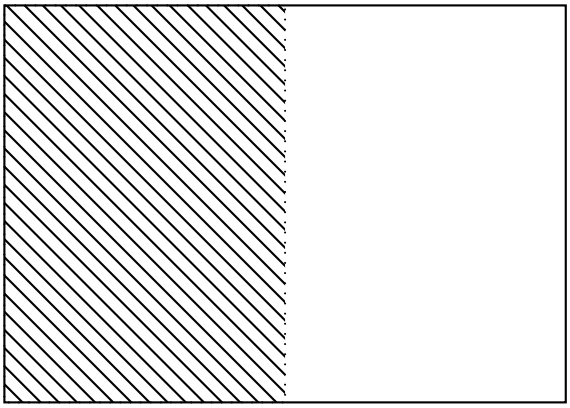
Épreuve de section européenne

A-series paper

A-series paper, which is used worldwide, has the interesting property that cutting a sheet in half (along its length) results in two smaller rectangles, each of which is similar to the original rectangle. When cut in half, A0 paper produces two A1 papers; when cut in half, A1 paper produces two A2 papers; and so on. The base A0 size of paper is defined to have an area of 1 m^2.



Relation between a A_n paper and the A_{n+1} paper (hatched)

The main advantage of this system is its scaling : if an A-sheet is divided into two equal halves parallel to its shortest sides, then the halves will again have the same ratio. Folded brochures of any size can be made by using sheets of the next larger size, e.g. A4 sheets are folded to make A5 brochures. The system also allows scaling without compromising the aspect ratio from one size to another – as provided by office photocopiers, e.g. enlarging A4 to A3 or reducing A3 to A4. Similarly, two A4 sheets can be scaled down and fit exactly on a single A4 sheet without any cut-off or margin.

From various sources

Questions

1. Compute the areas of an A1 sheet, an A2 sheet, an A3 sheet, an A4 sheet.
2. If $\mathcal{A}_n$ is the area of an An sheet, what is the nature of the sequence $\mathcal{A}_n$?
3. Calculate the value of $\mathcal{A}_{10}$. What does it represent ?
4. A rectangle with a ratio of $\sqrt{2}$ (meaning that its length is $\sqrt{2}$ times longer than its width) is cut in half. Prove that the two resulting rectangles have the same ratio.