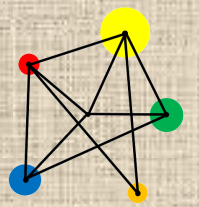
Units of Measurement



Understand units of length, mass and volume

Convert between metric units

Vocabulary

Unit
A unit of measurement is a standard amount of a quantity, such as metres, seconds or kilograms.

Prefix
A group of letters added to the beginning of a word to make a new word.

Metric
A system of standard units of measurement used around the world

Key Facts : Prefixes

kilo means 1000

centi means $\frac{1}{100}$

milli means $\frac{1}{1000}$

1 kilometre = 1000 metres

1 metre = 100 centimetres

1 metre = 1000 milliimetres

1 centimetre = 10 milliimetres

Examples

a) 1 kg = 1000 g

Convert 12 400 g to kg

b) 1 g = 1000 mg

Convert 80 mg to g

Examples

a) 1 kg = 1000 g

Convert 12 400 g to kg

12 400 ÷ 1000 = **12.4kg**

b) 1 g = 1000 mg

Convert 80 mg to g

80 ÷ 1000 = **0.08 g**

Exercise

2 m = _____cm

5 km = _____m

0.6 kg = _____g

2 litres = _____ml

35cm = _____m

5 000g = _____kg

0.4cm = _____mm

50 cm = _____ km

1 km ÷ 1000 = _____cm

1 cm x 100 = _____m

0.1 l x 1000 = _____ cl

1 cm ÷ 10 = _____mm

1 cm x 1000 000 = _____km

40cm ÷ 10mm = _____

0.1 kg ÷ 1 g = _____

1 km ÷ 1 mm = _____

$\frac{3}{4}\ m = ____cm$

$\frac{\square}{\square}\ km = 200m$

$\frac{1}{1000}\ m = ____cm$

$\frac{\square}{\square}\ l = 140\ cl$

$10\%\ of\ 20\%\ of\ 1m = ____\ cm$

Solutions

2 m = 200 cm

5 km = 5000 m

0.6 kg = 600 g

2 litres = 2000 ml

35cm = 0.35 m

5 000g = 5 kg

0.4cm = 4 mm

50 cm = 0.0005 km

1 km ÷ 1000 = 1 cm

1 cm x 100 = 1 m

0.1 l x 1000 = 10 000 cl

1 cm ÷ 10 = 1 mm

1 cm x 1000 000 = 10 km

40cm ÷ 10mm = 4

0.1 kg ÷ 1 g = 100

1 km ÷ 1 mm = 1 000 000

$\frac{3}{4}\ m = ____ cm$

75

$\frac{1}{5}\ km = 200m$

0.1

$\frac{1}{1000}\ m = ___ cm$

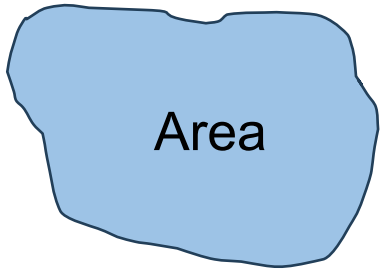
$\frac{7}{5}\ l = 140\ cl$

2

$10\%\ of\ 20\%\ of\ 1m = ____\ cm$

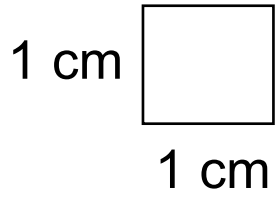
Key Fact

Area is a measure of the 2-dimensional space inside a shape.



Areas can be measured in cm^2.

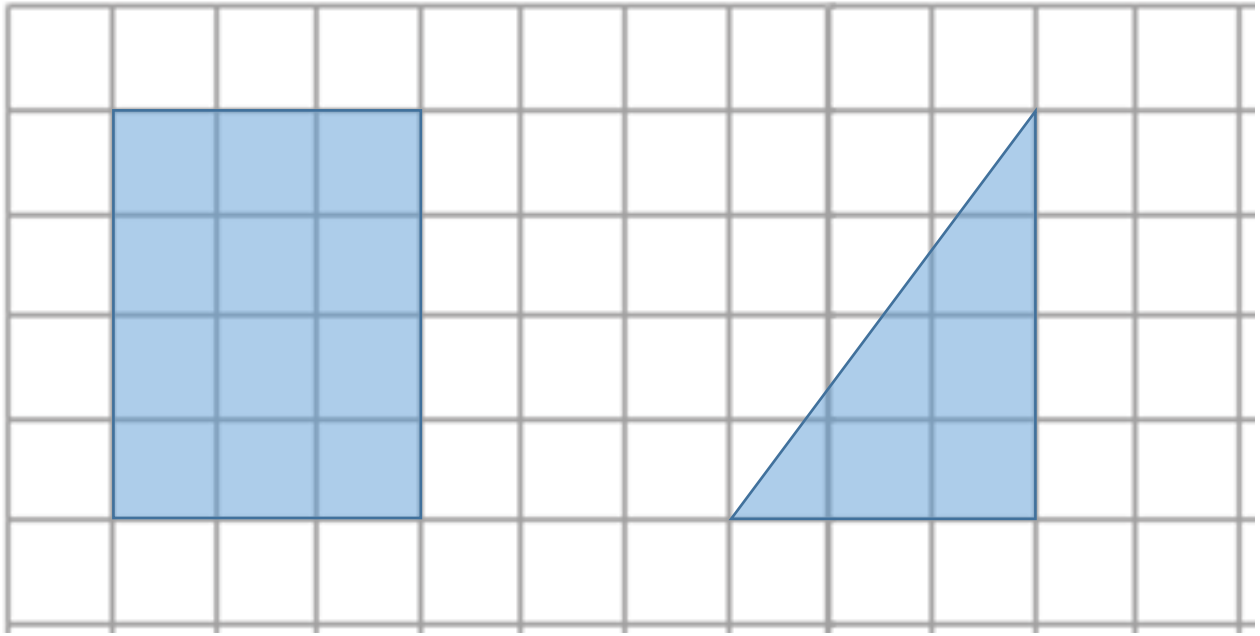
$1cm^2$ is the basic unit of area.



Examples

These shapes are drawn on a centimeter grid.

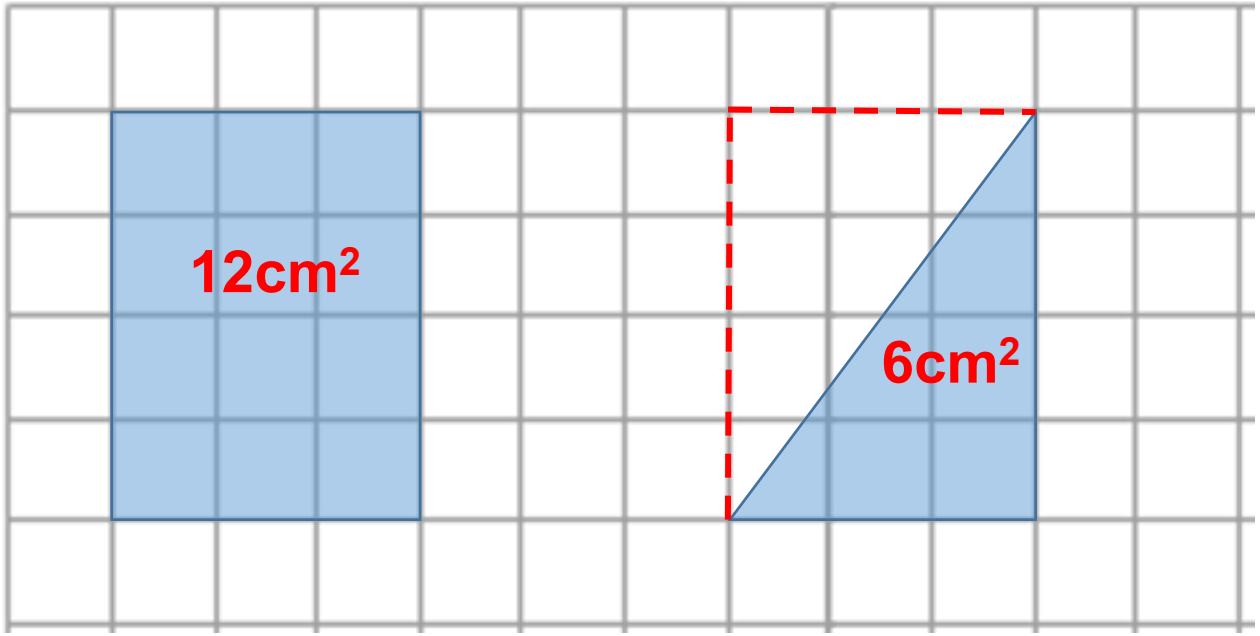
Work out the area of each shape.



Solutions

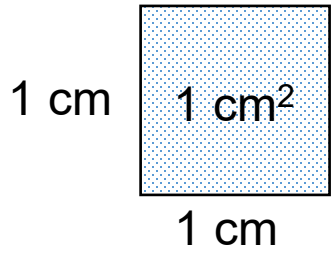
These shapes are drawn on a centimeter grid.

Work out the area of each shape.

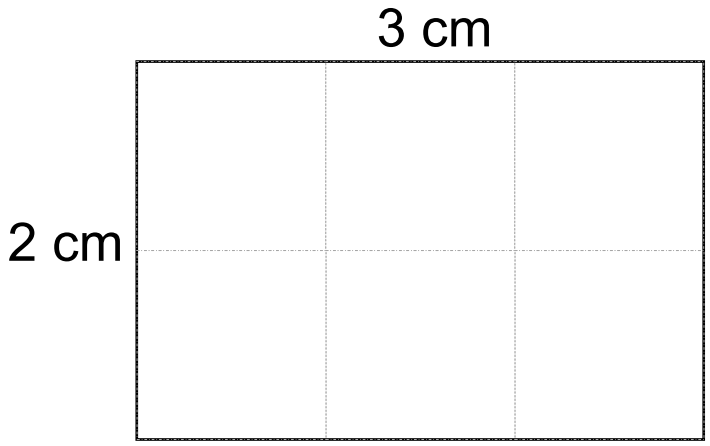


Key Fact

A **unit** of area is 1cm^2.



The area of this rectangle is 6cm^2.



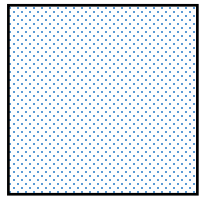
Key Fact

Lengths are measured in km , m , cm , mm.

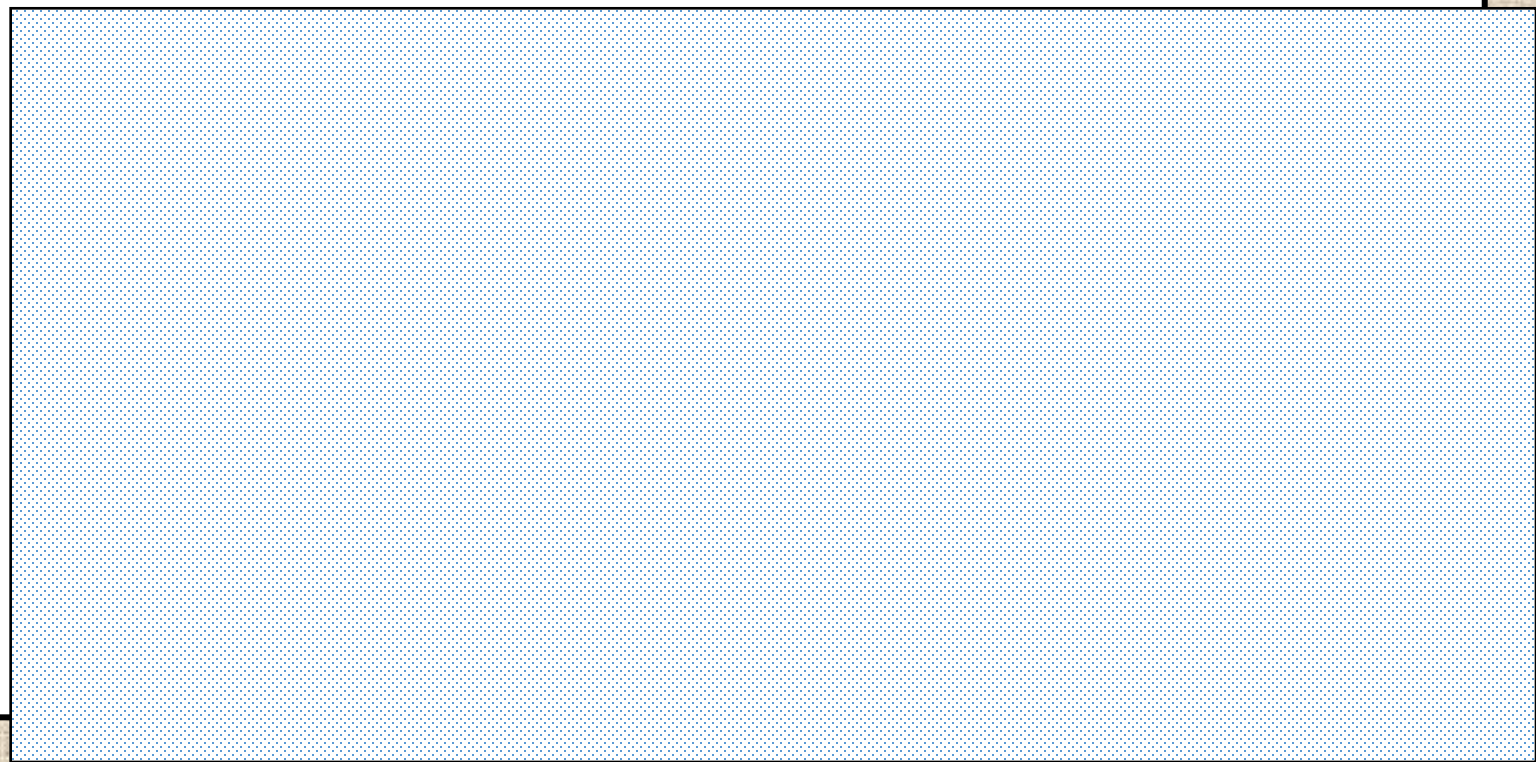
Areas are measured in km^2 , m^2, cm^2, mm^2.

$1mm^2$

$1cm^2$



$1m^2$ (too large to display)



Question

Which unit would you use to measure the area of:

a) The area of the front cover of your exercise book

b) The surface area of a raindrop

c) The area of France

d) The area of your classroom floor

Solutions

Which unit would you use to measure the area of:

a) The area of the front cover of your exercise book **cm^2**

b) The surface area of a raindrop **mm^2**

c) The area of France **km^2**

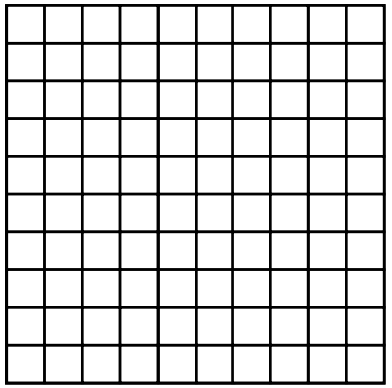
d) The area of your classroom floor **m^2**

Question

How many mm^2 are there in $1cm^2$?

□

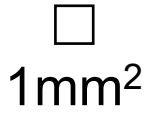
$1mm^2$



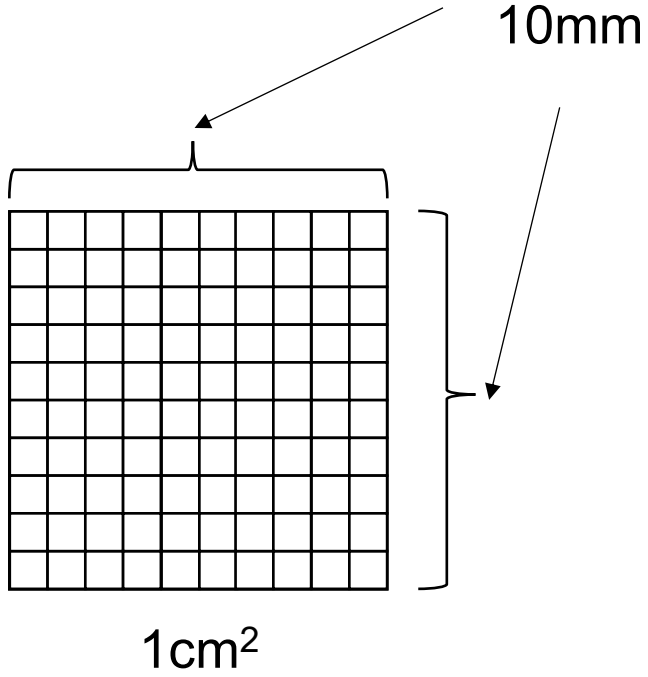
$1cm^2$

Solution

How many mm^2 are there in $1cm^2$?



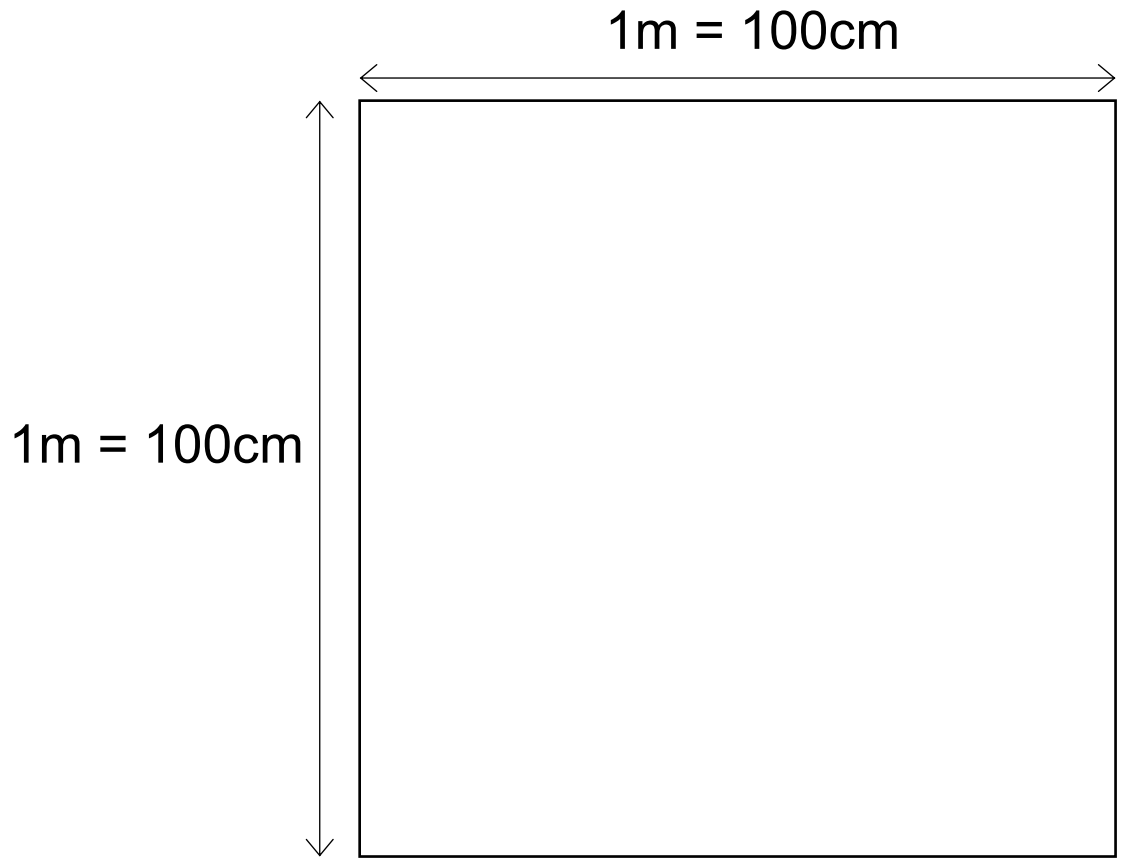
$1mm^2$



$1cm^2 = 100\ mm^2$

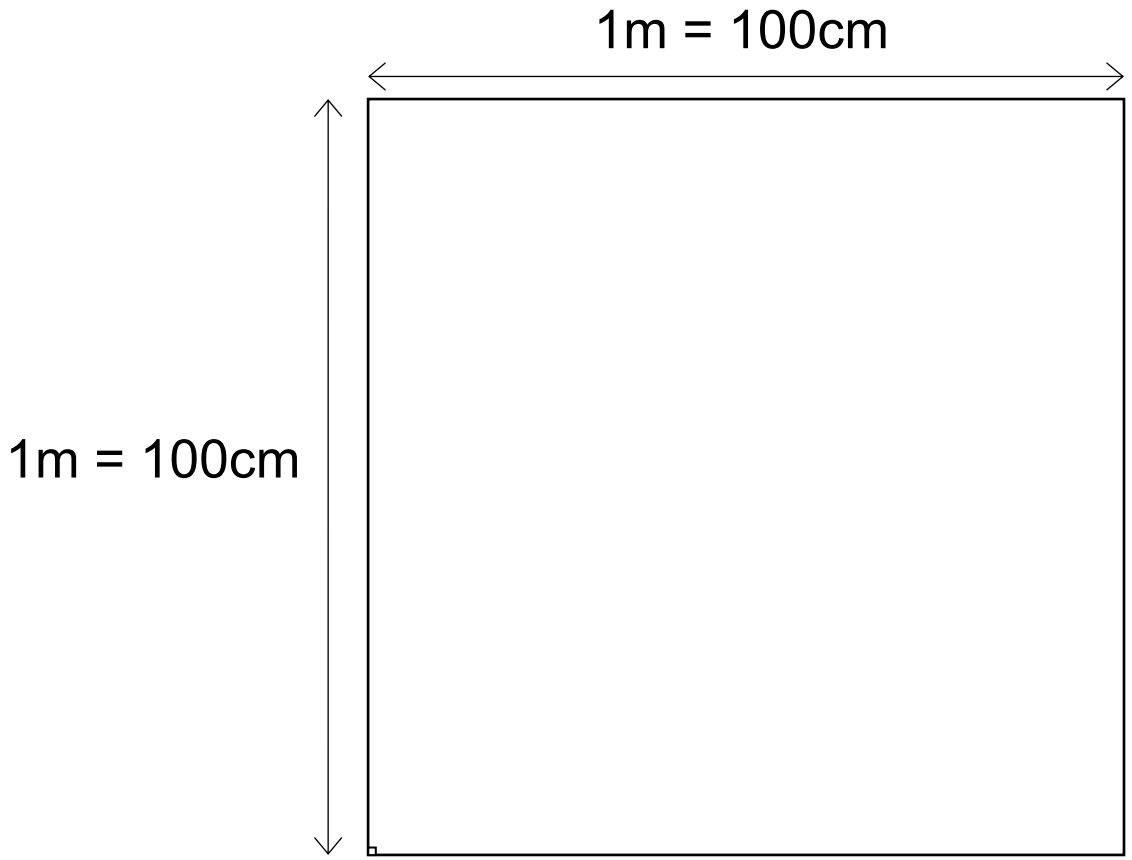
Question

How many cm^2 are there in $1m^2$?



Solution

How many cm^2 are there in $1m^2$?



$1m^2$ contains 100 x 100 = 10 000m^2

Exercise

1 cm^2 = _____ mm^2

1 m^2 = _____ cm^2

1 m^2 = _____ mm^2

1 km^2 = _____ m^2

10 cm^2 = _____ mm^2

3.2 cm^2 = _____ mm^2

1 mm^2 = _____ cm^2

1 mm^2 = _____ m^2

0.1 m^2 = _____ cm^2

0.01 km^2 = _____ m^2

10 m^2 = _____ km^2

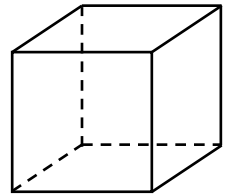
1 km^2 = _____ mm^2

The label on a 5 litre tin of paint states that 5 litres of paint will cover 60m^2.

Maya wishes to paint all the faces of of this cube.

Will one tin of paint be enough?

3m



Solutions

1 cm^2 = 100 mm^2

1 m^2 = 10 000 cm^2

1 m^2 = 1 000 000 mm^2

1 km^2 = 1 000 000 m^2

10 cm^2 = 1 000 mm^2

3.2 cm^2 = 320 mm^2

1 mm^2 = 0.01 cm^2

1 mm^2 = 0.000 001 m^2

0.1 m^2 = 1 000 cm^2

0.01 km^2 = 10 000 m^2

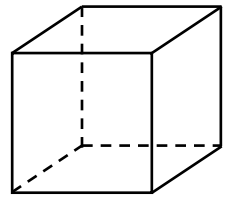
10 m^2 = 0.000 01 km^2

1 km^2 = 1 000 000 000 000 mm^2

The label on a 5 litre tin of paint states that 5 litres of paint will cover 60m^2.

Maya wishes to paint all the faces of of this cube.

Will one tin of paint be enough?



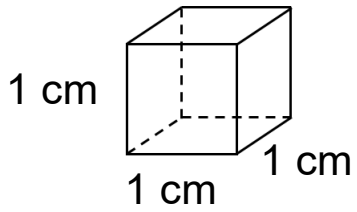
Yes because the total surface area of the cube is 54m^2

Key Fact

Volume is a measure of the 3-dimensional space inside a solid.

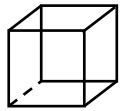
Volume can be measured in cm^3.

$1\ cm^3$

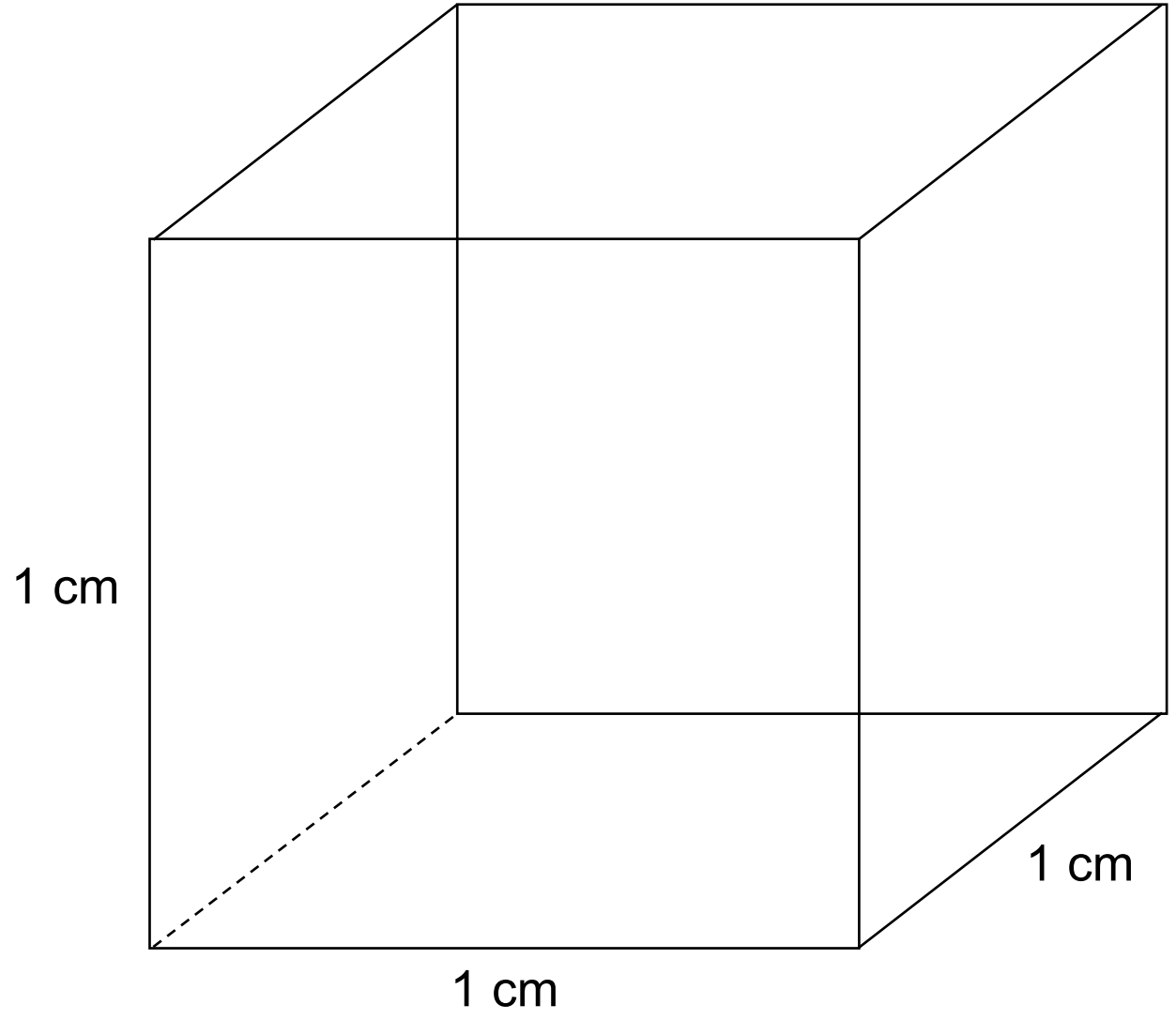


Question

How many mm^3 are there in $1cm^3$



1 mm^3



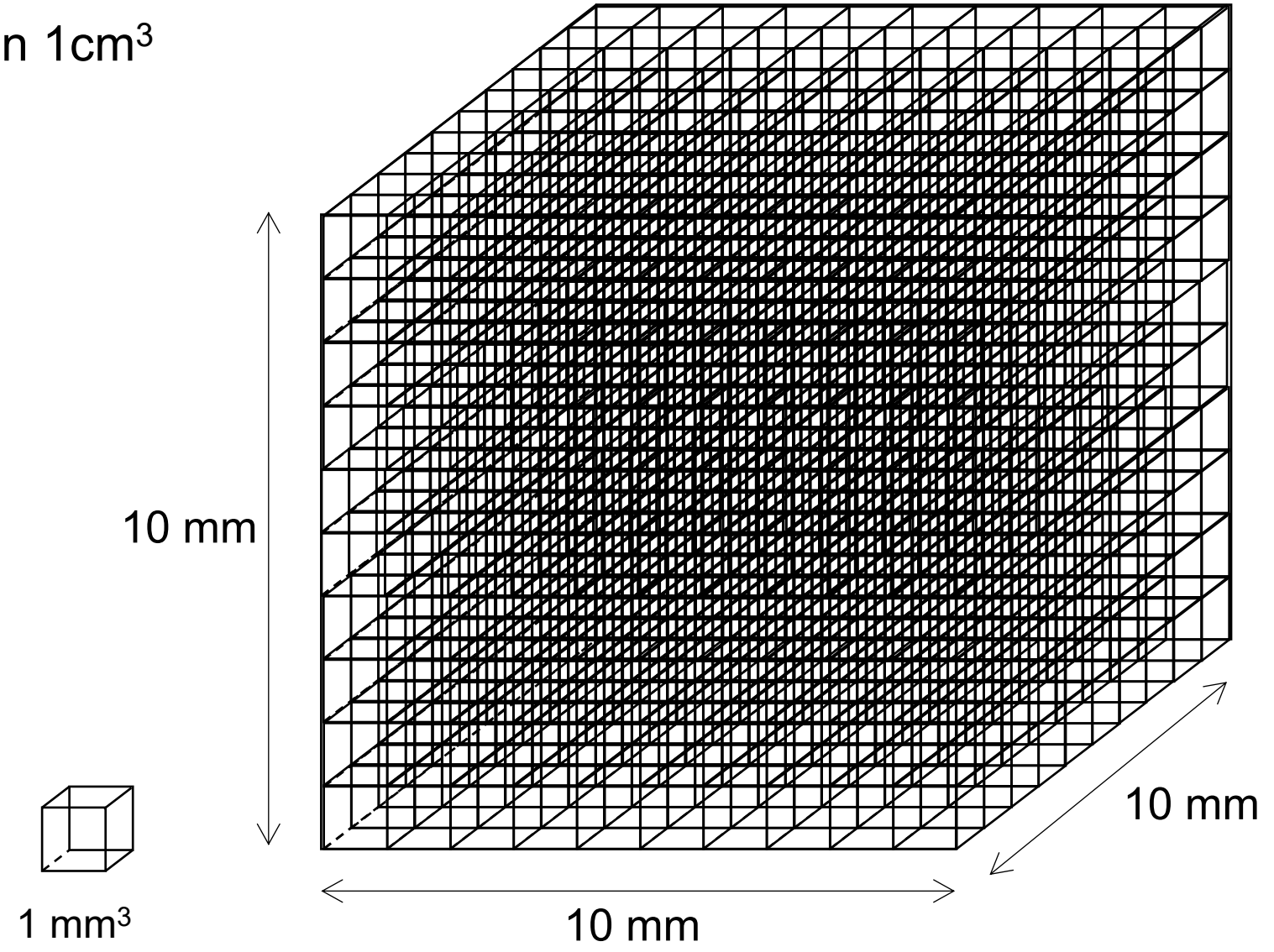
Solution

How many mm^3 are there in $1cm^3$

$1cm^2$ contains:

10 x 10 x 10

= $1000mm^2$



Exercise

1 cm^3 = _____ mm^3

1 m^3 = _____ cm^3

1 m^3 = _____ mm^3

1 km^3 = _____ m^3

1 km^3 = _____ cm^3

1 km^3 = _____ mm^3

4 cm^3 = _____ mm^3

0.01 m^3 = _____ cm^3

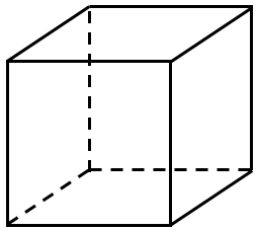
1001mm^3 = _____ cm^3

$\frac{1}{1000}$ km^3 = _____ m^3

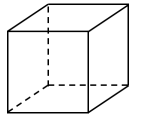
1 mm^3 = _____ cm^3

Here are two cubes.

A



B



The sides of cube A are twice as long as the sides of cube B.

What is the ratio

$$\frac{\textit{Volume of cube A}}{\textit{Volume of cube B}}$$

Solutions

1 cm^3 = 1 000 mm^3

1 m^3 = 1 000 000 cm^3

1 m^3 = 1 000 000 000 mm^3

1 km^3 = 1 000 000 000 m^3

1 km^3 = 10^{15} cm^3

1 km^3 = 10^{18} mm^3

Note: 10^{18} is the number consisting of 1 followed by 18 zeroes.

4 cm^3 = 4 000 mm^3

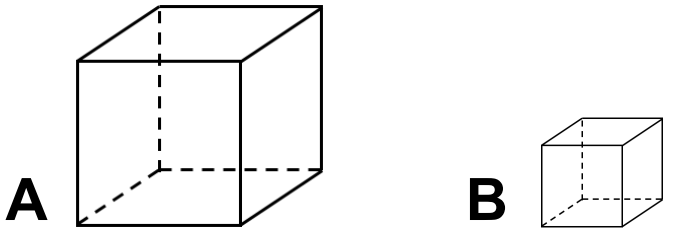
0.01 m^3 = 10 000 cm^3

1001mm^3 = 1.001 cm^3

$\frac{1}{1000}$ km^3 = 10^6 m^3

1 mm^3 = 0.001 cm^3

Here are two cubes.



The sides of cube A are twice as long as the sides of cube B.

What is the ratio

$$\frac{\textit{Volume of cube A}}{\textit{Volume of cube B}}$$

8 : 1

Other units you may meet

Length

I nanometre = 0.000 000 001m

Area

I hectare = 10 000 m^2

Volume

I litre = 1000 cm^3

Here are the full set of metric prefixes used for multiples of metres, grams etc.

peta	1 000 000 000 000 000
tera	1 000 000 000 000
giga	1 000 000 000
mega	1 000 000
kilo	1 000
hecto	100
deca	10

These prefixes describe fractions of a metre, grams etc.

deci	$\frac{1}{10}$
centi	$\frac{1}{10}$
giga	$\frac{1}{10}$
milli	$\frac{1}{10}$
micro	$\frac{1}{10}$
nano	$\frac{1}{10}$
pico	$\frac{1}{10}$
femto	$\frac{1}{10}$

Exam Style Question

a) Write 450 centimetres in metres.

b) Write 0.89 litres in millilitres.

c) Work out 5.7m + 73cm.

Give your answer in m.

d) Write 1200m as a fraction of 3km .

Give your answer in its simplest form.

Solution

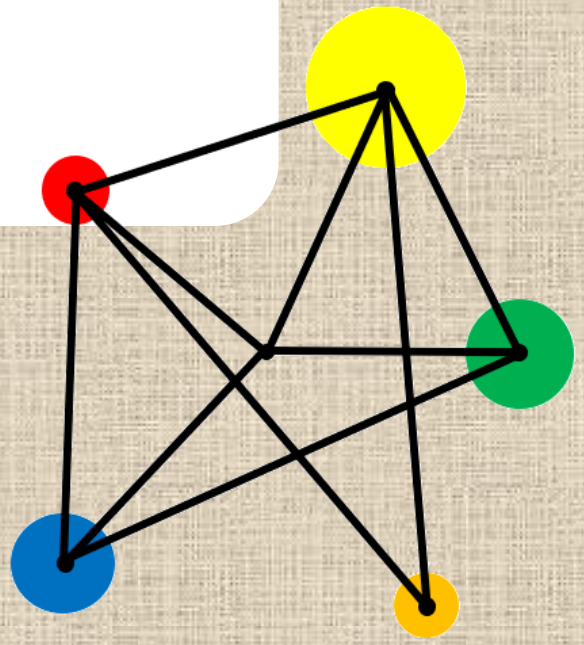
a) Write 450 centimetres in metres. *4.5m*

b) Write 0.89 litres in millilitres. *890ml*

c) Work out 5.7m + 73cm. *5.7m + 0.73m = 6.43m*

Give your answer in m.

d) Write 1200m as a fraction of 3km .

Give your answer in its simplest form. $\frac{1200}{3000} = \frac{2}{5}$

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