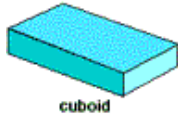


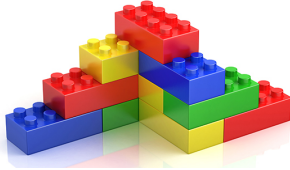
BRICKS, BLOCKS AND BOXES



Find a cuboid (with edges of integer values) that has a surface area of exactly 100 square units. Is there more than one?

It is quite easy to find a few solutions. The big challenge is to find all possible solutions.

What do you notice about this construction?



What do you notice about the dimensions of these building blocks? Look carefully at the blocks. How does the width of the block compare with the length?



Find the dimensions of a standard house brick in your country.

What do you notice about the width and the length of bricks?

Look at the way a wall is built.

Why do you think bricks are designed with these dimensions?

HELP

Try some dimensions for the cuboid and work out its surface area. Keep a record of everything you have tried.

Work with a partner or a group and between you split the work so you can check lots of surface areas and everyone does not have to check everything.

If you find a surface area near, but not exactly, 100 square units then try to find a solution by making small changes in the dimensions. For example for a 1 by 2 by 15 cuboid the surface area is 94 square units, so by changing one of these dimensions you might find a solution.

To answer the building questions, go and look at a wall and make some measurements.

If you can use some building blocks, then experiment by building some constructions that go around a corner as in the illustration shown. Take special notice of the ratios of the width and the length of the blocks.

NEXT

Cuboids with the same surface area

Find a convincing argument that all possible solutions have been found.

Once this has been answered, you might like to consider these extensions:

- Express the method for calculating surface area, algebraically.
- What total surface areas generate lots of cuboids? Which give none or just one?
- Could you set up a spreadsheet to help with the calculations?

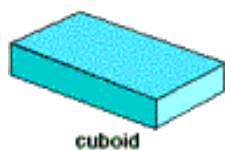
Building Application

Investigate dimensions for a double thickness wall with mortar 10 millimetres thick.

Investigate dimensions of paving slabs. When paving an area you are planning for 2 dimensions in contrast to building a 3 dimensional wall.

BLOCKS, BRICKS AND BOXES GAME FOR THE WHOLE CLASS

RULES



Players try to find cuboids with edges of integer values that have a surface area of exactly 100 square units.

At the start of the game decide whether players will join in the game individually or compete in pairs or small groups against other groups.

The players must keep a record of the dimensions of cuboids whose surface areas have been calculated.

A fixed time (for example 2 minutes) is given for each round of the game.

At the end of each round, for new results not considered already:

- 10 points are awarded for a bulls eye "100",
- 5 points for each surface area between 95 and 105,
- 2 points for surface areas between 90 and 95 or between 105 and 110.

Competition between groups works well If miscalculated results lose points giving motivation for peer checking and helping each other.

At the end of a game players should think about what they have achieved. Did they find all possible solutions? Which methods and ideas were most useful? What aspects of the problem remain unanswered?