CONVERTING AREA AND VOLUME UNITS

BUILDING BLOCKS

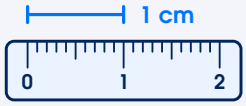
NAME _____ CLASS _____ DATE _____

KEY IDEA

There are 10 millimetres in 1 centimetre.

1 cm = 10 mm

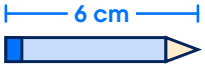
Do the same to both sides of a frame.



× 4 (1 cm = 10 mm / 4 cm = 40 mm) × 4

1 Use the frames to change the units. Do the same to both sides.

a) **The pencil is 6 cm long.**



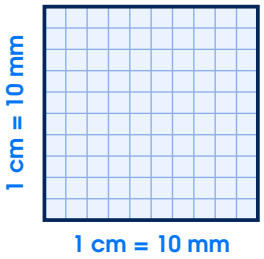
b) **3 metre sticks:**



× 6 (1 cm = 10 mm / 6 cm = ____ mm) ____

____ (1 m = 100 cm / 3 m = ____ cm) ____

2 This square is 1 cm by 1 cm. It is split into small squares that are 1 mm by 1 mm.



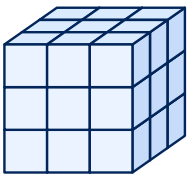
a) Small squares in each row: ____

b) Number of rows: ____

c) ____ × ____ = ____ small squares

d) So 1 cm² = ____ mm²

3 Count the small cubes. Then use the same idea for a 1 cm cube made of 1 mm cubes.



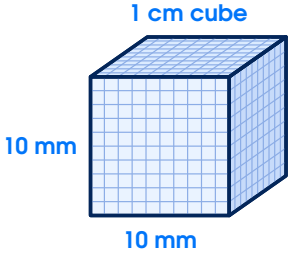
3 by 3 by 3

a) Cubes in one layer: 3 × 3 = ____

b) Number of layers: ____

c) Cubes altogether: ____

d) 1 cm³ = 10 × 10 × 10 = ____ mm³



4 Complete the function machines.

8	× 10	____	3	× 100	____	5	× 1000	____
90	÷ 10	____	700	÷ 100	____	4000	÷ 1000	____

CONVERTING AREA AND VOLUME UNITS

SUPPORT

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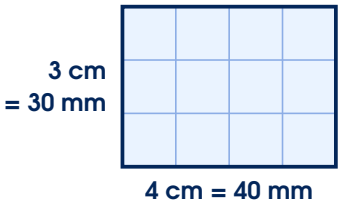
KEY IDEA

1 cm = 10 mm, so 1 cm² = 10 × 10 = 100 mm²
and 1 cm³ = 10 × 10 × 10 = 1000 mm³
1 m = 100 cm, so 1 m² = 100 × 100 = 10 000 cm²

Do the same to both sides of the frame.

1 cm² = 100 mm² (× 7)
7 cm² = 700 mm² (× 7)

1 This rectangle is 4 cm by 3 cm. Its sides are also shown in mm.



a) Area in cm²: 4 × 3 = ____ cm²

b) Area in mm²: 40 × 30 = ____ mm²

c) So 1 cm² = ____ mm²

2 Change between cm² and mm². Do the same to both sides.

a) Change 8 cm² to mm².

1 cm² = 100 mm² (× 8)
8 cm² = ____ mm² (× ____)

b) Change 1500 mm² to cm².

____ (**1 cm² = 100 mm²**) ____
____ cm² = **1500 mm²**

3 Change between m² and cm².

A 1 m square is 100 cm by 100 cm: 100 rows of 100 squares of 1 cm².

a) Change 4 m² to cm².

1 m² = 10 000 cm² (× 4)
4 m² = ____ cm² (× ____)

b) Change 70 000 cm² to m².

____ (**1 m² = 10 000 cm²**) ____
____ m² = **70 000 cm²**

4 Change between cm³ and mm³.

A 1 cm cube is 10 mm by 10 mm by 10 mm: 10 × 10 × 10 = 1000 cubes of 1 mm³.

a) Change 5 cm³ to mm³.

1 cm³ = 1000 mm³ (× 5)
5 cm³ = ____ mm³ (× ____)

b) Change 9000 mm³ to cm³.

____ (**1 cm³ = 1000 mm³**) ____
____ cm³ = **9000 mm³**

CONVERTING AREA AND VOLUME UNITS

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

	length	area	volume
cm and mm	× 10	× 10^2 = × 100	× 10^3 = × 1000
m and cm	× 100	× 100^2 = × 10 000	× 100^3 = × 1 000 000

× 3 (1 cm^3 = 1000 mm^3 ; 3 cm^3 = 3000 mm^3) × 3

To a smaller unit ×, to a bigger unit ÷. 1 litre = 1000 cm^3

FLUENCY

1 Change each area to the unit shown. Fill in the frames and the operations.

a) 6.4 cm^2 to mm^2

□ (1 cm^2 = 100 mm^2 ; □ = □) □

b) 51 000 cm^2 to m^2

□ (1 m^2 = 10 000 cm^2 ; □ = □) □

2 Change each volume to the unit shown. Fill in the frames and the operations.

a) 2.3 cm^3 to mm^3

□ (1 cm^3 = 1000 mm^3 ; □ = □) □

b) 4 600 000 cm^3 to m^3

□ (1 m^3 = 1 000 000 cm^3 ; □ = □) □

REASONING

3 Jade changes 7 cm^2 to mm^2. She writes: 7 × 10 = 70 mm^2

a) Explain Jade's mistake. .....

.....

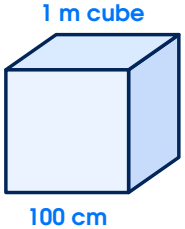
b) Write the correct answer. 7 cm^2 = □ mm^2

4 Kai says, "1 m = 100 cm, so 1 m^3 = 100 cm^3."

a) Convince Kai that he is wrong.

.....

.....



b) 1 litre = 1000 cm^3. How many litres fill a 1 m cube? □ litres

CONVERTING AREA AND VOLUME UNITS

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

REASONING

1 Is each statement always, sometimes or never true? Circle your answer.

Give an example or a reason for each answer.

a) To change m^2 to cm^2, multiply by 100. ALWAYS SOMETIMES NEVER

b) A shape with area 1 m^2 has a side of 100 cm. ALWAYS SOMETIMES NEVER

c) To change cm^3 to litres, divide by 1000. ALWAYS SOMETIMES NEVER

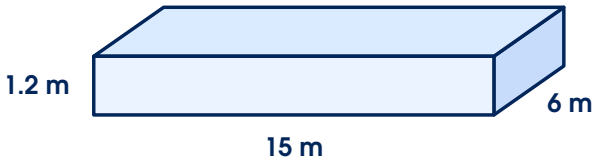
PROBLEM SOLVING

2 Write each list in order of size, smallest first. Show your conversions.

a) 0.07 m^2 | 650 cm^2 | 68 000 mm^2 | 0.069 m^2

b) 2.4 litres | 2050 cm^3 | 0.0025 m^3 | 2 300 000 mm^3

3 A swimming pool is a cuboid 15 m long and 6 m wide. It is filled with water to a depth of 1.2 m. (1 litre = 1000 cm^3)



a) Volume of water in m^3 ____

b) Volume in litres ____

c) Water flows in at 400 litres a minute. How many hours to fill it? ____ hours

★ CHALLENGE FOR ALL

4 A box is a cuboid 2 m long, 50 cm wide and 80 mm high.



a) Volume in cm^3 ____

b) Volume in litres ____

c) Volume in m^3 ____

d) How many cubes with 2 cm sides would exactly fill the box? ____

CONVERTING AREA AND VOLUME UNITS ? ANSWERS

ANSWERS

BUILDING BLOCKS

1 a) × 6 on both sides: 6 cm = 60 mm b) × 3 on both sides: 3 m = 300 cm
2 a) 10 b) 10 c) 10 × 10 = 100 small squares d) 1 cm^2 = 100 mm^2
3 a) 9 b) 3 c) 27 d) 1 cm^3 = 1000 mm^3
4 80 · 300 · 5000 · 9 · 7 · 4

SUPPORT

1 a) 12 cm^2 b) 1200 mm^2 c) 1 cm^2 = 100 mm^2 (1200 ÷ 12)
2 a) × 8 on both sides: 800 mm^2 b) × 15 on both sides: 15 cm^2
3 a) × 4 on both sides: 40 000 cm^2 b) × 7 on both sides: 7 m^2
4 a) × 5 on both sides: 5000 mm^3 b) × 9 on both sides: 9 cm^3

CORE

1 a) × 6.4 on both sides: 6.4 cm^2 = 640 mm^2 b) × 5.1 on both sides: 5.1 m^2 = 51 000 cm^2 (or ÷ 10 000: 51 000 ÷ 10 000 = 5.1 m^2)
2 a) × 2.3 on both sides: 2.3 cm^3 = 2300 mm^3 b) × 4.6 on both sides: 4.6 m^3 = 4 600 000 cm^3
3 a) She used the length factor. 1 cm^2 = 10 × 10 = 100 mm^2, so multiply by 100, not 10. b) 700 mm^2
4 a) A 1 m cube is 100 cm by 100 cm by 100 cm, so 1 m^3 = 100 × 100 × 100 = 1 000 000 cm^3, not 100 cm^3 (100 cm^3 would only fill a 100 cm by 1 cm by 1 cm row). b) 1 000 000 ÷ 1000 = 1000 litres

GREATER DEPTH

1 a) never (multiply by 100^2 = 10 000) b) sometimes (a 1 m square does; a 2 m by 50 cm rectangle does not) c) always (1 litre = 1000 cm^3)
2 a) 650 cm^2, 68 000 mm^2 (680 cm^2), 0.069 m^2 (690 cm^2), 0.07 m^2 (700 cm^2) b) 2050 cm^3, 2 300 000 mm^3 (2300 cm^3), 2.4 litres (2400 cm^3), 0.0025 m^3 (2500 cm^3)
3 a) 15 × 6 × 1.2 = 108 m^3 b) 1 m^3 = 1 000 000 cm^3 = 1000 litres, so 108 000 litres c) 108 000 ÷ 400 = 270 minutes = 4.5 hours
4 200 × 50 × 8 = 80 000 cm^3 a) 80 000 cm^3 b) 80 litres c) 0.08 m^3 d) 100 × 25 × 4 = 10 000 cubes