AREA UNITS

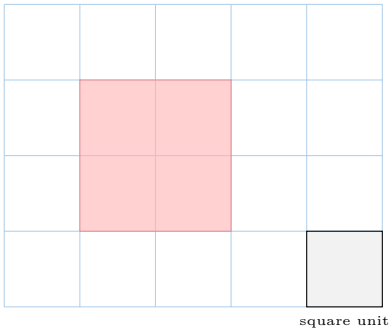
A AREA

Definition Area

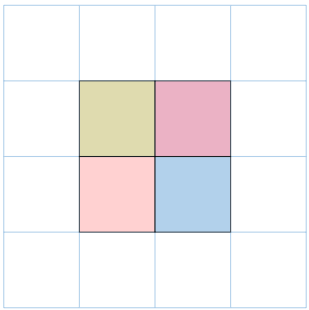
The **area** of a shape is the amount of space it covers on a flat surface. We measure it in square units, like square centimeters or square meters.

To find the area, imagine covering the shape with small squares, like tiles on a floor. Count how many squares fit inside the shape.

Ex: Find the area of the red shape:



Answer: To find the area, we count the number of unit squares inside the shape.



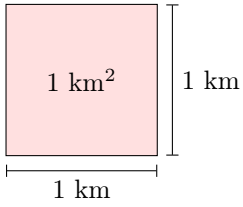
The area is 4 square units.

B UNITS OF AREA

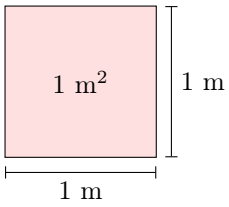
Discover: We can measure area using different units like tiles or paper squares. But these units are not the same for everyone. Your friend might have a bigger tile than yours, making it hard to compare. To solve this, mathematicians created universal units like the square centimeter and square meter, so everyone can measure and compare areas the same way.

Definition **Units of Area**

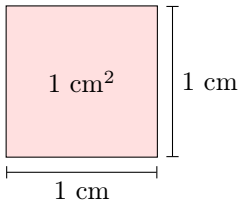
- Square Kilometer $\left(\text{km}^2\right)$: A very large unit of area, about the size of a small town.



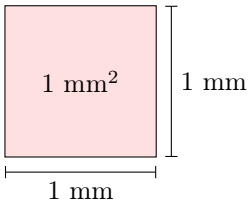
- Square Meter $\left(\text{m}^2\right)$: A larger unit of area, about the space it takes for you to lie down with your arms by your sides.



- Square Centimeter $\left(\text{cm}^2\right)$: A small unit of area, about the size of a big toe nail for a 6-year-old boy.

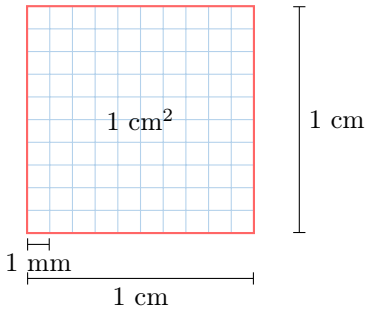


- Square Millimeter $\left(\text{mm}^2\right)$: A very small unit of area, about the size of a tiny dot made by a pencil.



C CONVERSION OF AREA UNITS

Discover: Let's explore how area units are related by looking at a small square. Below is a square that measures 1 cm by 1 cm, which is 1 cm^2. We divide it into smaller squares, each 1 mm by 1 mm (1 mm^2). Let's count how many 1 mm^2 squares fit inside 1 cm^2.



Each small square is 1 mm^2. There are 10 small squares along the length and 10 along the width, so there are $10 \times 10 = 100$ small squares in total. Therefore, 1 cm^2 contains 100 mm^2.

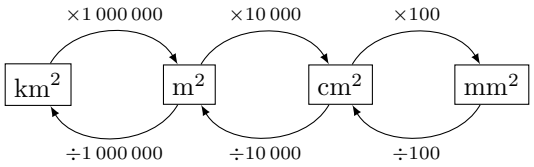
$$\begin{aligned} 1\ \text{cm}^2 &= 1\ \text{cm} \times 1\ \text{cm} \\ &= 10\ \text{mm} \times 10\ \text{mm} \quad (1\ \text{cm} = 10\ \text{mm}) \\ &= 10 \times 10 \times 1\ \text{mm} \times 1\ \text{mm} \\ &= 100\ \text{mm}^2 \end{aligned}$$

Proposition **Conversion of Area Units**

- $1\,\text{km}^2 = 1\,000\,000\,\text{m}^2$
- $1\,\text{m}^2 = 10\,000\,\text{cm}^2$
- $1\,\text{cm}^2 = 100\,\text{mm}^2$

Method **Converting Using Multiplication or Division**

- Use **multiplication** to go from a larger unit to a smaller one (like square meters to square centimeters).
- Use **division** to go from a smaller unit to a larger one (like square centimeters to square meters).



Method **Converting Using a Table**

To convert between units of area, we can use a conversion table. For example, to convert 10.5 square meters to square centimeters:

1. Write the units in the table: km^2, m^2, cm^2, mm^2.

km^2		ha			m^2			cm^2		mm^2	

2. Place the number in the column of the unit you start with.

km^2		ha			m^2			cm^2		mm^2	
					1	0.	5				

3. Fill in zeros in the columns to the right until you reach the unit you want to convert to.

km^2		ha			m^2				cm^2		mm^2	
					1	0.	5	0	0	0		

4. Read the number in the column of the target unit.

So, $10.5\ \text{m}^2 = 10\,500\ \text{cm}^2$.