

## Volume!

\_\_\_ **Question:** What is for you a length, an area and a volume? If you had to measure them how would you do and what would be the result?

\_\_\_ **Formulae:** What is the area of a square of edge length  $a$ ? the volume of a cube of edge length  $a$ ?

\_\_\_ What happens if I double or triple the edge ? You can investigate with small paper squares and cubic dice.

### Play time!

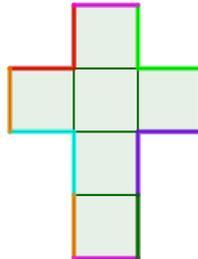
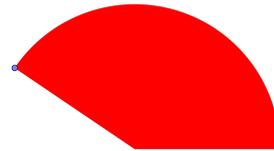
\_\_\_ **Hands on:** Build a cube, a cone, a pyramid or a cylinder using paper and duct tape.

\_\_\_ For the cube, draw carefully six attached squares in a cross, duct the corresponding sides.

\_\_\_ For the cone, decide of an angle, draw a circular sector of a given radius and glue the corresponding radii.

\_\_\_ For the pyramid, draw four times an isocetes triangle and glue the sides.

\_\_\_ For a cylinder, glue the top and bottom of a sheet of paper, then close it with an appropriate circle.



\_\_\_ **Smaller!** Once done, do it again but twice as small: every length is divided by two.

\_\_\_ **Fill it in!** Now count how many times you need to pour the smaller one to completely fill the large one.

\_\_\_ **And again!** If you have time, do it again but with an *enlargement* factor of  $\frac{3}{2}$ .

\_\_\_ **Conclusion? Try to build a conjecture:**

If you grow a body by a factor two, then the volume grows by a factor ...

If you grow a body by a certain factor  $a$ , then the volume grows by a factor ...

## The sphere

**Snapshots of a balloon.** Inflate a balloon with water and crimp it tight with your fingers. With a digital camera, take a snapshot of the balloon resting in your other hand, together with a ruler at the same depth. Empty the balloon in a measuring jug. Record both the size of the balloon and the associated volume of water. Do it several times (five or six) with an increasing volume of water. What would be the best way to make sense of this data? How does that look?

## Origamis

### Tetrahedra and octahedra.

Follow the instructions to build fours tetrahedra and one octahedron. Then use them to build a bigger tetrahedron.

What is the ratio of volume between the smaller and the larger tetrahedron?

What does it mean regarding the volume of the octahedron?

With your friends, unite to build a yet twice larger tetrahedron.