



This formula, which I first saw in Cheryl Burnette's book **Sweater 101**, tells you how to space increases or decreases evenly spaced over a set number of rows (or rounds) to achieve a smooth taper. I use this formula whenever calculating shaping for a sleeve, waist, or hips.

For the examples given here, we'll assume the following:
 Stitch Gauge = 5 stitches/inch
 Row Gauge = 7.5 rows/inch

Sleeve Shaping

Let's say you're working a sleeve from the cuff to the armhole. Let's also say that you want your sleeve to taper from 45 stitches (9") at the cuff to 75 stitches (15") at the armhole. In other words, you want to increase:

$$75 \text{ stitches at armhole} - 45 \text{ stitches at cuff} = 30 \text{ stitches to increase.}$$

Because the sleeve will have symmetrical shaping, i.e., the increases will be worked at the beginning and the end of each increase row, it will take:

$$30 \text{ stitches to increase} \div 2 \text{ increases per increase row} = 15 \text{ increase rows.}$$

The next step is to determine how many rows are in the total taper. Let's say that you want your sleeve to measure 17" from the cuff cast-on to the start of the armhole shaping.

In general bottom-up sleeve construction, the taper begins 2" after the cast-on and ends 2" before the start of the armhole shaping.

Therefore, your taper will take place over:

$$17" \text{ total length} - 2" \text{ at cuff} - 2" \text{ at upper arm} = 13" \text{ for taper.}$$

Multiply this taper by the row gauge to determine the number of rows in the taper:

$$13" \times 7.5 \text{ rows/inch} = 97.5 \text{ rows, which we'll round to an even number:} \\ 98 \text{ rows for taper.}$$

Because it's easiest to work the increases on right-side rows, we need to determine the number of right-side rows in our taper:

$$98 \text{ rows for taper} \div 2 = 49 \text{ right-side rows in taper.}$$

We now know that we want to space our 15 increase rows evenly over the available 49 right-side rows in our taper.

To determine how to space those 15 increase rows evenly over 49 right-side rows, divide 49 right-side rows by 15 increase rows.

$$15 \text{ inc rows} \overline{) 49 \text{ rs rows}} \\ \underline{45} \\ 4$$

This tells us that the number of full times that 15 goes into 49 is 3 with a remainder of 4.



This next part is sheer magic.

Subtract the remainder from the total number of increase rows ($15 - 4 = 11$), then add 1 to the whole number at the top of the division equation, which in this case is $3 + 1 = 4$.

$$\begin{array}{r}
 15 \text{ inc rows} \quad \begin{array}{r} 3 + 1 = 4 \\ \hline 49 \text{ rs rows} \\ 45 \\ \hline 15 - 4 = 11 \end{array}
 \end{array}$$

Finally, draw diagonal lines between the two numbers on the top line of the equation and the two numbers on the right side of the bottom line of the equation.

$$\begin{array}{r}
 15 \text{ inc rows} \quad \begin{array}{r} \textcircled{3} + 1 = \textcircled{4} \\ \hline 49 \text{ rs rows} \\ 45 \\ \hline 15 - 4 = 11 \end{array}
 \end{array}$$

These diagonal lines tell us to increase every 3rd right-side row (i.e., every 6th row) row 11 times, then to increase every 4th right-side row (i.e., every 8th row) 4 times.

You can check the math as follows:

Increase every 6th row 11 times = 66 rows; 11 increase rows.

Then increase every 8th row 4 times = 32 rows; 4 increase rows.

$$66 \text{ rows} + 32 \text{ rows} = 98 \text{ rows.}$$

$$11 \text{ increase rows} + 4 \text{ increase rows} = 15 \text{ increase rows.}$$

It really doesn't matter which interval you work first—you can increase every 8th row 4 times, then increase every 6th row 11 times. Either way, you'll work your total of 15 increase rows over a total of 98 rows, and those increases will always be worked on right-side rows.

Yes, the increase rows will be worked closer together at one end of your sleeve than the other, but the overall effect will be consistent taper throughout the 13" taper length. If this slight asymmetry bothers you, you can alternate the two intervals for a more even distribution.

For example:

Increase every 6th row 6 times = 36 rows; 6 increase rows.

Then increase every 8th row 4 times = 32 rows; 4 increase rows.

Then increase every 6th row 5 times = 30 rows; 5 increase rows.

$$36 \text{ rows} + 32 \text{ rows} + 30 \text{ rows} = 98 \text{ rows.}$$

$$6 \text{ increase rows} + 4 \text{ increase rows} + 5 \text{ increase rows} = 15 \text{ increase rows.}$$

If you were working the sleeve from the top down, you'd simply be working decreases instead of increases. In this case, you'd want to work 15 decrease rows over 98 rows (49 right-side rows). The same formula would apply, but in this case,



you'd decrease every 3rd right-side (i.e., every 6th) row 11 times, then decrease every 4th right-side (i.e., every 8th) row 4 times.

Waist Shaping

The same formula applies for waist or hip shaping in the body of a sweater. For "hourglass" waist shaping, you'll need work two sets of tapers. One between the hips and waist, and the other between the waist and hips.

For example, let's say the total lower body length (from cast on to the start of the armhole) is 17".

Like the sleeve taper, we don't do any shaping in the first 2" after the cast-on and we don't do any shaping in the last 2" before the start of the armhole shaping. We also, keep the number of waist stitches even for 1".

Therefore, in our 17" lower body length, there are $2" + 2" + 1" = 5"$ that are not included in the tapers.

$17" \text{ lower body length} - 5" \text{ of no shaping} = 12" \text{ for shaping.}$

For simplicity, divide this 12" of shaping evenly between the two tapers:

$12" \text{ available for tapers} \div 2 \text{ tapers} = 6" \text{ available for each taper}$

In other words, you'll work the taper between the hips and waist over 6", and you'll work the taper between the waist and bust over 6".

For A-line shaping, you'll work a single taper between the hips and bust.

In our example of a 17" lower body length, you'll start the taper 2" after the cast-on and end it 2" before the start of the armhole shaping.

$17" \text{ lower body length} - 4" \text{ of no shaping} = 13" \text{ for shaping}$

For either example, you'll divide the number of right-side rows in your taper by the number of decrease or increase rows (assuming 2 decreases or increases per decrease or increase row for symmetrical shaping) and use the magic to determine the interval (or rate) of the taper to create the shape you want.