

Teeth per Inch

4 January 2022 — 15:48

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Must be printed “actual size”, not “fit to printable area”.

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⁰TPI.tex 4 January 2022 15:48

1 A note about the Teeth Per Inch (TPI) figures

1. Accuracy of the TPI figures is controlled by the quality of the printer used to print it on and the number of times that the individual TPI figure has been reproduced from an original.
2. The generated PDF file is correct, however the actual printing process sometimes introduces sizing errors. When paper is wrapped around a drum, as it is with most laser printers, one surface is longer (one side is on the outside of the circle so its radius is slightly longer than the other side's is).
3. While the paper direction that is transverse to the cylinder is almost always "correct". This results in dimensions in one direction being somewhat better than those in the longitudinal direction.
4. Some printers do not produce 100% size output. Some of them have an option to "fit the image for printing". On two different printers that I tested on, this option is the default option and the printed image is at 90% of the "true" size. When "small" output size is obtained, measurements may be "off".
5. To get an estimate of the amount of "printing error" that has been introduced to any given target, a rule has been provided on each edge of the target grid. If this rule is checked with an accurate machinist's ruler an indication of the dimensional errors that have been introduced to the copy at hand may be estimated.
6. To verify that the printed figure was the "correct" size I used machinist's rules from three different manufactures. I consider them all to be of about equal accuracy. They are:
 - GENERAL, model CF1216 with inch measure in 10ths/50ths on one side and inch measure in 32ths/64ths on the other side. It is 10 inches long.
 - MITUTOYO, model 182-223 with inch measure in 32ths/64ths on one side and inch measure in 10ths/50ths on the other side. It is 10 inches long.
 - L.S.STARRETT, model C334 with inch measure in 10ths/50ths on one side and metric measure in full mm/ $\frac{1}{2}$ mm on the other. It is 10 inches long.
 - L.S.STARRETT, model CF616 with inch measure in 10ths/50ths on one side and inch measure in 32ths/64ths on the other side. It is 5 inches long.
7. The dimensional stability of paper varies in several ways:
 - Paper tends to change its size based on the temperature and humidity.
 - Paper changes its size depending if it is measured longitudinally or transversely as to the way it was processed in the paper plant. I.e. the amount of change may be different for left-right and top-bottom directions on the same sheet of paper.

8. On the bottom and left hand edge a rule calibrated in inches is affixed. On the top and right hand side there is a metric rule. Either one may be used depending on the availability of a high quality inch or metric rule.
9. The most teeth per inch that these figures represent is 21.0 TPI. Using a computer generated paper figure for more TPI would result in a figure that has lines too closely drawn to clearly use. If measurements of denser TPIs are needed I recommend that use be made of a common TPI gauge that is intended for use with screws.
10. When using these TPI figures, it is the responsibility of the user to determine if the figure has a acceptable accuracy.

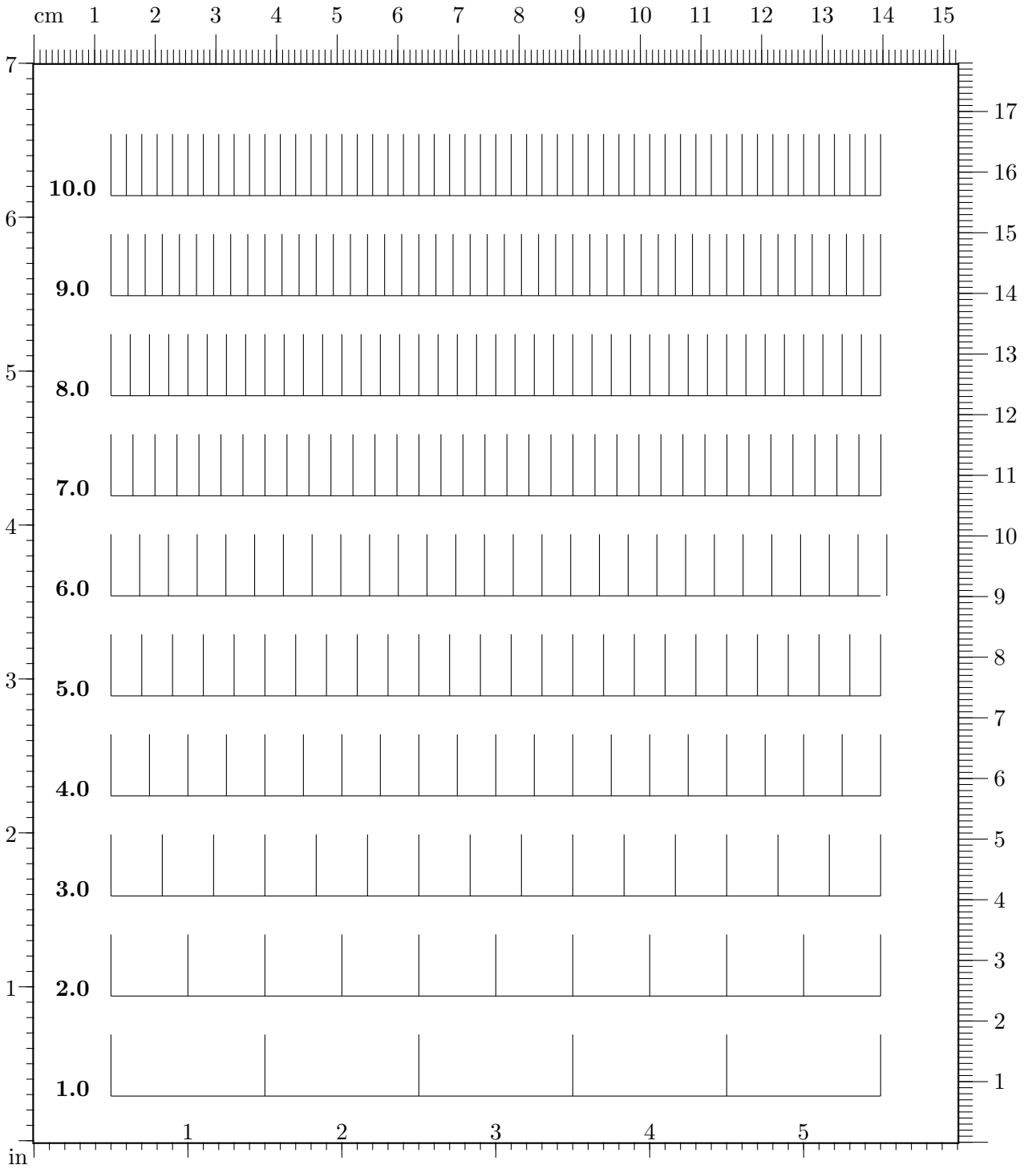


Figure 1: TPI 1 \rightarrow 10 by full point (4 JANUARY 2022 15:48)

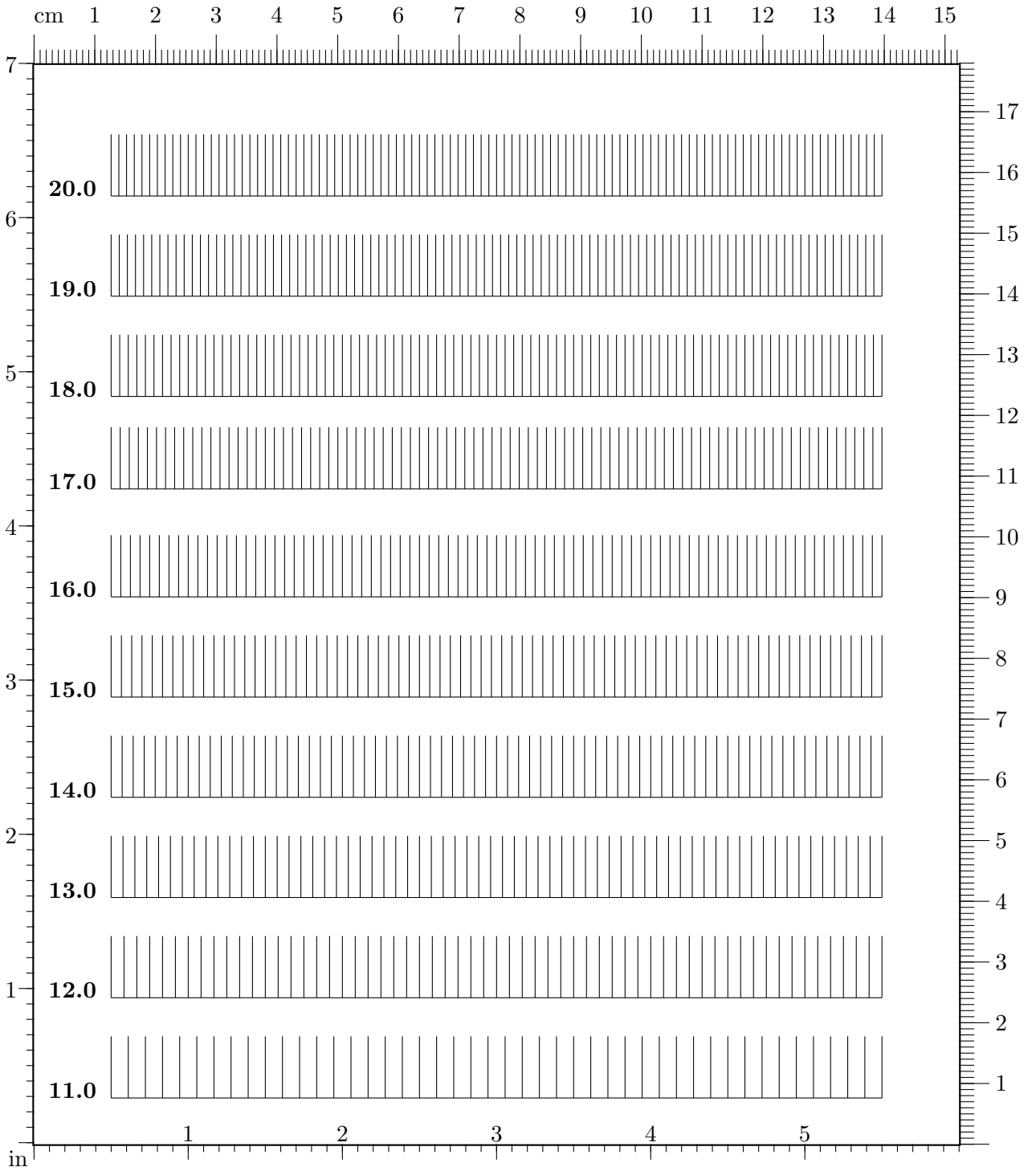


Figure 2: TPI 11 \rightarrow 20 by full point (4 JANUARY 2022 15:48)

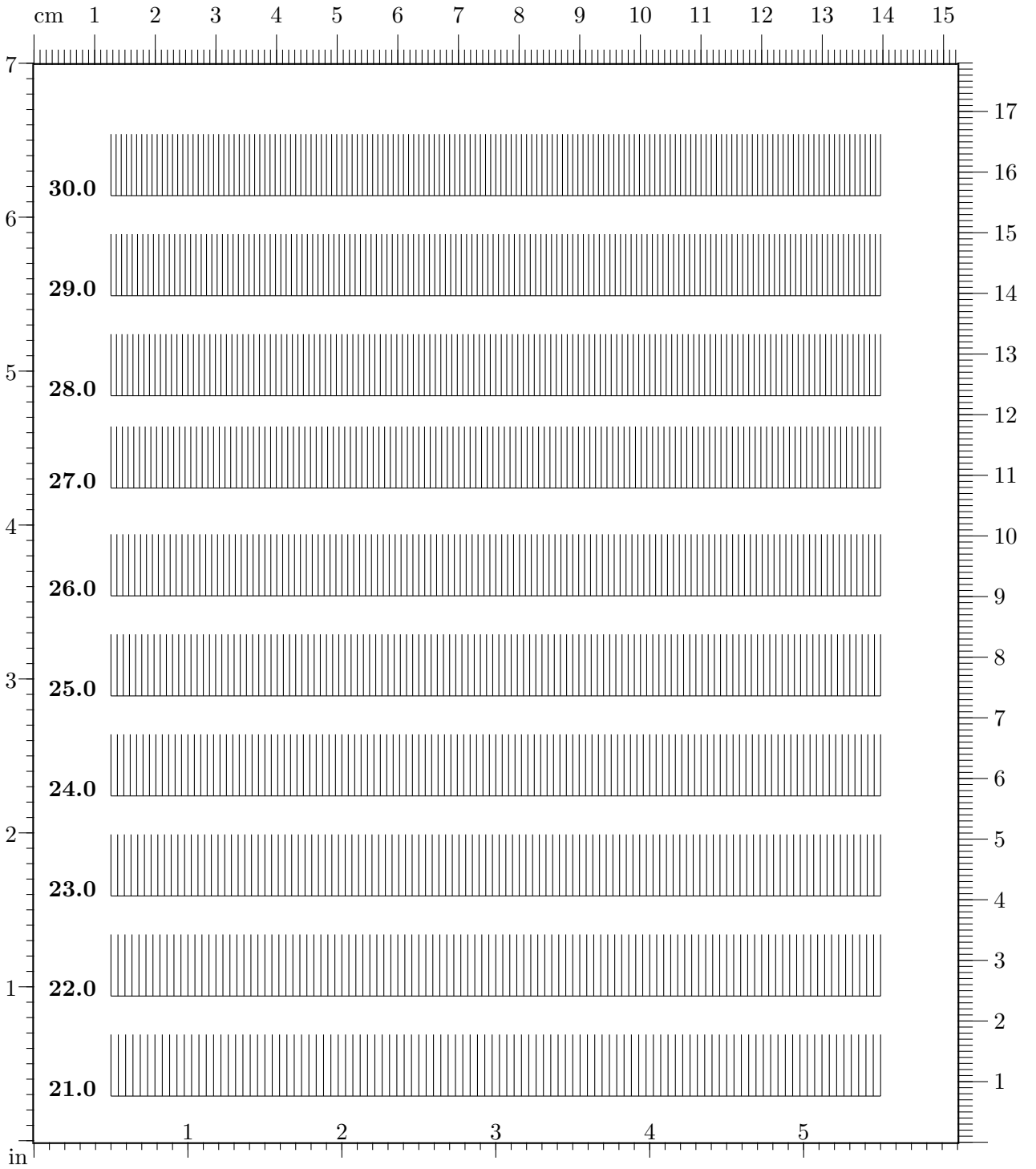


Figure 3: TPI 21 \rightarrow 30 by full point (4 JANUARY 2022 15:48)

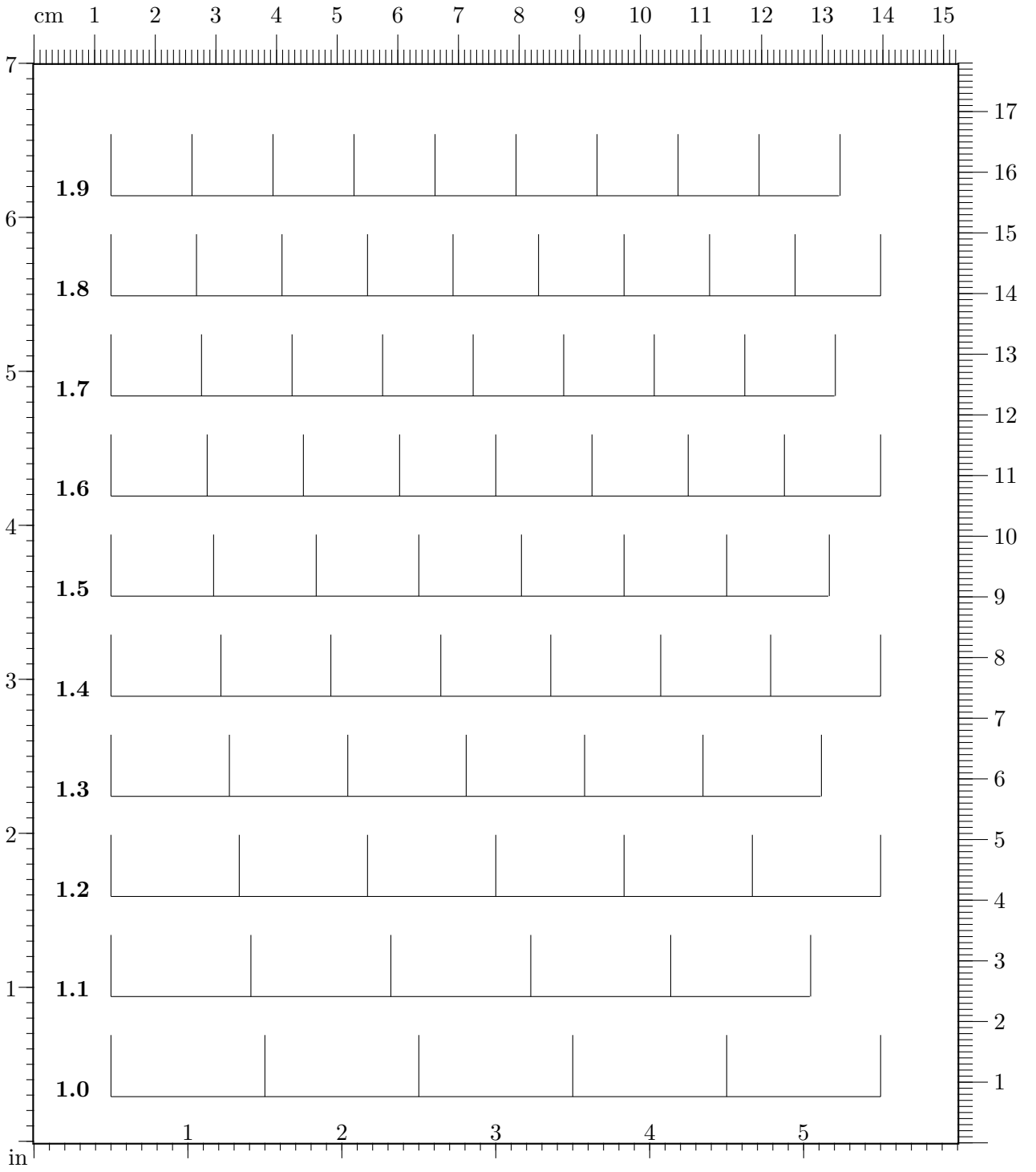


Figure 4: TPI 1.0 → 1.9 by .1 point (4 JANUARY 2022 15:48)

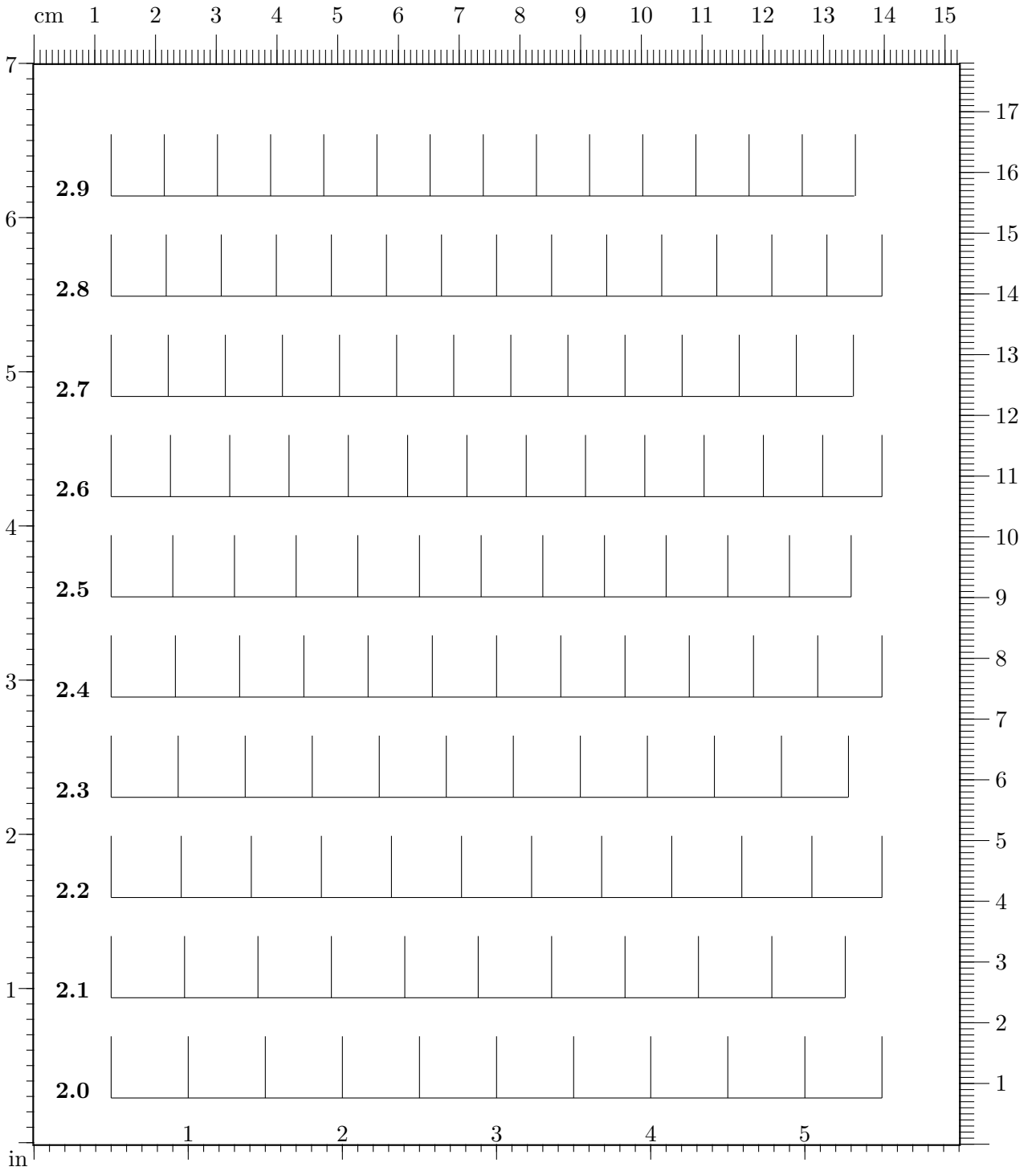


Figure 5: TPI 2.0 \rightarrow 2.9 by .1 point (4 JANUARY 2022 15:48)

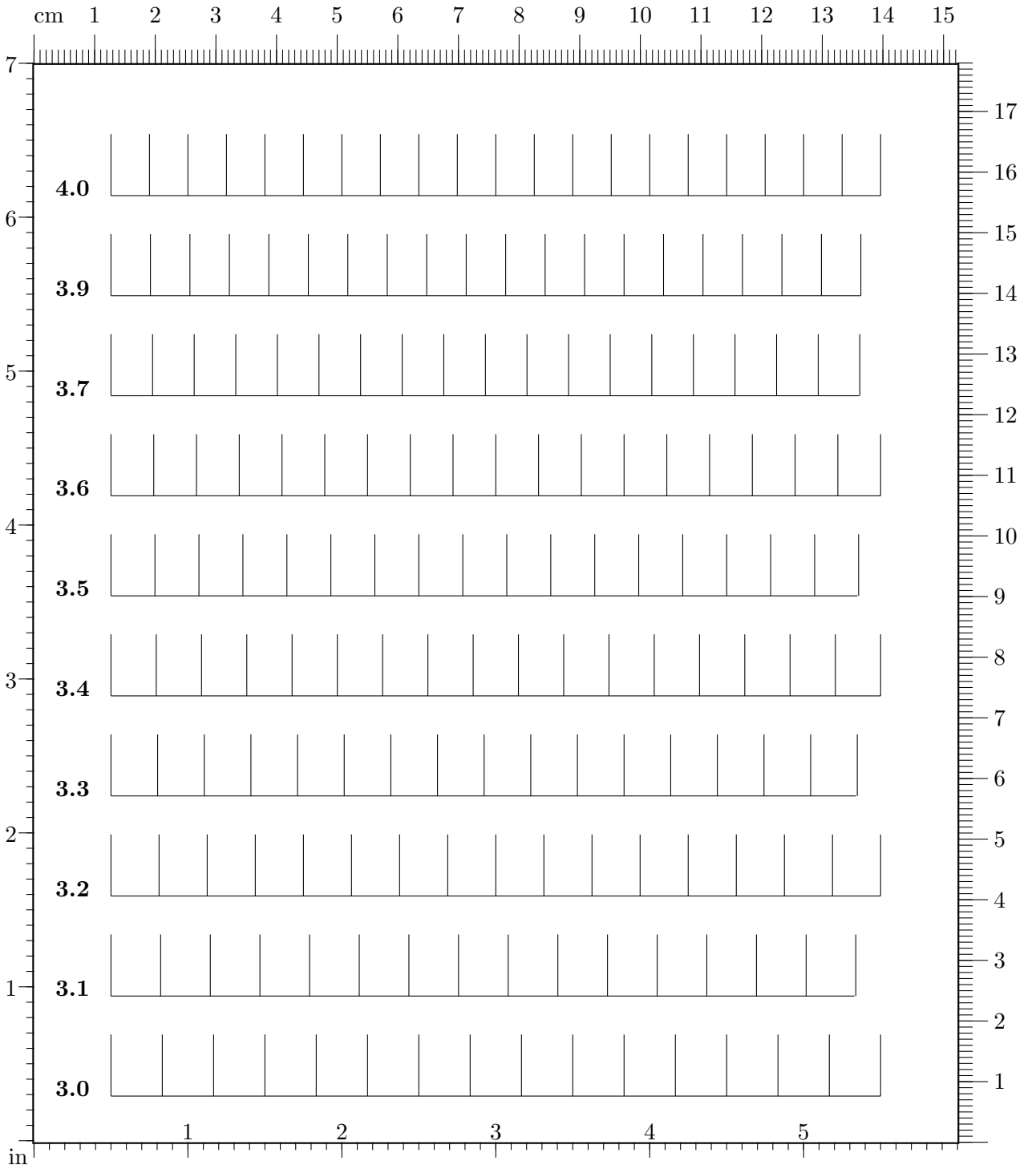


Figure 6: TPI 3.0 \rightarrow 3.9 by .1 point (4 JANUARY 2022 15:48)

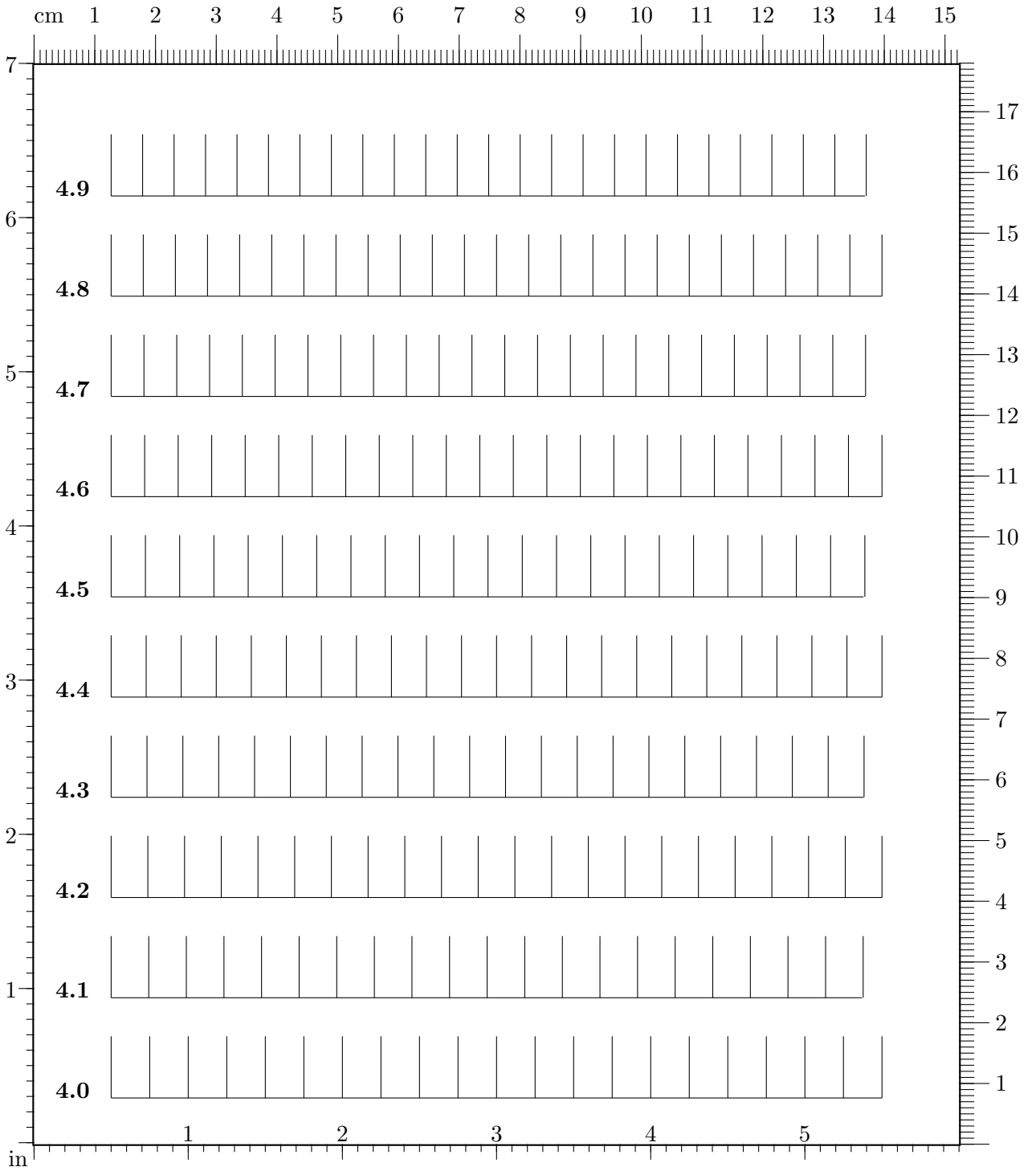


Figure 7: TPI 4.0 \rightarrow 4.9 by .1 point (4 JANUARY 2022 15:48)

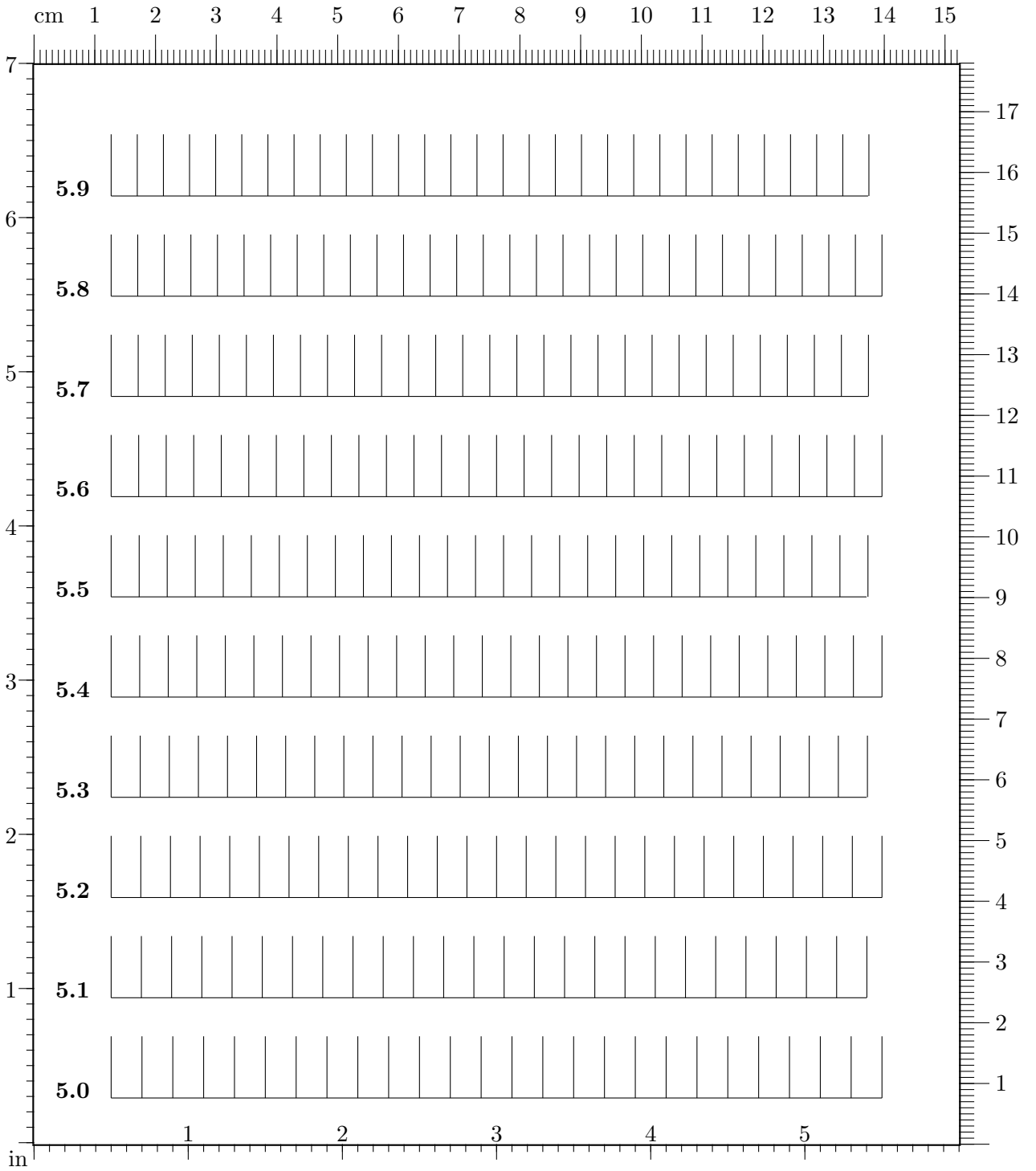


Figure 8: TPI 5.0 \rightarrow 5.9 by .1 point (4 JANUARY 2022 15:48)

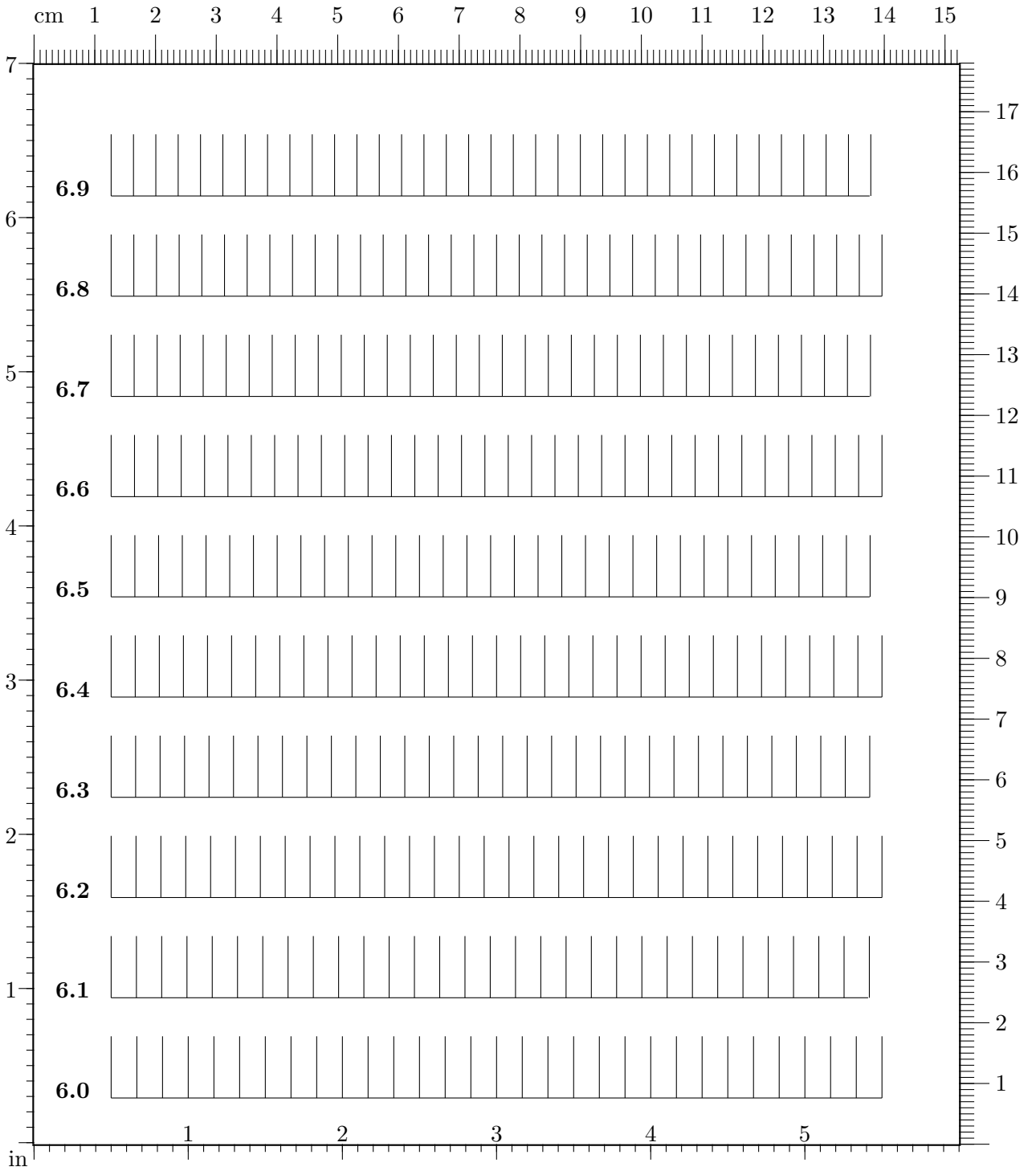


Figure 9: TPI 6.0 \rightarrow 6.9 by .1 point (4 JANUARY 2022 15:48)

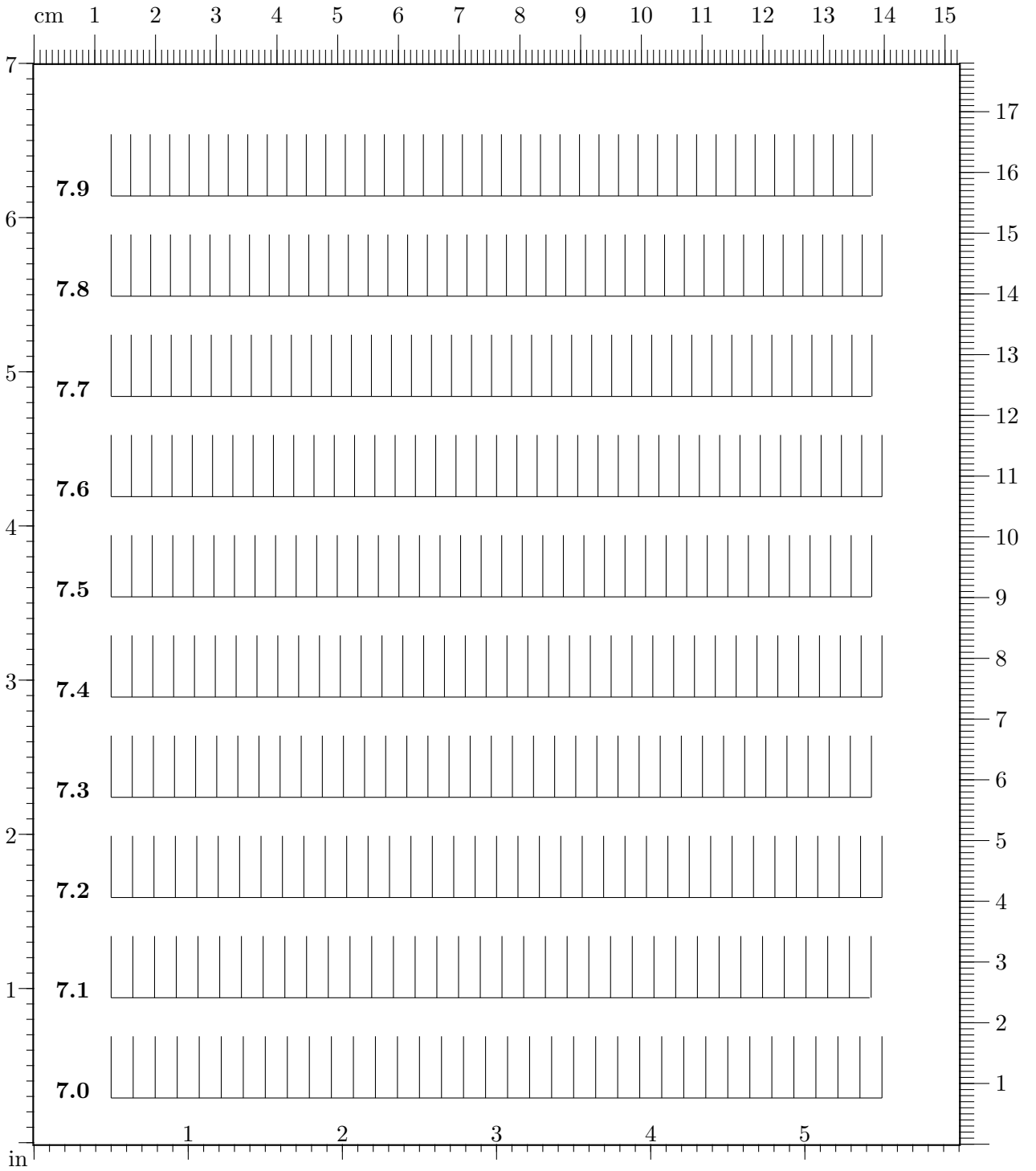


Figure 10: TPI 7.0 \rightarrow 7.9 by .1 point (4 JANUARY 2022 15:48)

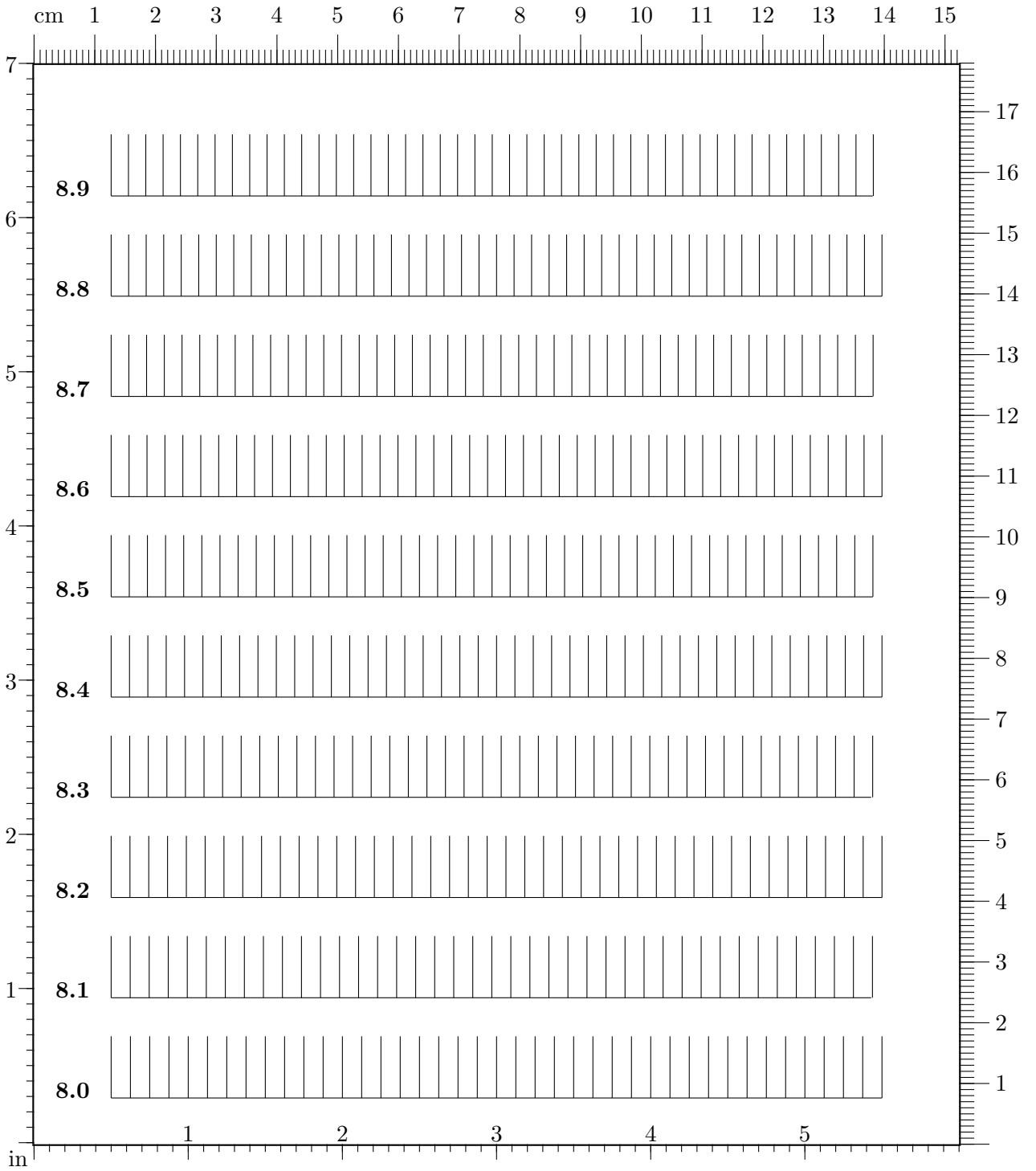


Figure 11: TPI 8.0 \rightarrow 8.9 by .1 point (4 JANUARY 2022 15:48)

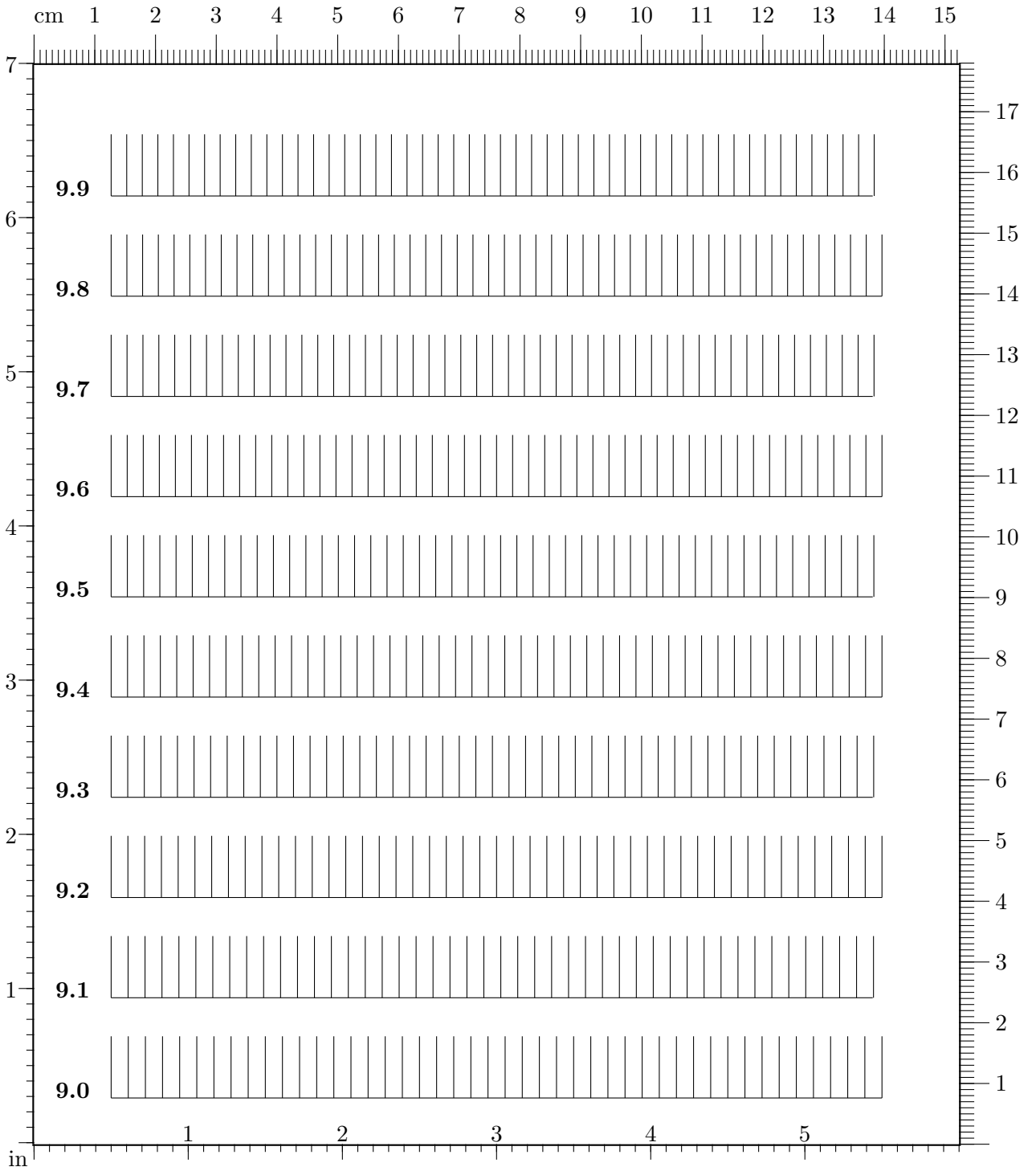


Figure 12: TPI 9.0 \rightarrow 9.9 by .1 point (4 JANUARY 2022 15:48)