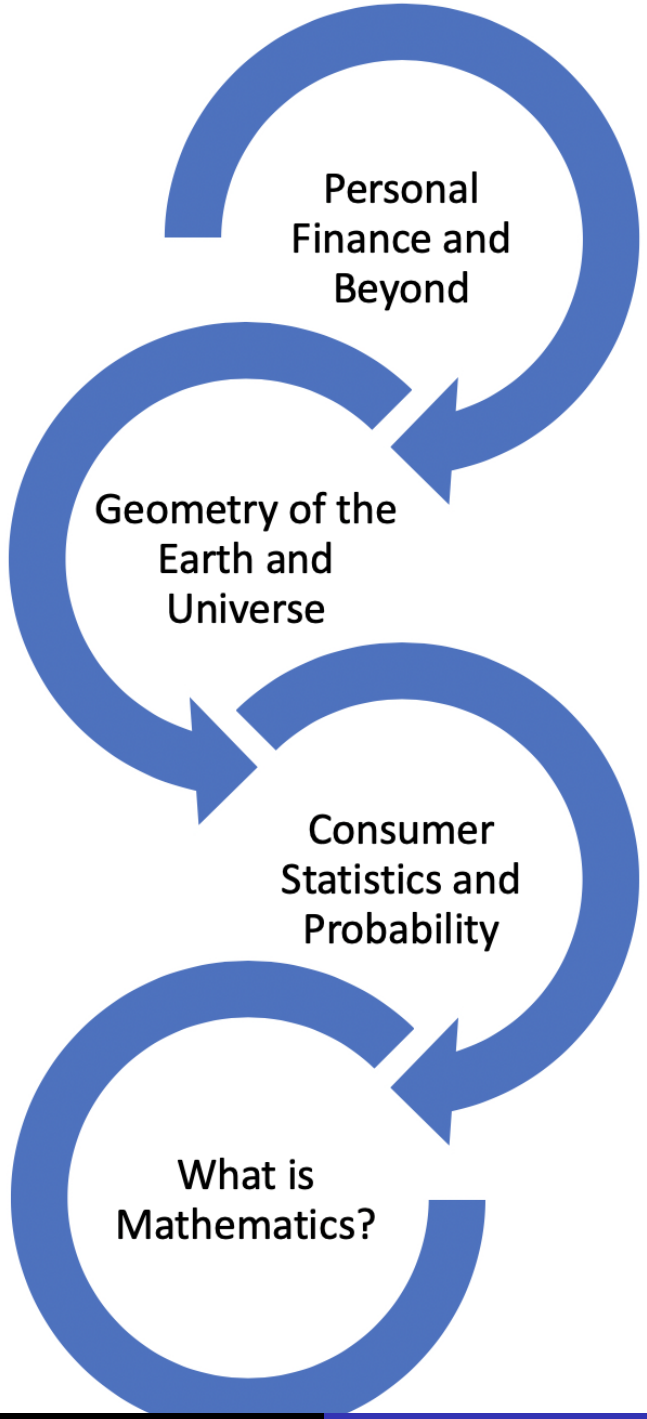
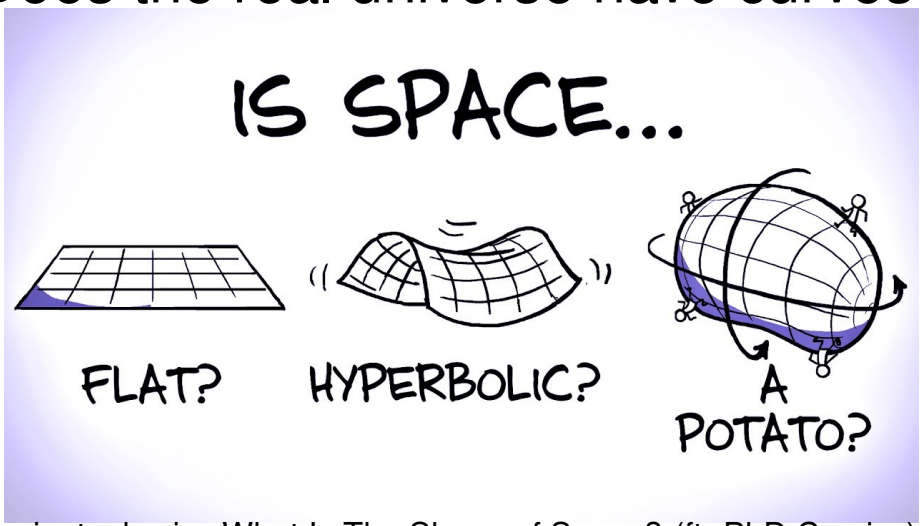

Personal Finance and Beyond
Geometry of the Earth and Universe
Consumer Statistics and Probability
What is Mathematics?

Geometry of the Earth and Universe

How we measure and view the world around us and decide what is the nature of reality: What does a geometric space look like, how do we know, and how do we represent it? Possibilities and real-world applications...

- diverse perspectives including local to global connections
- truth & consequences, the role of chance and probability
- ways that diverse people succeed in and impact mathematics
- what mathematics is & offers

Does the real universe have curves?



minutephysics What Is The Shape of Space? (ft. PhD Comics)
https://www.youtube.com/watch?v=oCK5oGmRtxQ/

Required Resources

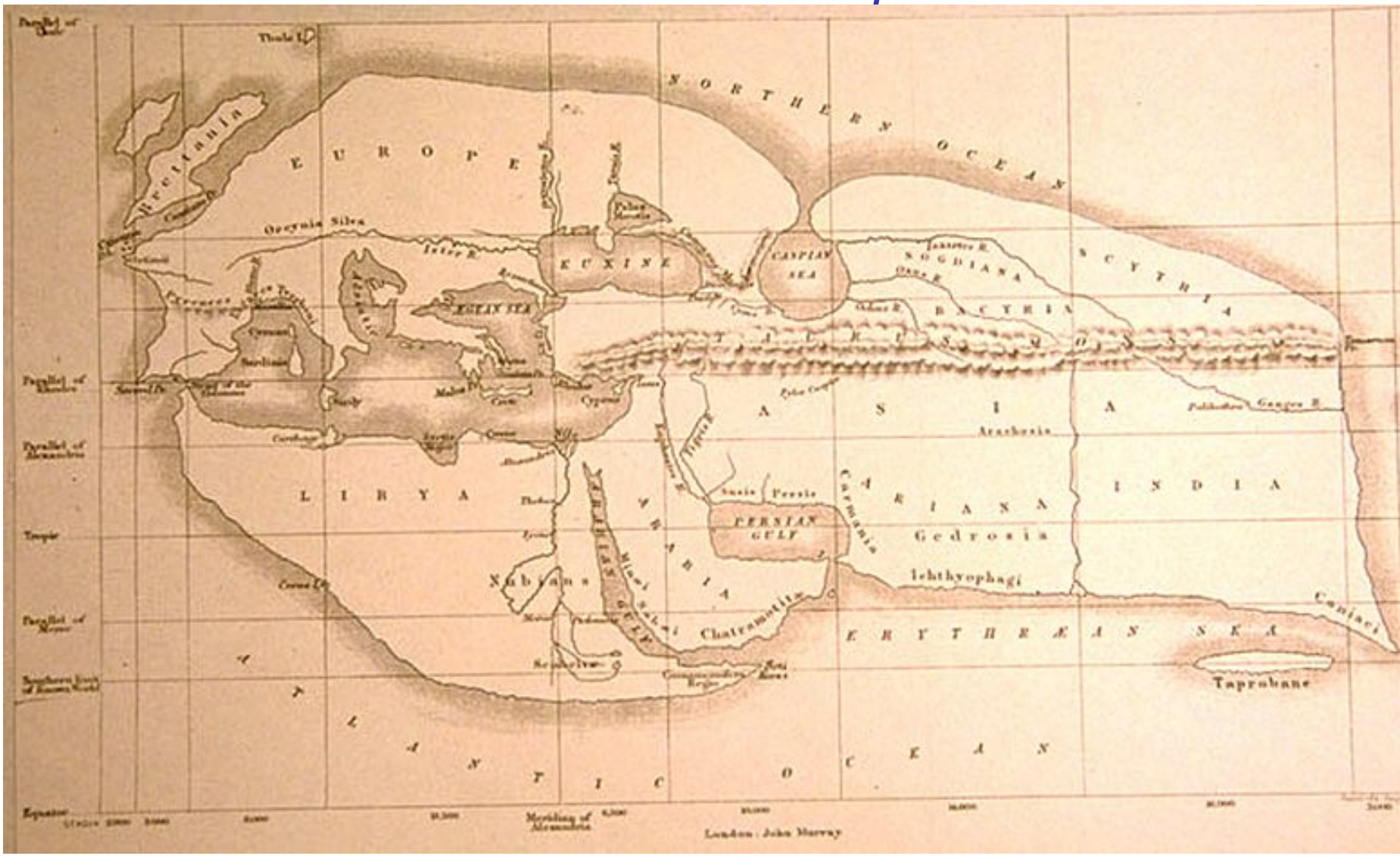
- **THoM**—*The Heart of Mathematics: An Invitation to Effective Thinking*by Edward Burger and Michael Starbird available for rental
- scientific calculator which can do powers (y^x or x^y or ^ symbol).
- printouts of your project and single PDFs scanned and created from your work on the handouts I give you
- **child's ball**—these are usually found in bins in stores and cost a couple of dollars. Be sure that this ball is smooth and that you will not mind writing on it. 10–12 inch diameter is ideal.
- reliable access to technology, software, and high speed connectivity

Discussion Question

How could we know that the earth is round without using modern technology from the 20th or 21st centuries?

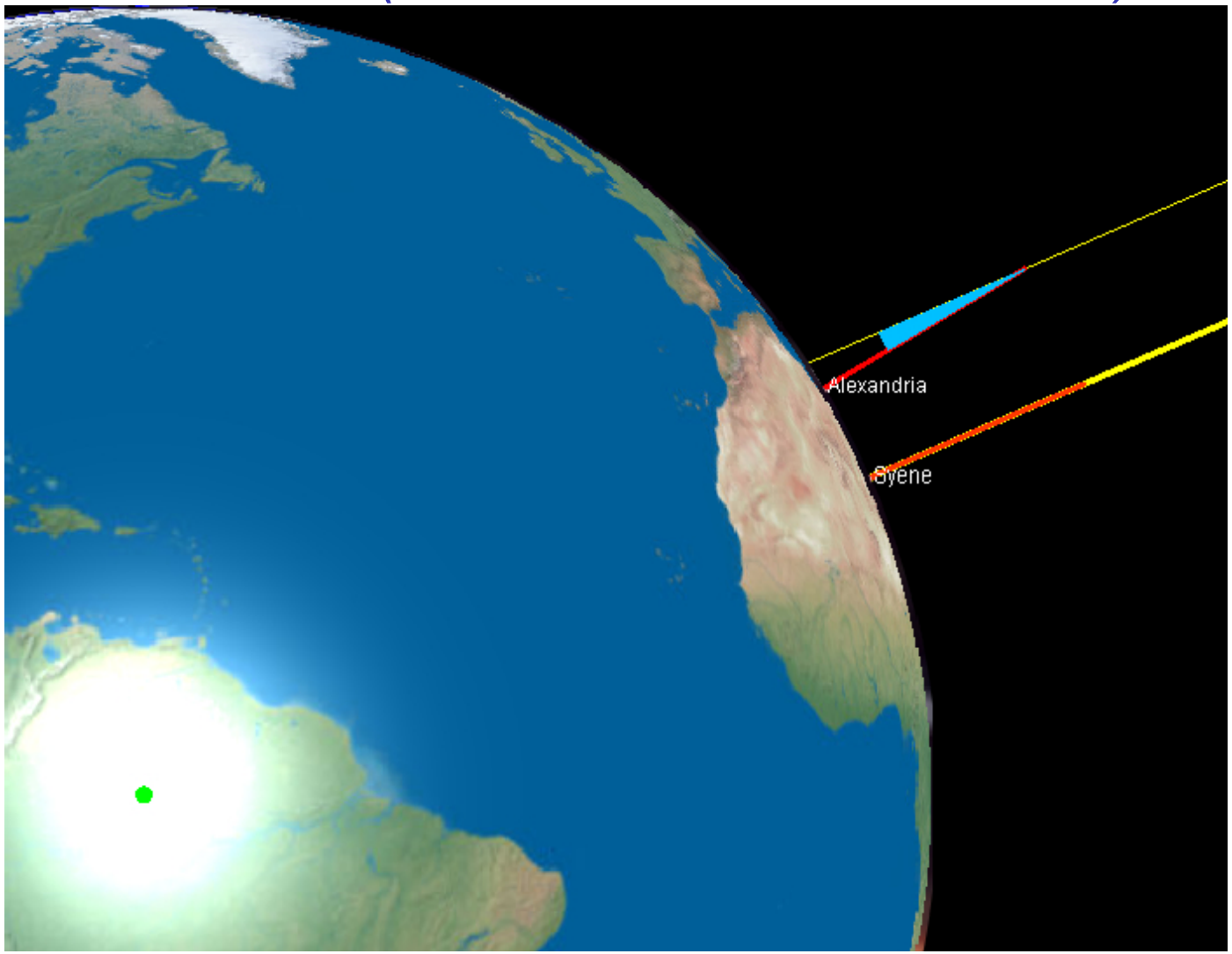
http://gstene.files.wordpress.com/2008/08/flat_earth.jpg

A View of the Earth—Once Upon a Time



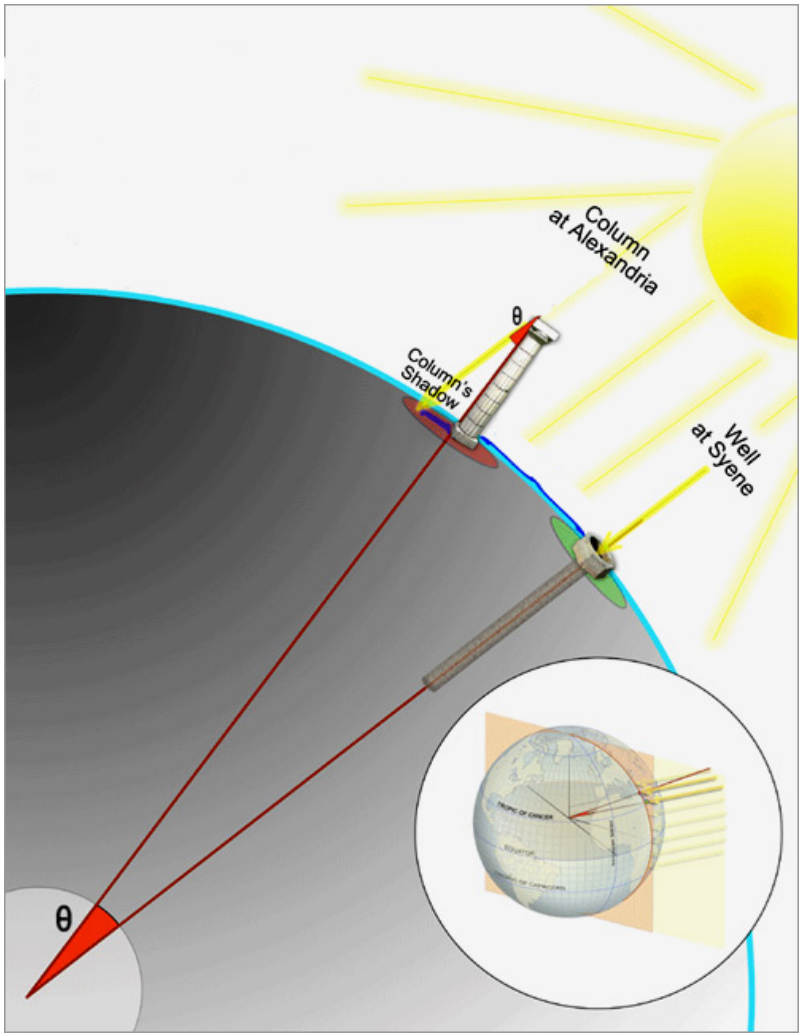
E.H. Bunbury

Eratosthenes' (~276 BCE – ~195 BCE) Data



http://weelookang.blogspot.sg/2012/06/ejs-open-source-eratosthenes-measures.html

Eratosthenes Thinks Big (Globally!)



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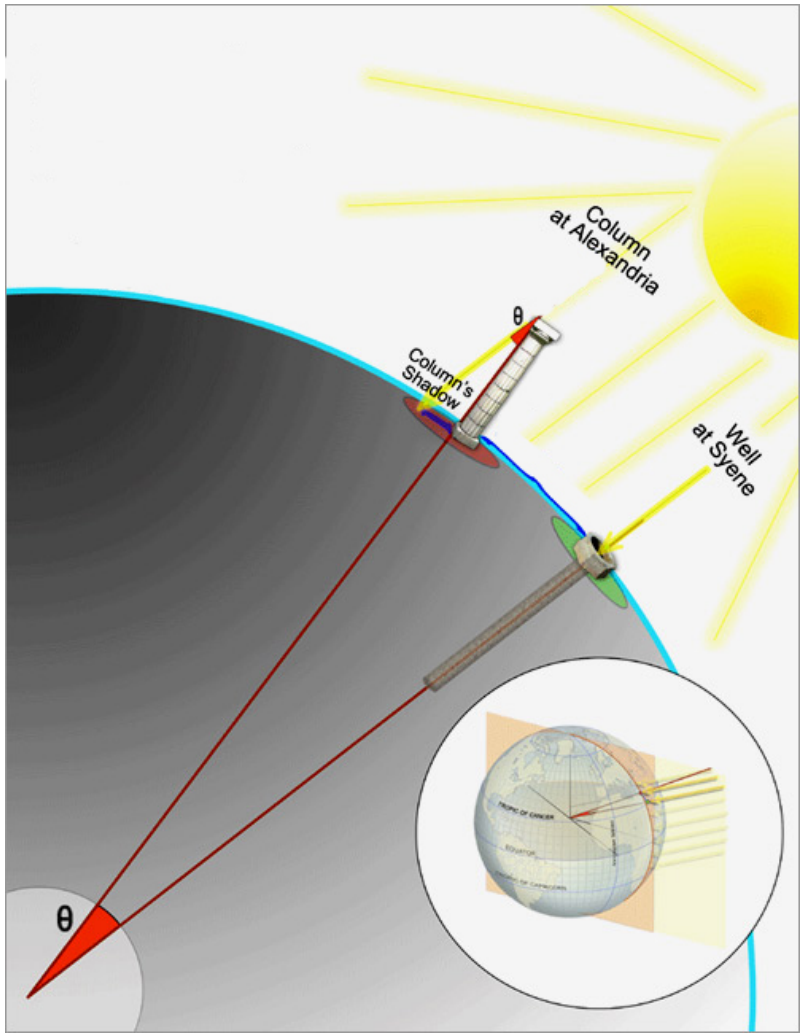

$$\frac{7.2^\circ}{360^\circ} = \frac{5000 \text{ stadia}}{\text{circumference}}$$

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

Local to Global: Multiple Perspectives

How could we know that the earth is round without using modern technology?

Geography
Philosophy
Physics & Astronomy
Mathematics
Navigation
Weather

Local to Global: Multiple Perspectives

How could we know that the earth is round without using modern technology?

Geography
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Physics & Astronomy
Mathematics
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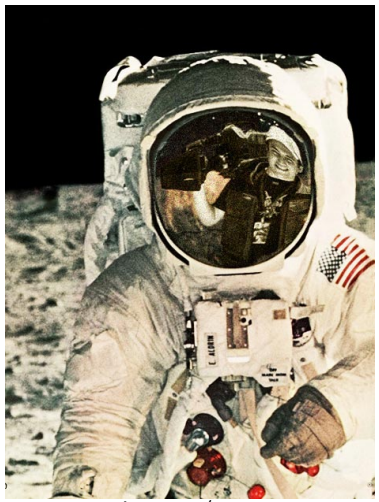
Weather

Still controversial? flat earth society (rapper BoB, NBA stars...)

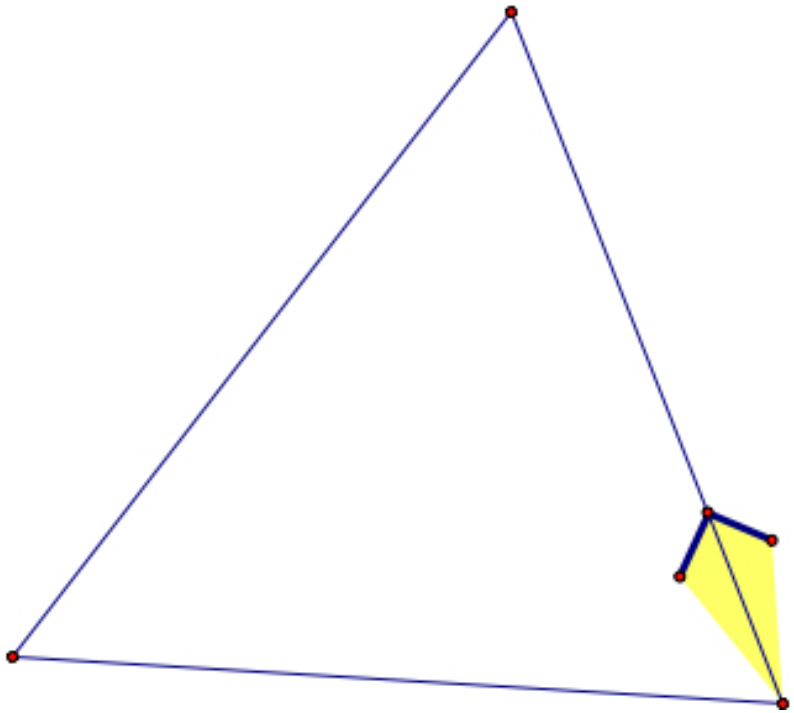


http://www.icis.com/blogs/asian-chemical-connections/FlatEarth.jpg
http://img.dailymail.co.uk/i/pix/2008/04_01/aprilfool60104_468x627.jpg

Geometry Flat Angle Sum = ?

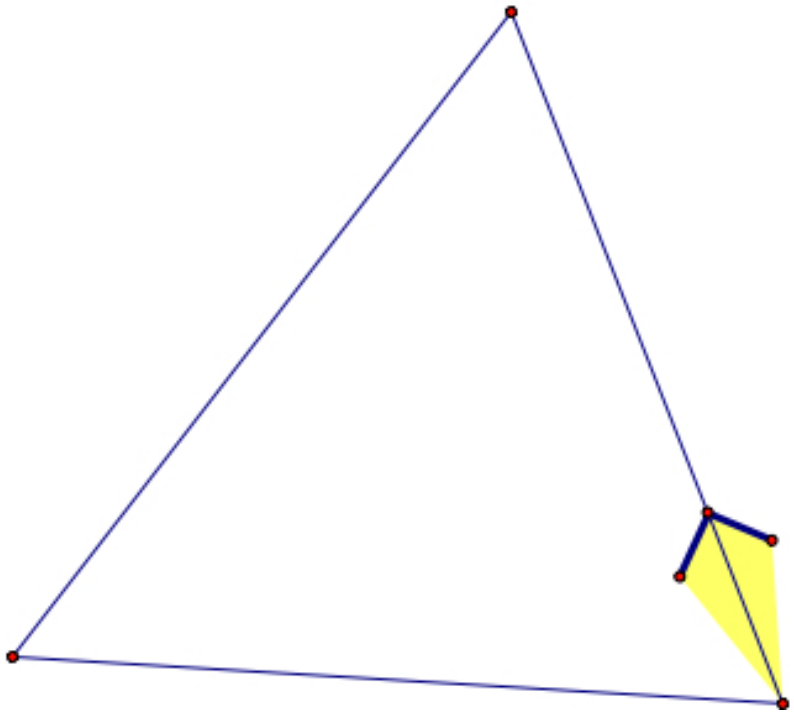
Geometry Flat Angle Sum = ?

Why/How do we know?



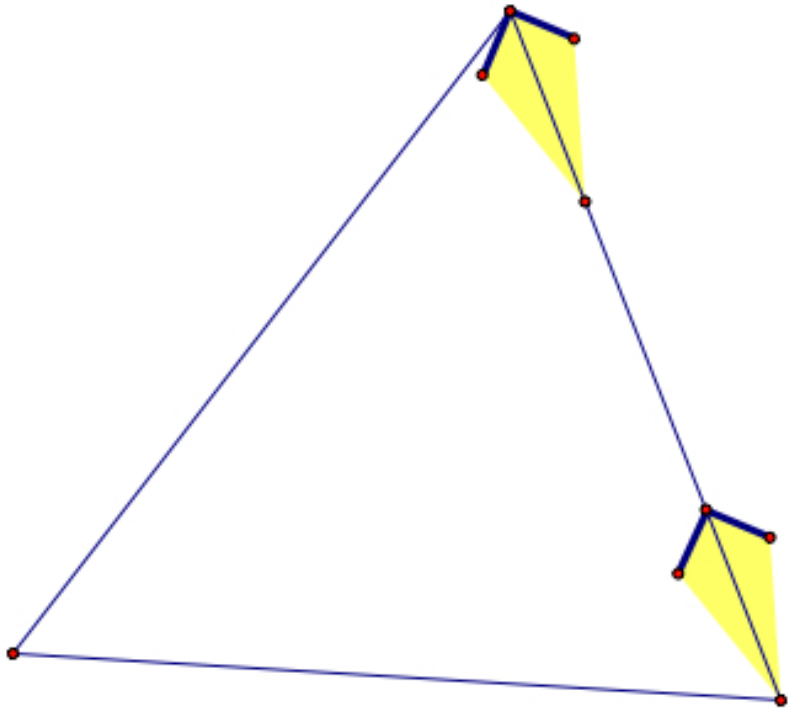
Walking a Euclidean Angle Sum

- Lay out a triangle with masking tape
- Pick a vertex to begin your triangle walk. Note the vertex and which way you are facing.



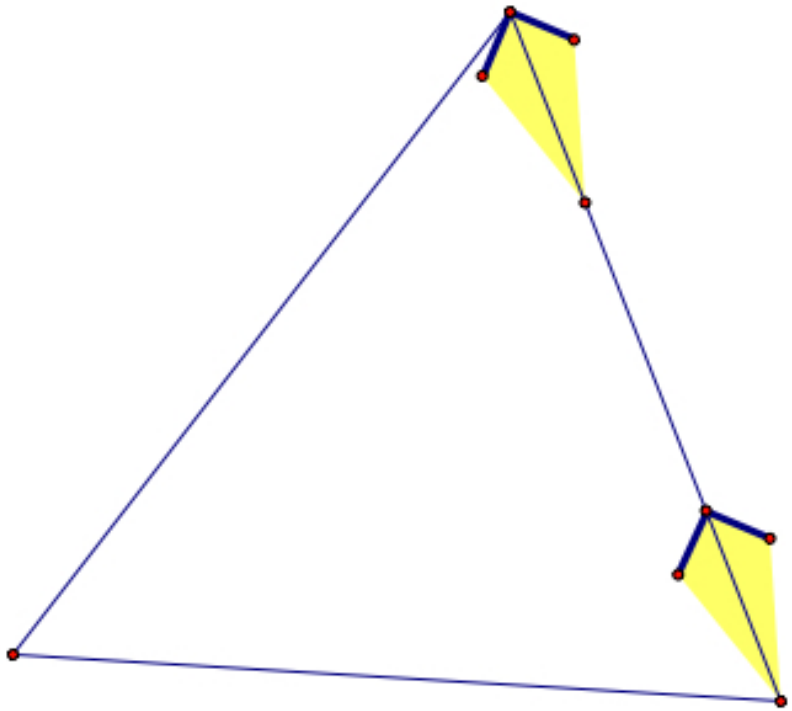
Walking a Euclidean Angle Sum

- Start walking along your triangle, keeping the center of your body on the boundary of the triangle.



Walking a Euclidean Angle Sum

- When you get to a turn (one of the angles of the triangle), turn your body so that it sweeps the interior angle of the triangle (careful!). You may be walking backwards for a time.



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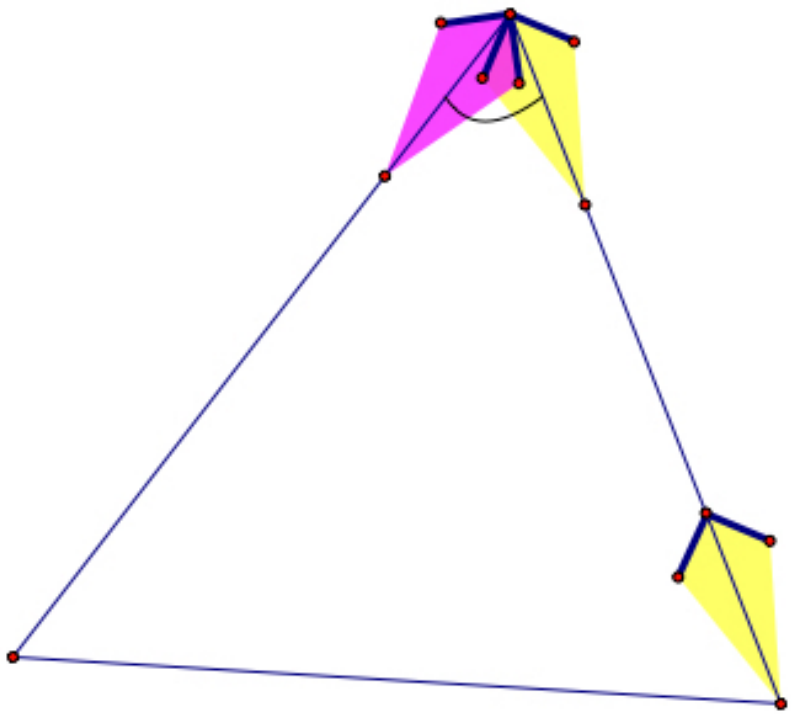

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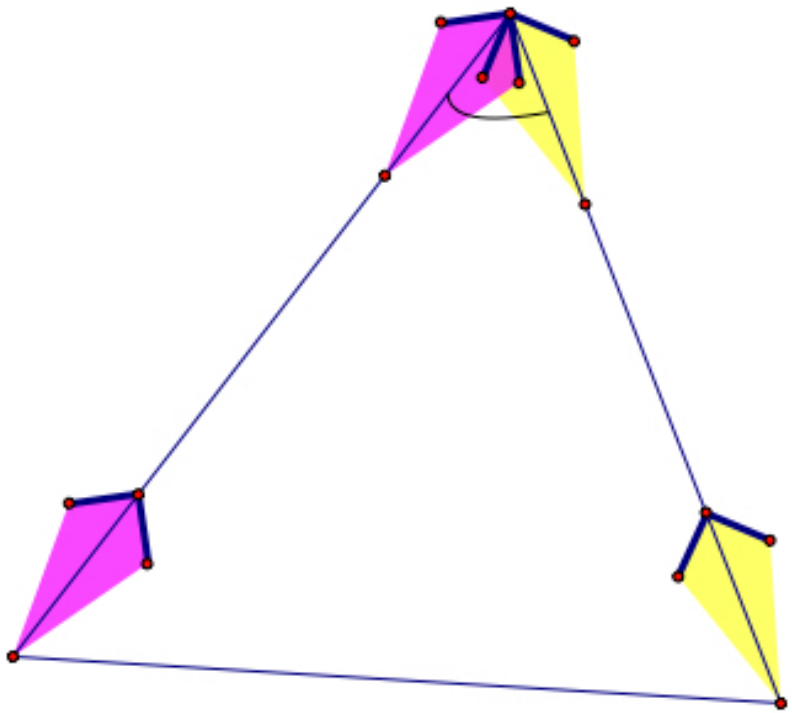

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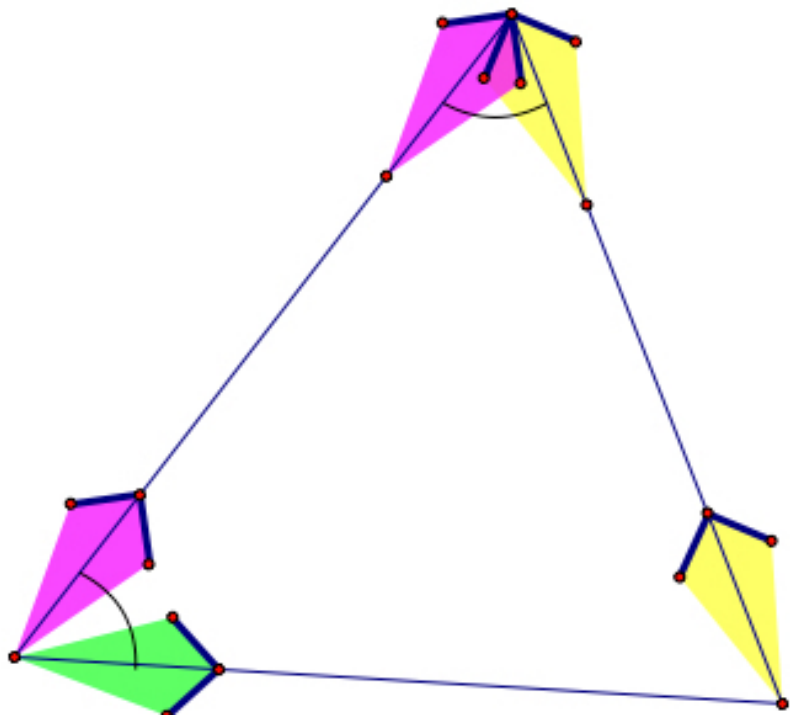

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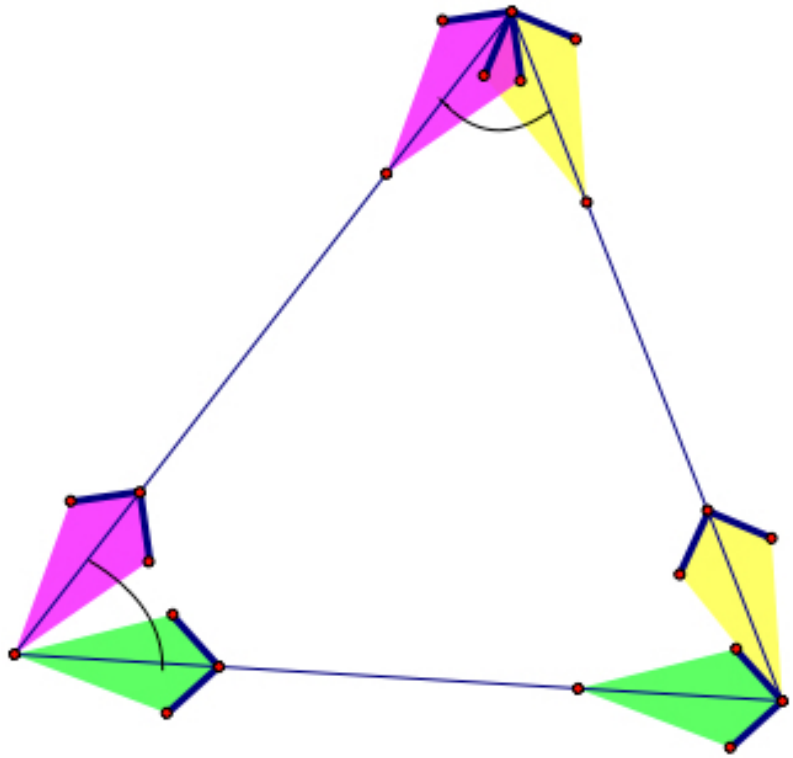
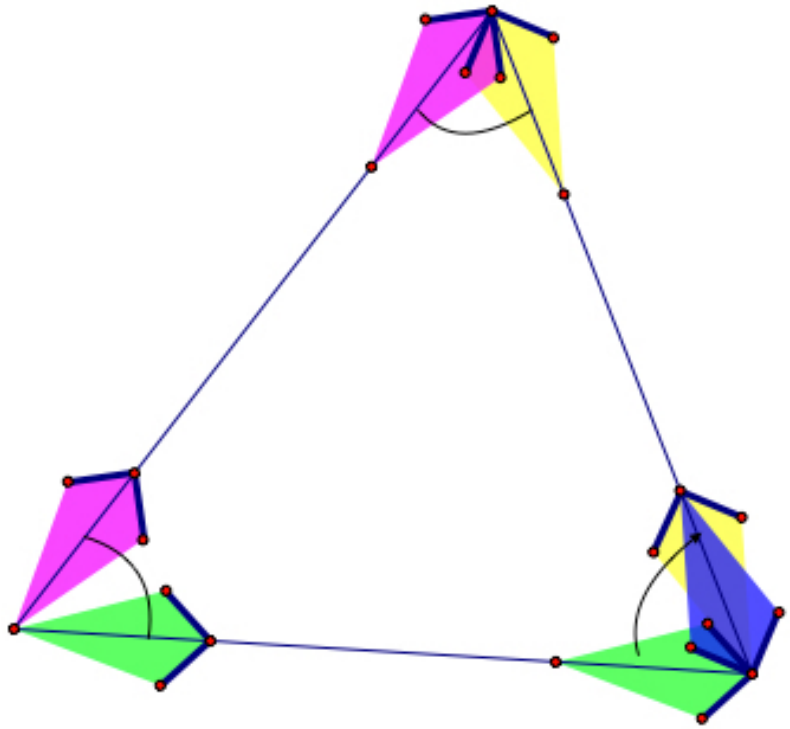


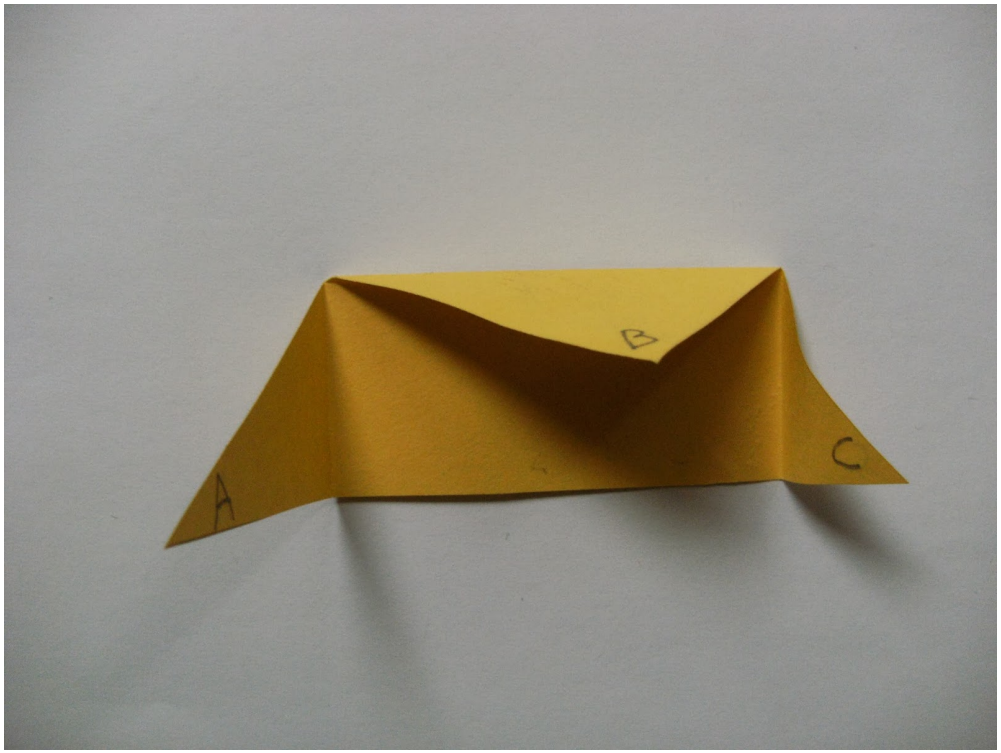
Walking a Euclidean Angle Sum Intrinsically

- Sweep out the last interior angle to finish your angle sum walk.
- The change in direction in your body from start to finish is the sum of the angles in this triangle.



Folding an Angle Sum Extrinsically

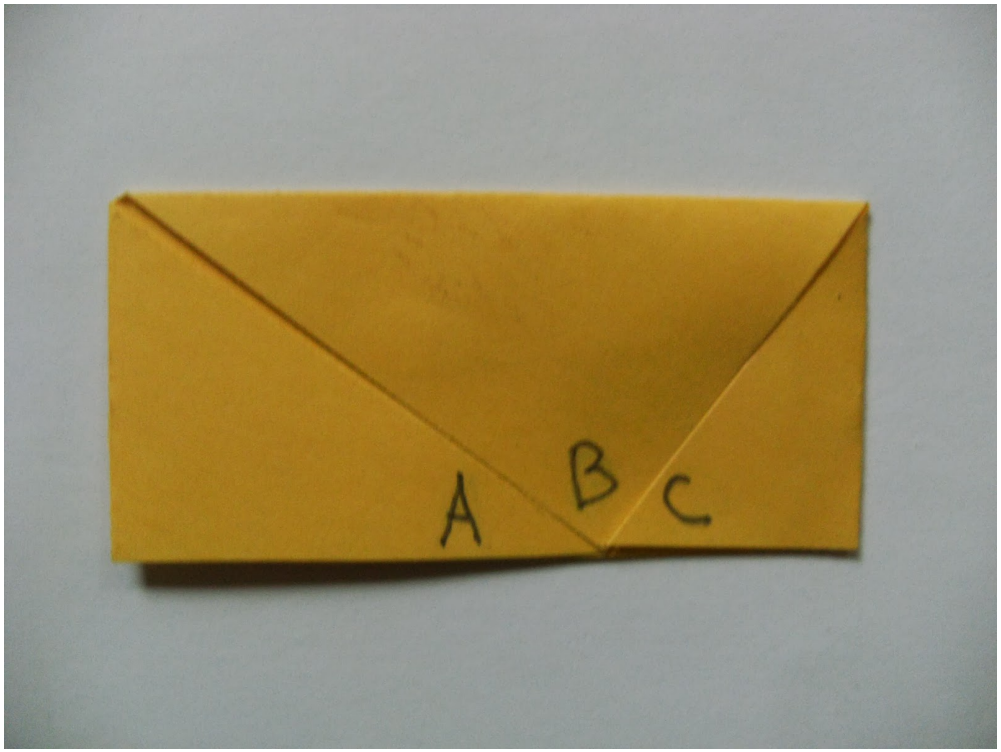
- Rip a triangle from paper.
- Fold one angle to bring it down to the base by using a fold parallel to the base.
- Fold the other angles in



http://mathonthemckenzie.blogspot.com/2013/12/180.html

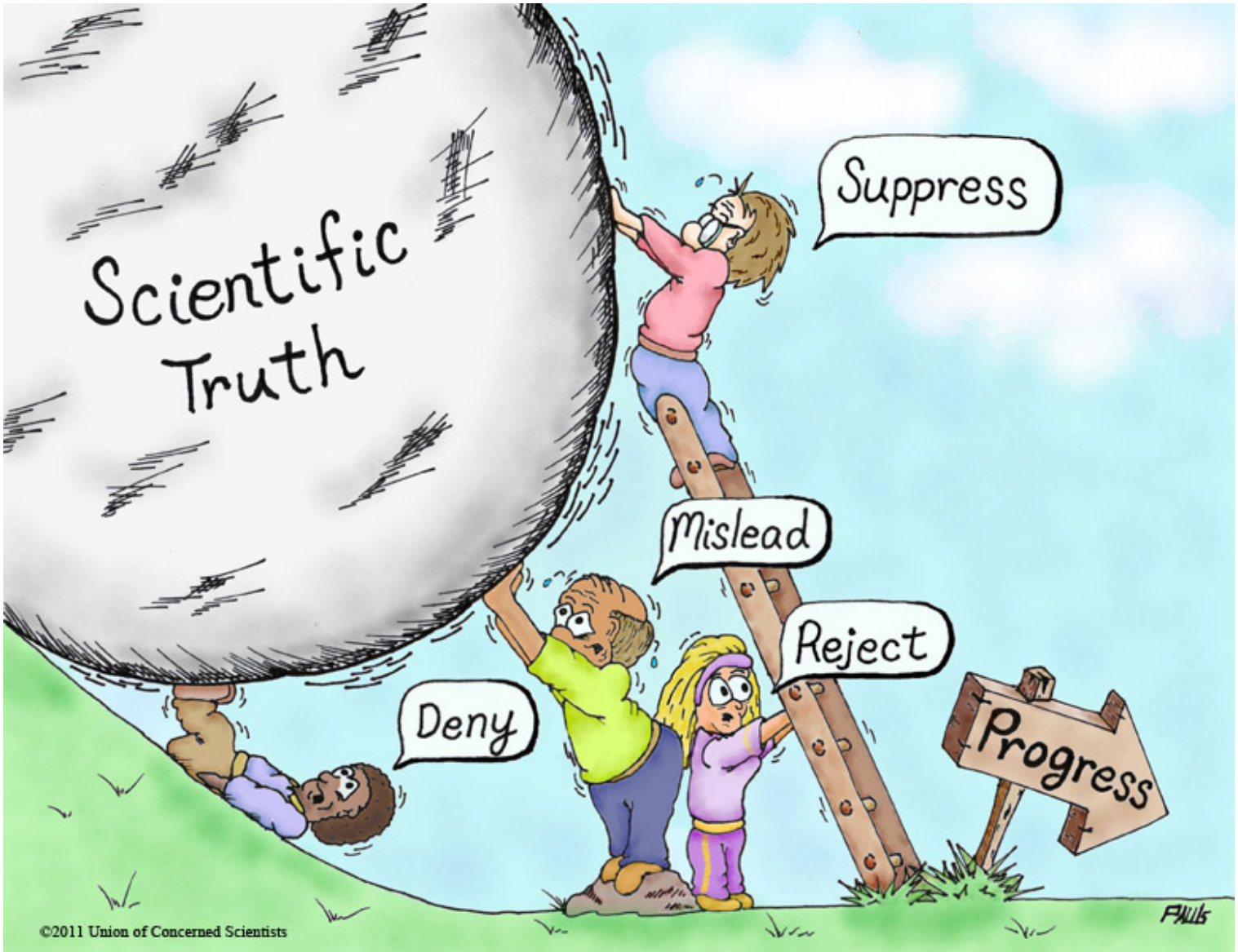
Folding an Angle Sum Extrinsically

- Notice the angles fit to take up the entire space along the base and this gives us the angle sum.



http://mathonthemckenzie.blogspot.com/2013/12/180.html

What does a geometric space look like, how do we know, and how do we represent it? Other possibilities and real-world applications...



What is Dimension and Parallel?

Dimension: degrees of freedom of movement in space or efficient algebraic coordinates.

Parallel: straight-feeling paths that never meet.

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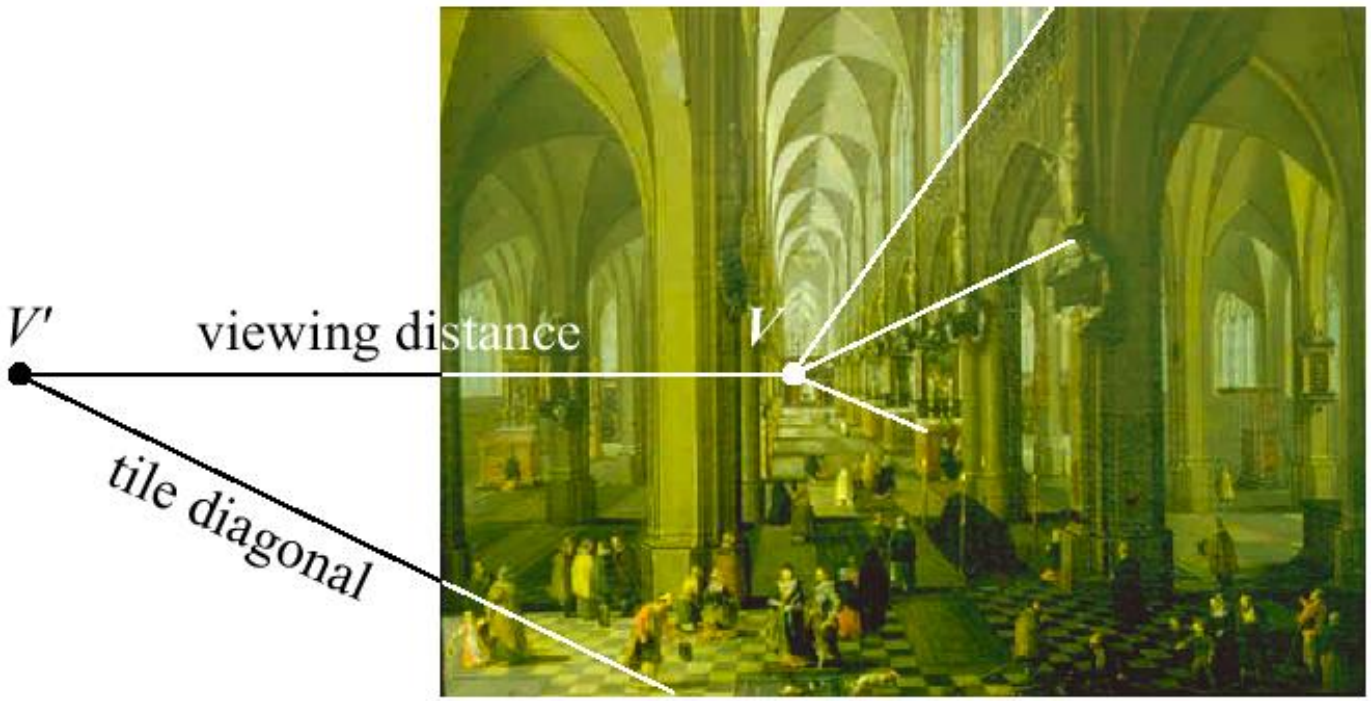
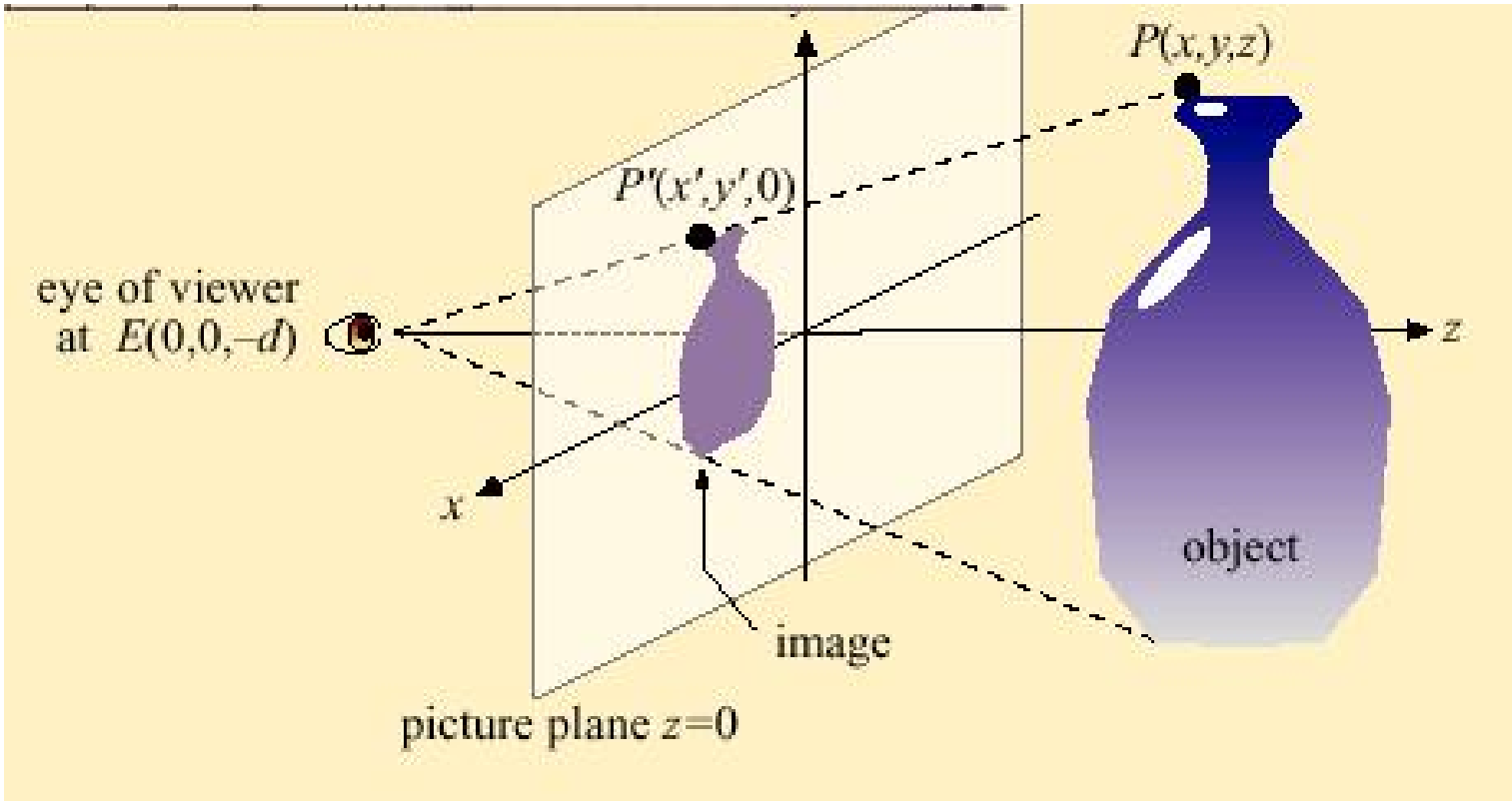
2D Representation of 3D Space



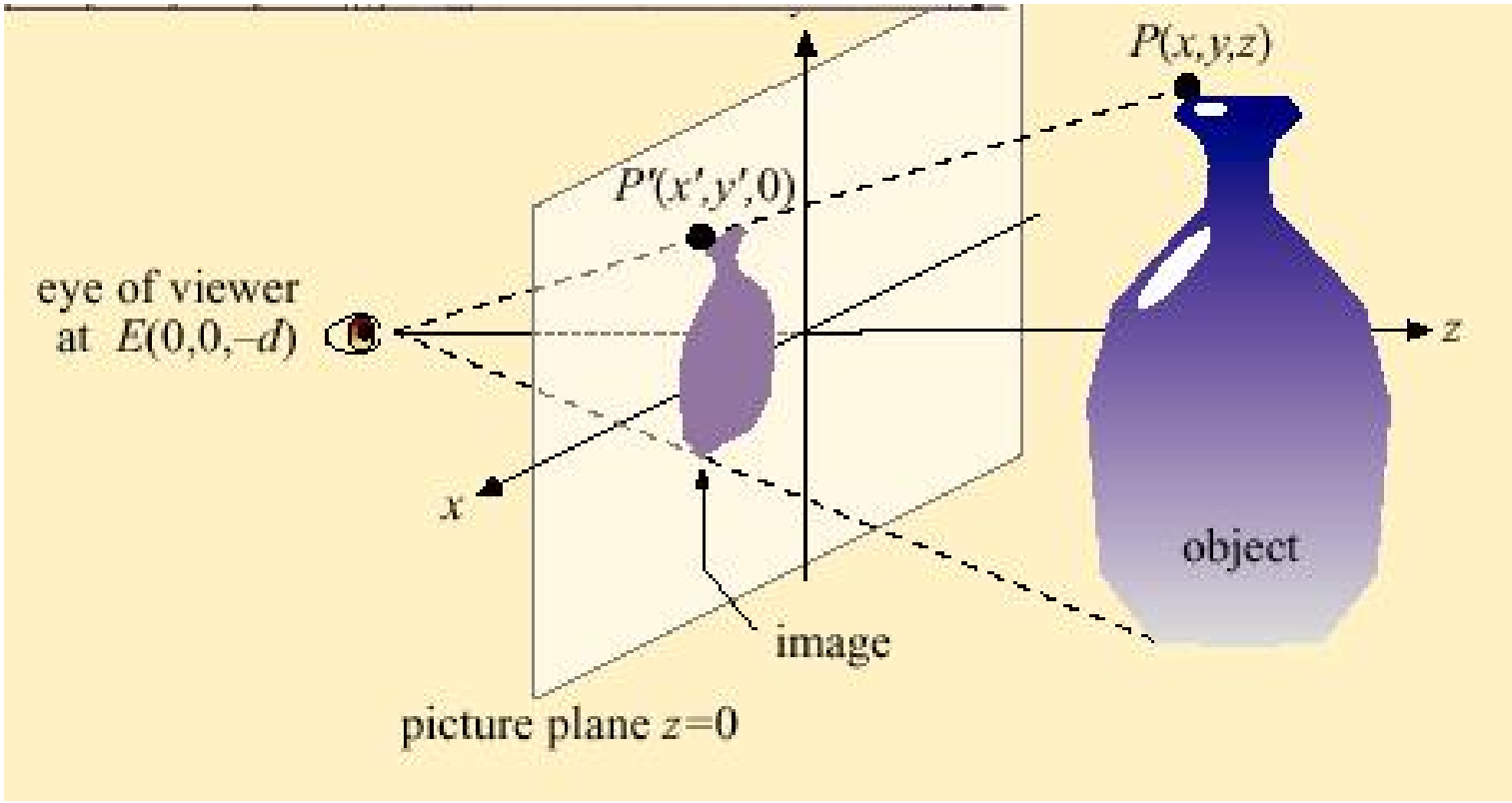
Interior of Antwerp Cathedral, by Pieter Neefs the Elder, 1651
http://collection.imamuseum.org/artwork/71818/



Marc Frantz's Mathematics and Art `https://math.iupui.edu/m290`

$$x' = \frac{dx}{z+d} \qquad y' = \frac{dy}{z+d}$$

where d is the distance from the viewer's eye at $(0, 0, -d)$
If $d = 3$ and we want to paint the point $(2, 4, 5)$, we paint at:



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where d is the distance from the viewer's eye at $(0, 0, -d)$
If $d = 3$ and we want to paint the point $(2, 4, 5)$, we paint at:

$$x' = \frac{3 \times 2}{5+3} \qquad y' = \frac{3 \times 4}{5+3}$$

Julian Beever's pavement drawings

http://www.julianbeever.net/images/phocagallery/gallery/butterfly-i.jpg

I decided to get into 3D after seeing the effect of tiles being removed from the street, and later trying to recreate the sense of depth in a drawing. Once I realised you could make things go down, I realised you could make them appear to go up and I began experimenting.

Julian Beever's pavement drawings

julianbeever.net/images/phocagallery/gallery/thumbs/phoca_thumb_l_globewrongview-i.jpg

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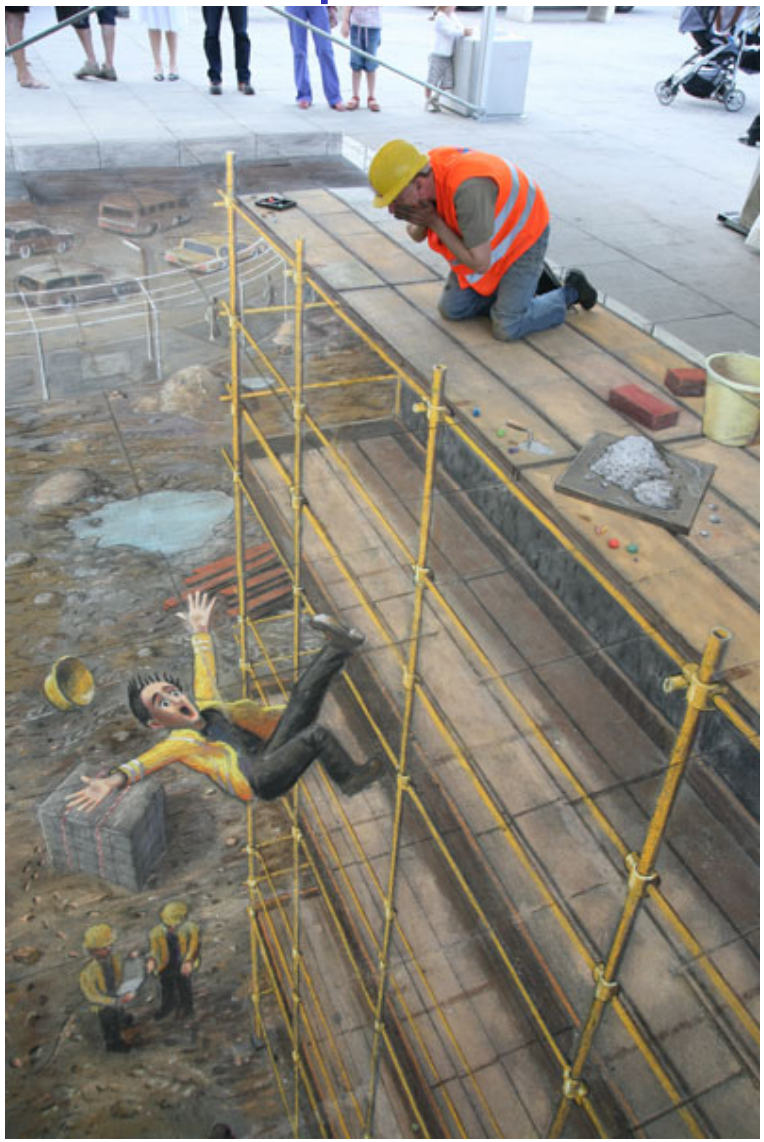
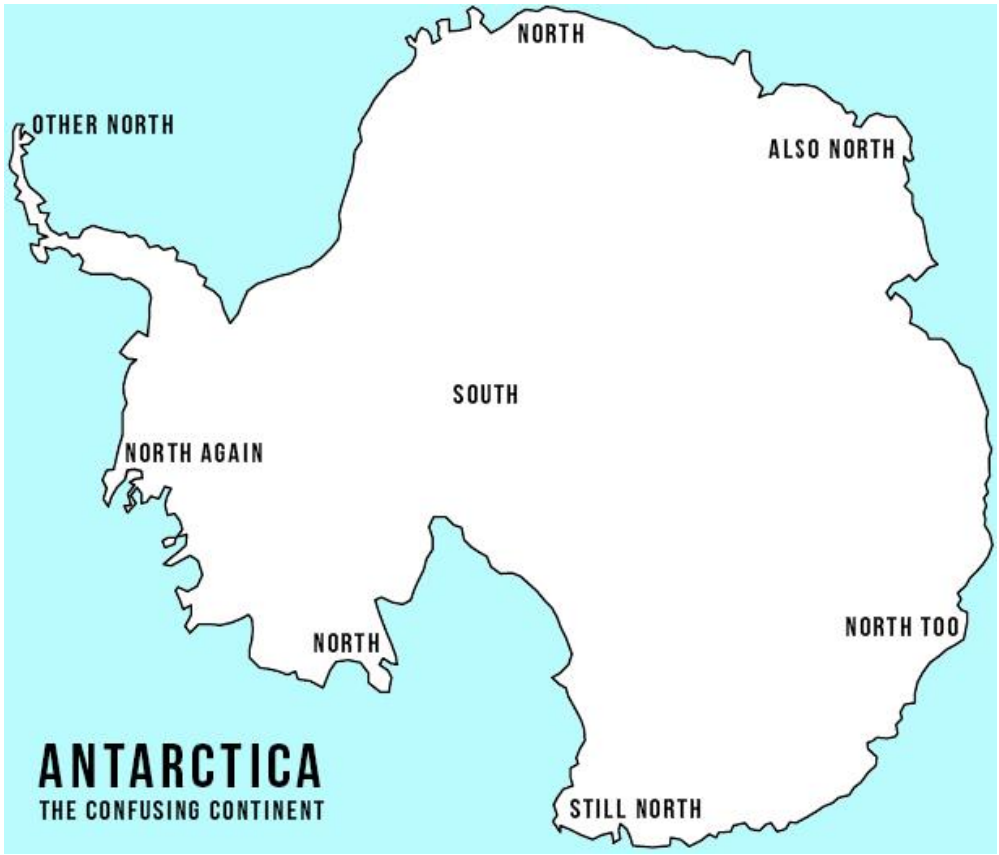


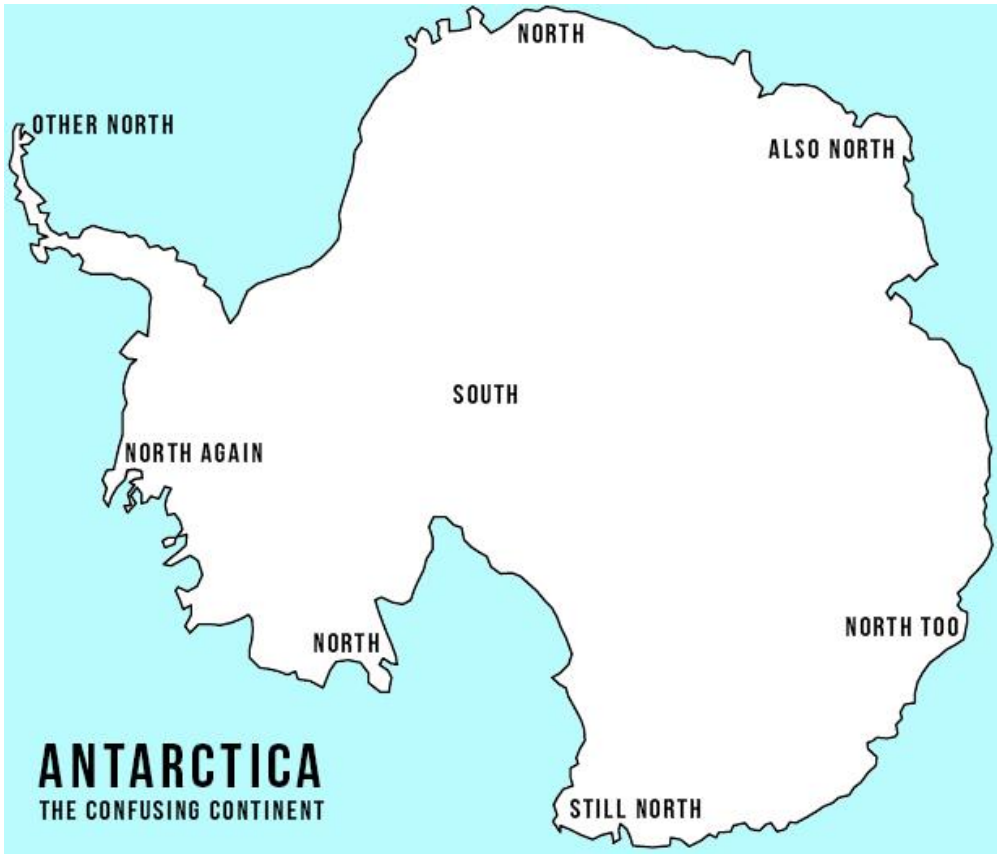
http://www.julianbeever.net/images/phocagallery/gallery/accident-i.jpg

Where is North?



https://www.reddit.com/r/Maps/comments/5cogwi/antarctica_the_confusing_continent/

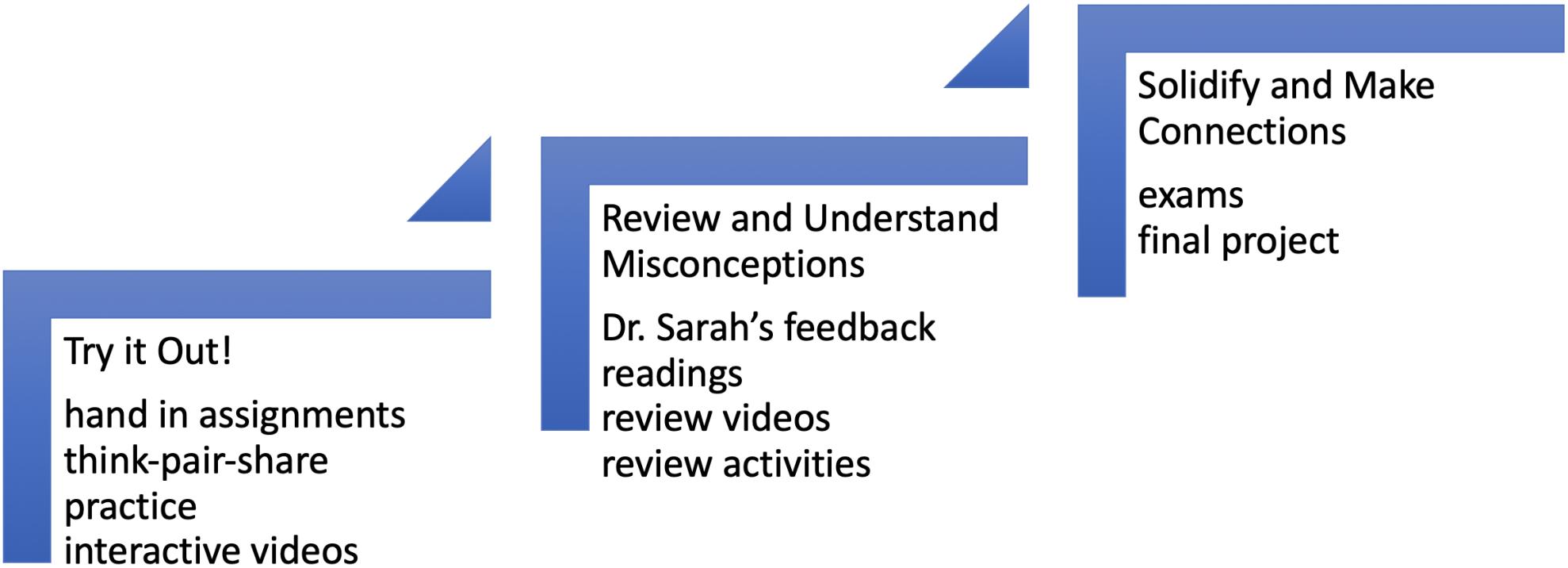
Where is North?



https://www.reddit.com/r/Maps/comments/5cogwi/antarctica_the_confusing_continent/

Stand up and point in the direction of North.

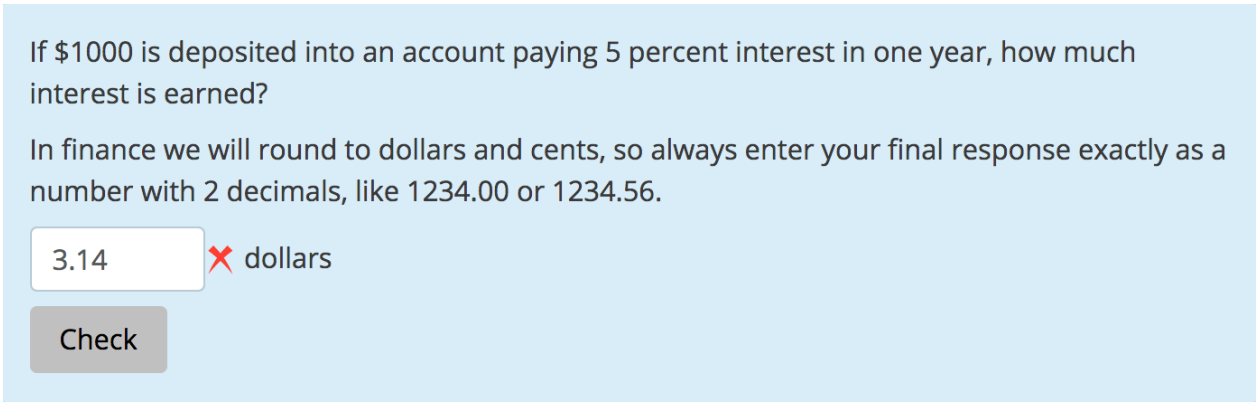
I care about your success and have designed 1010 to help you learn, incorporating feedback from prior students and principles from the literature like *Make It Stick: The Science of Successful Learning* by Peter Brown et al., which I highly recommend.

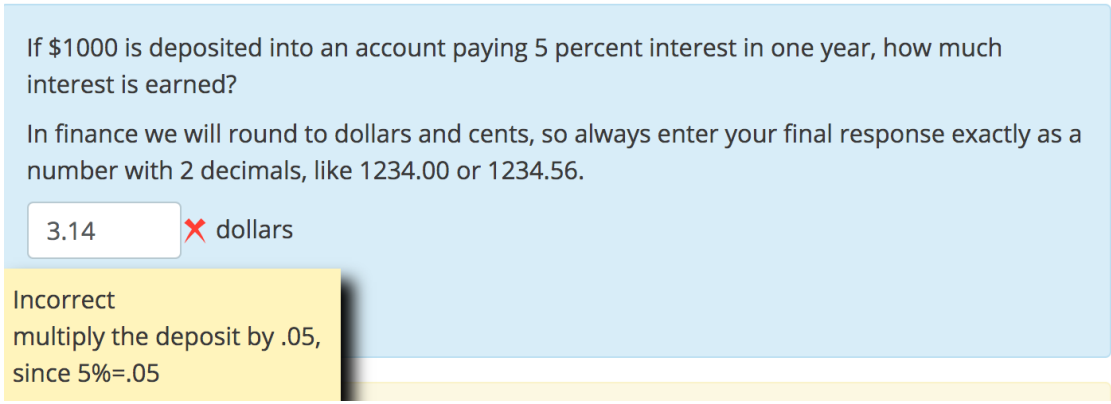


practice with instantaneous feedback check from me, repeatable

Instantaneous Feedback

Opens after you **Check** a response in a given problem, and then you can retake it if you wish. For a box where you enter the symbols, **hover over the box to see the feedback**.





 practice with instantaneous feedback from me, repeatable

General Feedback

Opens after you submit all problems on an assignment and finish (you can retake an assignment before it is due–that is repeatable too!). For credit I ask for a good faith effort rather than a specific score—aim for at least 70%, retaking if needed. The point of these is to help you develop your understanding. **Glossary Entries** are also available for you to click on at any point in the process to help—you should work to internalize the concepts.

Avoid Becoming too Dependent on the Online System

Take notes to help further solidify the material. Try them again on paper before the exam (without the solutions in front of you).

Second Chance

If you weren't able to succeed then a second chance will open after the deadline, but the checkmark is easier to obtain when it was originally due (70% instead of 90%).


interactive video activities.
The check feature will provide you with instant feedback so that you can revise your responses and earn credit after you'll watch the entire video and submit all the answers at the end.


webpages, PDF, files, videos, glossaries...
Some checkmarks may be ones where you can manually mark the activity as completed whenever you are ready to do so. Other checkmarks may only be earned when you receive a grade or when you access an assignment. **There will be more readings and videos, and less of some other activities.**

Where do earnings actually come from intro

5 Question(s) answered

You have answered 5 questions, click below to submit your answers.

Submit Answers

Answered questions		Score
1:26	Warren Buffett question	1 / 1
2:48	$37 question	1 / 1
3:52	Futurama question	1 / 1
6:47	Thrifty Savers question	1 / 1
9:31	Excel formula question	1 / 1


hand in. Some must be on the handouts and turned in as one single PDF (like Benjamin Franklin's legacy).

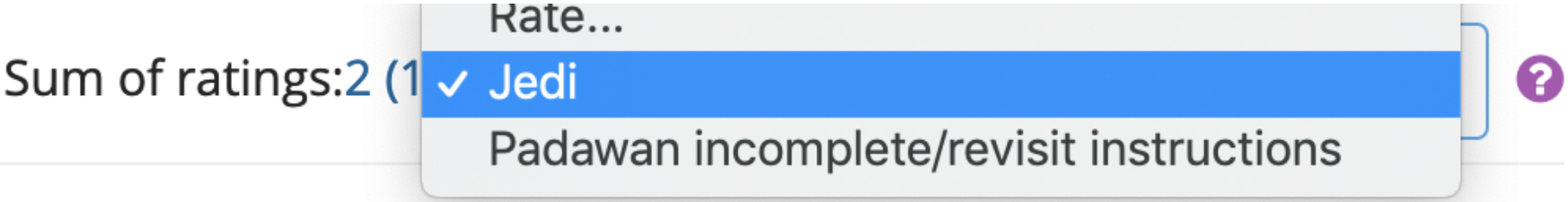
Grade:

scale	Padawan (still training)	Jedi	Jedi Master	Good start but this is incomplete. See the attached file.

- Padawans are training to one day become a Jedi.
- Both Jedi and Jedi Master ratings earn a checkmark.
- I'll respond with feedback within 24 hours from the due date. Any revisions for Padawans are due by the cut-off date.

think-pair-share to

1. respond to the questions with your own thoughts and
2. respond separately to someone else's post with something new that justifies your position on (at least) one of the questions. Don't just say, "Yeah, I agree." Instead, say, "Yes, but we also need to consider..." Or, "I don't agree because..." You might also pose questions, answer questions, extend ideas, or compare and contrast your responses and summarize what you chose and why.



Both must be rated as Jedi for a checkmark (you can revise as needed by completing/revisiting the instructions). You may temporarily see a checkmark before the other is rated.

I'll also respond with comments to the class on the shared posts within the successive days activities (in the next day or two) or within a class announcement.

Geometry of the Earth and Universe 6/5-6/14

Wed 6/5

face-to-face 6/5 10:20

Mathematics: The Most Misunderstood Subject

Thur 6/6

read THoM Geometric Gems

geom intro practice

geom intro hand in

geom intro think-pair-share

Fri 6/7

read THoM 2D universes

2D universes intro

2D universes practice

2D universes hand in

2D universes think-pair-share

Last Updated: May 31st at 7am	Name	Turanga Leela				
	Final Project 15% Fri 6/28					
	Exams 45% (can revise 1 by 6/28)					
	Exam 1 Wed 6/5					
	Exam 2 Fri 6/14					
	Exam 3 Tues 6/25					
Collated through "lump & periodic think-pair-share	Effective Class Engagement 40%	73.33				
Lowest 2 dropped	Padawan #	6				
Personal Finance and Beyond	5/28 face-to-face activities	☑	Geometry of the Earth and Universe	6/5 face-to-face geom intro	☐	Consumer Statistics and Probabilit
	Is 80% asynchronous 1010 a good fit for you?	☑		Mathematics: The Most Misunderstood Subject	☐	
	syllabus	☑		read p. 207--212 Geometric Gems	☐	
	what is mathematics	☐		geometry intro practice and p. xii	☐	
	profile picture	☐		geometry intro hand in	☐	
	real-life rates	☑		geometry intro think-pair share	☐	
	percent practice	☐		read p. 292-296, 307-308, 310, 332-333, 349-350 on 2D	☐	
	lump sum practice	☑		2D universes intro	☐	
	Where do earnings actually come from? intro	☑		my response to geometry intro think-pair-share	☐	
	Benjamin Franklin's financial legacy	☐		2D universes practice	☐	
	lump earnings think-pair-share	☑		2D universes hand in	☐	
	periodic payments intro	☑		2D universes think-pair-share	☐	
	my response to lump earnings think-pair-share	☑		earth & universe preliminary research hand in	☐	
	lump & periodic practice	☐		my response to 2D universes think-pair-share	☐	
	Jane & Joan	☑		read p. 289-291, 294-295 on the earth	☐	
	lottery	☑		earth intro	☐	
	lump & periodic think-pair-share	☐		earth practice	☐	
	loan intro	☑		Seeing is Believing/Shape of the World think-pair-share	☐	
	my response to lump & periodic think-pair-share	☑		my response to Seeing is Believing/Shape of the World	☐	
	loan practice	☑		read p. 270-275, 297-298, 309, 311, 313-317 on the uni	☐	
	condo decisions	☐		universe intro	☐	
	reflection on finance	☐		universe practice	☐	
	loan think-pair-share	☐		universe hand in	☐	
	my response to loan think-pair-share	☐		universe think-pair-share	☐	
	car decisions	☐		my response to universe think-pair-share	☐	
	payday lending	☐		review themes intro	☐	
	review themes intro	☐		review practice	☐	
	review practice	☐		review think-pair-share	☐	
	review problems think-pair-share	☐		my response to review think-pair-share	☐	
	my response to review problems think-pair-share	☐		study guide for exam 2	☐	
	study guide exam 1	☐		glossary/wiki for geometry	☐	
	glossary/wiki for finance	☐				

.15 Final Project +.45 Exams + .40 Effective Class Engagement

The grading scale is: $A \geq 93; 90 \leq A- < 93; 87 \leq B+ < 90 \ldots$

Where to Get Help

- need help from me, your classmates, or tech support forum
  -Zoom typically 10:20am &12:20pm M–F, and 8pm S–Th
  -office hours on the face-to-face days typically before and after class [today, Fri Jun 14, Tues Jun 25, Fri Jun 28 in 326 or 310 Walker]

I care about you and your success!

http://alangregerman.typepad.com/.a/6a00d83516c0ad53ef0168e783575e970c-800wi