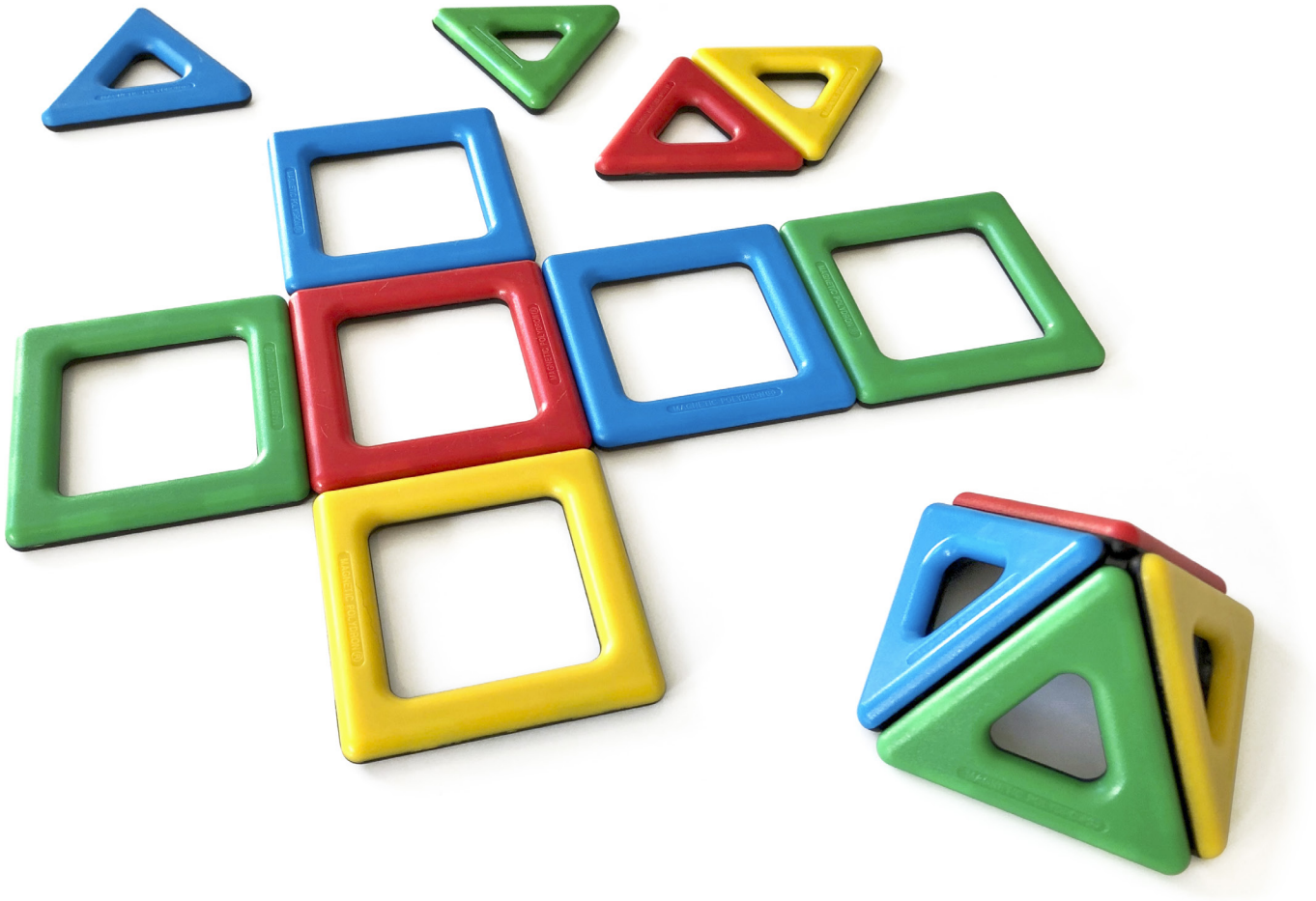
50-1014

MAGNETIC POLYDRON®

Student Set Workcards



The minimum number of pieces required to complete these workcards is 8 equilateral triangles & 6 squares

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Nets of a Cube

Warm-Up

Ask the students to construct a cube and then to open it carefully and lay the resulting net flat on the table.

Invite them to look at the nets created by other students. Ask the students to conjecture how many different nets there might be. If all of the students' nets are the same then invite them to find a different net that will fold to make a cube.

Explore

There are 11 nets of a cube. They can be classified in a number of ways but a useful one is to focus on the maximum number of squares in a row.

Students can use the grid on the following page to draw their nets.

The answers to the 11 nets are demonstrated on page 4.

Working with Nets

- Record each net on the grid below.
- Make sure that each one is different.

Working with Nets

Reflect & Connect

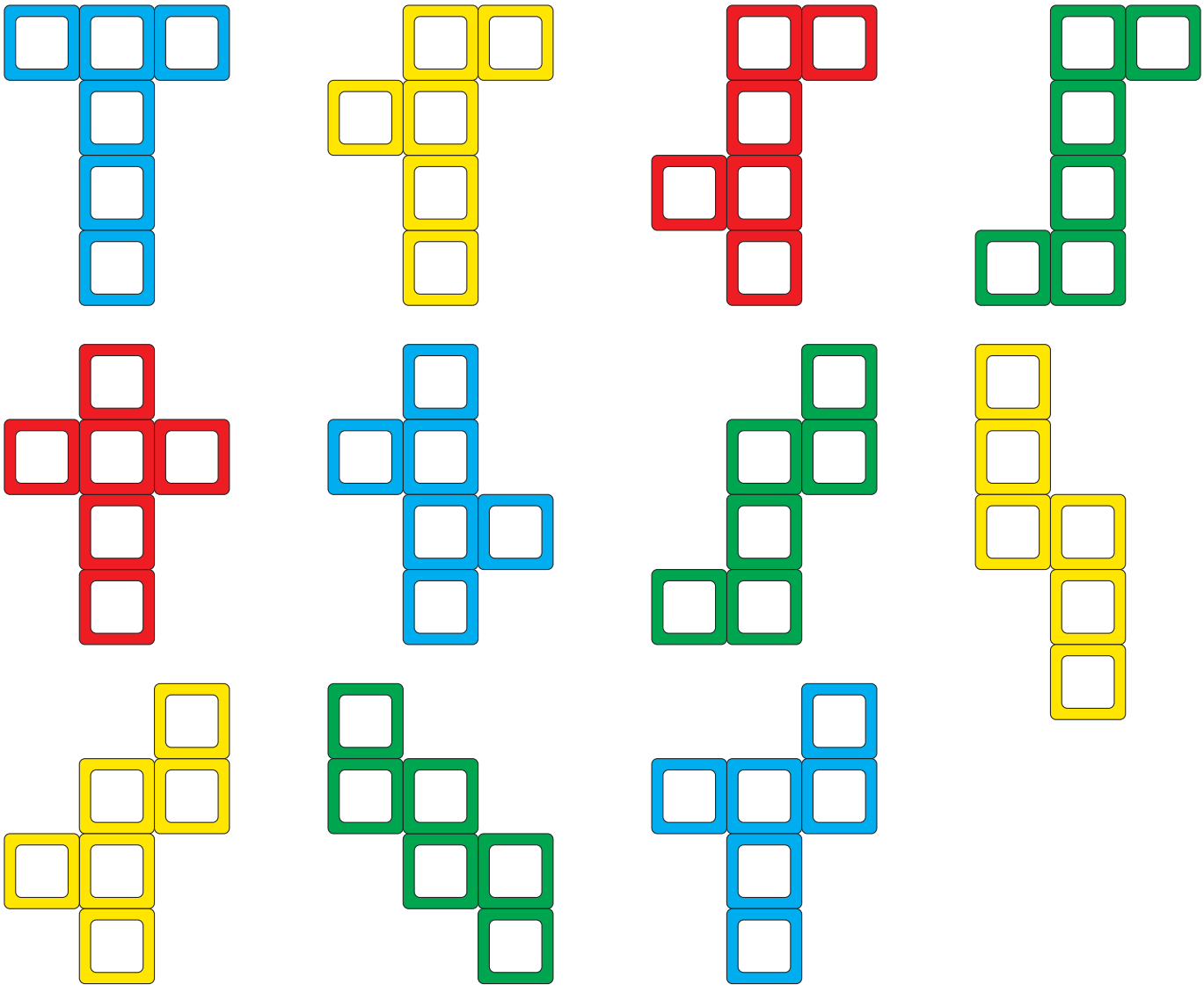
Discuss the following:

- How many different nets did you find?
- How can you be sure they are different?

Ask the students to write a few sentences discussing which nets were straightforward to find and which were more demanding. Ask them to explain why some are more difficult to find than others.

Working with Nets – Answers

There are 11 possible nets of a cube as shown below:

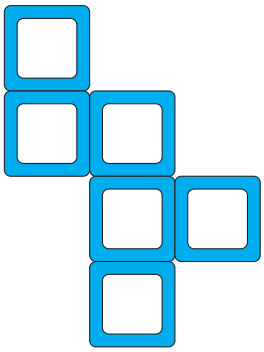


Working with Nets – Squares & Triangles

Focus

Students will explore a range of nets, starting with a cube (as a refresher of work carried out in the previous activity) and then continuing with the nets of solids that include triangles.

Warm-Up



- Hold up the net shown and ask the students to explain why they know it will fold to make a cube. Once you are satisfied with the explanations, fold it up to convince them.
- Ask the students to take four triangles and to join them together but not to fold them up. Ask them to decide if their four triangles will fold up to make a solid.
- Explain that the solid is called a tetrahedron and that the prefix 'tetra' comes from the Greek for four.
- Ask the students to take four triangles and one square and to make the net of a pyramid.

Once they are happy with nets that combine both triangles and squares they are ready for the exploration.

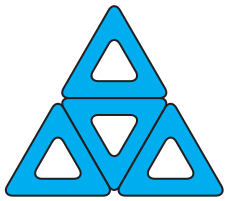
Explore

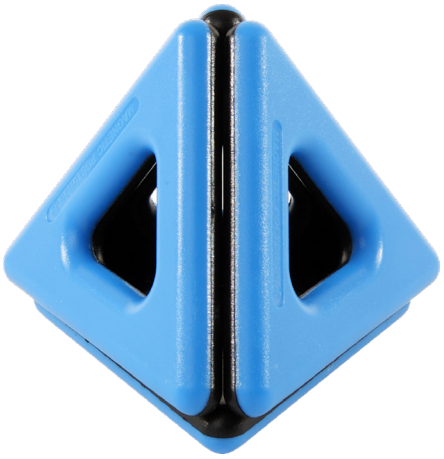
Invite the students to make nets of a variety of simple solids and to challenge their partners to describe the solid that each of the nets will make.

On pages 6 and 7, you can view a variety of shapes that can be constructed.

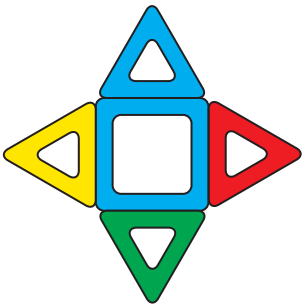
Working with Nets – Squares & Triangles

Tetrahedron

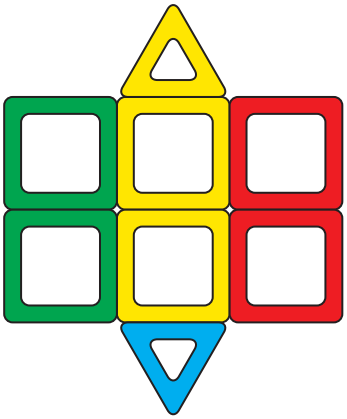


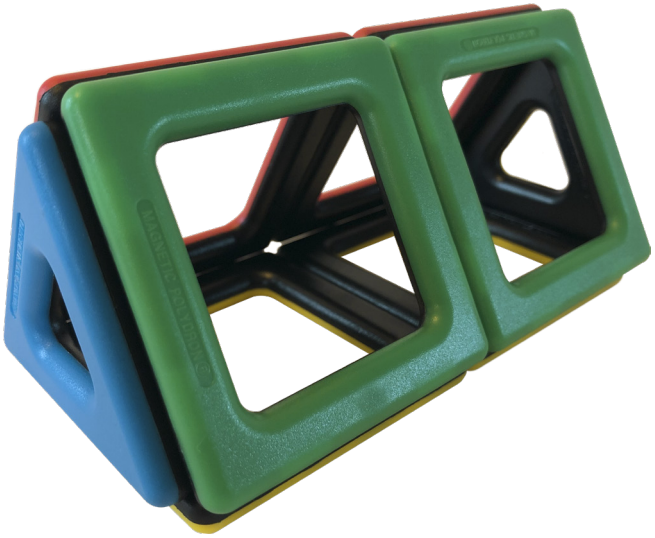


Square Based Pyramid



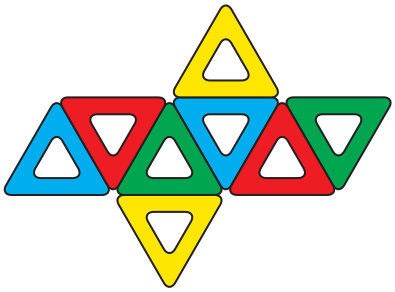
Triangular Prism



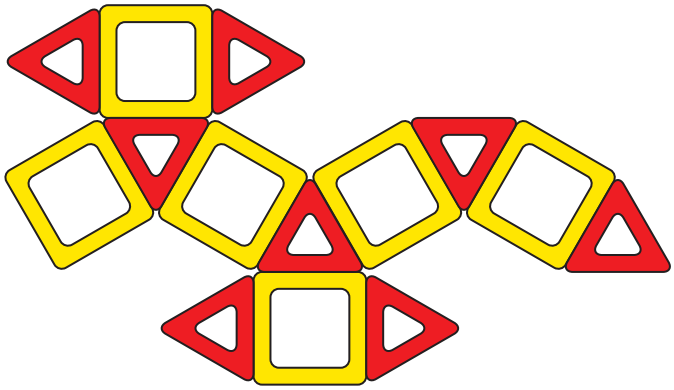


Working with Nets – Squares & Triangles

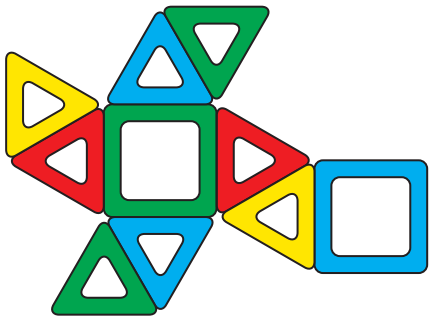
Octahedron



Cuboctahedron

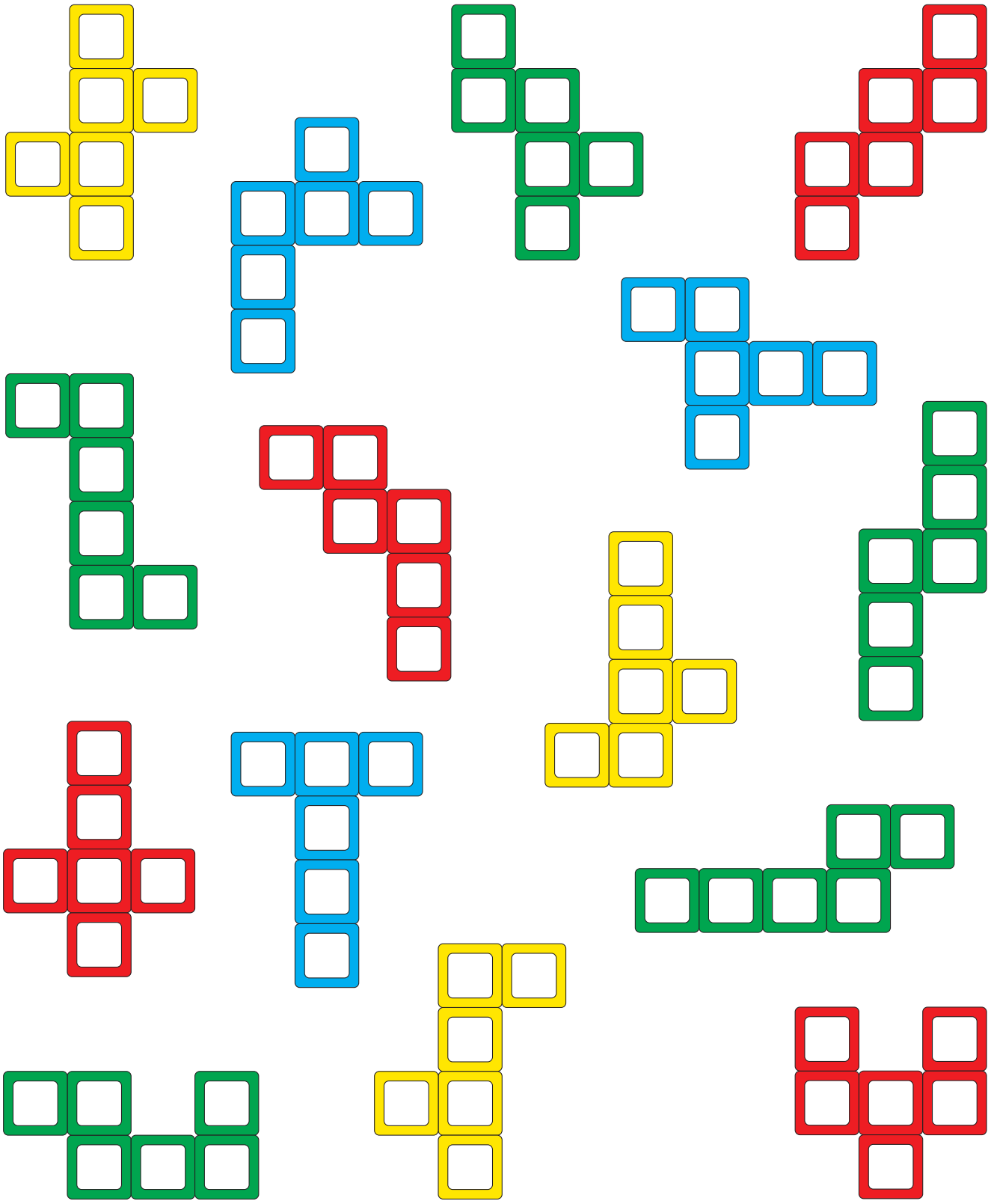


Square Based Antiprism



Nets of a Cube Puzzle

- A cube is made from 6 squares. Below are 15 nets – 11 make a cube.
- Can you identify the 4 which cannot be folded to make a cube?



Faces, Vertices & Edges

- This cube has 6 faces, 8 vertices or corners and 12 edges. Make one and check.
- Make a collection of solids like the ones below.
- Make a larger copy of the table below.
- For each solid, record the the number of faces (F), the number of vertices (V) and the number of edges (E).

Name of Solid	Faces (F)	Vertices (V)	Edges (E)	F+V
Cube	6	8	12	14

- In the final column record the sum F + V.
- Try to find a relationship between the number of faces (F), vertices (V) and edges (E), for each of your solids.
- This relationship is sometimes called Euler's formula, named after the 18th century Swiss mathematician, Leonhard Euler.