

Quantity of windows

Determine the number of windows of the tower at Frankfurt's Westhafen.



The tower at Frankfurt's Westhafen (left picture) as well as the IG Metall high-rise building (Frankfurt, right picture) are good examples for the calculation of quantity of windows. For the IG Metall high-rise building, one should limit the task at one side of the building.

Data to be measured:

Number of rows and number of windows in each row.

Solution for the tower:

- Determine the number b of triangular windows in one row
- Determine the number h of rows
- Multiply b and h
- Deduct some windows for the entrance

Possible Hints:

- How many triangles are in one row?
- How many rows of windows does the tower have?
- How do you calculate the number of pieces in a puzzle?

Determine the number of windows of the IG Metall high-rise building at its west side.

Solution for the high-rise building:

- One has to divide the window front in two rectangles.
- The quantity of windows can be calculated through multiplying rows and columns.

Quantity of stones in a wall



A wall with irregular stones. It is important that the questioned area is clearly recognizable.

Determine the number of stones in the wall.

Data to be measured:

There are three possibilities to determine the number N of stones.

0. Count all stones. This is possible, but not useful.
1. One counts the number n of stones in 1 m^2 and projects it to the total area A . It is helpful to do this at different parts of the wall, especially when the stones differ in their sizes.
2. One determines the length and height of the wall in „stone units“. This means that one determines the number of stones in length l and in height h .

Solution:

1. $N = A \cdot n$ with A being the total area and n the number of stones per m^2 .
2. One multiplies h and l .

Possible hints:

- Determine the number of stones in a special area, e.g. 1 m^2 or 4 m^2 .
- Consider how often this area will fit into the total area.
- How do you calculate the number of pieces in a puzzle?

Quantity of paving stones in a determined area.



The paving stones are arranged in a semi-circle.



It is easier when the stones are arranged rectangular.

Determine the number of paving stones in the semi-circle.

Data to be measured:

There are three possibilities to determine the number N of stones.

0. Count all stones. This is possible, but not useful.
1. One counts the number n of stones in 1 m^2 and projects it to the total area A . As the stones all have the same size, it is enough to do it once.
2. One determines the radius r in „stone units“.

Solution:

1. $N = A \cdot n$ with A being the total area and n the number of stones per m^2 .
2. One determines the area of the semi-circle in paving stones $N = \frac{r^2 \cdot \pi}{2}$

Possible hints:

For circular areas:

- How do you determine the area of a circle?
- How many stones fit into $0,25\text{m}^2$?
- One can express the radius with the number of stones.

For rectangular areas:

- Determine the number of stones in a special area, e.g. 1m^2 or 4m^2 .
- Consider how often this area will fit into the total area.
- How do you calculate the number of pieces in a puzzle?