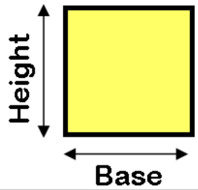
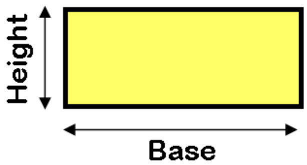
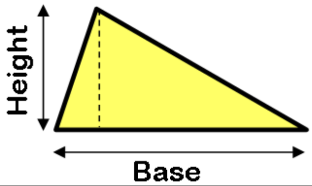
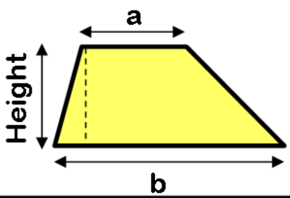
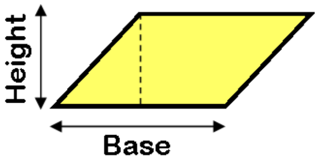
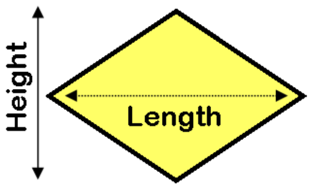
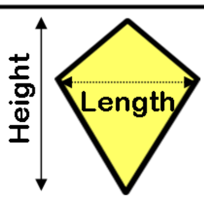
Perimeter, area and volume work book

Common formulae

Shape	Name	Formula for Area
	**Square**	Base x Height
	**Rectangle**	Base x Height
	**Triangle**	Base x Perpendicular Height ÷ 2
	**Trapezium**	$\frac{(a + b) \times height}{2}$
	**Parallelogram**	Base x Perpendicular Height
	**Rhombus**	Length x Height ÷ 2
	**Kite**	Length x Height ÷ 2

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Read It

perimeter

Define It

The distance around the outside of a shape is the perimeter.

Draw It

Digging Deeper:

The perimeter of the equator is 24,901 miles. If you are standing at the equator, since the world rotates in 24 hours, you are travelling at just over 1,000 mph.

Use It

Find the perimeter of the garden.

Link It

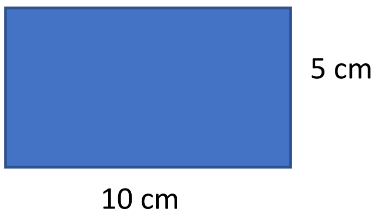
2-dimension, line, scale, measurement.

Deconstruct It

From the Latin *perimetros, peri* meaning around and *metros,* meaning measure.

Section 1: Area of a rectangle

Example 1. Calculate the area given the dimensions

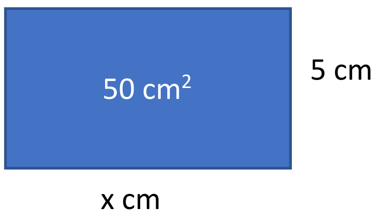


Area $= \text{length} \times \text{height}$

$= 10\text{ cm} \times 5\text{ cm}$

$\mathbf{= 50\ cm^2}$

Example 2. Calculate a missing dimension given the area



Area $= \text{length} \times \text{height}$

$50\text{ cm}^2 = x\text{ cm} \times 5\text{ cm}$

$x = 50\text{ cm}^2 \div 10\text{ cm}$

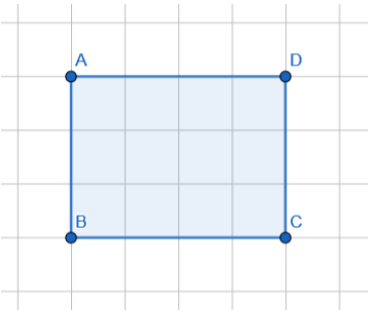
$\mathbf{= 5\ cm}$

Worksheet 1 Area of a rectangle

True or false

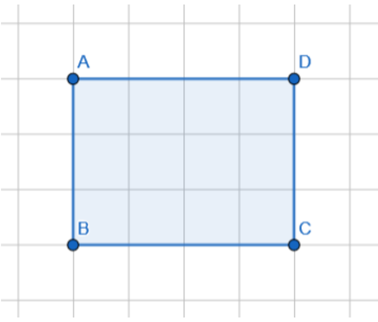
Write either T or F in the box depending on the answer.

1.



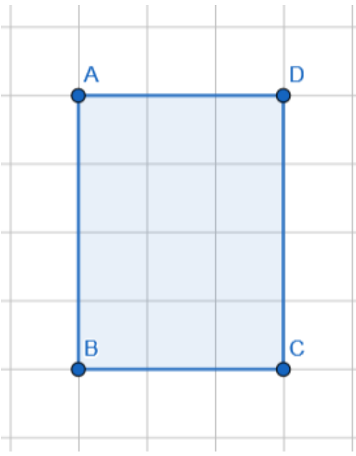
Area of ABCD = 14 cm^2

2.



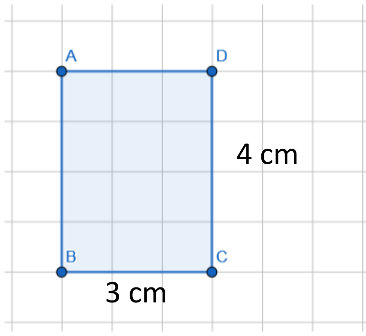
Area of ABCD = 12 cm^2

3.



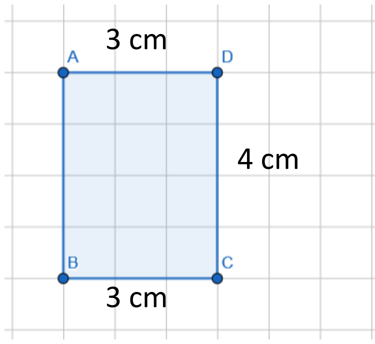
Area of ABCD = 12 cm^2

4.



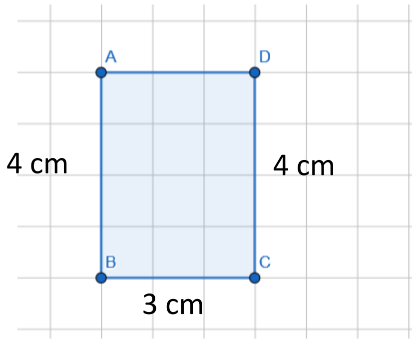
Area of ABCD = 12 cm^2

5.



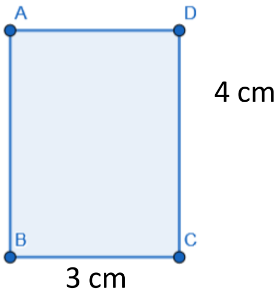
Area of ABCD = 36 cm^2

6.



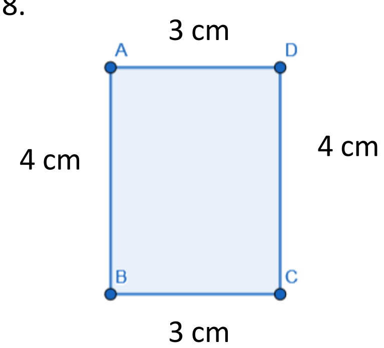
Area of ABCD = 48 cm^2

7.



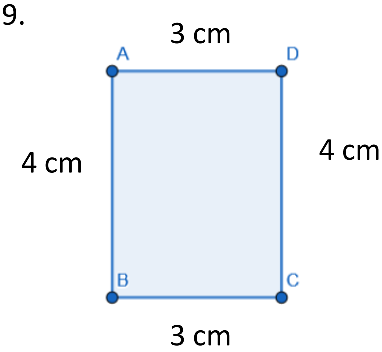
Area of ABCD = 12 cm²

8.



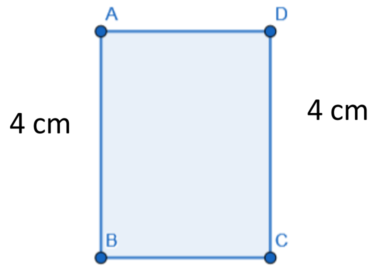
Area of ABCD = 14 cm²

9.



Area of ABCD = 144 cm²

10



Area of ABCD = 16 cm²

Worksheet 2 Area of a rectangle

Calculate the missing length given the area

Q1

$2\ cm$ | Area = $24\ cm^2$

p

Area = length × width

$24\ cm^2 = 2 \times p$

$\frac{24}{2} = p$

p = cm

Q2

$3\ cm$ | Area = $24\ cm^2$

p

Area = length × width

$24\ cm^2 = 3 \times p$

$\frac{24}{\quad} = p$

p = cm

Q3

$6\ cm$ | Area = $48\ cm^2$

p

Area = length × width

$48\ cm^2 = \quad \times p$

$\frac{48}{\quad} = p$

p = cm

Q4

$3\ cm$ | Area = $48\ cm^2$

p

Area = length × width

$cm^2 = \quad \times p$

$\frac{\quad}{\quad} = p$

p = cm

Q5

$1.5\ cm$ | Area = $48\ cm^2$

p

Area = length × width

$cm^2 = \quad \times p$

$\frac{\quad}{\quad} = p$

p = cm

Q6

$3\ cm$ | Area = $4.8\ cm^2$

p

Area = length × width

$cm^2 = \quad \times p$

$\frac{\quad}{\quad} = p$

p = cm

Q7

$1\ cm$ | Area = $4\ cm^2$

p

Area = length × width

$cm^2 =$ $\times p$

$\_\_\_\_ = p$

p = cm

Q8

$4\ cm$ | Area = $1\ cm^2$

p

Area = length × width

$cm^2 =$ $\times p$

$\_\_\_\_ = p$

p = cm

Q9

$4\ cm$ | Area = $5\ cm^2$

p

Area = length × width

$cm^2 =$ $\times p$

$\_\_\_\_ = p$

p = cm

Q10

$5\ cm$ | Area = $4\ cm^2$

p

Area = length × width

$cm^2 =$ $\times p$

$\_\_\_\_ = p$

p = cm

Q11

$\frac{1}{5}\ cm$ | Area = $\frac{1}{4}\ cm^2$

p

Area = length × width

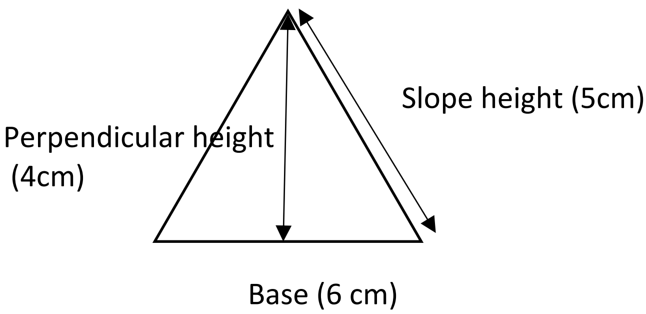
$\_\_\_\ cm^2 = \_\_\_ \times p$

$\frac{\_\_\_}{\_\_\_} = p$

p = ___ cm

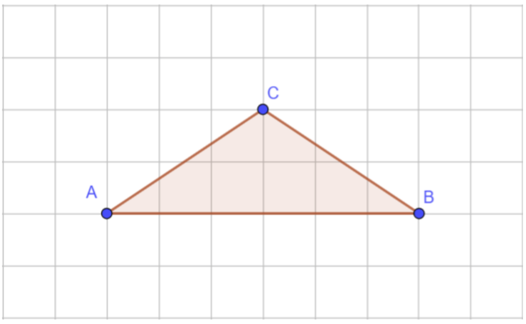
Section 3: Area of a triangle

Area of a triangle = ½ (base × perpendicular height).
Note the words "perpendicular height". This is the height that is at right angles to the base. This is important.
A common trick that examiners use is to give you the slope height, NOT the perpendicular height



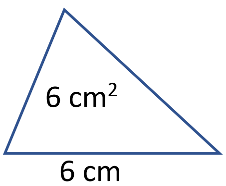
Area = ½ (base × perpendicular height).
= ½ (6 cm × 4cm) NOT = ½ (6 cm × 5cm).

Example 1: Find the area given the dimensions
Area of a triangle = ½ (base × perpendicular height).



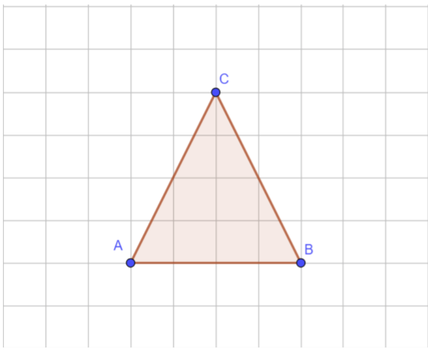
Area = ½ (base × perpendicular height).
= ½ (6 cm × 2cm).
= ½ (12 cm^2).
= 6 cm^2

Example 2: Find a dimension given the area.
Area of a triangle = ½ (base × perpendicular height).
Find the perpendicular height



Area = ½ (base × perpendicular height).
6 cm^2 = ½ (6 cm × height).
12 cm^2 = (6 cm × height).
12 cm^2 ÷ 6 cm = height
Height = 2 cm

Q1.

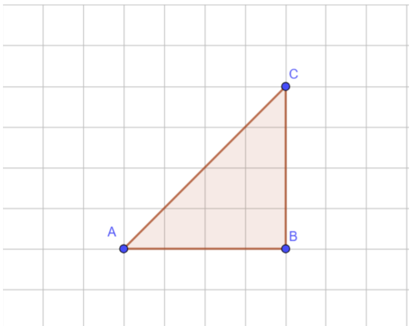


Area = ½ (base × perpendicular height).

= ½(4 × 4)

= cm²

Q2

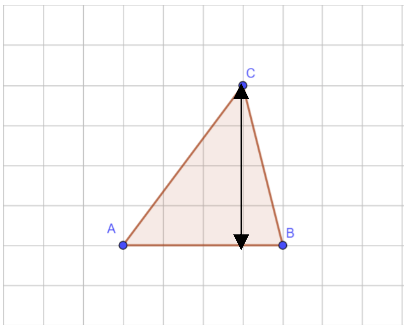


Area = ½ (base × perpendicular height).

= ½(×)

= cm²

Q3

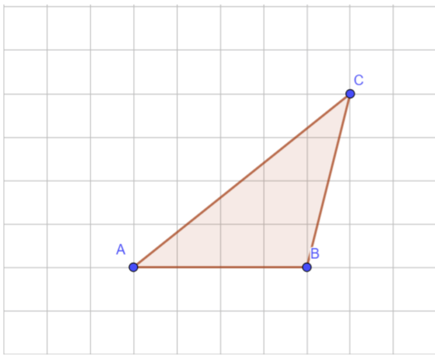


Area = ½ (base × perpendicular height).

= ½(×)

= cm²

Q4

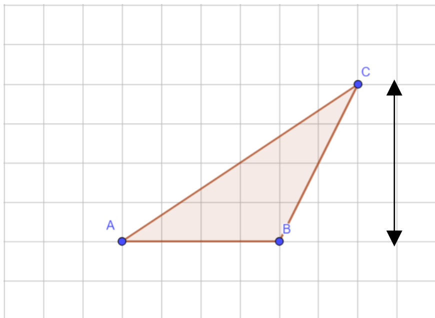


Area = ½ (base × perpendicular height).

= ½(×)

= cm²

Q5

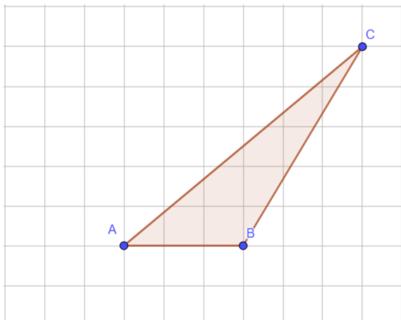


Area = ½ (base × perpendicular height).

= ½(×)

= cm²

Q6

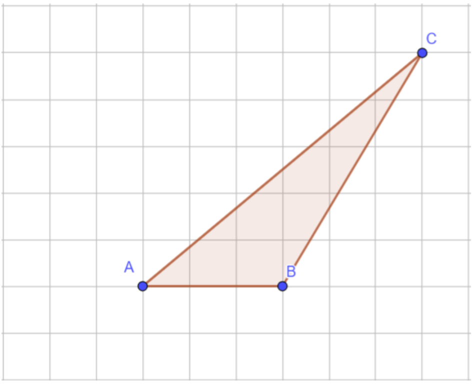


Area = ½ (base × perpendicular height).

= ½(×)

= cm²

Q7

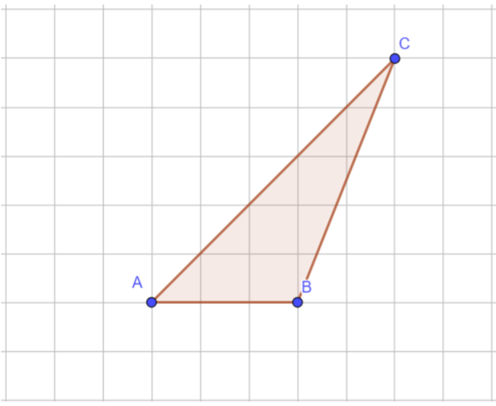


Area = ½ (base × perpendicular height).

= ½(×)

= cm^2

Q8

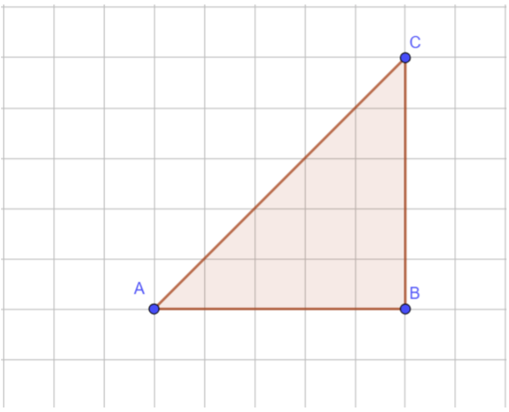


Area = ½ (base × perpendicular height).

= ½(×)

= cm^2

Q9



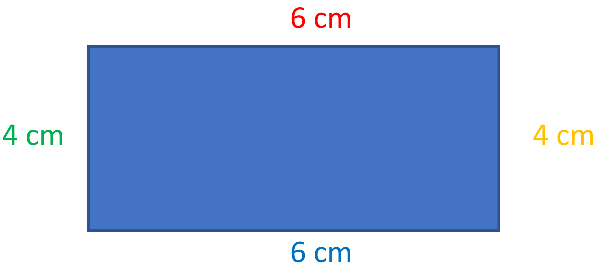
Area = ½ (base × perpendicular height).

= ½(×)

= cm^2

Section 4: Perimeter of a rectangle

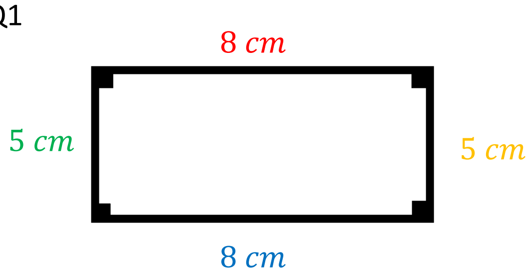
Perimeter = distance around a shape. Think of it as taking a journey around the outside of the shape.



Perimeter = 6 cm + 4 cm + 6 cm + 4 cm
= 20 cm (note unit – perimeter is a length so mm, cm, m etc).

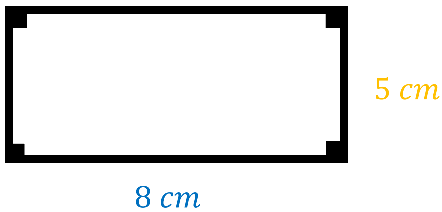
Worksheet 3: Perimeter of a rectangle

Q1



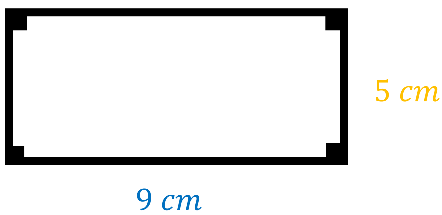
Perimeter = 8 cm + 5 cm + 8 cm + 5 cm
= cm

Q2



Perimeter = cm + cm + 8 cm + 5 cm
= cm

Q3

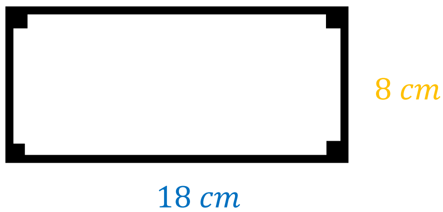


Perimeter = cm + cm + cm + cm
= cm

Q4

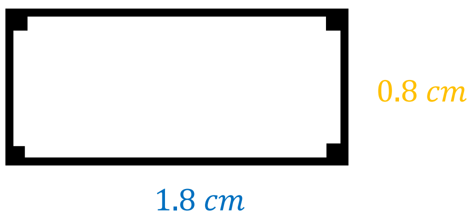
Perimeter = cm + cm + cm + cm
= cm

Q5



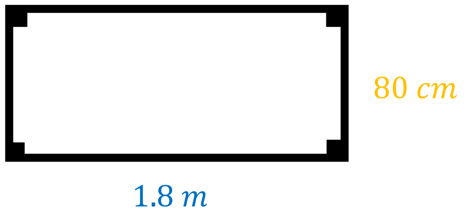
Perimeter =2 ×(cm + cm)
= cm

Q6



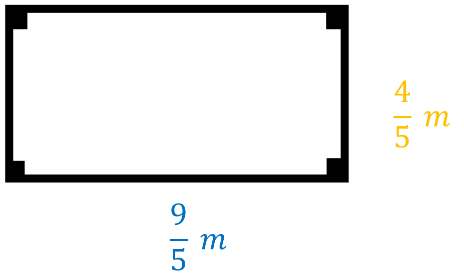
Perimeter =2 ×(cm + cm)
= cm

Q7



Perimeter =2 ×(+
)
=

Q8

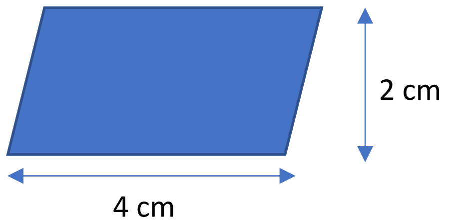


Perimeter =2 ×(—— m +—— m)

= ——

=   m

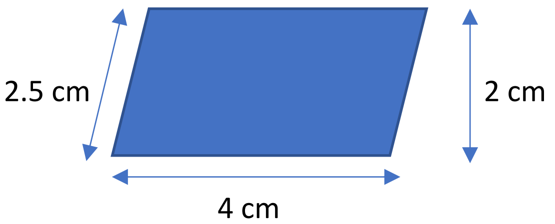
Section 5: Area of a parallelogram



Area = base × perpendicular height
= 4 cm × 2 cm
= 8 cm^2

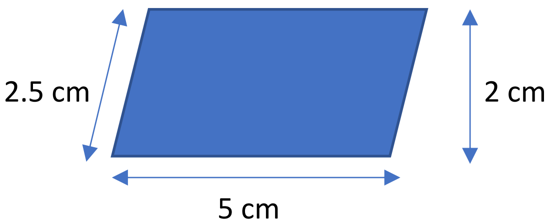
Once again, take care with questions trying to trick you. It is the perpendicular height, NOT the slope height

Ignore the 2.5 cm. It is a red-herring.



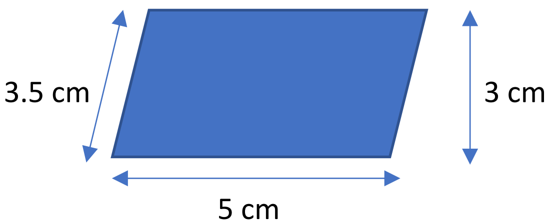
Worksheet 5: **Area of a parallelogram**

Q1.



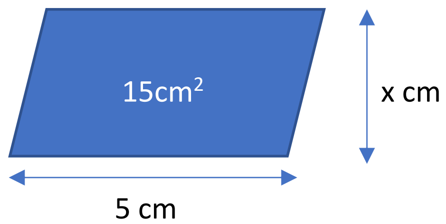
Area = base × perpendicular height
= 5 cm × 2 cm
= cm^2

Q2.



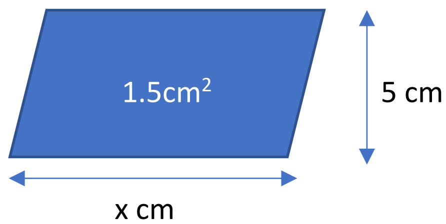
Area = base × perpendicular height
= cm × cm
= cm^2

Q3.



Area = base × perpendicular height
15 cm^2 = 5 cm × x cm
x = cm

Q4.

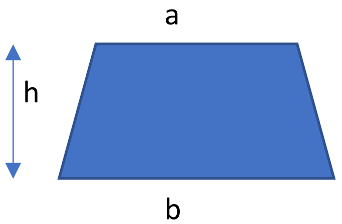


Area = base × perpendicular height
1.5 cm^2= 5 cm × x cm
x = cm

Section 6: Area of a trapezium

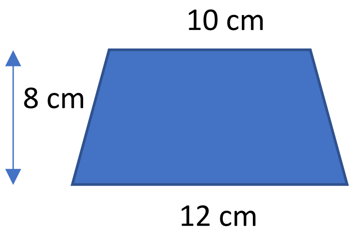
$$Area = \frac{h\,(a+b)}{2}$$

Where a, b are the two parallel sides, and h is the *perpendicular* height



Once again, don’t be fooled by questions that give you the slant height. It is the perpendicular height that you need.

Example 1



Calculate the area of this trapezium

$$Area = \frac{h\,(a+b)}{2}$$

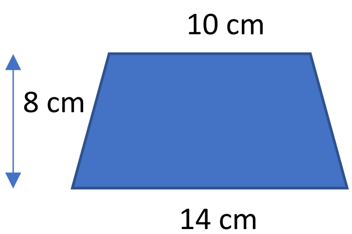
$$Area = \frac{8 \times (10+12)}{2}$$

$$Area = \frac{8 \times 22}{2}$$

= 88 cm²

Worksheet 6: Area of a trapezium

Q1



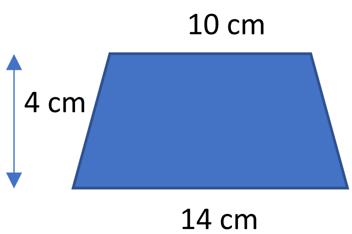
$$Area = \frac{h\,(a+b)}{2}$$

$$Area = \frac{8 \times (10+14)}{2}$$

$$Area = \frac{8 \times 24}{2}$$

= $\qquad$ cm^2

Q2



$$Area = \frac{h\,(a+b)}{2}$$

$$Area = \frac{\quad \times (10+14)}{2}$$

$$Area = \frac{\quad \times 24}{2}$$

= $\qquad$ cm^2

Q3

$$Area = \frac{h\,(a+b)}{2}$$

$$Area = \frac{\quad \times (\quad + 14)}{2}$$

$$Area = \frac{\quad \times \quad}{2}$$

= cm²

Q4

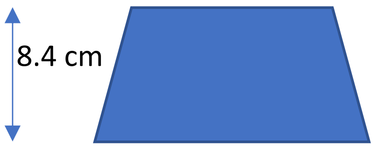
$$Area = \frac{h\,(a+b)}{2}$$

$$Area = \frac{\quad \times (\quad + \quad)}{2}$$

$$Area = \frac{\quad \times \quad}{2}$$

= cm²

Q5



$$Area = \frac{h\,(a+b)}{2}$$

$$Area = \frac{\quad \times (\quad + \quad)}{2}$$

$$Area = \frac{\quad \times \quad}{2}$$

= cm²

Q6

$$Area = \frac{h\,(a+b)}{2}$$

$$Area = \frac{\frac{\quad}{\quad} \times \left(\frac{\quad}{\quad} + \frac{\quad}{\quad}\right)}{2}$$

$$Area = \frac{\frac{\quad}{\quad} \times \frac{\quad}{\quad}}{2}$$

$= \frac{\quad}{\quad}$ cm²

Q7

$$Area = \frac{h\,(a+b)}{2}$$

$$Area = \frac{\frac{\quad}{\quad} \times \left(\frac{\quad}{\quad} + \frac{\quad}{\quad}\right)}{2}$$

$$Area = \frac{\frac{\quad}{\quad} \times \frac{\quad}{\quad}}{2}$$

$= \frac{\quad}{\quad}$ cm²

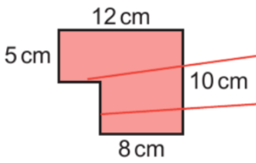
Section 7: Area of a compound shapes

Key point 6

A **compound shape** is made up of simple shapes.
To find the area of a compound shape, split it into simple shapes like rectangles and triangles.
Find the area of each shape and then add them all together.

Example 3

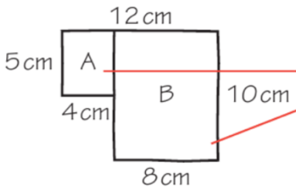
Calculate the perimeter and area of this compound shape.



Sketch the shape. Work out the missing lengths.
12 cm – 8 cm = 4 cm
10 cm – 5 cm = 5 cm

Perimeter = 12 + 10 + 8 + 5 + 4 + 5 = 44 cm^2

Add all the lengths around the shape to work out the perimeter.

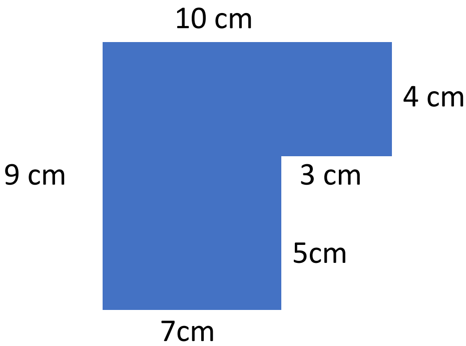


Divide the shape into two rectangles A and B.

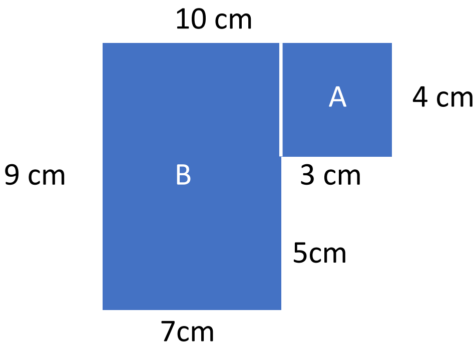
Area of A = 5 x 4 = 20 cm^2
Area of B = 8 x 10 = 80 cm^2
Total area = 100 cm^2

Work out the area of each.

Example 1:
Calculate the area and perimeter of this shape



Divide the shape into two rectangles, A and B. Calculate their areas. Add them.



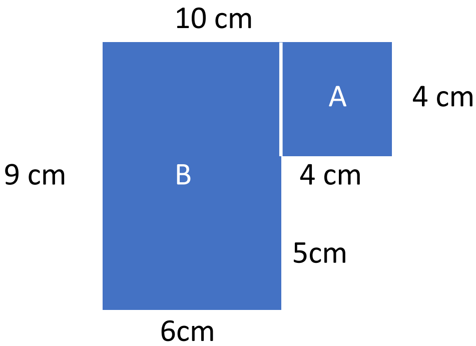
Area A: 3 cm × 4 cm = 12 cm^2
Area B = 7 cm × 9 cm = 63 cm^2

Total area = 12 cm^2 + 63 cm^2
= 75 cm^2

Perimeter = 10 + 4 + 3 + 5 + 7 + 9
= 38 cm

Worksheet 7: Area of a compound shapes

Q1



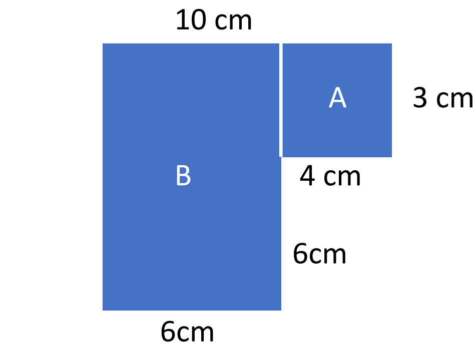
Area A: 4 cm × 4 cm = 16 cm^2

Area B: 6 cm × 9 cm = 54 cm^2

Total area = 16 cm^2 + 54 cm^2

= cm^2

Q2



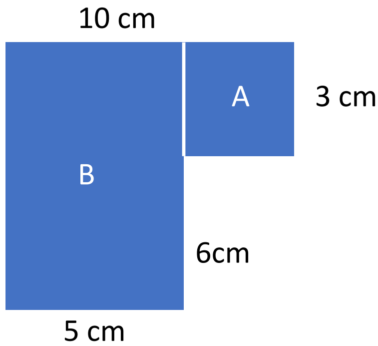
Area A: 3 cm × 4 cm = 12 cm^2

Area B: 6 cm × cm = cm^2

Total area = 12 cm^2 + cm^2

= cm^2

Q3



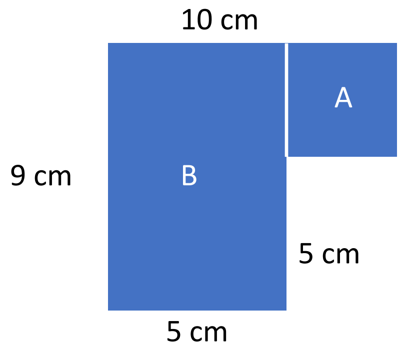
Area A: 3 cm × cm = cm^2

Area B: 5 cm × cm = cm^2

Total area = cm^2 + cm^2

= cm^2

Q4



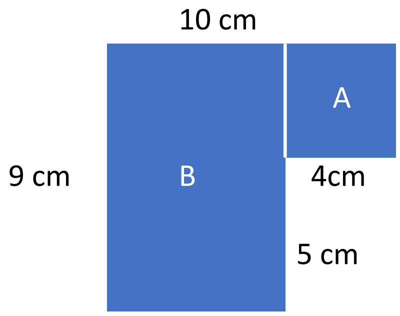
Area A: cm × cm = cm^2

Area B: 5 cm × cm = cm^2

Total area = cm^2 + cm^2

= cm^2

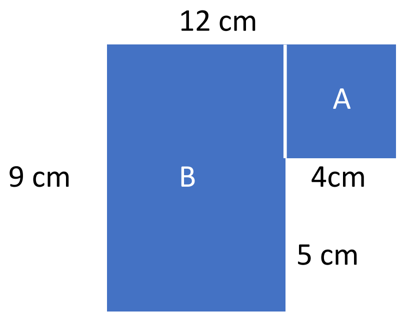
Q5



Area A: cm × cm = cm^2
Area B: cm × cm = cm^2

Total area = cm^2 + cm^2
= cm^2

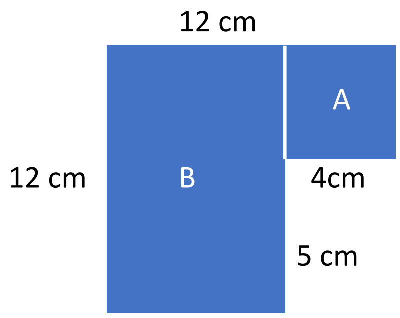
Q6



Area A: cm × cm = cm^2
Area B: cm × cm = cm^2

Total area = cm^2 + cm^2
= cm^2

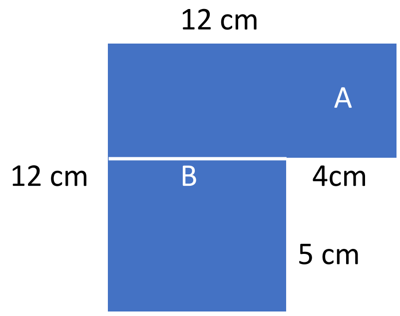
Q7



Area A: cm × cm = cm^2
Area B: cm × cm = cm^2

Total area = cm^2 + cm^2
= cm^2

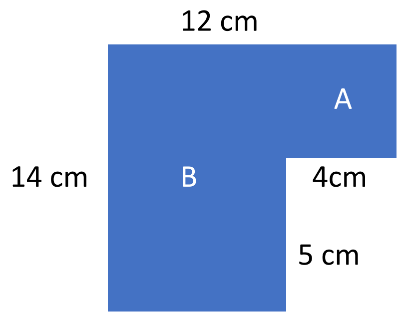
Q8



Area A: cm × cm = cm^2
Area B: cm × cm = cm^2

Total area = cm^2 + cm^2
= cm^2

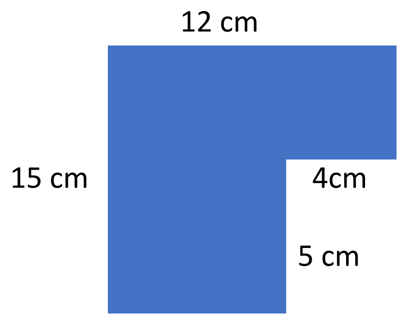
Q9



Area A: cm × cm = cm^2
Area B: cm × cm = cm^2

Total area = cm^2 + cm^2
= cm^2

Q10

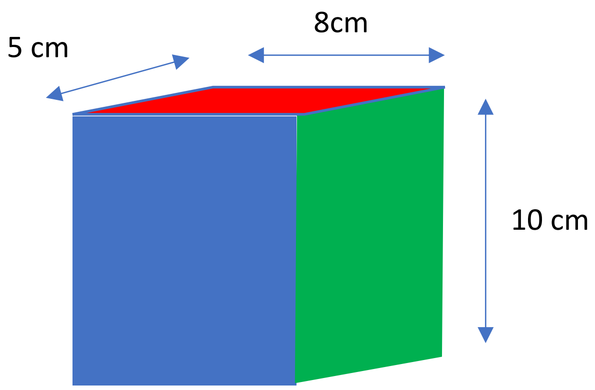


Area A: cm × cm = cm^2
Area B: cm × cm = cm^2

Total area = cm^2 + cm^2
= cm^2

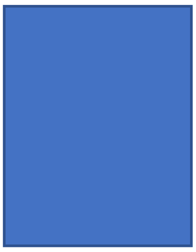
Section 8: Surface area of 3D solids (cuboids/cubes)

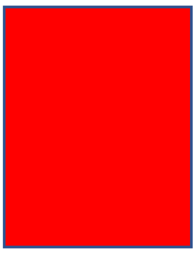
When we talk about the surface area of a shape, we are referring to the total area of all of its faces.
A reminder, a face is the surface of a shape. A cube or a cuboid, has six faces.

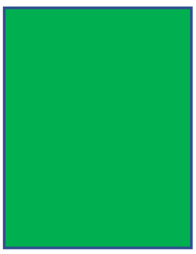


In this diagram you can see three of them, but there will be two blue, two green and two red surfaces.

Surface area = area of all the surfaces of a shape.
Surface rea of cuboid = 2 × area blue rectangle (one front, one back) + 2 × area red rectangle (one top, one bottom) + 2 × area green rectangle (one left, one right)

 $= 10 \times 8 = 80cm^2$

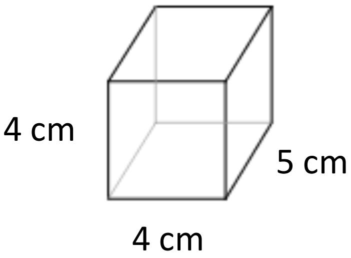
 $= 8 \times 5 = 40cm^2$

 $= 10 \times 5 = 50\ cm^2$

Area $= (2 \times 80cm^2) + (2 \times 40cm^2) + (2 \times 50cm^2)$
$= 160\ cm^2 + 80\ cm^2 + 100\ cm^2$
$= 340\ cm^2$

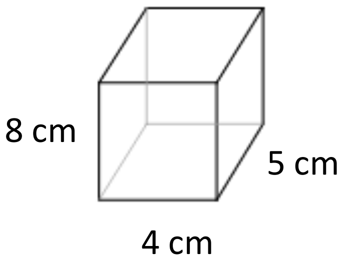
Worksheet 8: Surface area of 3D solids

Q1



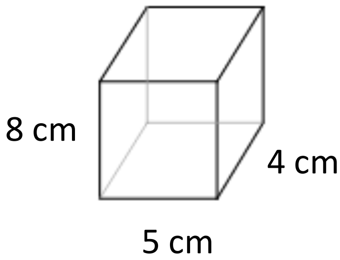
Front and back	$2 \times 4 \times 4$ cm^2 = 32 cm^2
Left and right side	$2 \times 5 \times 4$ cm^2 = 40 cm^2
Top and bottom	$2 \times 4 \times 5$ cm^2 = 40 cm^2
Total Surface Area	32 + 40 + 40 cm^2 = cm^2

Q2



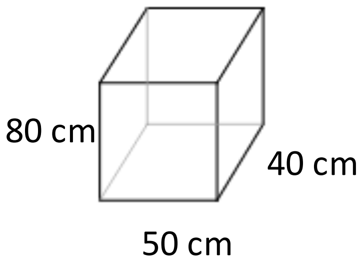
Front and back	$2 \times 8 \times 4$ cm^2 = cm^2
Left and right side	$2 \times 5 \times 4$ cm^2 = cm^2
Top and bottom	$2 \times 8 \times 4$ cm^2 = cm^2
Total Surface Area	+ + cm^2 = cm^2

Q3



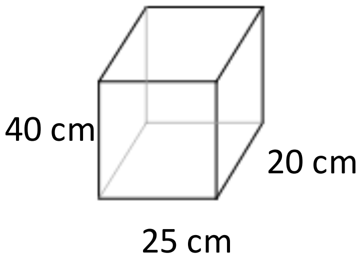
Front and back	$2 \times 8 \times$ cm^2 = cm^2
Left and right side	$2 \times 8 \times$ cm^2 = cm^2
Top and bottom	$2 \times 5 \times$ cm^2 = cm^2
Total Surface Area	+ + cm^2 = cm^2

Q4



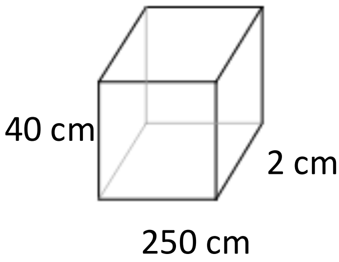
Front and back	$2 \times \quad \times$ cm^2 = cm^2
Left and right side	$2 \times \quad \times$ cm^2 = cm^2
Top and bottom	$2 \times \quad \times$ cm^2 = cm^2
Total Surface Area	+ + cm^2 = cm^2

Q5



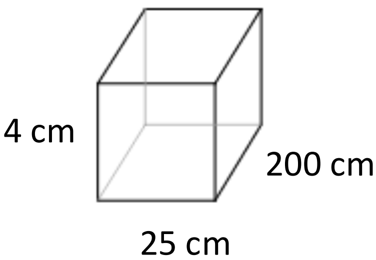
Front and back	× × cm^2 = cm^2
Left and right side	× × cm^2 = cm^2
Top and bottom	× × cm^2 = cm^2
Total Surface Area	+ + cm^2 = cm^2

Q7



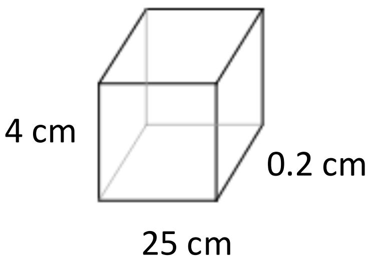
Front and back	× × cm^2 = cm^2
Left and right side	× × cm^2 = cm^2
Top and bottom	× × cm^2 = cm^2
Total Surface Area	+ + cm^2 = cm^2

Q6



Front and back	× × cm^2 = cm^2
Left and right side	× × cm^2 = cm^2
Top and bottom	× × cm^2 = cm^2
Total Surface Area	+ + cm^2 = cm^2

Q8



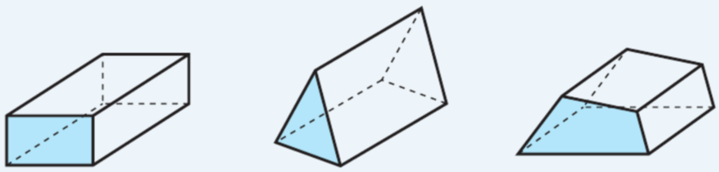
Front and back	× × cm^2 = cm^2
Left and right side	× × cm^2 = cm^2
Top and bottom	× × cm^2 = cm^2
Total Surface Area	+ + cm^2 = cm^2

Section 9: Surface area of 3D solids (prisms)

You can calculate the surface area of any 3D prism

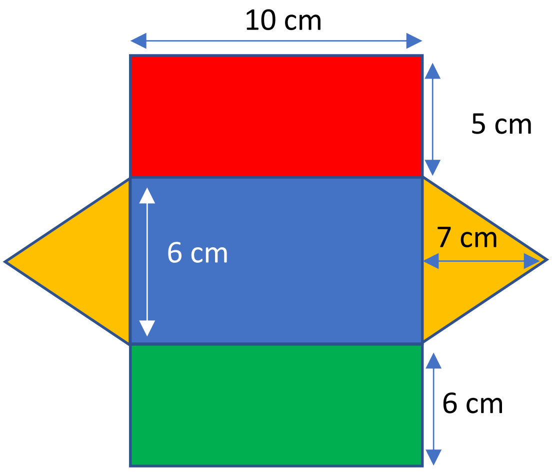
Key point 7

A prism is a 3D solid that has the same cross-section all through its length.



In exactly the same way that you calculated the surface area of a cuboid, so you can calculate the surface area of a prism

One way of thinking about it is to think about the net that would make the shape.



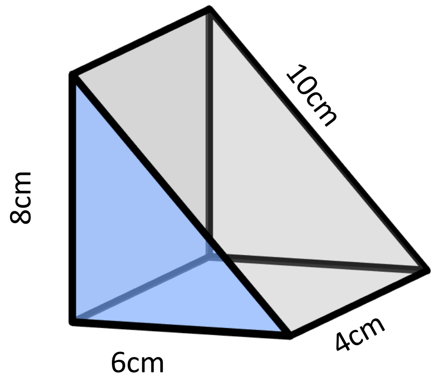
Finding areas of rectangles should not be a problem. The area of the two orange triangles you will have to think about

Area = ½ (base × height)
= ½ (6cm × 7cm)
= ½ ($42cm^2$)
= 21 cm^2

Total area = (10cm × 5cm) + (10cm × 6cm) + (10cm × 6cm) + (2×21 cm^2)
= $50cm^2$ + $60cm^2$ + $60cm^2$ + $42cm^2$
= $212cm^2$

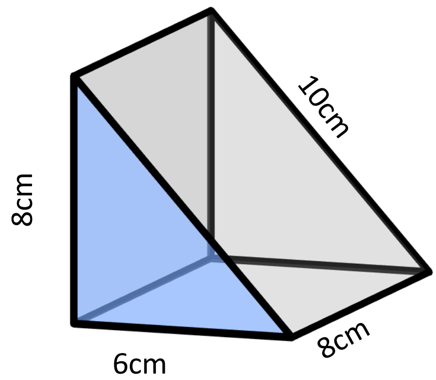
Worksheet 9: Surface area of 3D solids (prisms)

Q1



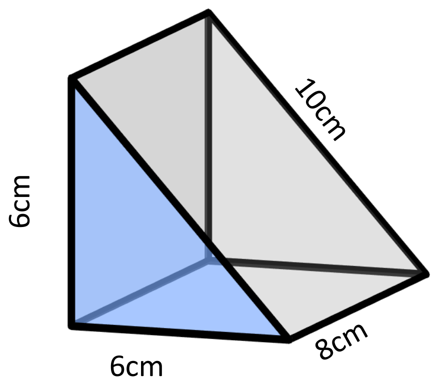
Area of triangle	½ (base × height) ½ (6 × 8) = 24 cm^2
Area of base	4 cm × 6 cm = 24 cm^2
Area of top	4 cm × 10 cm = 40 cm^2
Area of back	8 cm × 4 cm = 32 cm^2
Total	(2 × 24) + 24 + 40 + 32 = cm^2

Q2



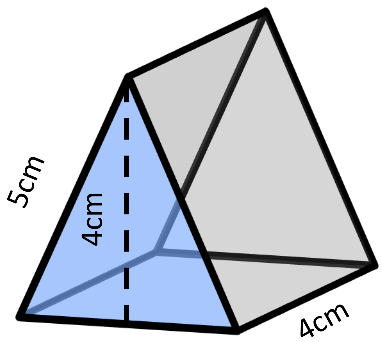
Area of triangle	½ (base × height) ½ (6 × 8) = cm^2
Area of base	6 cm × cm = cm^2
Area of top	10 cm × 8 cm = 80 cm^2
Area of back	8 cm × 8 cm = 64 cm^2
Total	(2 ×) + + 80 + 64 = cm^2

Q3



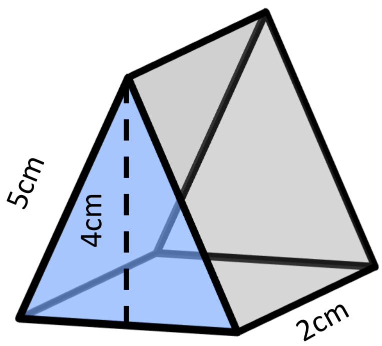
Area of triangle	½ (base × height) ½ (×) = cm^2
Area of base	cm × cm = cm^2
Area of top	cm × 8 cm = cm^2
Area of back	6 cm × 8 cm = 48 cm^2
Total	(2 ×) + + + 48 = cm^2

Q4



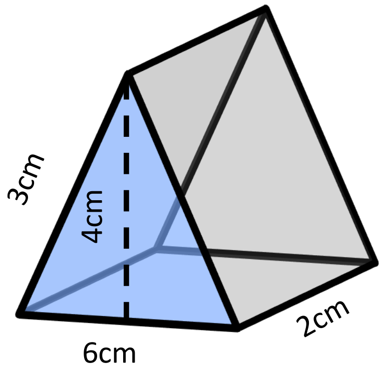
Area of triangle	½ (base × height) ½ (6 × 4) = cm^2
Area of base	cm × cm = cm^2
Area of Left top	5 cm × 4 cm = 20 cm^2
Area of right top	cm × cm = cm^2
Total	(2 ×) + + 20 + = cm^2

Q5



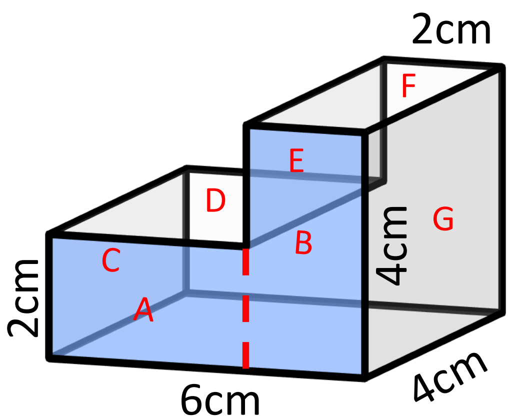
Area of triangle	½ (base × height) ½ (×) = cm^2
Area of base	cm × cm = cm^2
Area of Left top	cm × 2 cm = cm^2
Area of right top	5 cm × cm = cm^2
Total	(2 ×) + + + = cm^2

Q6



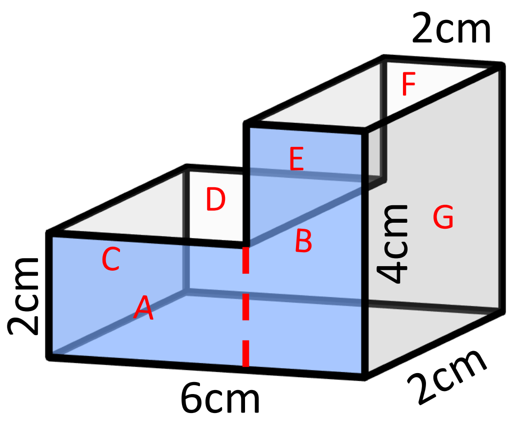
Area of triangle	½ (base × height) ½ (×) = cm²
Area of base	cm × cm = cm²
Area of Left top	cm × cm = cm²
Area of right top	cm × cm = cm²
Total	(2 ×) + + + = cm²

Q7



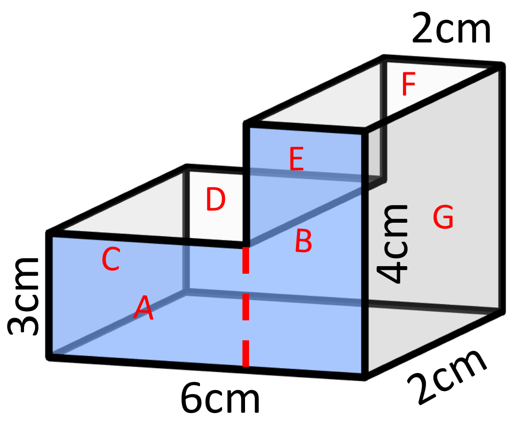
Area of rectangle A (front)	2 cm × 4 cm = cm²
Area of rectangle B (front)	2 cm × 4 cm = cm²
Total area of front	+ = cm²
Area of base	6 cm × 4 cm = cm²
Area of rectangle C (Left hand side)	2 cm × 4cm = cm²
Area of rectangle D (Top surface)	4 cm × 4 cm = cm²
Area of rectangle E (Left hand side)	2 cm × 4 cm = cm²
Area of rectangle F (Top surface)	2 cm × 4 cm = cm²
Area of rectangle G (Right hand side)	4 cm × 4 cm = cm²
Total (2 × Front) + base + C + D + E + F + G	(2 ×) + + + + + + = cm²

Q8



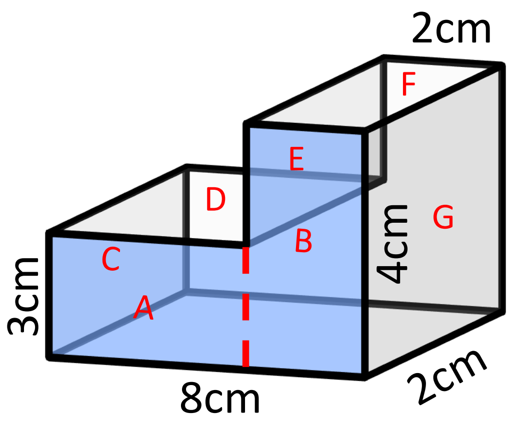
Area of rectangle A (front)	cm × 4 cm = cm^2
Area of rectangle B (front)	2 cm × cm = cm^2
Total area of front	+ = cm^2
Area of base	6 cm × cm = cm^2
Area of rectangle C (Left hand side)	2 cm × cm = cm^2
Area of rectangle D (Top surface)	4 cm × cm = cm^2
Area of rectangle E (Left hand side)	2 cm × cm = cm^2
Area of rectangle F (Top surface)	2 cm × cm = cm^2
Area of rectangle G (Right hand side)	4 cm × cm = cm^2
Total (2 × Front) + base + C + D + E + F + G	(2 ×) + + + + + + = cm^2

Q9



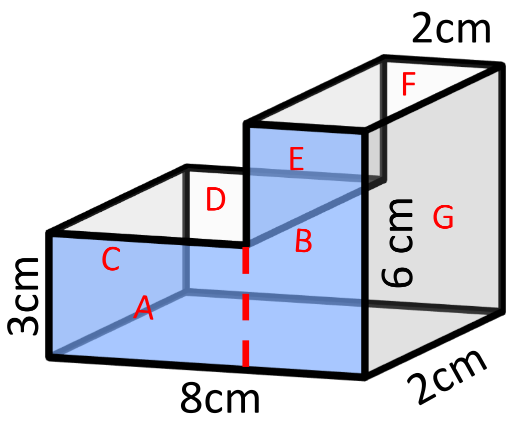
Area of rectangle A (front)	cm × 4 cm = cm^2
Area of rectangle B (front)	cm × cm = cm^2
Total area of front	+ = cm^2
Area of base	cm × cm = cm^2
Area of rectangle C (Left hand side)	3 cm × cm = cm^2
Area of rectangle D (Top surface)	cm × cm = cm^2
Area of rectangle E (Left hand side)	2 cm × cm = cm^2
Area of rectangle F (Top surface)	cm × cm = cm^2
Area of rectangle G (Right hand side)	4 cm × cm = cm^2
Total (2 × Front) + base + C + D + E + F + G	(2 ×) + + + + + + = cm^2

Q10



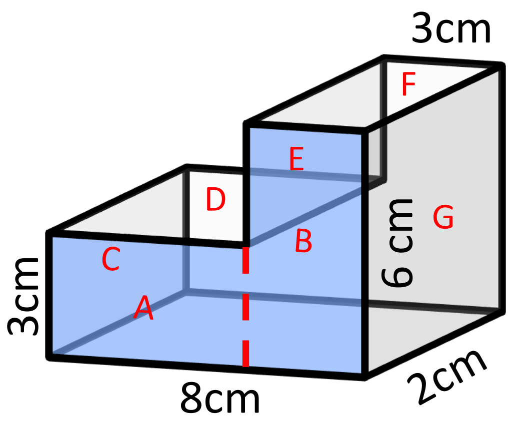
Area of rectangle A (front)	cm × cm = cm^2
Area of rectangle B (front)	cm × cm = cm^2
Total area of front	+ = cm^2
Area of base	cm × cm = cm^2
Area of rectangle C (Left hand side)	cm × cm = cm^2
Area of rectangle D (Top surface)	cm × cm = cm^2
Area of rectangle E (Left hand side)	cm × cm = cm^2
Area of rectangle F (Top surface)	cm × cm = cm^2
Area of rectangle G (Right hand side)	cm × cm = cm^2
Total (2 × Front) + base + C + D + E + F + G	(2 ×) + + + + + + = cm^2

Q11



Area of rectangle A (front)	cm × cm = cm^2
Area of rectangle B (front)	cm × cm = cm^2
Total area of front	+ = cm^2
Area of base	cm × cm = cm^2
Area of rectangle C (Left hand side)	cm × cm = cm^2
Area of rectangle D (Top surface)	cm × cm = cm^2
Area of rectangle E (Left hand side)	cm × cm = cm^2
Area of rectangle F (Top surface)	cm × cm = cm^2
Area of rectangle G (Right hand side)	cm × cm = cm^2
Total (2 × Front) + base + C + D + E + F + G	(2 ×) + + + + + + = cm^2

Q12

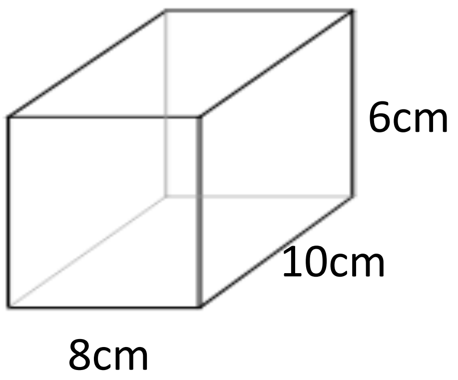


Area of rectangle A (front)	cm × cm = cm^2
Area of rectangle B (front)	cm × cm = cm^2
Total area of front	+ = cm^2
Area of base	cm × cm = cm^2
Area of rectangle C (Left hand side)	cm × cm = cm^2
Area of rectangle D (Top surface)	cm × cm = cm^2
Area of rectangle E (Left hand side)	cm × cm = cm^2
Area of rectangle F (Top surface)	cm × cm = cm^2
Area of rectangle G (Right hand side)	cm × cm = cm^2
Total (2 × Front) + base + C + D + E + F + G	(2 ×) + + + + + + = cm^2

Section 10: Volume of cubes and cuboids

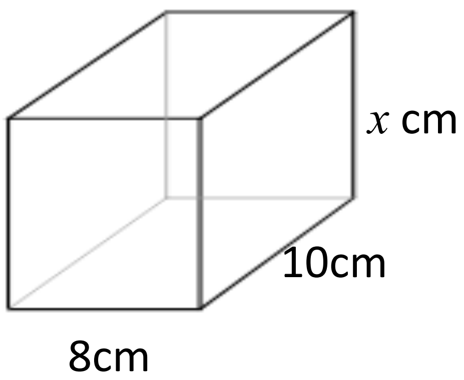
Volume = length × width × height
The unit of volume is mm^3, cm^3, or m^3 or, if it was something massive, km^3.

Example 1: Calculate the volume given the dimensions



Volume	= length × width × height
	= 8 cm × 10 cm × 6 cm
	= 480 cm^3

Example 2: Calculate a missing dimension given volume

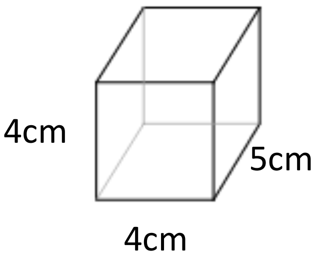


Volume = 240 cm^3

Volume	= length × width × height
240	= 8 cm × 10 cm × x cm
240	= 80 × x cm
240 / 80	= x cm
$\boldsymbol{x}$	= **3 cm**

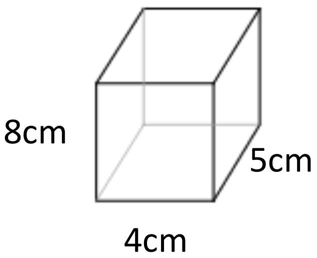
Worksheet 10: Volume of cubes and cuboids

Q1



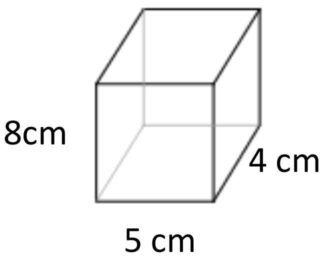
Volume = length × width × height
= 4 cm × 5 cm × 4 cm
= cm^3

Q2



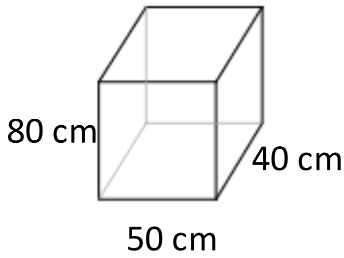
Volume = length × width × height
= 4 cm × 5 cm × cm
= cm^3

Q3



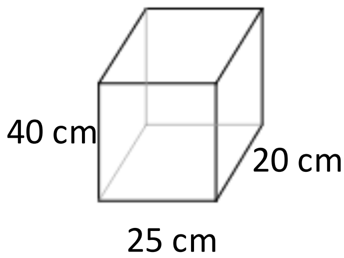
Volume = length × width × height
= cm × cm × cm
= cm^3

Q4



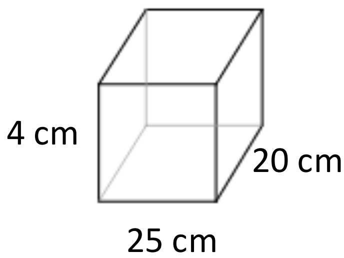
Volume = length × width × height
= cm × cm × cm
= cm^3

Q5



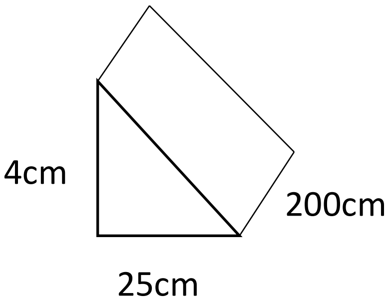
Volume = length × width × height
= cm × cm × cm
= cm^3

Q6



Volume = length × width × height
= cm × cm × cm
= cm^3

Q7



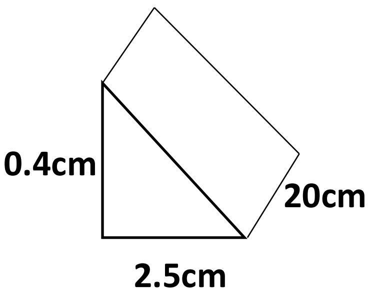
Think about this one. If you calculated the volume in Q6, then this is half of the shape. If it is half the size of Q6, then what will it's volume be?

Volume = ½ (length × width × height)

=½ (cm × cm × cm)

= cm^3

Q8.



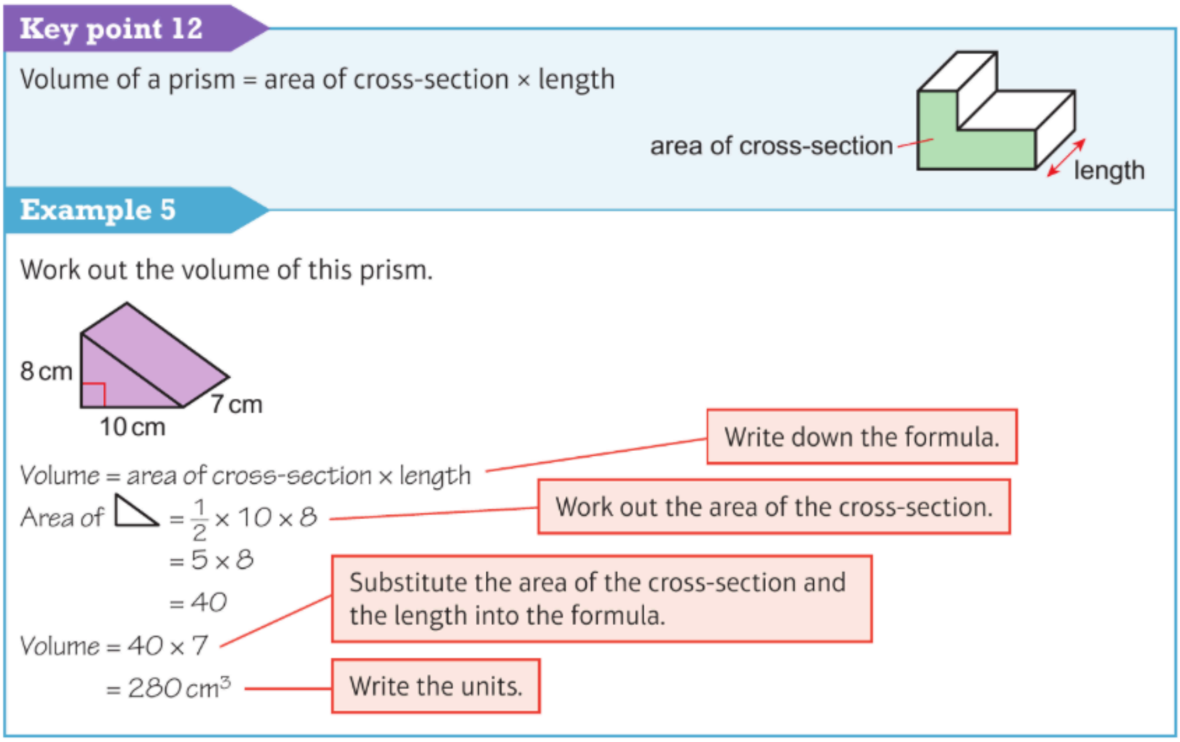
Volume = ½ (length × width × height)

=½ (cm × cm × cm)

= cm^3

Section 11: Volume of prisms

Cross sectional area means the area of the base.


Key point 12

Volume of a prism = area of cross-section × length

area of cross-section

length

Example 5

Work out the volume of this prism.

8 cm

7 cm

10 cm

Volume = area of cross-section × length — Write down the formula.

Area of ◺ = $\frac{1}{2} \times 10 \times 8$ — Work out the area of the cross-section.

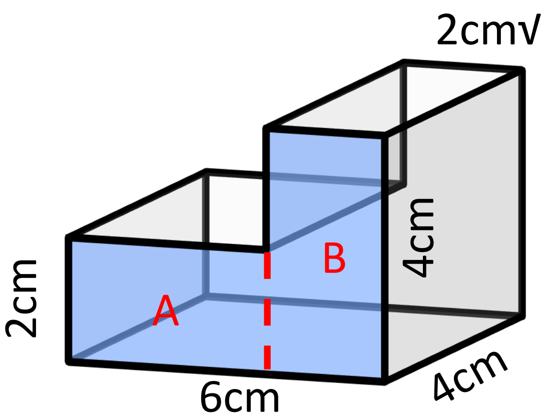
= 5 × 8

= 40

Volume = 40 × 7 — Substitute the area of the cross-section and the length into the formula.

= 280 cm^3 — Write the units.

Example 2. More complex shape



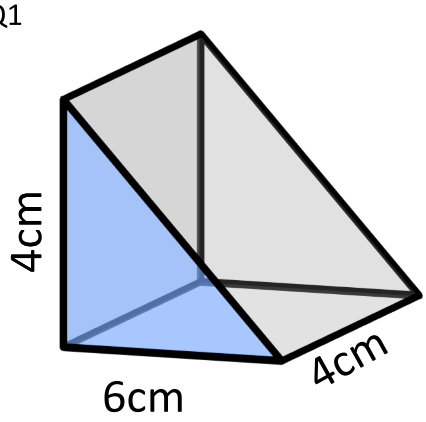
Volume = cross sectional area × length

Cross sectional area = area A + area B
= (4 × 2) + (2 × 4)
= 8 cm^2 + 8 cm^2
= 16cm^2

Volume = cross sectional area × length
= 16cm^2 × 4cm
= 64 cm^3

Worksheet 11: Volume of prisms

Q1



Volume = cross sectional area × length

cross sectional area = ½ (base × height)

= ½ (6 cm × 4 cm)

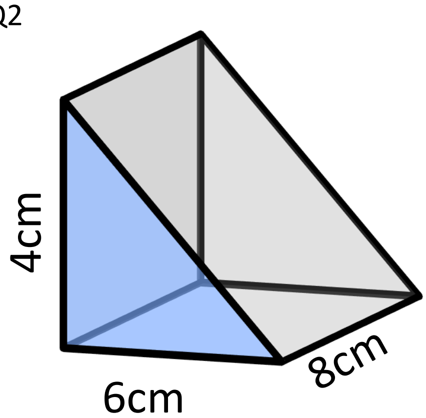
= 12 cm^2

Volume = cross sectional area × length

= 12 cm^2 × 4 cm

= cm^3

Q2



Volume = cross sectional area × length

cross sectional area = ½ (base × height)

= ½ (6 cm ×
cm)

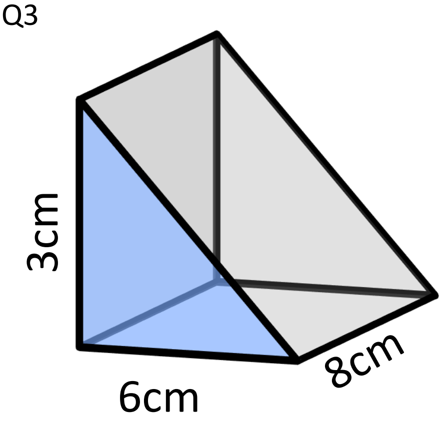
= cm^2

Volume = cross sectional area × length

= cm^2 × 8 cm

= cm^3

Q3



Volume = cross sectional area × length

cross sectional area = ½ (base × height)

= ½ (cm ×
cm)

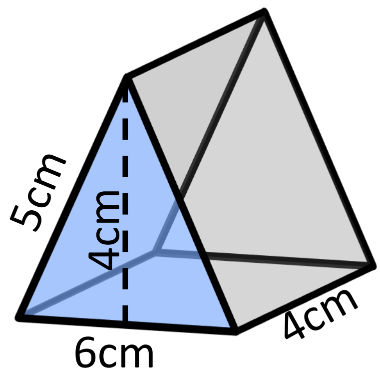
= cm^2

Volume = cross sectional area × length

= cm^2 × cm

= cm^3

Q4



Volume = cross sectional area × length

cross sectional area = ½ (base × height)

= ½ (6 cm × 4 cm)

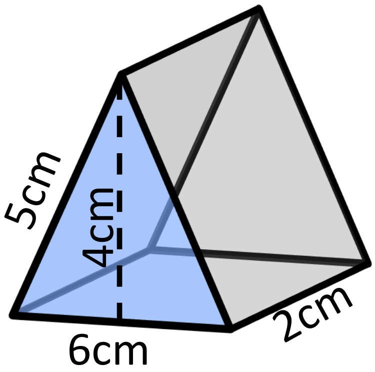
= cm^2

Volume = cross sectional area × length

= cm^2 × cm

= cm^3

Q5



Volume = cross sectional area × length

cross sectional area = ½ (base × height)

= ½ (cm × cm)

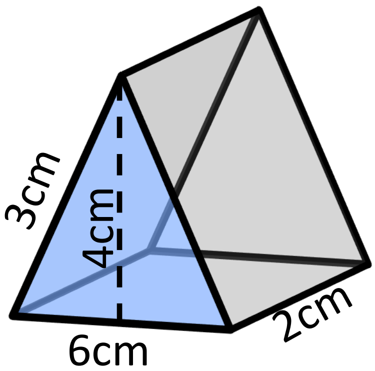
= cm^2

Volume = cross sectional area × length

= cm^2 × cm

= cm^3

Q6



Volume = cross sectional area × length

cross sectional area = ½ (base × height)

= ½ (cm × cm)

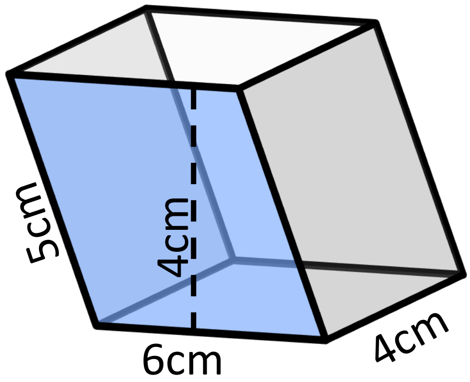
= cm^2

Volume = cross sectional area × length

= cm^2 × cm

= cm^3

Q7



Volume = cross sectional area × length

cross sectional area

= (base × perpendicular height)

= (6 cm × 4 cm)

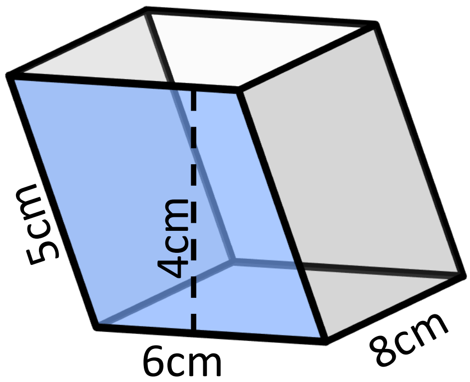
= cm^2

Volume = cross sectional area × length

= cm^2 × cm

= cm^3

Q8



Volume = cross sectional area × length

cross sectional area

= (base × perpendicular height)

= (cm × cm)

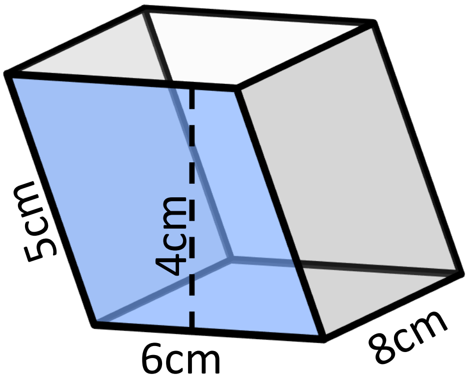
= cm^2

Volume = cross sectional area × length

= cm^2 × cm

= cm^3

Q9



Volume = cross sectional area × length

cross sectional area

= (base × perpendicular height)

= (cm × cm)

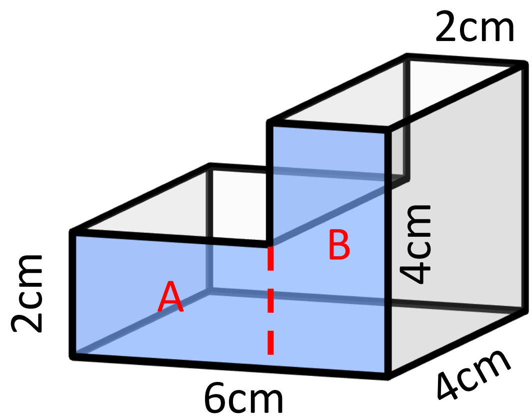
= cm^2

Volume = cross sectional area × length

= cm^2 × cm

= cm^3

Q10



Volume = cross sectional area × length

Cross sectional area = area A + area B

= (4 × 2) + (2 × 4)

= 8 cm^2 + 8 cm^2

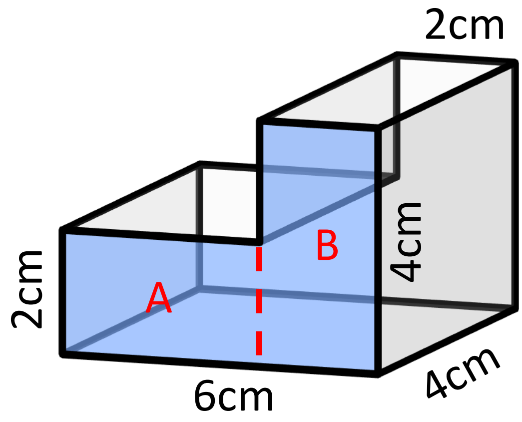
= cm^2

Volume = cross sectional area × length

= cm^2 × cm

= cm^3

Q11



Volume = cross sectional area × length

Cross sectional area = area A + area B

= (×) +

(×)

= cm^2 +

cm^2

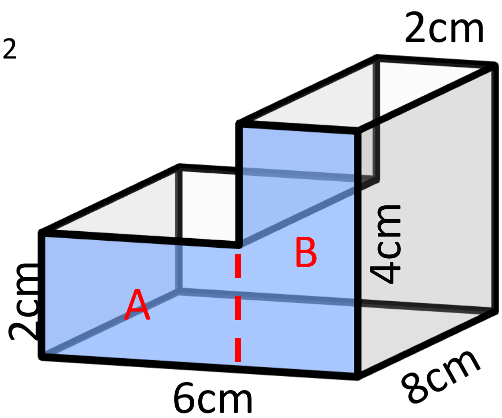
= cm^2

Volume = cross sectional area × length

= cm^2 × cm

= cm^3

Q12



Volume = cross sectional area × length

Cross sectional area = area A + area B

= (×) +

(×)

= cm^2 +

cm^2

= cm^2

Volume = cross sectional area × length

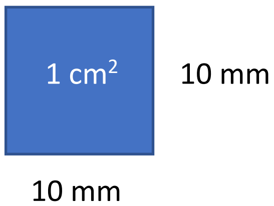
= cm^2 × cm

= cm^3

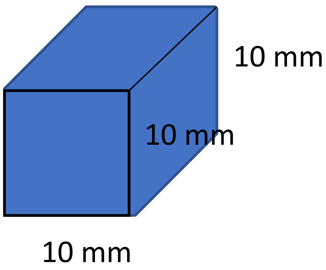
Section 12: Converting area and cubic units

I cm = 10 mm
1 m = 100 cm

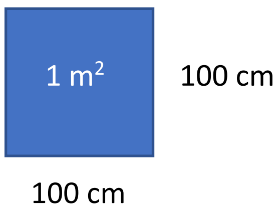
So 1 cm^2 = 10 mm × 10 mm
= 100 mm^2



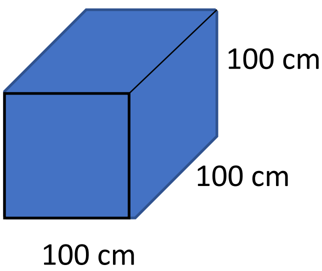
And 1 cm^3 = 10 mm × 10 mm × 10 mm
= 1000 mm^2



Likewise
1m^2 = 100 cm × 100 cm
= 10,000 cm^2



And 1 m^3 = 100 cm × 100 cm × 100 cm
= 1,000,000 cm^2



Worksheet 12: Converting area and cubic units

Q1
Convert 7cm^2 into mm^2

1 cm^2 = 100 mm^2
7 cm^2 = 7 × 100 mm^2
= mm^2

Q2
Convert 70cm^2 into mm^2

1 cm^2 = 100 mm^2
70 cm^2 = × 100 mm^2
= mm^2

Q3
Convert 0.70cm^2 into mm^2

1 cm^2 = 100 mm^2
0.70 cm^2 = × mm^2
= mm^2

Q4
Convert 0.7cm^2 into mm^2

1 cm^2 = 100 mm^2
0.7 cm^2 = × mm^2
= mm^2

Q5
Convert 0.07cm^2 into mm^2

1 cm^2 = 100 mm^2
0.07 cm^2 = × mm^2
= mm^2

Q7
Convert 3.07cm^3 into mm^3

1 cm^3 = 1 000 mm^3
3.07 cm^3 = × mm^3
= mm^3

Q8
Convert 3.7cm^3 into mm^3

1 cm^3 = 1 000 mm^3
3.7 cm^3 = × mm^3
= mm^3

Q9
Convert 3.7m^3 into cm^3

1 m^3 = 1 000 000 cm^3
3.7 m^3 = × cm^3
= cm^3

Q10
Convert 0.37m^3 into cm^3

1 m^3 = 1 000 000 cm^3
0.37 m^3 = × cm^3
= cm^3

Q11
Convert 0.37m^3 into mm^3

1 m^3 = 1 000 000 cm^3
1 cm^2 = 100 mm^2
0.37 cm^3 = × cm^3
= cm^3
cm^3 = mm^3

Q12
Convert 37m^3 into mm^3

1 m^3 = 1 000 000 cm^3
1 cm^2 = 100 mm^2
37 cm^3 = × cm^3
= cm^3
cm^3 = mm^3

Q13
Convert 137m^3 into mm^3

1 m^3 = 1 000 000 cm^3
1 cm^2 = 100 mm^2
137 cm^3 = × cm^3
= cm^3
cm^3 = mm^3