



# GEOMETILES®

## Mini Set 1 Activities



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# Welcome to Geometiles®!

Your Mini Set 1 contains 20 equilateral triangles and 12 regular pentagons. This booklet contains some problems and brainteasers for you to try. The puzzles are all at different levels, so there's something for everyone.

## Puzzle 1

- Make an equilateral triangle that is  $\frac{1}{9}$  yellow,  $\frac{1}{3}$  green and  $\frac{5}{9}$  purple.
- Now make an equilateral triangle that is  $\frac{1}{4}$  purple,  $\frac{1}{4}$  green,  $\frac{3}{16}$  orange and  $\frac{5}{16}$  yellow.

### Notes:

In these problems, the student must first realize that he needs 9 and 16 triangles, respectively, to make each figure. (A multiple of 9 or 16 would also work, but this impossible due to the size of the set)

## Puzzle 2

Make a closed object out of all the 12 pentagons in your box such that any two adjacent tiles have different colors.

## Puzzle 3

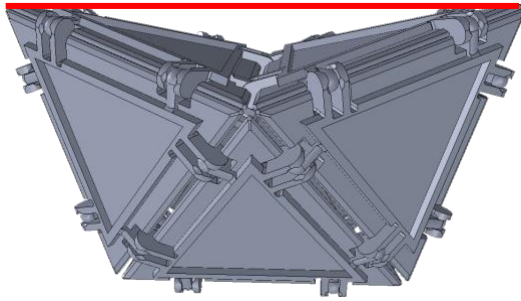
Build a closed solid having 6 rhombic faces

### Hints:

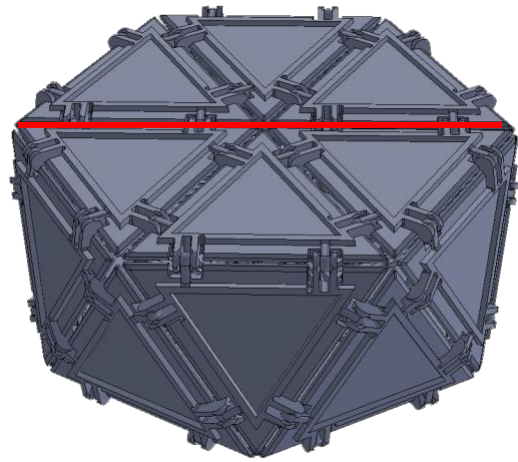
- You can make a rhombus by joining two equilateral triangles.
- Think “stretched out cube”. Just as a cube is made of 6 square faces, with three faces joining at each corner, so too will your solid. The difference is that in your solid, the faces will be rhombic instead of square.

## Puzzle 4

A solid is **strictly convex** if a line segment joining any two of its corners is entirely contained inside the solid (not on its surface or outside it). Note that a strictly convex solid may not have any coplanar faces. Here are some examples of solids that are NOT strictly convex.



Not strictly convex (or even convex) because red line is not contained inside it.

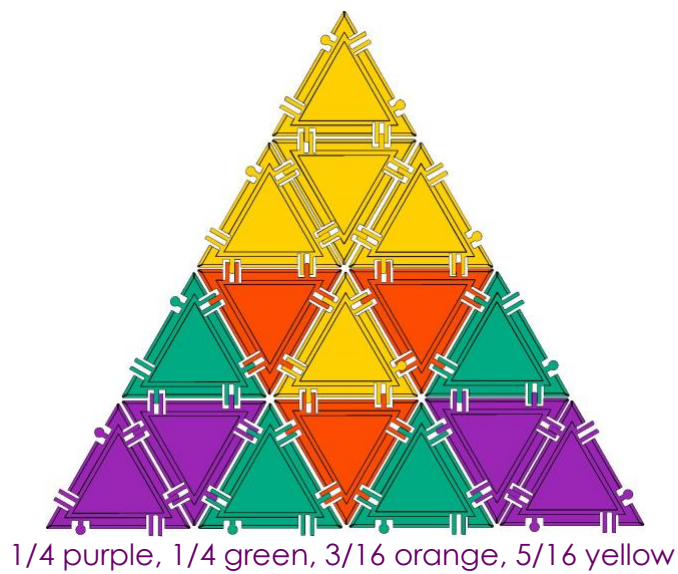
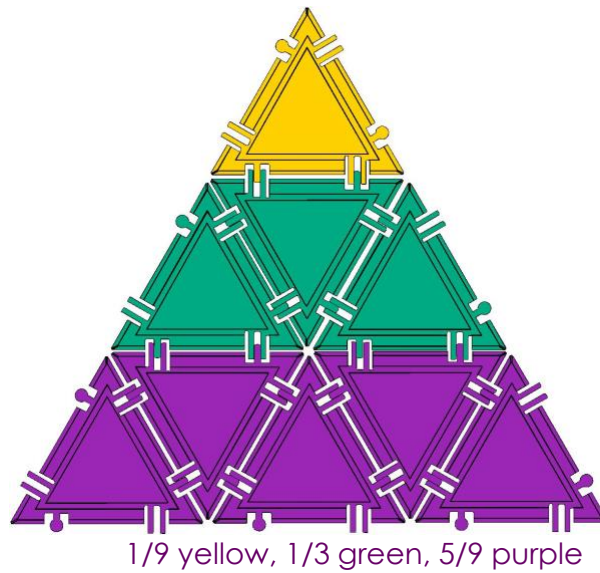


Convex, but not strictly convex because red line is on the surface. The faces on the top are coplanar.

Here is a question to ponder: build a **strictly convex** solid using the following numbers of equilateral triangles:  
4, 6, 8, 20.

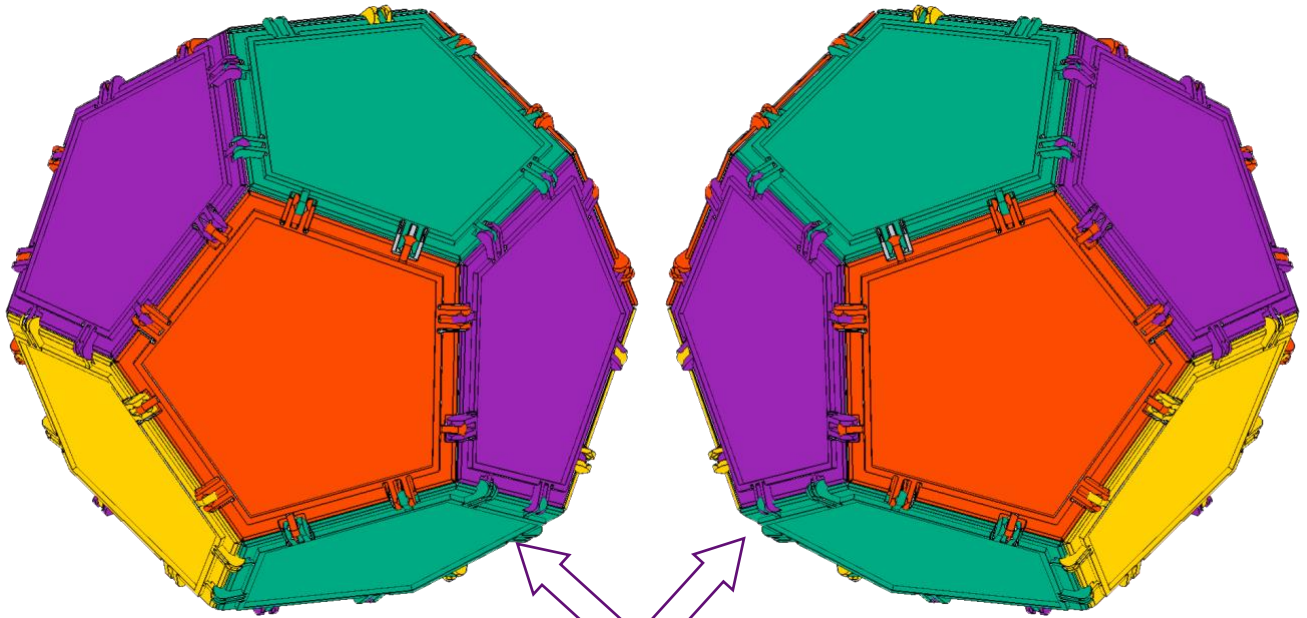
**Answers to all puzzles are given on the following pages. Don't turn over the page unless you are ready to look at the answers!**

**Answers:**  
**Puzzle 1**



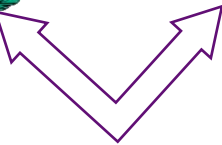
**Puzzle 2**

The object in question is called a *dodecahedron*. There 4 solutions to this problem, and the two in each row are mirror images of one another.

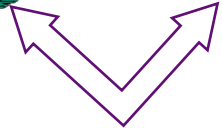
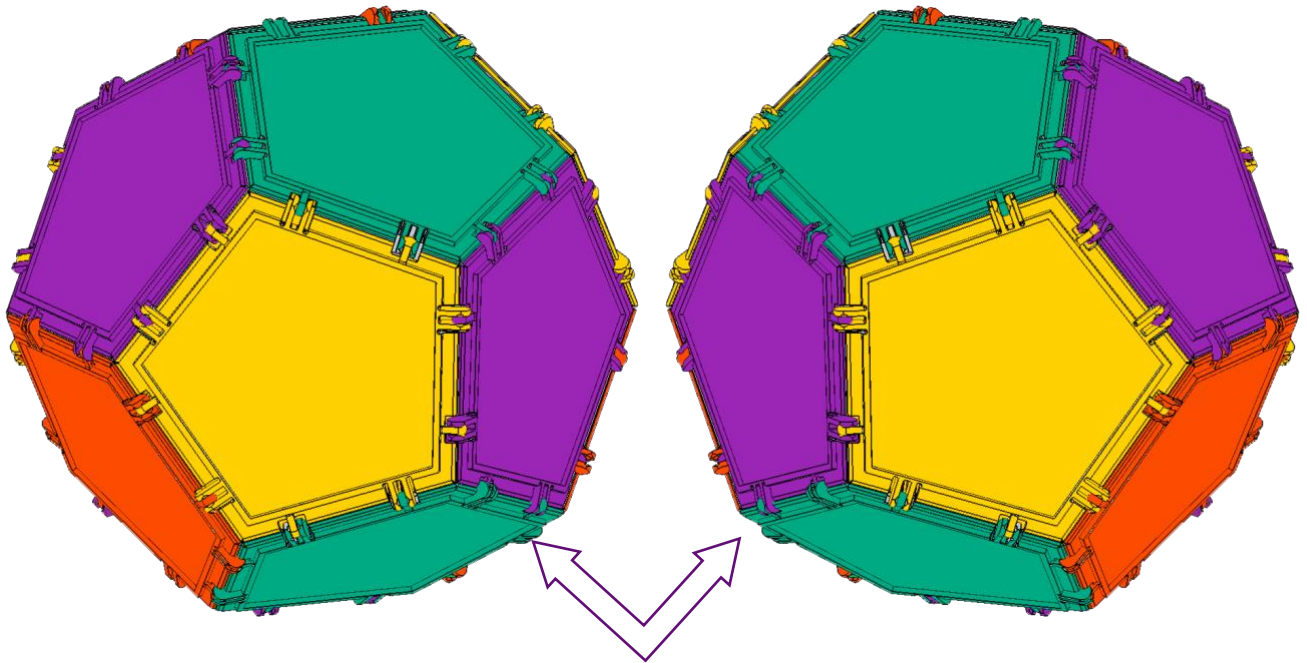


Solution 1

Solution 2



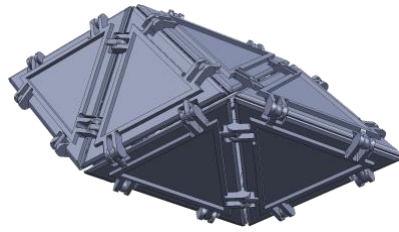
Mirror images



Mirror images

### Puzzle 3

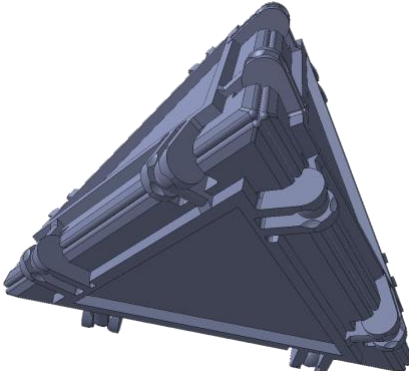
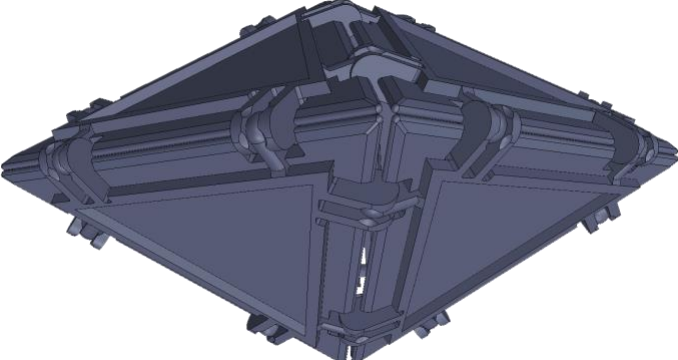
This shape is called a **rhombohedron**. It is a special case of a parallelepiped in which each face is a rhombus.



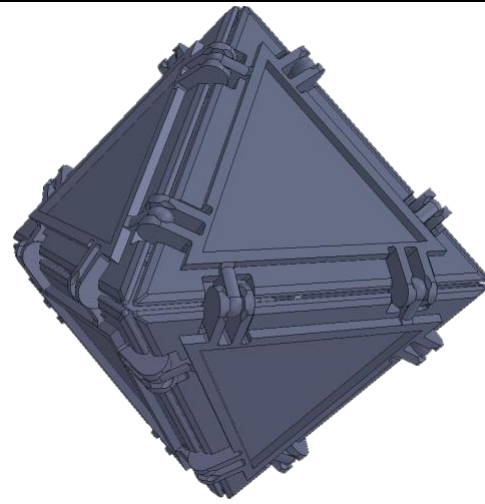
12 equilateral triangles

### Puzzle 4

These solids are called the **convex deltahedra**.

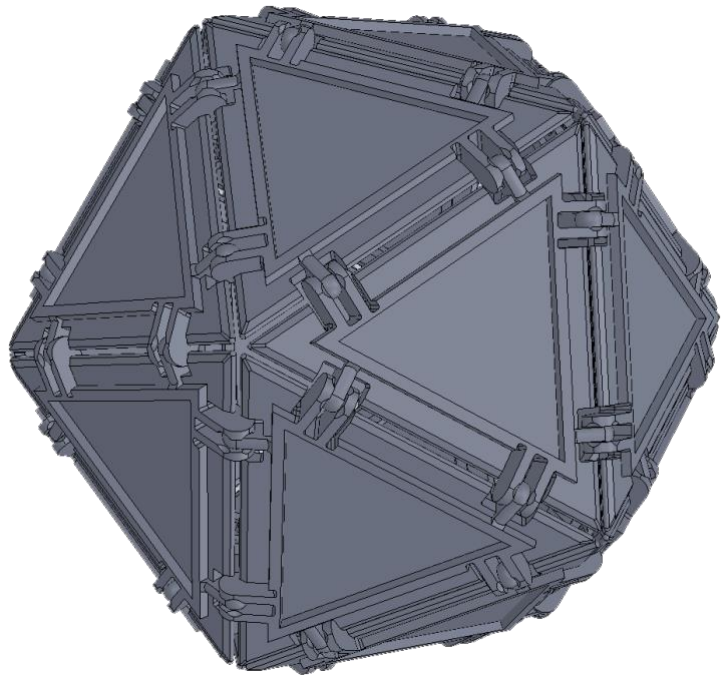
Number of equilateral triangles	Solid
4	 tetrahedron
6	 triangular dipyramid

8



octahedron

20



icosahedron