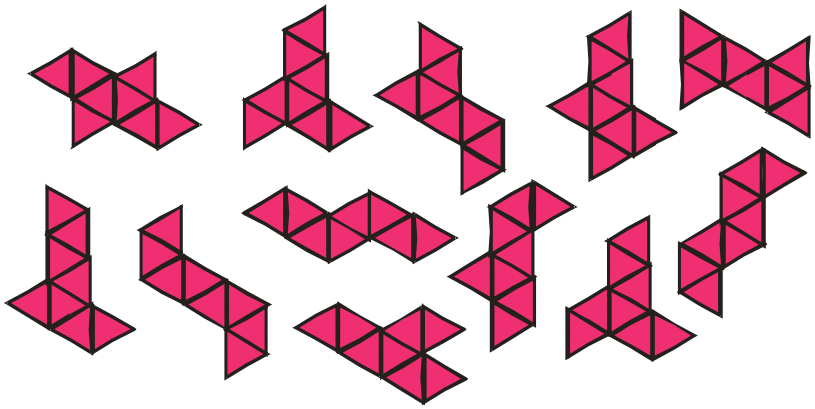
NETS OF ARCHIMEDEAN AND PLATONIC SOLIDS

Problem 1. *Which figure **is not** the net of an octahedron?*

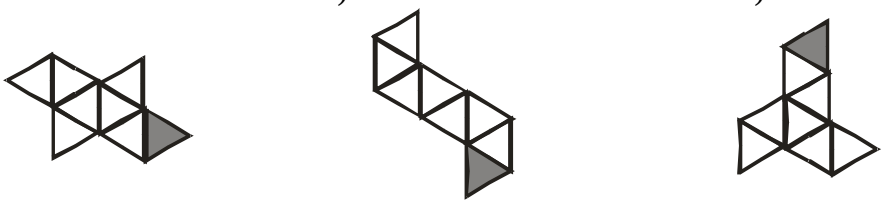


To construct a net with *Origami nets* one needs to know the measure of a dihedral angle (the rotation angle of a face). This could be done by specifying the degree measure (found separately in the Internet or given by the teacher) or by experimenting (using the specified key shortcut). In this case it is not mandatory to achieve the precise solid, it is sufficient to get to an intermediate situation that would help to find the answer.

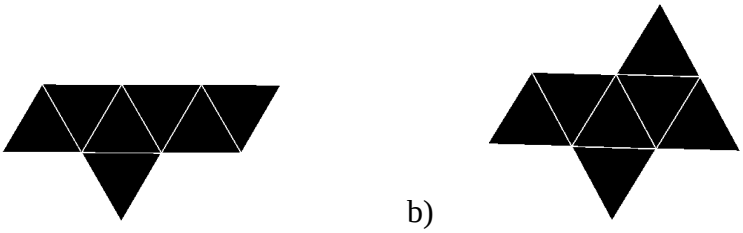
Cube and tetrahedron are studied at school and in this work they will be used only for the sake of similarity and completeness of classification. Octahedron has 11 nets, like the cube, and this fact could be discussed once the problem has been solved.

Problem 2. *Specify the faces that will be adjacent to the shaded face when making an octahedron out of the net.*

a) b) c)

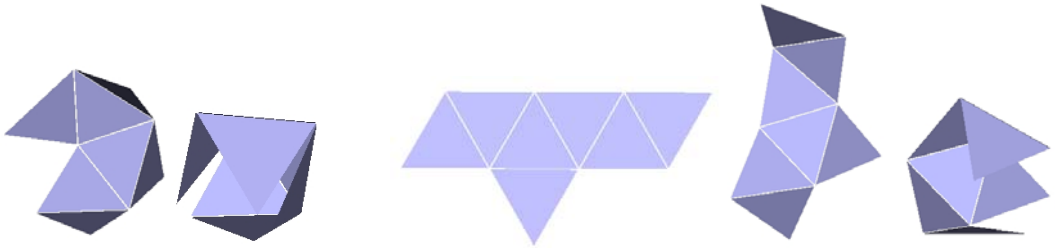


Problem 3. *Supplement the figure to get the net of an octahedron.*



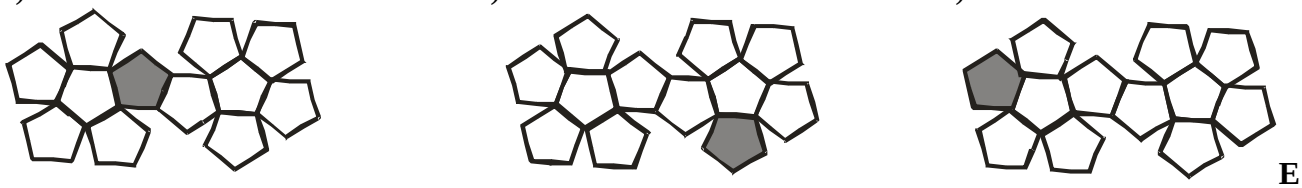
a) b)

The faces of an octahedron are triangles and each face has three adjacent faces. Therefore, there are 3 possibilities of adding a triangle in each case. Construct a virtual model and identify the edges that can be used to add a triangle.



Problem 4. *Specify the faces that will be adjacent to the shaded face when making a dodecahedron out of the net.*

a) b) c)



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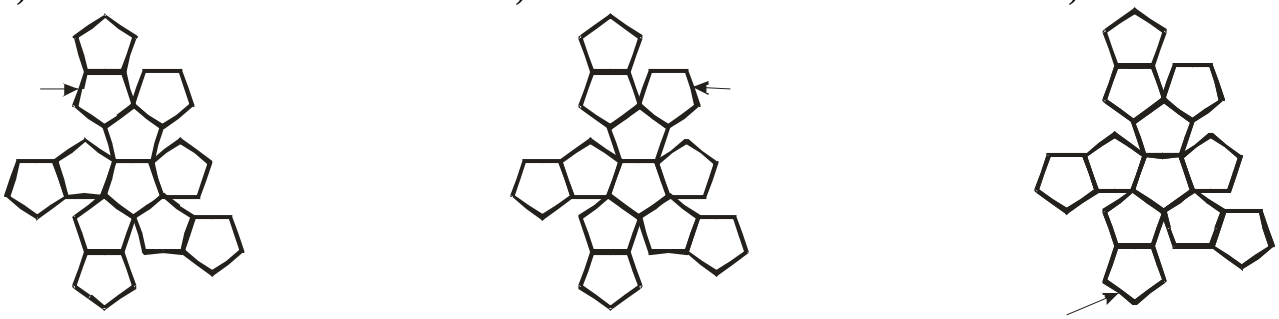
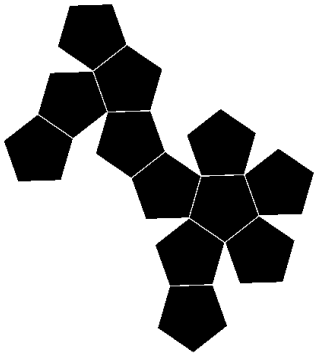
The nets of a dodecahedron (like the icosahedron) are 43,380 43 380 . The mental manipulation of this net turns out to be easy for the students and probably this makes it the most used one. It is easy to disjoint the net to two symmetrical parts and to identify the faces that will be adjacent when folding the net.

Problem 5. *Which edge will join the specified edge when making a dodecahedron from the net?*

a) b) c)

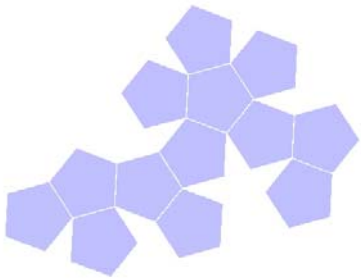


Problem 6. *Specify the two edges that will join when making a dodecahedron from the net.*

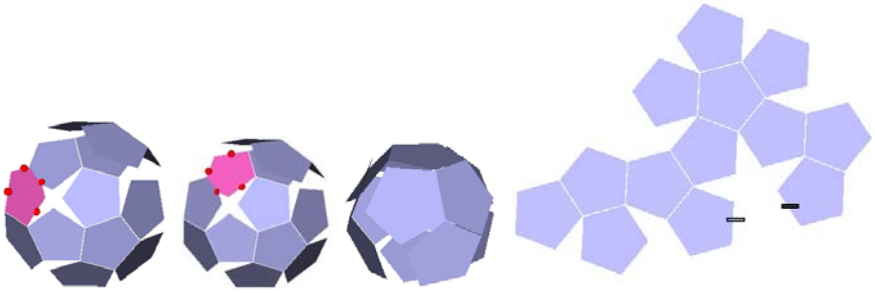


The dynamic model can be used to create intermediate "snapshots" of a folding that can be used as help during solving or as a visualization means of the solution.

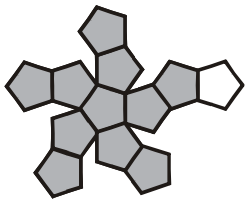
Problem 7. *Remove one pentagon so as the resulting figure to be the net of a dodecahedron.*



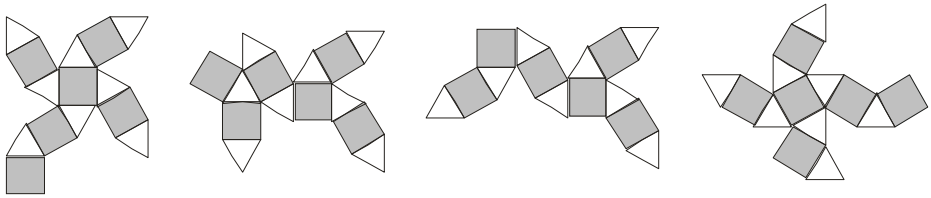
Experiment with *Origami nets*. Both faces with different colors in the figure below are overlapping. Therefore, after removing any of the two pentagons we will get the net of a dodecahedron.



Problem 8. *Construct the net of a dodecahedron.*
The students use most often the figure given below.

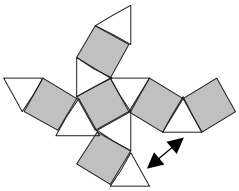


Problem 9. *Which figure* ***is not*** *a net of the solid?*

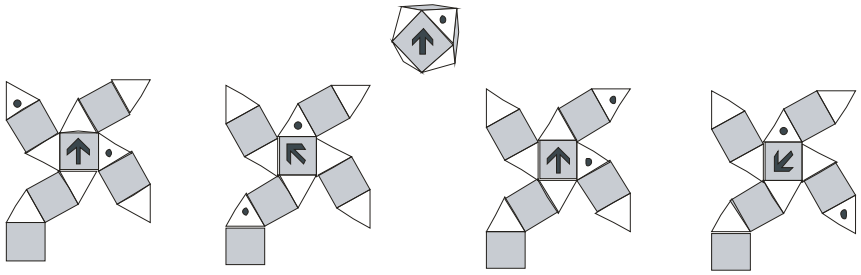


A) B) C) D)

Answer: D). It could be seen that for this figure we will have the edges of two triangles joined together.



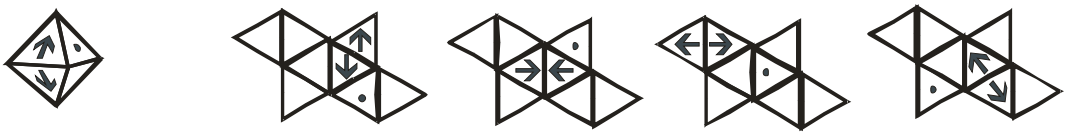
Problem 10. Which figure can be a net of the solid?



A) B) C) D)

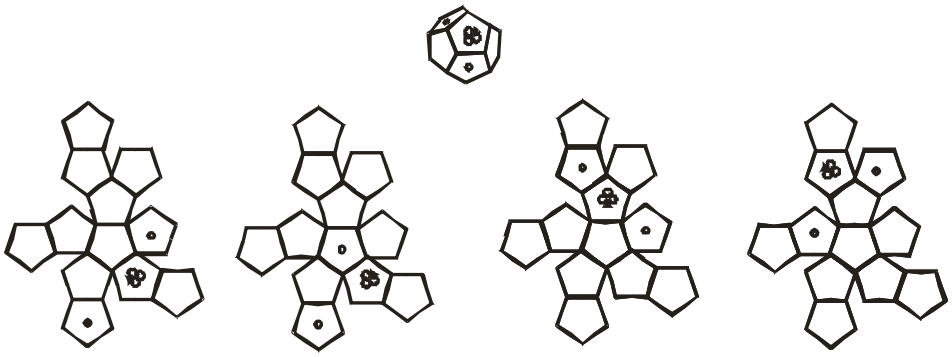
Answer: B). The arrow on the face is directed along the diagonal of a square and, therefore, we can exclude answers A) and C). Now we have only to consider the mutual location of the circle (point) and the arrow.

Problem 11. *Which figure can be a net of an octahedron?*



A) B) C) D)

Problem 12. *How many of these figures can be a net of a dodecahedron?*



A) 1 B) 2 C) 3 D) 4

The work with *Origami nets* enabled to check a solution, to come to a solution, to visualize a solution and the make new problems.

Information on regular and semi-regular solids in the Internet contain facts about the number of faces, edges, vertices, measures of dihedral angles, surface area or volume, and a solid is visualized through an image of the solid itself or through its net.