

Mth171 Agenda - Thu. 11/6

- \* Distribute revised calendar (note new Exam 3 date)
- \* Discuss upcoming student presentations  
(assign groups)
- \* Exchange peer-feedback on portfolios
  
- \* Discuss 7.1 - Pyramids, Prisms, Anti-prisms

Nov 6-12:31 PM

Student presentations on Tue. Nov. 18

Topics:

- 7.3 - The Archimedean Solids
- 7.4 - Polyhedral Transformations
- 7.5 - Models of Polyhedra (specifically, Nets)
- 8.1 - Symmetries of Polyhedra

Each group should:

- \* Specify 1 or 2 specific learning outcomes (LOs).
- \* Prepare a 10-15 minute lesson to address their LOs.
- \* Select, work, and assign 2-4 HW problems to help your peers meet the LOs.

Groups:

7.3	7.4	7.5	8.1
Abby	Ashton	Amy	Brianna
Anna	Aubriann	Katie	Christy
James	Kyle	Lila	Grant
Jordan	Nicole	Tim	Megan
			Nick

Nov 6-12:40 PM

## Portfolio Peer-Feedback

Provide your peer with target feedback about their portfolio.

### Questions to consider in your review:

- Is it well-organized?
- Are the course objectives clearly stated? Is each entry well-aligned with the course objective?
- Can you think of a way to improve an entry?
- Was anything unclear or confusing?

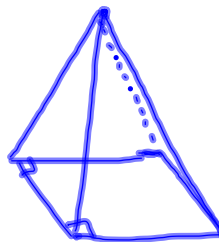
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## 7.1 - Pyramids, Prisms, and Antiprisms

Polyhedra: A polyhedron is a 3D figure whose faces, or sides, are polygons.

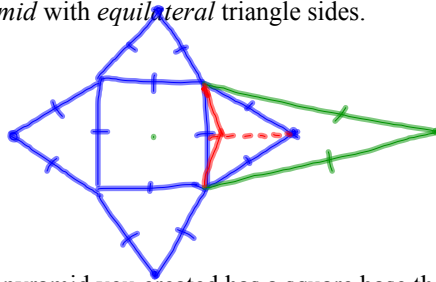
Pyramids and prisms are two simple kinds of polyhedra.

Pyramid: A pyramid consists of a polygonal base and the triangles that are formed when the base's vertices are connected to a single point called the apex.

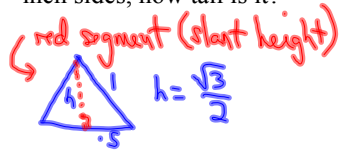


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Task: Draw a "net" that could be used to build a model of a *right square pyramid* with *equilateral* triangle sides.



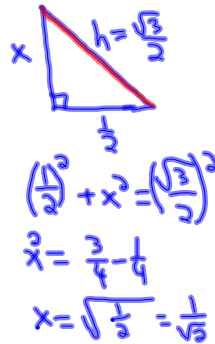
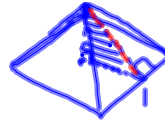
Exercise 2: If the pyramid you created has a square base that has one inch sides, how tall is it?



$$\left(\frac{1}{2}\right)^2 + h^2 = 1^2$$

$$h^2 = 1 - \frac{1}{4} = \frac{3}{4}$$

HW: #3, #4, #5

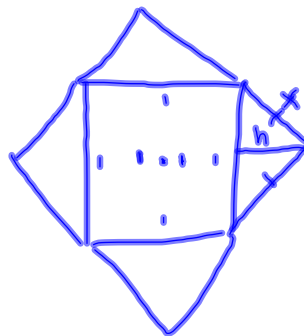


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Exercise 6: There is no limit to how tall the isosceles triangles forming the sides of a *right square pyramid* can be, there is a lower limit.

If the square base has side length 1 inch, what number must the altitude of the triangular faces exceed?

$$h > .5 \text{ in.}$$

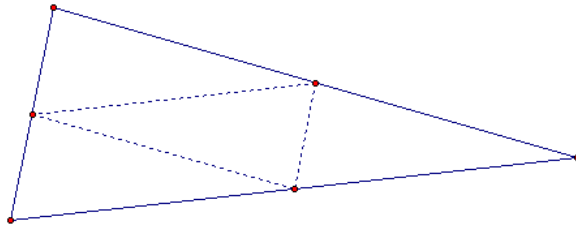


Nov 6-1:31 PM

A *skew square pyramid* will have a square base, but the apex will not be over the center of the base.

HW: #7

Exercise 8: Build a model of a disphenoid, which is a *skew triangular pyramid* whose faces are all congruent but not equilateral. (Take any acute triangle & join the midpoints of the sides to form four congruent triangles.)



Nov 6-1:34 PM

Other types of pyramids may:

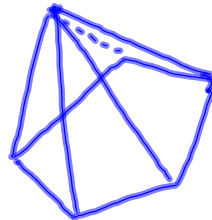
- \* be either right or skew.
- \* have either a regular or an irregular base.
- \* have a base formed from any  $n$ -gon.

HW #9-12, **13**.



13. If a pyramid has a base with  $n$  sides, find:  $f$ ,  $e$ , and  $v$ .

Follow-up: What is the Euler Characteristic  $\chi = v - e + f$ ?



pentagonal  
skew pyramid

$$\begin{array}{r} v = 6 \\ e = 10 \\ f = 6 \end{array} \quad \begin{array}{r} 4 \\ 6 \\ 4 \end{array}$$

$$\chi = 6 - 10 + 6 = 2.$$

$$\begin{aligned} \chi &= (n+1) - 2n + (n+1) \\ &= 2 \end{aligned}$$

Nov 6-1:40 PM

**Prisms:** A prism has congruent polygonal bases that are parallel, and sides joining corresponding edges.

As with pyramids, prisms may:

- \* be either right or skew.
- \* have either regular or irregular (identical) bases.
- \* have bases formed from any n-gon.

HW: #15-17. Also calculate the Euler Characteristic for #17.

Nov 6-1:45 PM

Volume Formulae:

It is a (perhaps suprising) fact that the volume of any prism is

$$V = (A_{\text{base}})(h).$$

This is true if the base is regular or not, and whether the prism is skew or right.

It is a (perhaps even more suprising) fact that the volume of any pyramid is

$$V = (1/3)(A_{\text{base}})(h)$$

That is, the volume of a pyramid is 1/3 the volume of the corresponding prism with the same base.

Nov 6-1:48 PM