## Length, area and volume.

1. Draw the lines with the same shape as the lines below but twice increase the size (use ruler and compass!)


## 1 cm


2. How many square millimeters in one square centimeter? How many square meters in 1 square kilometer?
3. Can we measure the area in a triangles with side equale to 1 unit? How many such triangles in an equilateral triangle with side 7 units?
4. How the area of a square will change if we increase the length of the side 2 times? 3 times? $2 \frac{1}{2}$ times? How will change the area of a triangle if each of its side will be increase 2 times? 3 times?
5. How the area of the circle will change if the radius is increased two times? On the picture, the radius of the bigger circle is twice as big as the radius of the smaller circles. Prove that the area shaded blue is the same as the area shaded yellow.

6. Prove that the area of the green square is $13 \mathrm{~cm}^{2}$ (assuming that the grid is 1 cm in each dimension).
7. Draw the curved line with the same length, but covering the area $1 \mathrm{~cm}^{2}$ bigger then the ellipse on the picture. (hint, you can cut the figure)

8. On a graph paper draw a square with the area equal to 2 cells, 4 cells, 5, 8, 9, $10,16,17,20$ cells.

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9. Calculate the volume of the 3D shaped, build from cubes with the edge of 1 cm :


- Each plane figure or 2D body has size and shape. Equal figures have equal sizes and same shape.

Do we have enough information to really calculate the volume for the shapes above?
We use the cubed length unit to measure volume. How we can measure the volume of some irregular shape? In such case we can use water as a measuring tool. 11 is a volume of $1 \mathrm{dm}^{3}$ of water at room temperature and it is also 1 kg .


| gallon | ounces | liter |
| :---: | :---: | :---: |
| 1 | 128 | 3.78541178 |

10. How many cubes do you see on the picture?


When we draw a 3D shape we usually show the edges which we can see as a solid line and the edges we can't see as a dotted line.

11. On the picture below, show the cube seen from

bottom left

up left

bottom right
12. Which of the nets below are the nets of cube?



14

15

16

17

18

19

20

21

22

23
13. Which cube can be created out of this net?
14. On a on the right the caterpillar wants to go from vertex $G$ to vertex $E$ on the cube. Draw the shortest way for it to go. What will be the shortest way to go from the vertex $G$ to vertex A? Find all possible solutions.


17. Draw the wire on the cube from these views:

18. A farmer has a square field. He decided to divide his field between his four sons so that the parts of the field should be equal, but a quarter of the field he wants to keep for himself. How he can do it? If the field is an equilateral triangle?

