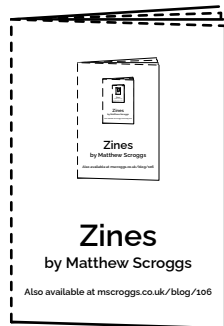


Zines

by Matthew Scroggs

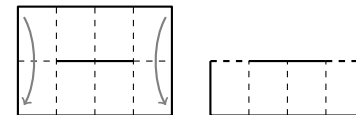
Also available at mscroggs.co.uk/blog/106



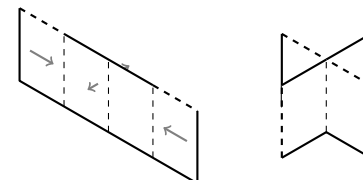
This zine was written by Matthew Scroggs.

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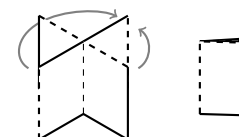
Fold the paper in half the other way:



Push the two ends of the paper together so that the front of the middle bit of paper comes forward, and the back goes backward:

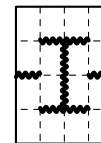


Finally, flatten all the pages and you have your zine:



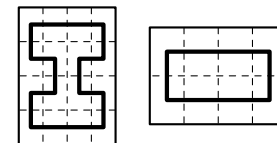
A 16-page zine

If you're anything like me, you'll already be wondering if it's possible to do some more folding and cutting to make a 16-page zine from a piece of A4. After some trial and error, I found that you can if you fold the paper 4 times then cut along these zig-zag lines:



(This time, I've drawn the diagram with a portrait pieces of paper, as this leads to a portrait zine. For a 8-page zine, a landscape piece of paper led to a portrait zine.)

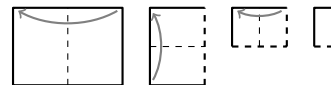
Instead of drawing which lines we need to cut, we can represent our two zines so far by drawing lines that connect the pages in order:



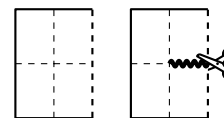
Making an 8-page zine

A few months ago at Cheltenham Science Festival, Hana Ayoob showed me how to make an 8-page zine. If you've not make one before, I recommend unfolding the zine you're currently reading to see how these steps were followed to make it.

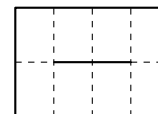
Take a piece of A4 paper, and fold it 3 times like this:



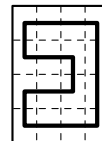
Unfold all the folds except the first one and cut along the zig-zag line:



After unfolding, your paper should look like this:

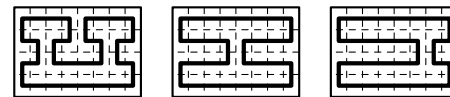


During my experimentation, I saw that every second and connection between pages must be horizontal. These horizontal connections end up in the spine of the zine and allow the pages to turn. If you can't visualise why the pages won't turn if this condition doesn't hold, try making a 16-page zine like this:



32-page zines

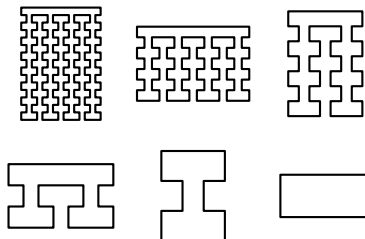
Now that we can make a 16-page zine, the obvious question is: can we make a 32-page zine? To answer this, we need to look for lines that go through all 32 pages where every second connection is a horizontal. I wrote a Python script to look for these and it found 3:



The code also told me that the 8- and 16-page zines we know about are the only 8- and 16-page

How many zines?

There are, of course, many other generalisations that you could come up with.

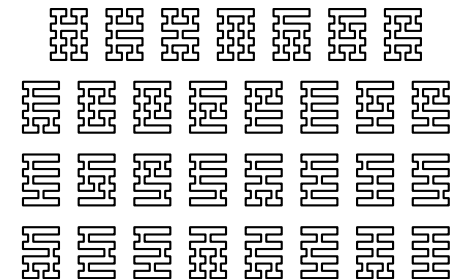


Now that we have 8- to 32-page zines, we can try to generalise to make a 2^n -page zine. This generalisation was the first I came up with:

I'm only counting the zines where the pages in the final zine are portrait, and have the same side ratio a the original piece of A4 paper: there will be other possible zines if you relax these requirements.

While working towards our generalised zine, you may have started pondering another question: for any given n , how many different 2^n -page zines can be made?

So the start of the sequence of the number of possible zines is: 1, 1, 1, 3, 31.



For $n=2$, there's only one way to make a zine (fold the paper twice). For $n=3$ to 6, we've already seen that there are 1, 1, and 3 ways to make zines. The code I wrote was also able to tell me that there are 31 possible 64-page zines:

After a fair amount of work, I managed to compute the number of 128-page zines: 315 434. I've written up an insight I used to help speed up computing this number at mscroggs.co.uk/blog/110, and the zines sequence is now published on the OEIS: A367038: 1, 1, 1, 3, 31, 315434

I think calculating number of 256-page zines is still beyond my code though...