

Platonic Solids

A geometry solid bounded by planes is called a polyhedron. If the polyhedron has congruent regular polygons as faces and the same number of faces meet at each vertex in exactly the same way, then it is a regular polyhedron. There are only five such regular polyhedrons. Plato knew that the number of convex polyhedrons was limited to five, and we therefore refer to them as Platonic solids. The following table summarizes information about the Platonic solids.

Name of Solid	Polygons Used as Faces	Number of Vertices	Number of Edges	Number of Faces
Tetrahedron	equilateral triangles	4	6	4
Cube	squares	8	12	6
Octahedron	equilateral triangles	6	12	8
Dodecahedron	regular pentagons	20	30	12
Isoshadedron	Equilateral triangles	12	30	20

Your project is to make these give Platonic solids. Use posterboard or cardstock for the models (BUT I would strongly suggest trying it with paper first! You will only get as much posterboard or cardstock as you need and any extra YOU will have to provide.)

Hint: If you google the names of the solids, you will be able to find the nets of them and print them out.

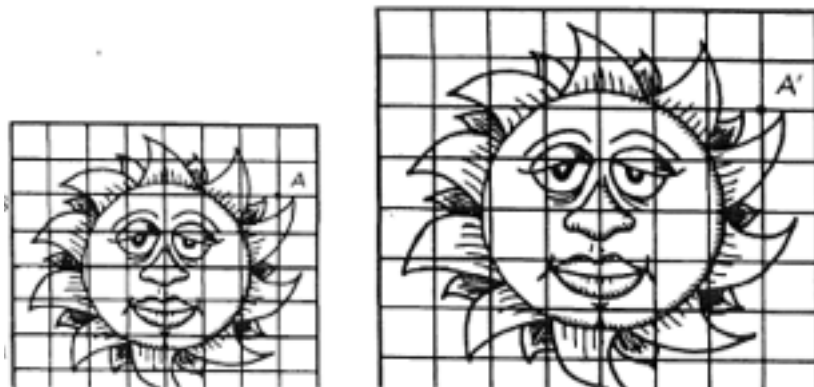
CAREFULLY cut out the polygons and CAREFULLY align them before you start taping or gluing. If you use tape, tape from the inside as much as possible.

You will be graded on how NEAT the finished project is.

Making a Mural

Mural artists use similarity to help them create their large artwork. Muralists begin creating a mural by drawing a small picture with a grid of squares drawn over it. They then divide the surface on which the mural will be painted into a similar, but larger group of squares. Proceeding square by square, they draw the lines and shapes of the original drawing into the corresponding positions of the mural surface's large squares.

The design in the small grid at the right is similar to the design in the larger grid of squares. The enlargement was made by matching points in the original drawing to the corresponding points in the larger grid. For example, point A in the small grid is in the same position as Point A' in the larger grid.



Your project is to create a mural of your own using a picture of your choosing and posterboard.

1. Select a small drawing of your choice to reproduce.
2. Begin by constructing a centimeter grid of squares in pencil on the original drawing.
3. On your posterboard, create another grid of squares in pencil, this time in inches (cut off any excess).
4. To create your mural, carefully draw the lines and curves of the drawing in the small squares into their corresponding large squares.
5. Color your posterboard drawing and attach the original drawing to the BACK of your posterboard.

Origami

Origami is the Japanese art of paper folding. Thousands of designs are possible, and some are very simple, while others are quite complex.

Your project is to research the art of origami and construct at least 5 designs using this ancient method. Attach them to a posterboard, carefully labeling each design.

Use different colors for each origami design, and color your posterboard.



Toothpick Puzzles

You may have seen puzzles like the following in books of recreational mathematics. Some are fairly simple, but others can be quite challenging. Use any convenient objects (such as toothpicks, straws, or pencils) to help you find solutions.

On a posterboard, draw and list the instructions to each of the following puzzles. Next to each puzzle, draw the solution. Use a piece of construction paper to hide the result of each puzzle from the viewer.

1. Move toothpicks to form four squares of the same size.



2. Make six squares with these thirteen toothpicks.



3. Remove three toothpicks so that three squares are left.



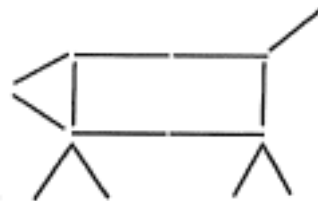
4. Remove the least number of toothpicks to leave four triangles the same size as the eight shown.



5. Move the least number of toothpicks to make the fish swim in the opposite direction.



6. Move the least number of toothpicks to make the pig face the opposite direction.



7. Move one toothpick to make a correct equation. More than one solution is possible



Selfieometry

In this project, you will find real-world objects that demonstrate 10 of the geometry terms listed below. You will take a picture of these objects, but there is a catch. YOU must be in the picture with the objects.



YOU ARE RESPONSIBLE FOR PRINTING YOUR OWN PICTURES to attach to your posterboard. You may NOT use the same picture for more than one term.

Next to or beneath each selfie, you must identify the geometry term demonstrated and explain what makes it the term you identify. For example, if you took a picture with a trash can, you might say that it's a cylinder because it has round sides and two circles as bases. Label your pictures very clearly.

Geometry Terms

point	angle bisector	median	sphere
line	triangle	altitude	cone
plane	acute triangle	parallelogram	cylinder
segment	right triangle	rectangle	rectangular prism
ray	obtuse triangle	rhombus	rectangular pyramid
line segment	equilateral triangle	square	hemisphere
bisector	scalene triangle	trapezoid	arc
midpoint	isosceles triangle	circle	sector
acute angle	vertical angles	radius	semicircle
obtuse angle	perpendicular lines	chord	central angle
right angle	parallel lines	diameter	inscribed angle
straight angle	polygon	secant	cube
congruent angles	regular polygon	tangent	symmetry

Tangrams

A tangram is a puzzle consisting of 7 flat shapes, called tans, which are put together to form shapes. The objective of the puzzle is to form a specific shape (given only an outline or silhouette) using all seven pieces, which may not overlap.

Your project is to find 5 tangram outlines or silhouettes, print them, cut them out, and paste them on a posterboard. Clearly label what they are supposed to be.

You must also print five copies of the tans. These you will color and cut out.

Using the tans you've cut out and the silhouettes, solve the tangram puzzles. Paste the solution next to the silhouette on your posterboard, and use a piece of construction paper to cover the solution so it can't be seen by viewers.

Note: DO NOT just print out a copy of the solved tangram puzzle. If your tans are not cut and pasted together, you WILL NOT get credit for completing them.

