

4.5

## THE PLATONIC SOLIDS TURN AMOROUS

*Discovering the Symmetry and Interconnections Among the Platonic Solids*

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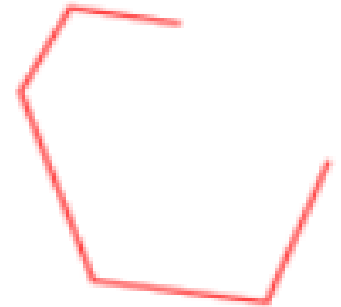
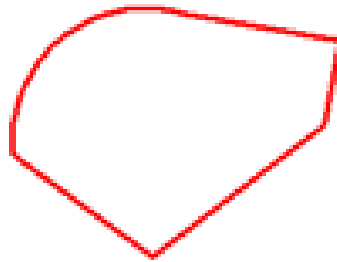
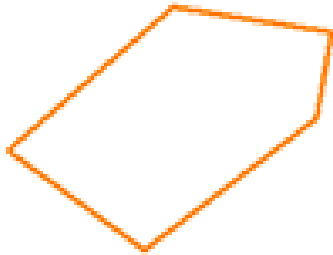
### QUESTION OF THE DAY:

What's the most symmetric figure you can draw in the plane?

What if you could only use straight lines?

# What is a polygon?

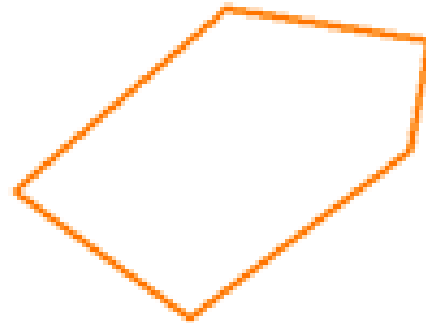
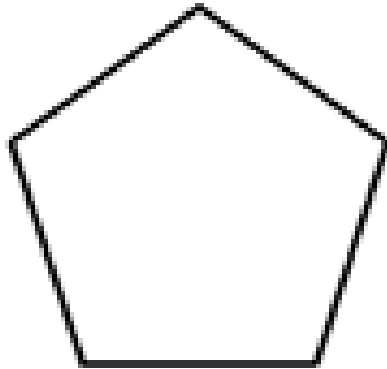
- Polygon -



**Polygon** comes from Greek. **Poly-** means “\_\_\_\_\_” and **-gon** means “\_\_\_\_\_”.

# What is a regular polygon?

- Regular Polygon -



# How Many Regular Polygons are There?

<http://www.mathsisfun.com/geometry/polygons-interactive.html>

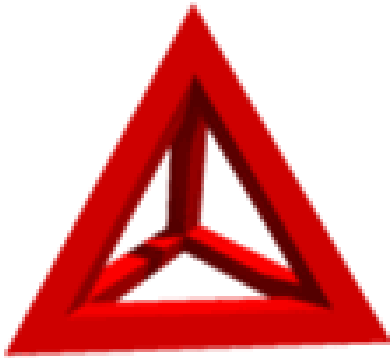
**What is the most symmetric figure you can imagine in 3-dimensional space?**



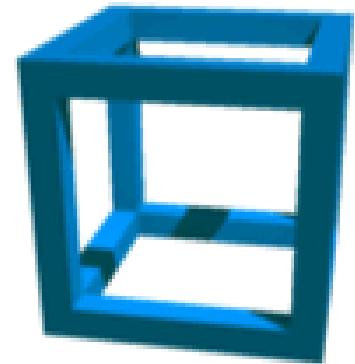
**What if you can only use flat sides?**



# The Five Platonic Solids



- Tetrahedron



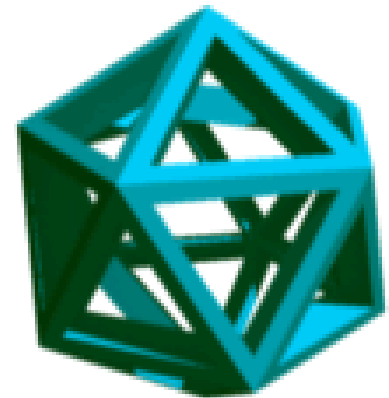
- Hexahedron  
(Cube)



- Octahedron



- Dodecahedron



- Icosahedron

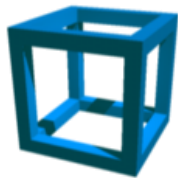
# Use your platonic solids to fill in the following chart:

	<b>F</b>	<b>V</b>	<b>E</b>	<b>Type of Face (# of sides per face)</b>	<b>Number of Faces Meeting at Each Vertex</b>
<b>Tetrahedron</b>					
<b>Cube</b>					
<b>Octahedron</b>					
<b>Dodecahedron</b>					
<b>Icosahedron</b>					

# The Five Platonic Solids



- The **tetrahedron** (greek “tetraédron” = four-sided) is bounded by 4 regular triangles. The faces are bordered by 6 edges of equal length and 4 vertices. 3 triangles meet at each of the vertices. The tetrahedron has the least ratio of volume to surface area. According to Plato it symbolizes dryness or fire.

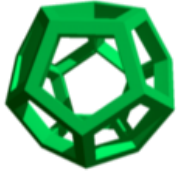


- The **hexahedron** (greek “hexáedron” = six-sided) is bounded by 6 squares. The faces are bordered by 12 edges of equal length and 8 vertices. 3 squares meet at each of the vertices. The tetrahedron rests solidly on its base. According to Plato it stands for the stable earth.



- The **octahedron** (greek “oktáedron” = eight-sided) is bounded by 8 equilateral triangles. The faces are bordered by 8 edges of equal length and 6 vertices. 4 triangles meet at each of the vertices. It can rotate freely when grasped at opposite vertices and symbolizes air.

# The Five Platonic Solids



- The **dodecahedron** (greek “dodécáedron” = twelve-sided) is bounded by 12 regular pentagons. The faces are bordered by 30 edges of equal length and 20 vertices. 3 pentagons meet at each of the vertices. It represents the universe and, according to Plato, its faces symbolize the 12 signs of the zodiac.



- The **icosahedron** (greek “eikosáedron” = twenty-sided) is bounded by 20 equilateral triangles. The faces are bordered by 30 edges of equal length and 12 vertices. 5 triangles meet at each of the vertices. It has the highest ratio of volume to surface area and, according to Plato, symbolizes water.



**End Day I**

# Homework

- Read 4.5 The Platonic Solids Turn Amorous pgs. 270-288.
- Mindscapes 4.5 #2, 6, 7, 8
- The Math Book Presentation



# Resources

- <http://www.mathsisfun.com/geometry/polygons.html>
- <http://www.greatlittleminds.com/pages/maths/3d-platonic-solids.html>
- <http://www.korthalsaltes.com/cuadros.php?type=p>
- <http://isotropic.org/polyhedra/>
- <http://www.platonicsolids.info/>
- <http://www.3quarks.com/en/PlatonicSolids/index.html>
- <http://www.learner.org/interactives/geometry/platonic.html>