or right-aligning the table column will keep the stitch labels and knit symbols aligned even as the row numbers progress from one to ten to a hundred.

To set the font size for the knit symbols, we have to do some simple arithmetic using a calculator. The font size we need to use for our knit symbol grid is

font size =  $72 \div \text{stitch gauge per inch}$

$$\text{font size} = 72 \times \text{width in inches} \div \text{number of stitches}$$

- 🌀 If our gauge is five stitches per inch, the calculated font size is exactly 14.4 points.
- 🌀 If we had seventeen stitches in three inches, the font size needs to be 12.70588235 points.
- 🌀 If our gauge is six stitches per inch, the font size must be exactly twelve points.
- 🌀 If we have five and a half stitches per inch, the calculator will say we need a font size of 13.0909090909 points.

Our word processor's list of font sizes won't include any weird fractional numbers, but that doesn't matter. We just double-click on or click-drag across the number already in the font size's box, type the exact value we calculated, then press Tab or Enter to complete the change.

Our word processor may, however, force us to use a slightly different font size.

- ☉ LibreOffice Writer allows us to specify from 0.1 to 0.9 tenths of a point, but it may adjust the value to a slightly different number of tenths.

- ☉ Microsoft Word allows us to enter a value rounded only to the nearest half point.

For two of our oddball font sizes, LibreOffice Writer rounds 14.4 to 14.3 and accepts 13.1, while Microsoft Word forces us to round to 14.5 and 13.0.<sup>9</sup>

## ***The Knit Symbols Must Not Wrap***

Note that we may have to do one or more of the following steps to prevent the symbols from wrapping at the right edge of the table cells.

- ☉ Set the page margins as small as possible. The minimums will be determined based on how close our printer can print to each edge. Both LibreOffice Writer and Microsoft Word will warn us if we try to set any margin smaller than our default printer allows.
- ☉ Turn the page to landscape.
- ☉ Change to legal paper.
- ☉ If our word processor can output a PDF, we can set whatever page size we like (like twenty by twenty-four), create the grid, convert the file to PDF, then use Adobe Reader to print the large PDF onto multiple sheets of regular-size paper.

## ***Convert the Table to Text***

We have now completed all the steps we can do while the symbols are still in a table. To finish our knit symbol grid, we must change our one-column table to ordinary paragraphs. We should only need to click in any cell of the table, but we can optionally select the entire table just to be sure.

- ☉ In LibreOffice Writer, we select the menu entry Table | Convert Table to Text.
- ☉ In Microsoft Word, we click on Table Tools | Layout on the ribbon, then click on Convert to Text in the Data section.

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<sup>9</sup> I think word processors do some kind of conversion internally to different units, then either round off in those units or as they convert back to the displayed units.

Both word processors will open a dialog box asking what character should be used to separate the text once it's no longer in the table. That character will be put between each column's text across each row, which is handy in some situations. But since this table has only one column, it doesn't matter which character we select. All choices should give the same results, but we can select "Paragraph" if we want to be sure of the result.

When we click OK, the table contents will be rows of empty rectangles, with each row in its own paragraph. If we used row numbers and/or stitch labels, we'll see them as well.

Note that each grid row must be in its own word processor paragraph. Allowing the knit symbols to wrap in the ordinary way is going to cause trouble. We can confirm the presence of the pilcrow character ¶ at the end of each grid row by making hidden symbols visible.

## *Use Row Gauge to Set the Line Spacing*

Now we need to do to all of the grid rows exactly what we did when we typed English papers with double spacing (for those of us old enough to have actually used a typewriter). Well, actually, we won't increase the amount of white space between the chart rows. No, we're going to decrease that white space between the rows. While almost all of us have changed the font size, some of us may have never fiddled with **line spacing**.

The line spacing we need to set for the entire grid is determined with

$$\text{line spacing} = 72 \div \text{row gauge per inch}$$

As with the font size calculation, if we know our gauge as some number of rows over some number of inches, then we use

$$\text{line spacing} = 72 \times \text{height in inches} \div \text{number of rows}$$

We use a calculator as before, but this time we can round to the nearest tenth of a point for both LibreOffice Writer and Microsoft Word. In some cases, though, we may not be able to specify every tenth from 0.1 to 0.9, which I again assume is due to internal rounding.

Let's look at some examples.

- ☉ If our gauge is seven rows per inch, the calculated line spacing is 10.28571429 points, which we round to 10.3 points.
- ☉ If it's eleven rows per inch, the calculated line spacing is 6.545454545 points, which we round to 6.5 points.
- ☉ If it's three and a half rows per inch, the calculator will say we need a line spacing of 20.57142857, which we round to 20.6 points.

## In LibreOffice Writer

1. We select the entire grid, then either open the Paragraph dialog box with the menu entry Format | Paragraph or right-click somewhere in the grid and choose Paragraph.
2. If necessary, we click on the Indents and Spacing tab.
3. Under Line Spacing, we select “Fixed” in the pull-down.
4. Next to the pull-down will be a box labeled “of.” We need to specify the rounded-off number **as well as units *in points***. The box may initially have the percent sign %, the inch sign ", or a units abbreviation after the number. If it does, we click-drag across the **entire** contents, type the rounded-off number, then type “pt” after the value. (If the box already has “pt” in it, we can just change the number.) Note that a space between the number and “pt” is optional.

If we’ve set Writer to always use inches or centimeters (or any units other than points), then if we don’t include “pt” with the numeric value we type, the grid will suddenly become enormously tall. Don’t panic! The entire grid should still be selected (if it’s not, we select it all again), so we reopen the Paragraph dialog box, select the entire contents of the “of” box including the units, then type the value and remember to add “pt” to it.

5. In the Spacing section, we need to make sure Above Paragraph and Below Paragraph are both set to zero.
6. In the Indent section, we need to make sure Before Text, After Text, and First Line are all set to zero.

## In Microsoft Word

1. We select the entire grid, then open the Paragraph dialog box by either clicking the arrow at the lower right corner of the Paragraph section of the Home ribbon or right-clicking somewhere in the grid and choosing Paragraph.
2. If necessary, we click on the Indents and Spacing tab.
3. In the Spacing section, we need to set the “Line spacing” pull-down to “Exactly.”
4. Next to the “Line spacing” pull-down will be a box labeled “At.” We need to specify our rounded-off number **as well as units *in points***. The box may initially have the percent sign %, the inch sign ", or a units abbreviation after the number. If it does, we click-drag across the **entire** contents, type the number we calculated, and type “pt” after the value. (If the box already has “pt” in it, we can just change the number.) Note that a space between the number and “pt” is optional.

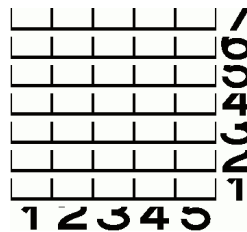
If we’ve set up Word to always use inches or centimeters (or any units other than

points), then if we don't include "pt" with the numeric value we type, the chart may suddenly become enormously tall. Don't panic! The entire chart should still be selected (if it's not, we select it all again), so we reopen the Paragraph dialog box, select the entire contents of the "At" box including the units, then type the value and add "pt" to it.

5. In the Spacing section, we need to make sure Before and After are set to zero. If either one has the value "Auto," we must change it to zero.
6. In the Indentation section, we need to make sure Left and Right are set to zero and that the Special pull-down is set to "(none)."

## What We'll See

Neither Writer nor Word appears to squash the symbols and numbers shorter on the **computer screen**. Instead, their heads look chopped off, which is a bit alarming. Here's a screenshot showing a sample knit symbol grid with five stitches and seven rows per inch.



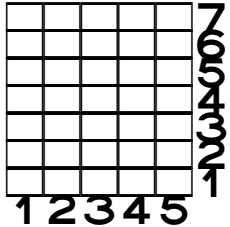
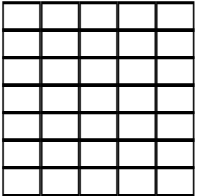
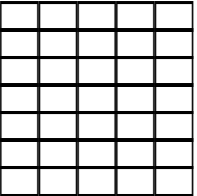
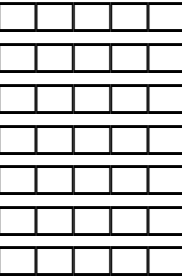
When we print the chart or have our word processor convert the file to a PDF, the symbols and numbers will have their heads.<sup>10</sup>

## Examples

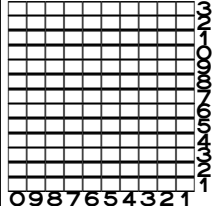
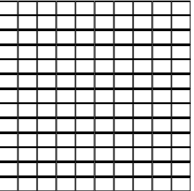
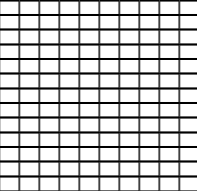
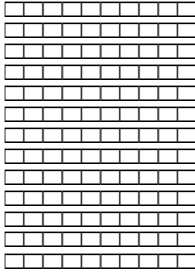
Let's create some sample charts to see how close we can get them to come out one inch square.

For five stitches and seven rows per inch, I have to set the font size in LibreOffice Writer to 14.3, instead of the exact value of 14.4, while Microsoft Word makes me round to either 14.0 or 14.5 points. I can use the same value of 10.3 points for the line spacing in both. Let's compare charts in all three font sizes, along with one that has the paragraph line spacing set to "Single."

<sup>10</sup> The heads of the very top row of symbols may still be cut off, depending on the exact combination of font size and line spacing. If that's troublesome, we can make the grid one row taller to compensate.

14.0/10.3	14.3/10.3	14.5/10.3	14.3/Single
			

At ten stitches and thirteen rows per inch, which we might need if we're charting a sock design, we need the font size to be exactly 7.2, which I can use in LibreOffice Writer, but I have to round either up to 7.5 or down to 7.0 in Microsoft Word. For both, I can set the line spacing to 5.5 points. Again, the last column shows quite clearly why leaving the line spacing set to "Single" won't work when we need a proportional grid.

7.0/5.5	7.2/5.5	7.5/5.5	7.2/Single
			

Note that the row numbers, starting with ten, have only one digit representing them. We can use two digits (and three, if we have more than a hundred rows) if we like, but if we need to save room, we can use just one digit fairly easily.

### *Print the Knit Symbol Grid*

We print out the knit symbol grid and proceed as described for using grid paper from the website.

## **Rounding Off Doesn't Matter Much**

To show how little difference rounding off the grid dimensions will make, whether we're



creating the grid with a table or knit symbols, let's imagine two different scarf projects. One scarf will be narrow stitch-wise but have seven hundred rows. The other scarf will be short row-wise but have seven hundred stitches. Let's see how different the chart dimensions will be compared to the actual scarves worked up in yarn.

Since five stitches per inch doesn't need rounding, let's use as our gauges six stitches and seven rows per inch. The table shows the exact values for the scarf dimensions along with the chart dimensions that we'll get with both rounded values.

700-Row Skinny Scarf	Inches	700-Stitch Short Scarf	Inches
Scarf length at 7 rows per inch	100	Scarf width at 6 stitches per inch	116.7
Calculated row height	0.143	Calculated stitch width	0.167
Chart length at 0.14 inches	98	Chart width at 0.16 inches	112
at 0.15 inches	105	at 0.17 inches	119

For both scarves, either rounded value would work, since it's the proportion between stitches and rows that's the most important thing.

## Typing Up the Marked Grid in the Computer

If we created a grid in the computer and printed it out, then we might want to create in the computer a regular chart from our marked grid.

Should we take the time to do so? After all, we've got the paper version and our backup photograph or photocopy. If we type up the chart in the computer and something happens to our hand-drawn original, then all we have to do is print it.<sup>11</sup> If the typed chart is in the computer, we can also e-mail it or otherwise share it online.

### *A Table Grid*

We'll use our standard three-column table so we can show both public- and private-side row numbers, and it will have twenty knit symbols in its twenty-eight rows. We'll include stitch labels as well, just to help us match up the marked table cells and the knit symbols we have to change.

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<sup>11</sup> If your life is like mine, then if I take the time to type up the hand-marked chart in the computer, I would bet my paycheck that nothing would happen to the paper original.

	09876543210987654321	
28		
		27
26		
		25
24		
		23
22		
		21
20		
		19
18		
		17
16		
		15
14		
		13
12		
		11
10		
		9
8		
		7
6		
		5
4		
		3
2		
		1
	09876543210987654321	

Now we select the knit symbol that corresponds to a marked table cell, then type a low-  
ercase p to switch it to purl.

	0	9	8	7	6	5	4	3	2	1	0	9	8	7	6	5	4	3	2	1	
8																					8
7																					7
6																					6
5																					5
4																					4
3																					3
2																					2
1																					1
0																					0
9																					9
8																					8
7																					7
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	09876543210987654321	
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12		
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		9
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		3
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		1
	09876543210987654321	

Despite the proportions of the typed-up chart's width and height, Mr. Smiley **will** be

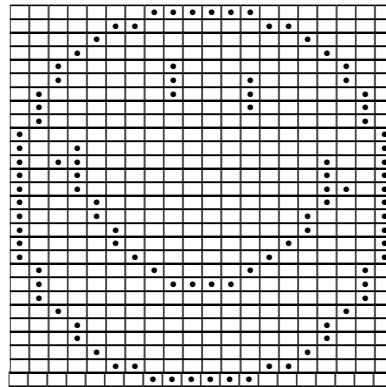
round when we work him up in yarn because of the way we created the empty table we marked up.

To work from the typed-up chart, we format the table however we want, making the font size larger, increasing the cell internal margins, changing the stitch labels to their boxed versions, and whatever other changes we like.

## ***A Knit Symbol Grid***

If we used a printed-out knit symbol grid to chart our image, should we use our marked version to create in the computer a working chart with knit and purl symbols?

We make a copy of the file containing the knit symbol grid, then open it and change the appropriate knit symbols to purls.



When we're done substituting purls where needed, we can do some simple changes to make it easier for us to work from the chart.

We undo the scrunched rows by selecting the entire chart and setting the paragraph line spacing back to "Single." We can also set the font size to the largest size that will allow the chart to fit on the page.

## **Convert the Chart to a Table**

If we didn't put row numbers on the blank grid initially, the easiest way to add them is to first convert the entire chart to a table. We start by selecting the entire grid.

🌀 In LibreOffice Writer, we select the menu entry Table | Convert Text to Table.

🌀 In Microsoft Word, we select Insert on the ribbon, click Table in the Tables area, then select Convert Text to Table.

For either word processor, there's only one column, which means we don't need to specify the character that separates the columns on each row, so we just click OK.

We can now add a column on the right and/or left edge to hold the row numbers, and we can add rows at top and/or bottom to hold stitch labels if we want them. We can also make any changes we like to the format of the table and the symbols, including cell internal margins, font size, and so forth.

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	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0		
																						28
27																						
																						26
25																						
																						24
23																						
																						22
21																						
																						20
19																						
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3																						
																						2
1																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		

## Charting Directly in the Computer

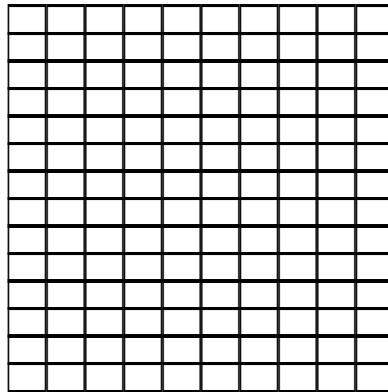
In the first part of the appendix, we saw how to mark Mr. Smiley with several kinds of grids when Mr. Smiley was on paper.

Let's now put an electronic version of Mr. Smiley underneath an electronic grid, making

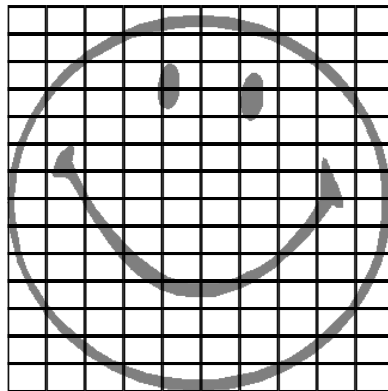
Mr. Smiley in both a life-size two-inch version and a double-life-size four-inch version, at five stitches and seven rows per inch.

### Two-Inch Life-Size Chart

We'll need ten stitches and fourteen rows to make a life-size chart of Mr. Smiley. We know from previous sections that we may have to round the font size and/or the line spacing, depending on our word processor. Since we do need to round off the values, Mr. Smiley won't be exactly square in our example charts, but the differences are very small and won't really show up in yarn.

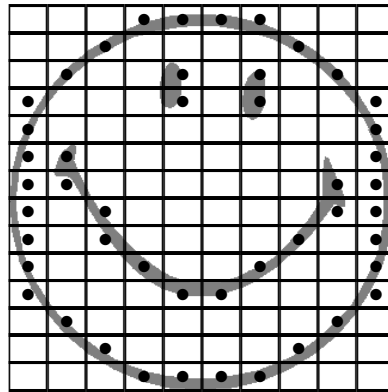


Now we put Mr. Smiley underneath the grid.<sup>12</sup>



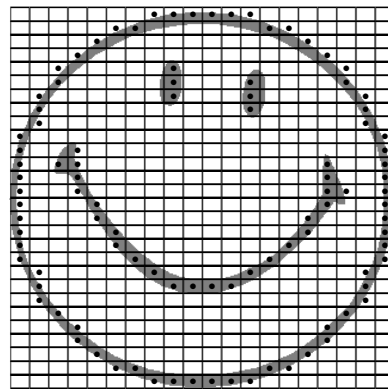
and change the appropriate knit symbols to purls.

<sup>12</sup>I actually have the knit symbol grid inside a one-row table, because doing so makes it easier for me to attach Mr. Smiley to the grid.



### Double-Size Mr. Smiley

Since we want the chart to still be two inches square, we have to put in twice as many stitches and rows as the life-size chart had: twenty stitches and twenty-eight rows.



As before, some of the purl symbols are judgment calls, and after we take the image out from under the grid, we may well want to adjust exactly which stitch will be part of Mr. Smiley or part of the background.

### *An Extra Trick for Color Images*

Since Mr. Smiley has small amounts of darkish features on a white background, the grids made from tables and knit symbols could remain their normal color, black, and still be mainly visible. Other color images, including photographs, that are mostly light colors would also work well with black cell borders or knit symbols.

But suppose our image is mostly medium to dark colors.

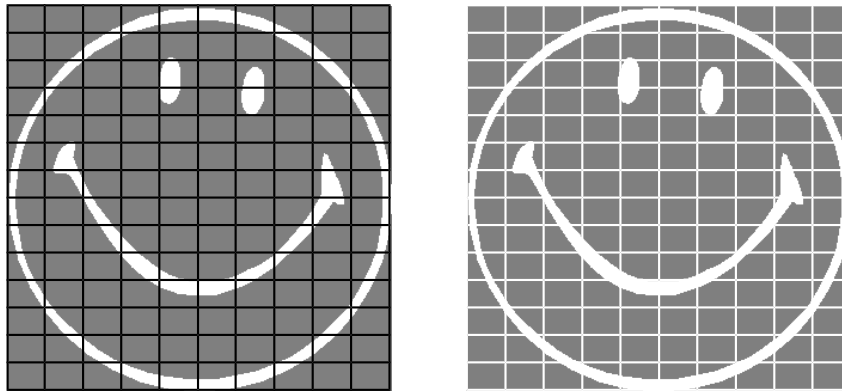


How do we see a grid on top of this version of Mr. Smiley? If we're working with a paper grid stacked on a paper image, it may be difficult.

But if the image is in the computer, we can easily make visible grid lines no matter what colors the image may have.

### With a Table

We create the table as usual, but then at the end, **we set the table's grid lines to white**, and perhaps make them a bit wider. That's a trick we can't do on paper!

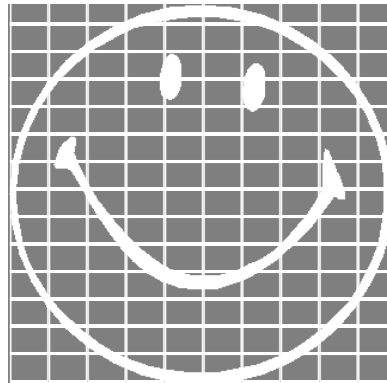
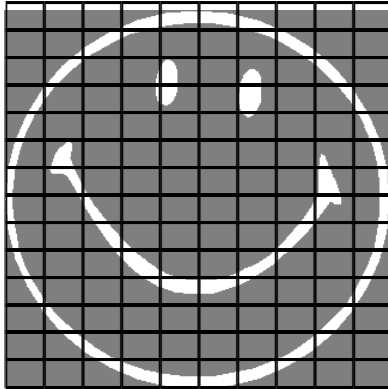


We can then type any symbol we like in each cell to mark the grid, whether a simple letter like an x or a more substantial symbol like ●. We could even use the stylized knit stitch from the knitting font, as shown in this appendix's part two on charting detailed images.

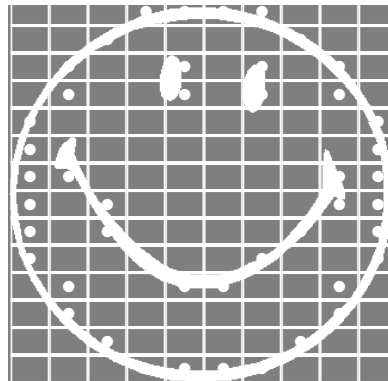
### With a Knit Symbol Grid

We again set up a grid of knit symbols, setting the font size and line spacing as described before. But instead of the knit symbols being black, we **change the font color to white**.





We change knits to purls as before, and they also will be white. In the next chart, we can see at least parts of the purl dots in most of the chart.



Then we remove the image from beneath the grid and change the font color to black.

### ***Using Two Colors***

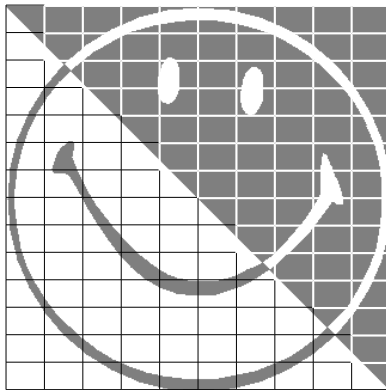
For images that have both light and dark areas, we may have to use black (or another dark color) in some areas and white (or another light color) in others.



### In a Table

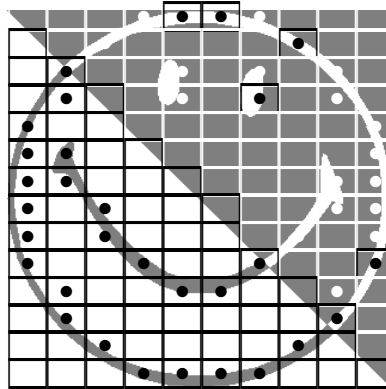
Whichever color we use initially for the table's cell borders, we can always change the color of any cell borders we can't see because they're too similar to the image color.

We click-drag across areas where we can't see the cell borders, then change their color so that it contrasts with the image's color. If the affected area is irregularly shaped, we'll have to change several small groups of cells one group at a time, because the computer will always select a rectangular area of table cells.



### In a Knit Symbol Grid

We start out with a font color that makes most of the knit symbols visible. Then we select those symbols we can't see and change their font color.



Because of the way the computer will want to select symbols on different chart rows, we may have to change the symbols' font color one row at a time. If our word processor has an "alternate selection mode" (see part four's "More Chart Tips"), we'll be able to click-drag a section of symbols on adjacent rows but only in a rectangular shape. We'll still probably have to change several small areas one at a time.

## Working from a Proportional Computer Grid

Of course, we don't have to **work** from a proportional chart typed up in the computer as either a table or a knit symbol grid. Once we type symbols in each table cell or switch knit symbols to purls, we can undo all the squashing that made the grid proportional.

- ☞ We make the table rows taller and/or increase the font size of whatever characters we used to mark the grid cells.
- ☞ We make the knitting symbol font size larger and/or change the entire grid's paragraph Line Spacing back to "Single." We can also put the entire chart into a table.

We only need to use a proportional grid to **create** the grid so that we wind up with the proper width and height **in yarn**.

### Lesson Learned

We can reformat a typed-up chart, increasing the font size and row spacing, to make it easier to work from it.