Divide into equal parts

Below are pattern sequences that can be used to split a square or rectangle into an exact number of equally si parts without doing any measurements at all. It is accomplished by drawing lines between intersections or cc on the frame or through intersections of the lines inside the frame. Lines can also originate from the horizon vertical vanishing points if in perspective, which outside of perspective just means perfectly horizontal or ver lines.

As I have done some fairly extensive research in this area there are a few patterns that have alternative paths these cases the top pattern is either easier to use or less complex while the bottom pattern can be used to actu divide the square or rectangle horizontally as well, creating a grid. All other patterns can already be used to c grids.

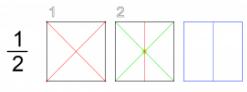
The philosophy is that every step adds as many lines as possible which do not depend on each other but prev existing lines. This means that you can draw the new lines in any order you wish.

Document legend for each step:

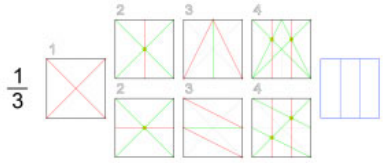
- The **black frame** is the square or rectangle you are about to split.
- Red lines are new lines you should draw.
- Small red dots on the **border** show where new lines start or end.
- Green lines are pre-existing lines that should be used as references.
- Yellow circles mark the intersections of the green lines to use.
- Gray lines are old lines that will not be used.
- Blue lines are previously drawn lines that are part of the final result, they are faded like the gray lines whe in use as references.

All these patterns have been verified by doing measurements, which again is precisely the activity we are tryi avoid by using them! To easily test a pattern you can use a sheet of paper and fold it according to the instruct this is of course easier with the earlier patterns that result in fewer parts.

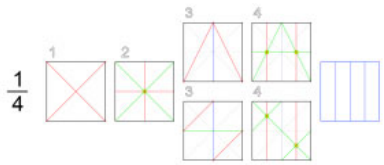
These first four patterns are pretty much all the basic methods used to start more complex patterns. They usu make out step 1-3 in some way, and in reality, that is because no other patterns are possible in those steps! P click the images to view larger versions!



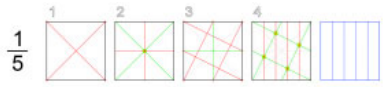
The first step in this most basic pattern is actually the first step for all the pattern simply finds the center of the frame.



It was actually after discovering this pattern when I needed to split something in three that I got interested in exploring geometry in this As you can see it is a basic method that can be achieved by drawing li several ways.

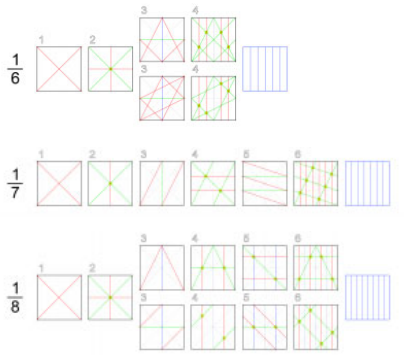


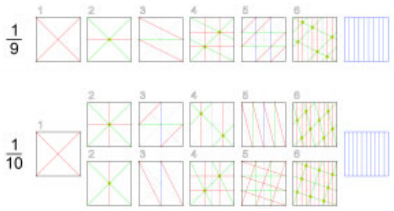
The top patterns actually starts out just like with thirds above, you ju different intersections to draw the next step. In the bottom step you c see how we repeat the first step om the third step.



This pattern is my favorite by far, so simple yet so useful. A fun thing that the parts created can be used to make five equally sized squares.

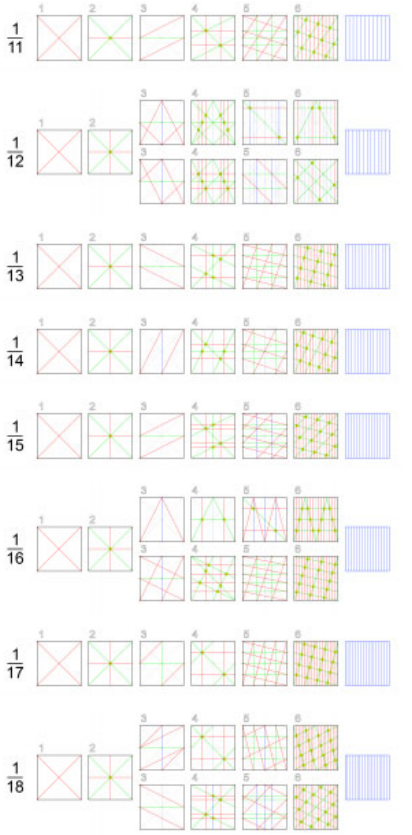
These next five patterns are the ones I have used the most, with the last pattern doing tenths. It is very seldo want to split something in more parts than that.

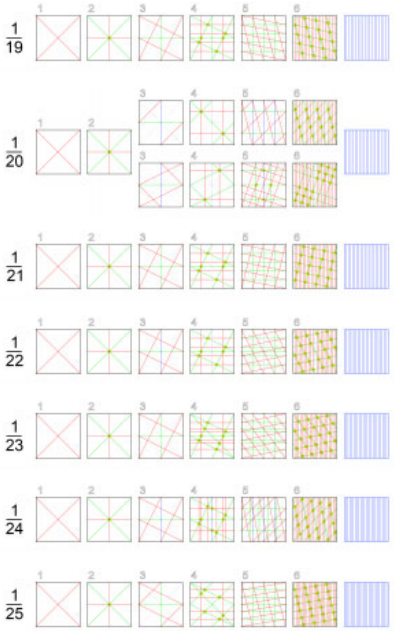




The patterns that are the hardest to find are naturally the primes as they cannot be based on any other patte already have found, they are all very unique, this is the reason why finding all the patterns in a sequence is a tricky.

While I found various patterns for much higher amount of parts I decided to stop at 25 because it would be realistic to fill in the gaps. Even then it is probably a few patterns too many, mostly because as the amount of increase the patterns become quite busy and thus hard to read.





I have to confess I spent way too much time figuring all of this out. Hopefully it will be useful for someone el than myself :) If so, do not hesitate to leave a comment!

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64 Responses to *Divide into equal parts*

kawika *says:*
June 7, 2018 at 4:46

This is awesome and so are you!!

Nevil *says:*
June 14, 2018 at 22:40

This is actually quite remarkable. I'm totally going to put this to use with my wood working. Thank you so much for yo and effort!

Tay *says:*
September 20, 2018 at 20:24

I need to divide a sheet into 23rds and this is a godsend!!! THANK YOU YOU BLESSED HUMAN

thechickadeefeeder *says:*
November 7, 2018 at 21:10

Huh! I was wondering how to cut a pan of food into definite thirds, and I think this will do nicely!

Lynnea Luebben *says:*
June 15, 2019 at 6:03

Very awesome....I had a discussion with my student on how many times can you divide a rectangle in half equally...he c several cuts that made me smile and opened my eyes beyond the standard answers. He would love these charts.

Luca *says:*
June 20, 2019 at 11:53

Thank you soooo much!

Shashi *says:*
July 31, 2019 at 9:37

This is gold.i have referring tonnes of material and you sorted it all out in one page in most simplistic way.grateful.

ryanwhowe *says:*
September 27, 2019 at 23:00

And another cool part to this, if you are drawing things using perspective drawing with up to a 3 point perspective you use these to split things and stay true to the perspective you are in.

Linda *says:*
October 21, 2019 at 17:29

This is so helpful! Thank you! You can also “drop a diagonal” whereby you create a line segment divided into as many divisions as needed using perpendicular segments (ex: 17 inch line for 17 divisions), group all that and rotate that divid until each endpoint hits the outer lines of the shape to be divided. Then just draw verticals through the intersections. Granted, this was easier on paper, but can be done in drawing programs.

ArtZombie *says:*
October 22, 2019 at 12:04

This was so useful I’m an artist and I have used your techniques to grid up my canvases ready for painting, I am dyslexi have number blindness so this way is so much easier than doing the math.
Thanks for doing the hard work for me.
ArtZombie. Cornwall England.

Grant *says:*
November 18, 2019 at 23:55

These geometric divisions are amazing, thank you for posting and finding them! I’ve known about the square divided ir thirds, but haven’t seen it taken further like here. Have you seen anyone show any form of mathematical proof for this division into thirds- trigonometry or other than visual means?

Andreas Aronsson *says:*
November 20, 2019 at 20:03

> Grant, there is certainly some kind of mathematical way to do this, if nothing else modern machine learning could probably explore this beyond infinity. Myself I’m mostly simulating mathematical things by sheer brute force so not entirely sure how that would be done ?
>
> Thanks for all kind comments, everyone, you are lovely human beings.

Grant *says:*
November 20, 2019 at 20:18

Thanks for the feedback Andreas. Brute force is winning here:) I kept googling on this matter and found an elegant mathematical proof using slope and line intersection, which wasn’t exactly the raw geometric reveal I was looking for, l proof enough. Anyone else interested can see it here: https://tasks.illustrativemathematics.org/content-standards/tasks/1571
Cheers!

Lý Minh Phúc *says:*
February 24, 2020 at 12:08

Yo thanks so much. I’ll apply this into my origami work. Super cool