

Flatland

Flatland: A Romance of Many Dimensions is a satirical novella by the English schoolmaster Edwin Abbott Abbott, first published in 1884 by Seeley & Co. of London. Written pseudonymously by "A Square",^[1] the book used the fictional two-dimensional world of Flatland to comment on the hierarchy of Victorian culture, but the novella's more enduring contribution is its examination of dimensions.^[2]

Several films have been made from the story, including the feature film *Flatland* (2007). Other efforts have been short or experimental films, including one narrated by Dudley Moore and the short films *Flatland: The Movie* (2007) and *Flatland 2: Sphereland* (2012).^[3]

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Plot

The story describes a two-dimensional world occupied by geometric figures, wherein women are simple line-segments, while men are polygons with various numbers of sides. The narrator is a square, a member of the caste of gentlemen and professionals, who guides the readers through some of the implications of life in two dimensions. The first half of the story goes through the practicalities of existing in a two-dimensional universe as well as a history leading up to the year 1999 on the eve of the 3rd Millennium.

On New Year's Eve, the Square dreams about a visit to a one-dimensional world (Lineland) inhabited by "lustrous points". These points are unable to see the Square as anything other than a set of points on a line. Thus, the Square attempts to convince the realm's monarch of a second dimension, but is unable to do so. In the end, the monarch of Lineland tries to kill the Square rather than tolerate his nonsense any further.

Following this vision, he is himself visited by a three-dimensional sphere. Similar to the "points" in Lineland, the Square is unable to see the sphere as anything other than a circle. The Sphere then levitates up and down through the Flatland, allowing Square to see the circle expand and contract. The Square is not fully convinced until he sees Spaceland (a tridimensional world) for himself. This Sphere visits Flatland at the turn of each millennium to introduce a new apostle to the idea of a third dimension in the hope of eventually educating the population of Flatland. From the safety of Spaceland, they are able to observe the leaders of Flatland secretly acknowledging the existence of the Sphere and prescribing on the silencing. After this proclamation is made, many witnesses are massacred or imprisoned (according to caste), including the Square's brother.

After the Square's mind is opened to new dimensions, he tries to convince the Sphere of the theoretical possibility of the existence of a fourth and higher spatial dimensions, but the Sphere returns his student to Flatland in disgrace.

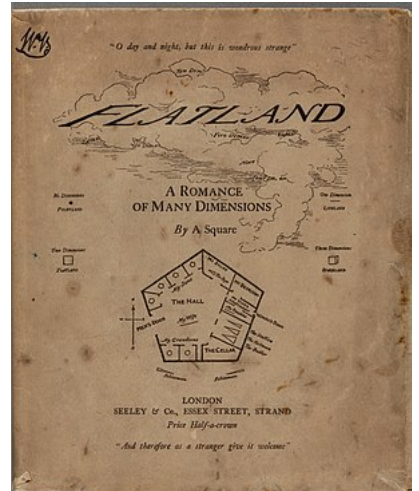
The Square then has a dream in which the Sphere visits him again, this time to introduce him to Pointland, whereof the Point (sole inhabitant, monarch, and universe in one) perceives any communication as a thought originating in his own mind (cf. Solipsism):

"You see," said my Teacher, "how little your words have done. So far as the Monarch understands them at all, he accepts them as his own – for he cannot conceive of any other except himself – and plumes himself upon the variety of *Its Thought* as an instance of creative Power. Let us leave this god of Pointland to the ignorant fruition of his omnipresence and omniscience: nothing that you or I can do can rescue him from his self-satisfaction."^[4]

— the Sphere

The Square recognises the identity of the ignorance of the monarchs of Pointland and Lineland with his own (and the Sphere's) previous ignorance of the existence of higher dimensions. Once returned to Flatland, the Square cannot convince anyone of

Flatland: A Romance of Many Dimensions



The cover to *Flatland*, first edition

Author	<u>Edwin A. Abbott</u>
Illustrator	Edwin A. Abbott
Country	<u>England</u>
Genre	<u>Mathematical fiction</u>
Publisher	<u>Seeley & Co.</u>
Publication date	1884
Pages	96
OCLC	<u>2306280 (https://www.worldcat.org/oclc/2306280)</u>
LC Class	QA699
Text	<u><i>Flatland: A Romance of Many Dimensions</i> at Wikisource</u>

Spaceland's existence, especially after official decrees are announced that anyone preaching the existence of three dimensions will be imprisoned (or executed, depending on caste). Eventually the Square himself is imprisoned for just this reason, with only occasional contact with his brother who is imprisoned in the same facility. He does not manage to convince his brother, even after all they have both seen. Seven years after being imprisoned, A Square writes out the book *Flatland* in the form of a memoir, hoping to keep it as posterity for a future generation that can see beyond their two-dimensional existence.

Social elements

Men are portrayed as polygons whose social status is determined by their regularity and the number of their sides, with a Circle considered the "perfect" shape. On the other hand, women consist only of lines and are required by law to sound a "peace-cry" as they walk, lest they be mistaken face-to-face for a point. The Square gives accounts of cases where women have accidentally or deliberately stabbed men to death, as evidence of the need for separate doors for women and men in buildings.

In the world of Flatland, classes are distinguished by the "Art of Hearing", the "Art of Feeling", and the "Art of Sight Recognition". Classes can be distinguished by the sound of one's voice, but the lower classes have more developed vocal organs, enabling them to feign the voice of a Polygon or even a Circle. Feeling, practised by the lower classes and women, determines the configuration of a person by feeling one of its angles. The "Art of Sight Recognition", practised by the upper classes, is aided by "Fog", which allows an observer to determine the depth of an object. With this, polygons with sharp angles relative to the observer will fade more rapidly than polygons with more gradual angles. Colour of any kind is banned in Flatland after Isosceles workers painted themselves to impersonate noble Polygons. The Square describes these events, and the ensuing class war at length.

The population of Flatland can "evolve" through the "Law of Nature", which states: "a male child shall have one more side than his father, so that each generation shall rise (as a rule) one step in the scale of development and nobility. Thus the son of a Square is a Pentagon, the son of a Pentagon, a Hexagon; and so on".

This rule is not the case when dealing with Isosceles Triangles (Soldiers and Workmen) with only two congruent sides. The smallest angle of an Isosceles Triangle gains 30 arc minutes (half a degree) each generation. Additionally, the rule does not seem to apply to many-sided Polygons. For example, the sons of several hundred-sided Polygons will often develop 50 or more sides more than their parents. Furthermore, the angle of an Isosceles Triangle or the number of sides of a (regular) Polygon may be altered during life by deeds or surgical adjustments.

An Equilateral Triangle is a member of the craftsman class. Squares and Pentagons are the "gentlemen" class, as doctors, lawyers, and other professions. Hexagons are the lowest rank of nobility, all the way up to (near) Circles, who make up the priest class. The higher-order Polygons have much less of a chance of producing sons, preventing Flatland from being overcrowded with noblemen.

Apart from Isosceles Triangles, only regular Polygons are considered until chapter seven of the book when the issue of irregularity, or physical deformity is brought up. In a two-dimensional world, a regular polygon can be identified by a single angle and/or vertex. To maintain social cohesion, irregularity is to be abhorred, with moral irregularity and criminality cited, "by some" (in the book), as inevitable additional deformities, a sentiment with which the Square concurs. If the error of deviation is above a stated amount, the irregular Polygon faces euthanasia; if below, he becomes the lowest rank of civil servant. An irregular Polygon is not destroyed at birth, but allowed to develop to see if the irregularity can be "cured" or reduced. If the deformity remains, the irregular is "painlessly and mercifully consumed."^[5]

As social satire

In *Flatland*, Abbott describes a society rigidly divided into classes. Social ascent is the main aspiration of its inhabitants, apparently granted to everyone but strictly controlled by the top of the hierarchy. Freedom is despised and the laws are cruel. Innovators are imprisoned or suppressed. Members of lower classes who are intellectually valuable, and potential leaders of riots, are either killed or promoted to the higher classes. Every attempt for change is considered dangerous and harmful. This world is not prepared to receive "revelations from another world". The satirical part is mainly concentrated in the first part of the book, "This World", which describes Flatland. The main points of interest are the Victorian concept of women's roles in the society and in the class-based hierarchy of men.^[6] Abbott has been accused of misogyny due to his portrait of women in *Flatland*. In his Preface to the Second and Revised Edition, 1884, he answers such critics by emphasizing that the description of women was satirizing the viewpoints held, stating that the Square:

was writing as a Historian, he has identified himself (perhaps too closely) with the views generally adopted by Flatland and (as he has been informed) even by Spaceland, Historians; in whose pages (until very recent times) the destinies of Women and of the masses of mankind have seldom been deemed worthy of mention and never of careful consideration.

— the Editor

Critical reception

Although *Flatland* was not ignored when it was published,^[7] it did not obtain a great success. In the entry on Edwin Abbott in the *Dictionary of National Biography* for persons who died in the period of 1922 to 1930, *Flatland* was not even mentioned.^[2]

The book was discovered again after Albert Einstein's general theory of relativity was published, which brought to prominence the concept of a fourth dimension. *Flatland* was mentioned in a letter entitled "Euclid, Newton and Einstein" published in *Nature* on 12 February 1920. In this letter, Abbott is depicted, in a sense, as a prophet due to his intuition of the importance of *time* to explain

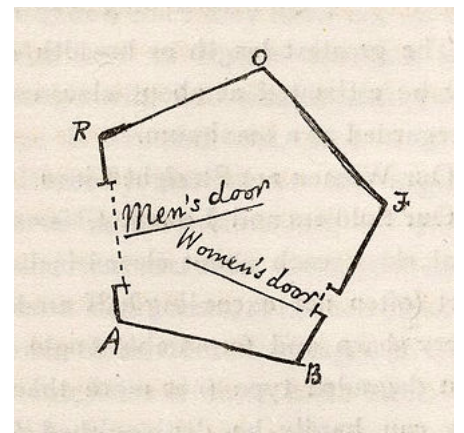


Illustration of a simple house in Flatland.



The last sketch in the book.

certain phenomena:^{[8][9]}

Some thirty or more years ago a little *jeu d'esprit* was written by Dr. Edwin Abbott entitled *Flatland*. At the time of its publication it did not attract as much attention as it deserved... If there is motion of our three-dimensional space relative to the fourth dimension, all the changes we experience and assign to the flow of time will be due simply to this movement, the whole of the future as well as the past always existing in the fourth dimension.

— from a "Letter to the Editor" by William Garnett. in *Nature* on February 12, 1920.

The *Oxford Dictionary of National Biography* subsequently revised his biography, and as of 2020 it states that [Abbott] "is most remembered as the author of *Flatland: a Romance of Many Dimensions*".

Adaptations and parodies

Numerous imitations or sequels to *Flatland* have been created. Examples include:

Films and TV

- *Flatland* (1965), an animated short film based on the novella, was directed by Eric Martin and based on an idea by John Hubley.^{[10][11][12]}
- *Flatlandia* (1982), an Italian animated short film, directed by Michele Emmer.^[13]
- *Flatland* (2007), a 98-minute animated independent feature film version directed by Ladd Ehlinger Jr., updates the satire from Victorian England to the modern-day United States.^[14]
- *Flatland: The Movie* (2007), by Dano Johnson and Jeffrey Travis,^[15] is a 34-minute animated educational film.^[16] Its sequel was *Flatland 2: Sphereland* (2012), inspired by the novel *Sphereland* by Dionys Burger.^{[17][18][19]}
- In the *Star Trek: The Next Generation* episode "The Loss", the *USS Enterprise-D* becomes trapped within a field of two-dimensional lifeforms.^[20]

Literature

Books and short stories inspired by *Flatland* include:

- *An Episode on Flatland: Or How a Plain Folk Discovered the Third Dimension* by Charles Howard Hinton (1907)
- *The Dot and the Line: A Romance in Lower Mathematics* by Norton Juster (1963)
- *Sphereland* by Dionys Burger (1965)
- *The Incredible Umbrella* by Marvin Kaye (1980)
- "Message Found in a Copy of *Flatland*" by Rudy Rucker (1983)
- *The Planiverse* by A. K. Dewdney (1984)
- *Flatterland* by Ian Stewart (2001)
- *Spaceland* by Rudy Rucker (2002)
- *VAS: An Opera in Flatland* (2002) by Steve Tomasula, which uses the two-dimensional world to critique contemporary society^[21]

In popular culture

- Physicists and science popularizers Carl Sagan and Stephen Hawking have both commented on and postulated about the effects of *Flatland*. Sagan recreates the thought experiment as a set-up to discussing the possibilities of higher dimensions of the physical universe in both the book and television series *Cosmos*,^[22] whereas Hawking notes the peculiarity of life in two-dimensional space, as any inhabitants would necessarily be unable to digest their own food. (This concept is parodied in the below-described episode of *Futurama*. The protagonists attempt to eat Flatland food but it falls out immediately. The native organisms in Flatland absorb food somewhat like amoeba.)^[23]
- In the "2-D Blacktop" episode of the animated science fiction TV comedy series *Futurama* (season 7, episode 15, originally broadcast June 19, 2013), two spaceships moving at relativistic speeds crash head on and are compressed together into a flat disk. They meet natives of the realm, who chase after them when the concept of a third dimension is brought up.^[24]
- In David Foster Wallace's novel *Infinite Jest* (1996), it is briefly mentioned that students from the Enfield Tennis Academy could be seen studying and highlighting copies of *Flatland* on the bus.^[25]
- *Flatland* features in *The Big Bang Theory* episode "The Psychic Vortex",^[26] when Sheldon Cooper declares it one of his favourite imaginary places to visit.^[27]
- On the series *The Orville*, episode "New Dimensions", after entering a region of two-dimensional space Captain Ed Mercer references Flatland and its theme of social hierarchy.^[28]
- In the *Sons of Anarchy* episode "Straw," Clay Morrow is lounging on a cot in a private cell in county jail when he first meets retired U.S. Marshal Lee Toric. Morrow half-ignores Toric while keeping his eyes on a copy of *Flatland*.

See also

- *The Dot and the Line*
- Fourth dimension in literature
- *Gödel, Escher, Bach*

- [Sphere-world](#)
- [The Planiverse](#)

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External links

- "Sci-Fri Bookclub" (<https://www.npr.org/2012/09/21/161551778/the-scfri-book-club-visits-flatland>)—recording of National Public Radio discussion of *Flatland*, featuring mathematician Ian Stewart (21 September 2012)

Online and downloadable versions of the text


eBooks

- *Flatland, a Romance of Many Dimensions (first edition)* on Wikisource
- *Flatland, a Romance of Many Dimensions (second edition)* on Wikisource
- *Flatland* (<https://standardebooks.org/ebooks/edwin-a-abbott/flatland>) at Standard Ebooks
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- *Flatland* (<https://gutenberg.org/ebooks/97>) at Project Gutenberg, text, no illustrations
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- *Flatland* (<https://gutenberg.org/ebooks/201>) at Project Gutenberg, with ASCII illustrations
- *Flatland* (<https://fadedpage.com/showbook.php?pid=20140519>) at Faded Page (Canada)
- *Flatland* (<https://archive.org/details/flatlandromanceo00abbouoft>), digitised copy of the first edition from the Internet Archive
- *Flatland* (Second Edition), Revised with original illustrations (<http://www.geom.uiuc.edu/~banchoff/Flatland/>) (HTML format, one page)
- *Flatland* (Fifth Edition), Revised, with original illustrations (<http://xahlee.org/wordy/flatland/index.html>) (HTML format, one

chapter per page)

- *Flatland* (Fifth Edition), Revised, with original illustrations (https://github.com/lvesvdf/flatland/blob/master/oneside_a4.pdf?raw=true) (PDF format, all pages, with LaTeX source on github (<https://github.com/lvesvdf/flatland>))
- *Flatland* (<http://manybooks.net/titles/abbottedetext95flat10a.html>) (illustrated version) on Manybooks
- *Flatland* (<https://openlibrary.org/works/OL118420W>) at Open Library

Recording

-  *Flatland: A Romance of Many Dimensions* (https://librivox.org/search?title=Flatland:+A+Romance+of+Many+Dimensions&author=Abbott&reader=&keywords=&genre_id=0&status=all&project_type=either&recorded_language=&sort_order=catalog_date&search_page=1&search_form=advanced) public domain audiobook at LibriVox

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