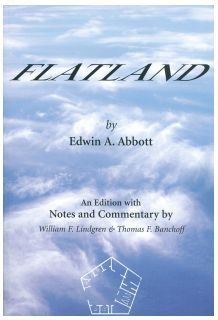
Flatland. by *Edwin A. Abbott* an edition with **Notes and Commentary by** *William F. Lindgren & Thomas F. Banchoff*, Cambridge University Press, 2010 (ix+294 p.), soft cover, ISBN 978-0-521-75994-6.



E.A. Abbott



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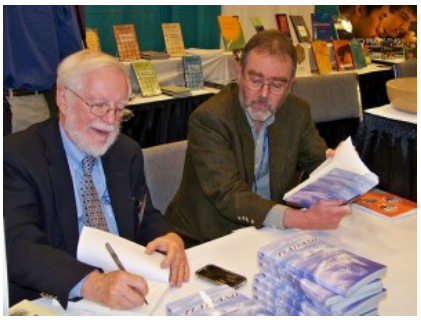
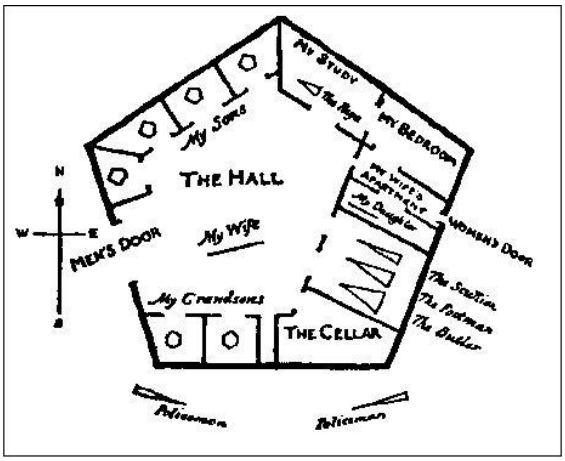


T.F. Banchoff (left) and
W.F. Lindgren (right)

Flatland by Edwin A. Abbott is probably as well known as *Alice in Wonderland* written by his contemporary Lewis Carroll (pseudonym of G.A. Dodgson). Flatland is the story told by A. Square, who lives in a two-dimensional world. The middle class inhabitants in Flatland are regular polygons, starting with the equilateral triangles whose children are squares, and they get pentagons as their offspring. These have a better status of Professionals and Gentlemen. The n-gons for larger n are Nobility, and for n large, they are almost as circles having the order of Priests. The female inhabitants are needle-like: long thin and pointy. In a two-dimensional world they will see one another always as lines, but they can recognize each other by touching and "feeling" the angle of the partner.



A house in Flatland

The sketch on the left shows the house of A. Square. The house is oriented North-South, where the two top "walls" are called "roof". The men's door is on the left, while the women's door is a very narrow entrance on the right. The wife (needle) is in the hall, and the sons (pentagons) are in their rooms against the Western roof and there is one daughter (short needle) in the narrow room near the women's entrance. The two grandchildren (hexagons) are in the rooms on the Southern wall. The large room against the Eastern wall is for the servants (isosceles triangles). At the bottom we see two policemen (pointy isosceles triangles).

Females are close to the lowest cast of Soldiers and Workmen (isosceles triangles). If their angle shrinks below 10 degrees, they can become Criminals, totally devoid of intelect and used for warfare, but if they are not even good enough for war, they are used for education. Isosceles cannot raise their status by birth, unless by exceptional merits, they may grow more equilateral. As an individual is from a higher cast, he learns to recognize the other by "sight". Living in a foggy world, they can develop a highly sensitive depth sight and estimate how fast the sides of their opponent slopes away from them and thereby estimate the angle and hence the status of the other one.



During a dream A. Square had a vision of Lineland, a one-dimensional world, in which he is an external observer who can see the whole land, whereas the inhabitants of Lineland cannot pass each other. Linelanders can only communicate with a distant relative by sound. The king of Lineland is trying just as hard to explain his world to A. Square who is both so ignorant and yet so superior to his world, as A. Square is trying to explain his world to, us, the readers of this book.

Moreover when Sphere from Spaceland enters his Flatland, it appears as a perfect circle of varying size. A. Square, instructed by Sphere is taken outside his flat world and given a view of Flatland from within Spaceland. Then things that were unexplainable before, becomes obvious: how Sphere can see

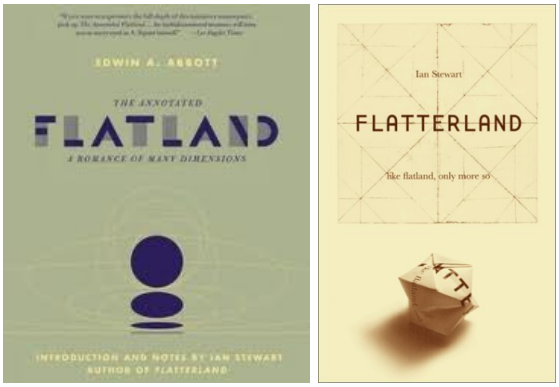
the complete house in Flatland, and take something out of the closet without opening a door. In fact since houses in Flatland only have walls (i.e., lines), even though they call the two northern sides of the house a roof, the house has no roof in the third dimension, and so Sphere can see and enter everywhere. When A. Square is back, he tries to explain his three-dimensional insights but he is not understood by his cohabitants and eventually locked away for his theories. He writes this book in prison.



Flatland:the film & Flatland : the movie

Edwin A. Abbott (1838–1926) studied at the City School of London and got degrees from St. Johns College, in Cambridge. He graduated in Classics (first class honors), Mathematics (second class honors)[1] and Theology. He became headmaster of the City School of London. He wrote several books on literature and on theology but he is best known among a broader audience as the author of Flatland. The first edition appeared in 1884, and a second edition was printed shortly after. The current book contains this second edition. The original had an introduction which is added here as an epilogue, which seems a natural place to put it. Indeed, it was written by Abbott because there came some critique saying that a Flatlander cannot "see" in Flatland, since indeed perfectly flat things are in fact invisible, since they do not have any volume. With a pseudo scientific style Abbott argues that Flatland-items do have some "height" that they are not aware of and wouldn't know how to measure it anyway. Since the reader has to know Flatland to understand these comments, an epilogue is the proper place.

The subtitle of *Flatland* is *A romance of many dimensions*, and there are many dimensions indeed. Not only the mathematical satire, but also the a critique of the Victorian and the classical Greek societies. The parallels between true history and Flatland with its casts, its civil war about the Color Bill, etc., are very clearly explained by the editors W.F. Lindgren and T.F. Banchoff. Both of these are mathematicians, the first one at Slippery Rock University and the second at Browns. They add general comments about the mathematical aspects, but also about historical and philosophical aspects, and even on the meaning of English words and expressions as the language of Abbott is not exactly the same as what is used today. The original text is printed on the left page and the comments on the right page. The comments are mostly very helpful, but in my opinion they are sometimes a bit over the top. For example they explain the word "rhetoric" as "the art of using language to persuade or influence others". I believe this is known to readers of the 21st century, unless they hope it becomes a prescribed book in secondary schools.



Flatland edited by Ian Stewart and the sequel Flatterland

The editors are really specialists of Flatland and of Abbott. They also edited previous releases of *Flatland* and wrote papers and published books on related topics. Most appreciated are the appendices with a summary of the early reviews of *Flatland* (which triggered the preface by Abbott, mentioned above). There is also a chronology of Abbott's life. Not exactly a biography, but nonetheless good enough for this edition. They do include however what they call "a mathematical biography", some facts about the education of girls in Victorian England (females are teated in a politically very incorrect way in Flatland), and Abbott's obituary. This edition can be used as a study book in secondary school, but with suggestions for further reading and indexes, it can also be a starting point for a further thorough study of some of the aspect dealt with. But you may as well just want to enjoy the fantasy.

Flatland, like *Alice in Wonderland* has had a big influence on many generations and inspired many editions and authors of sequels (e.g., *Flatterland: Like Flatland, only even more so* by Ian Stewart) and moviemakers (*Flatland: the film* by Ladd Ehlinger Jr., a computer animation (2007)).

Adhemar Bultheel

[1] Lewis Carroll studied in Oxford and got first class honors in mathematics and second class honors in classics.