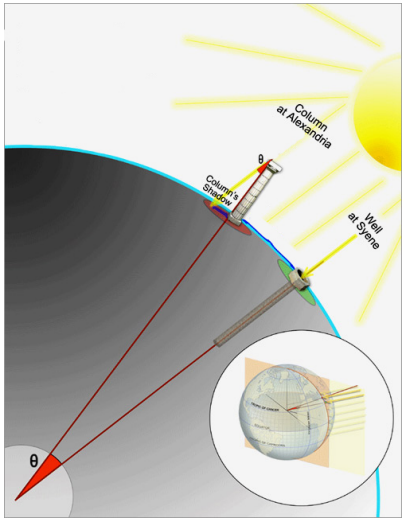
Of the following, what is the most compelling argument (to you) about ways we could know that the earth was round without modern technology?

a) The sun and moon are round so the earth should be (originally attributed to Pythagoras)
b) Ships disappearing on a clear day appear to sink in the horizon
c) Stars change as we change latitude and overlaps flip when we pass over the equator
d) Directions of hurricanes change from Northern to Southern Hemisphere (Coriolis force)
e) On midsummers day at noon, Syene (Aswan) made no shadows, while Alexandria did (Eratosthenes used this to calculate the circumference of the earth)

In Eratosthenes' experiments he found the light ray at Alexandria made an angle of 7.2°

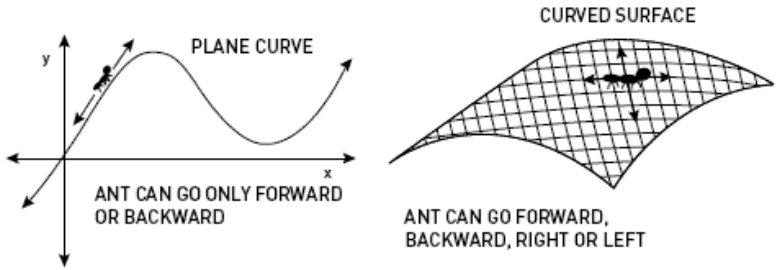


http://www.freewebtown.com/gr_math/mathimatikoi_astr/eratosthenes_of_cyrene_m.htm

(1) Select a different angle that is between 6.2° and 8.2° (i.e. $7.2° \pm 1$, like say there was a margin of error in experimentation) and list what angle you selected
(2) Set up the ratios, still using the 5000 stadia between the cities, and solve for the circumference
(3) Compute the difference between your circumference and the 250,000 stadia we obtained in class

Write your responses to **all three of these** on a board. If you work in a group, send one person up.

Cartoon, Anime or Video Game Dimensions



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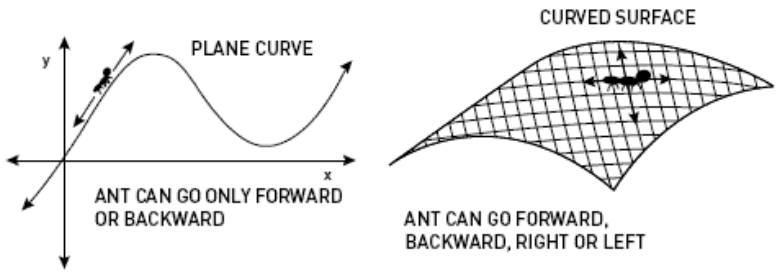
1D versus 2D: degrees of freedom of movement in space or efficient algebraic coordinates

Cartoon, Anime or Video Game Dimensions



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1D versus 2D: degrees of freedom of movement in space or efficient algebraic coordinates

Think of a cartoon, anime or video game or character and **answer all of the following** questions:

(1) What is the name of the cartoon, anime or video game or character?

(2) Apply our definition of dimension to their world (degrees of freedom of movement in space or efficient algebraic coordinates). What dimension do they live in?

(3) Explain how can you tell?

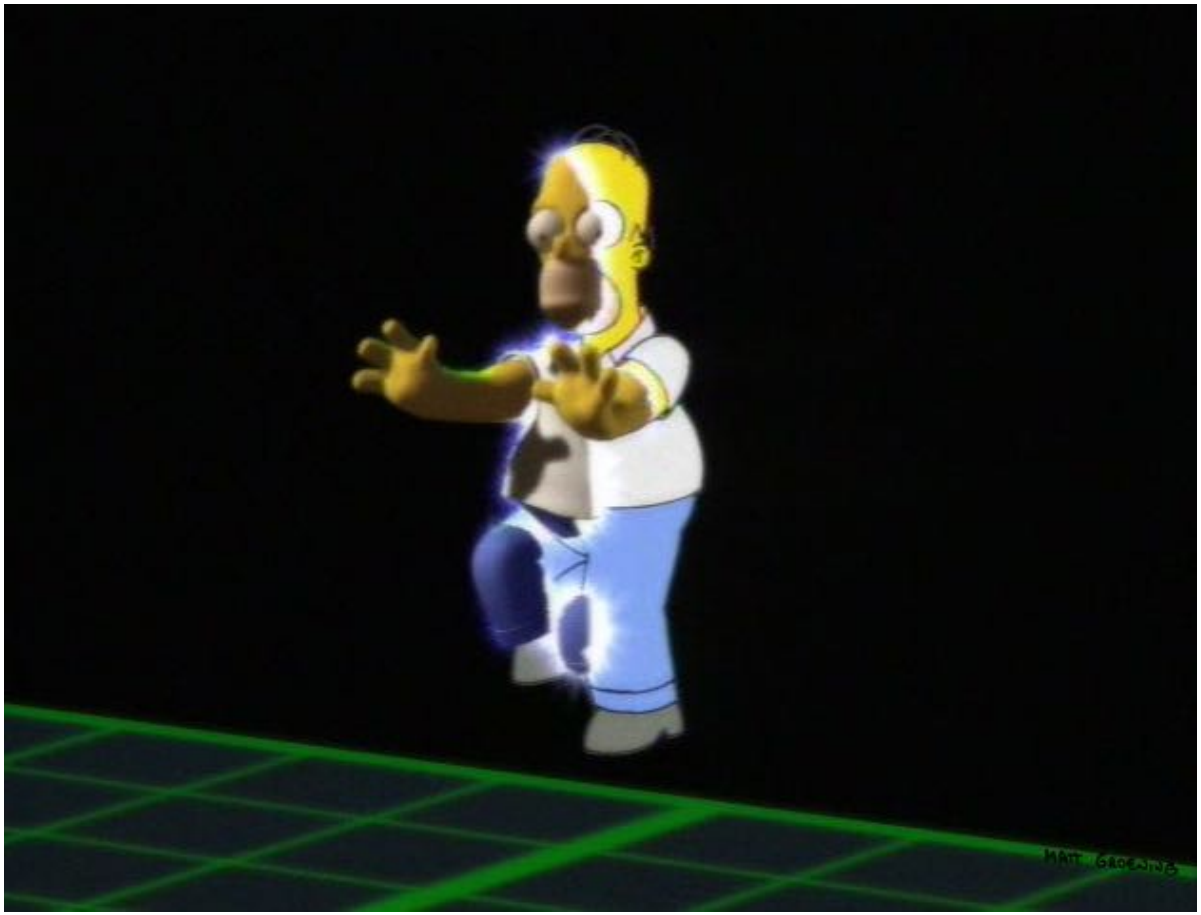
Homer^3

The Simpsons : Treehouse of Horror VI

Homer^3

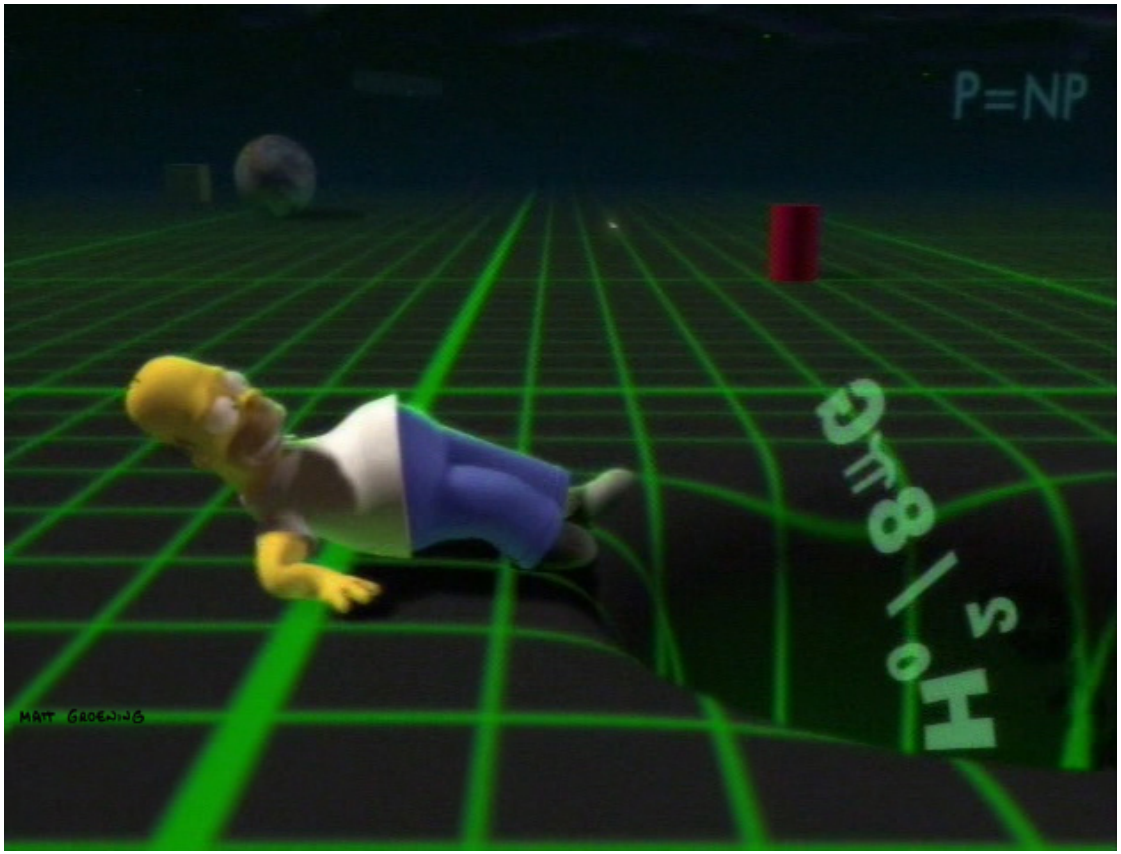
The Simpsons : Treehouse of Horror VI

Homer^3



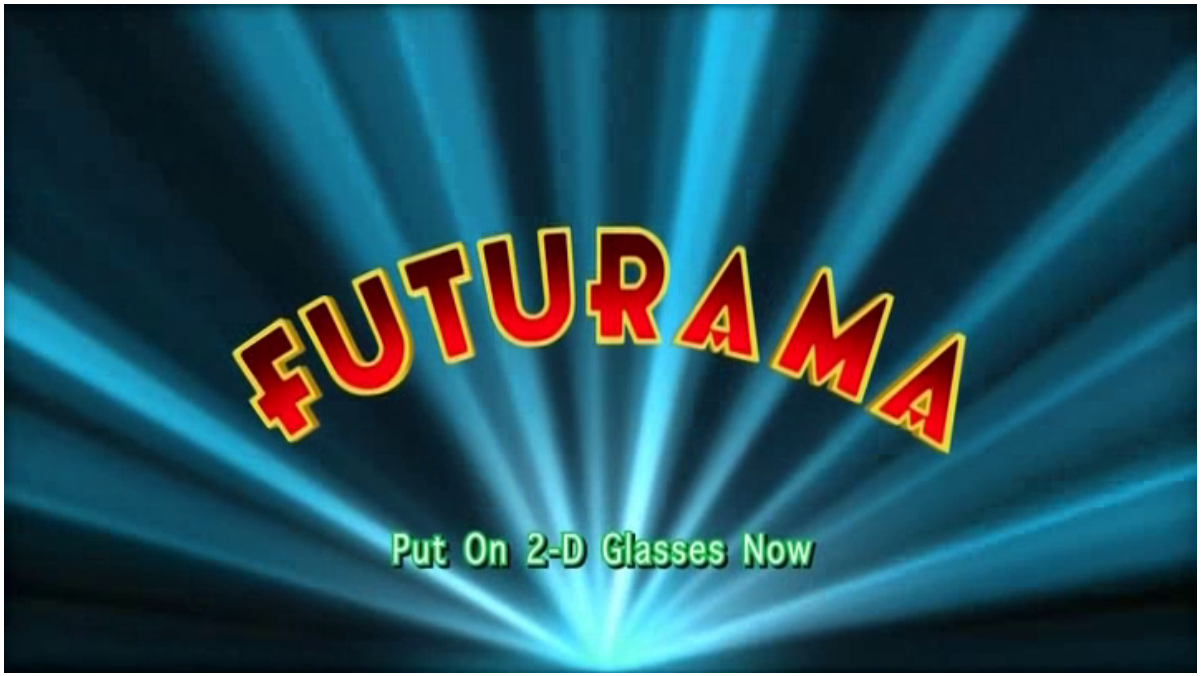
The Simpsons : Treehouse of Horror VI

Homer^3



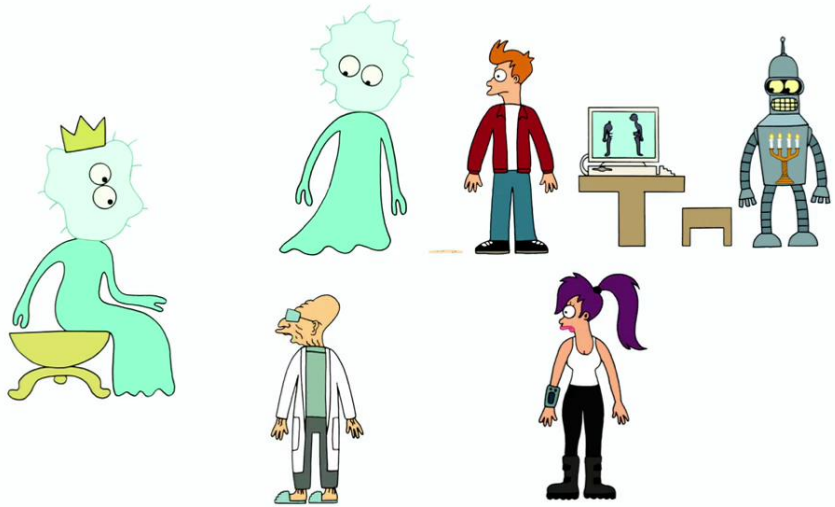
The Simpsons : Treehouse of Horror VI

Futurama Goes 2D



Futurama: 2-D Blacktop

Futurama Goes 2D



Futurama: 2-D Blacktop

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What is Straight on a Curved Surface?

symmetry!

locally, how do we know if we are on a curved space or flat Euclidean space? eqs like angle sum or Pythagorean theorem

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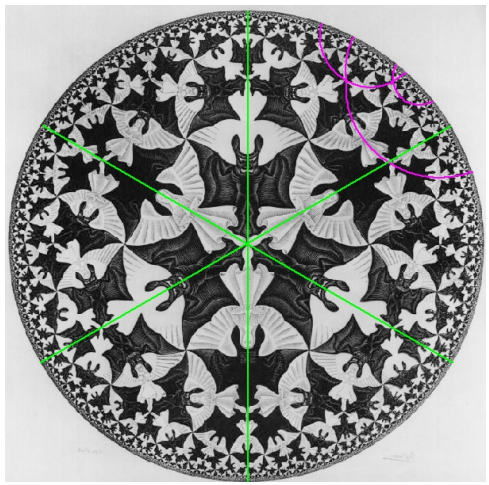


Dutch graphic artist M.C. Escher's Sphere Surface with Fish, 1958 and Circle Limit IV: Heaven and Hell, 1960;

Latvian/US mathematician Daina Taimina *Crocheting Adventures with Hyperbolic Planes*

Which quote from Escher do you find most interesting?

a) *The ideas... often bear witness to my amazement and wonder at the laws of nature which operate in the world around us... By keenly confronting the enigmas that surround us, and by considering and analyzing the observations that I had made, I ended up in the domain of mathematics* [The Graphic Work, 1954].

b) *At first I had no idea at all of the possibility of building up my figures. I did not know any "ground rules" and tried, almost without knowing what I was doing, to fit together congruent shapes that I attempted to give the form of animals. Gradually, designing new motifs became easier as a result of my study of the literature on the subject, as far as this was possible for someone untrained in mathematics, and especially as a result of my putting forward my own layman's theory, which forced me to think through the possibilities. It remains an extremely absorbing activity* [Regular Division of the Plane, 1958].

c) *The geometry of space translates to a reoccurring theme in my creations: the tessellation... had been considered solely in theory prior to me, some say. I diverged from traditional approaches, and chose instead to find solutions visually* [interview, January 17, 1971].

Latvian/US mathematician Daina Taimina *Crocheting Adventures with Hyperbolic Planes*

Geometry is about how you view space. Take charge of it—it's yours. Understand how you see things and how you imagine things. Geometry can say something about you and your universe.

In front matter of *Experiencing Geometry: Euclidean and Non-Euclidean with History*, fourth edition
by David W. Henderson and Daina Taimina

Summarize the parables/analogies in *Mathematics The Most Misunderstood Subject* by Robert H. Lewis

Ready for the big play

The considerate piano teacher

Confusion of education with training

Computers, mathematics, and the chagrinned diner

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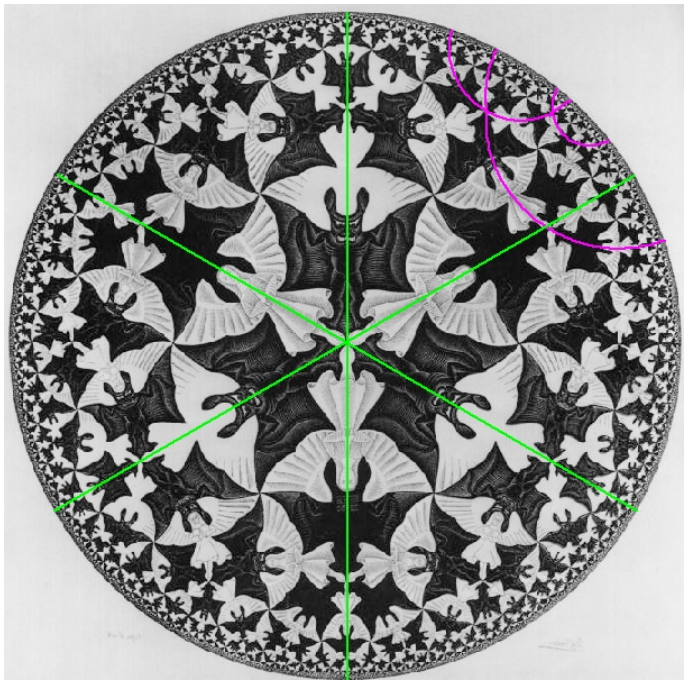
What does the author say about geometry?

- In flat Euclidean geometry of the infinite blackboard from high school, named for Euclid of Alexandria (˜325 BCE–265 BCE), what is the sum of the angles in a triangle? Why?
- In M.C. Escher's (1898-1972) *Circle Limit 4: Heaven and Hell* representation of hyperbolic geometry, what is the sum of the angles? Why?



Dutch graphic artist M.C. Escher's Circle Limit IV: Heaven and Hell, 1960, M.C. Escher self-portrait