KING EDWARD VI
HANDSWORTH GRAMMAR
SCHOOL FOR BOYS

KING EDWARD VI
ACADEMY TRUST
BIRMINGHAM

Year 9

2026 Mathematics 2027

Unit 13 Student – Part 1

HGS Maths

Tasks

Dr Frost Course

Name: _____

Class: _____

KING EDWARD VI
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KING EDWARD VI
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Unit 13 Student – Part 2

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Name: _____

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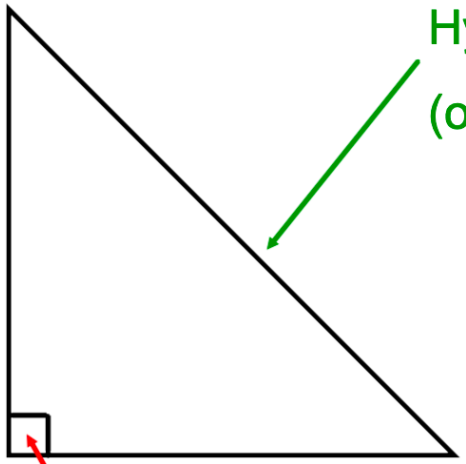
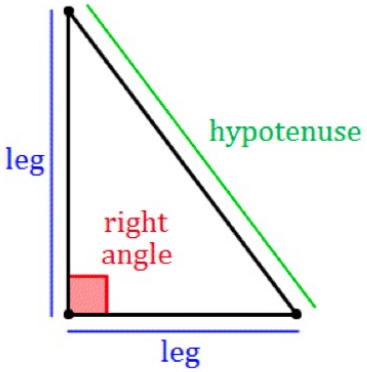
Contents Page

1 2D Pythagoras' Theorem

Hypotenuse



From the Greek derived *hypo* meaning 'under' and *teinein* meaning 'to stretch'.

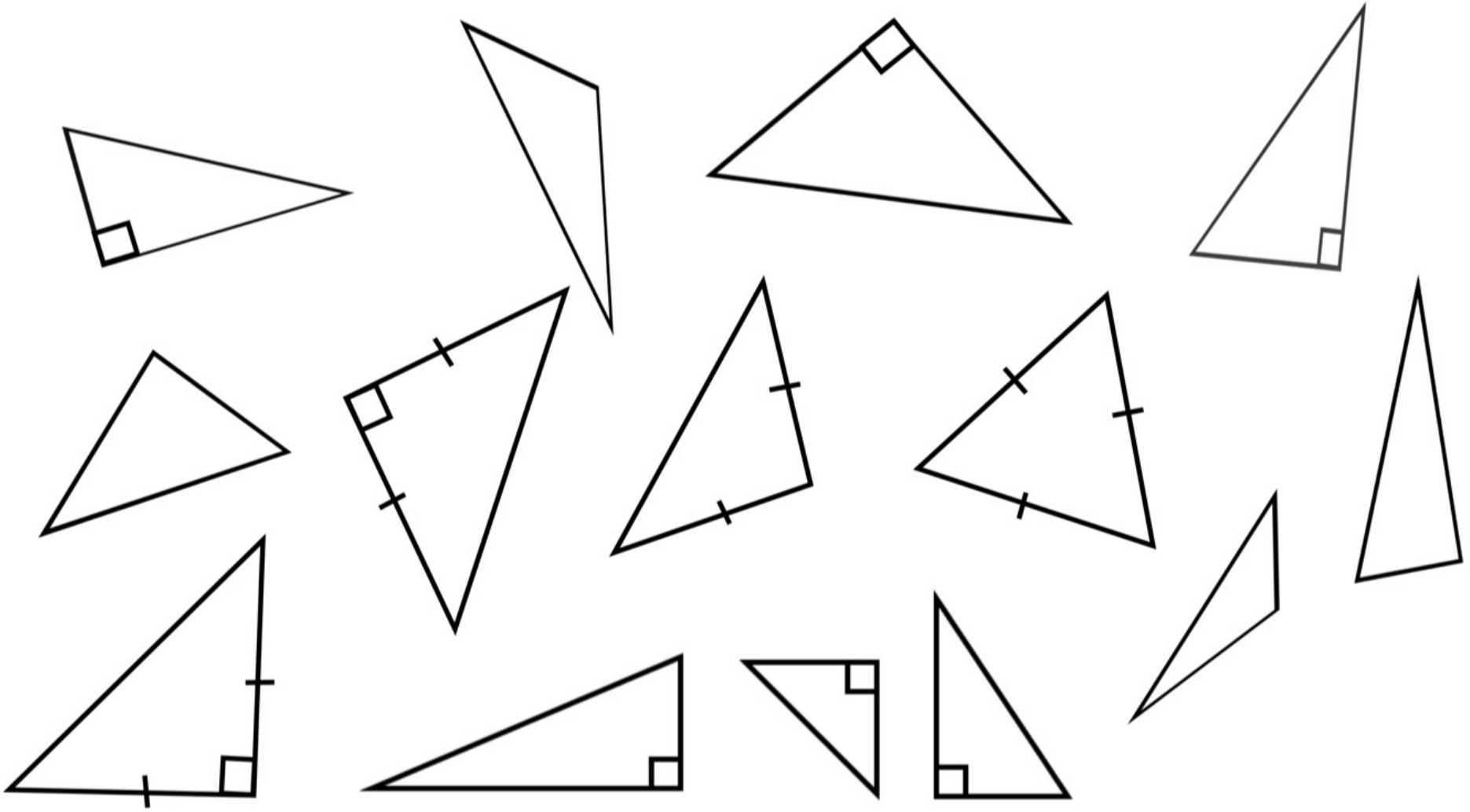


The two sides that aren't the hypotenuse are known as legs.

The hypotenuse is the side that stretches from one leg to another.

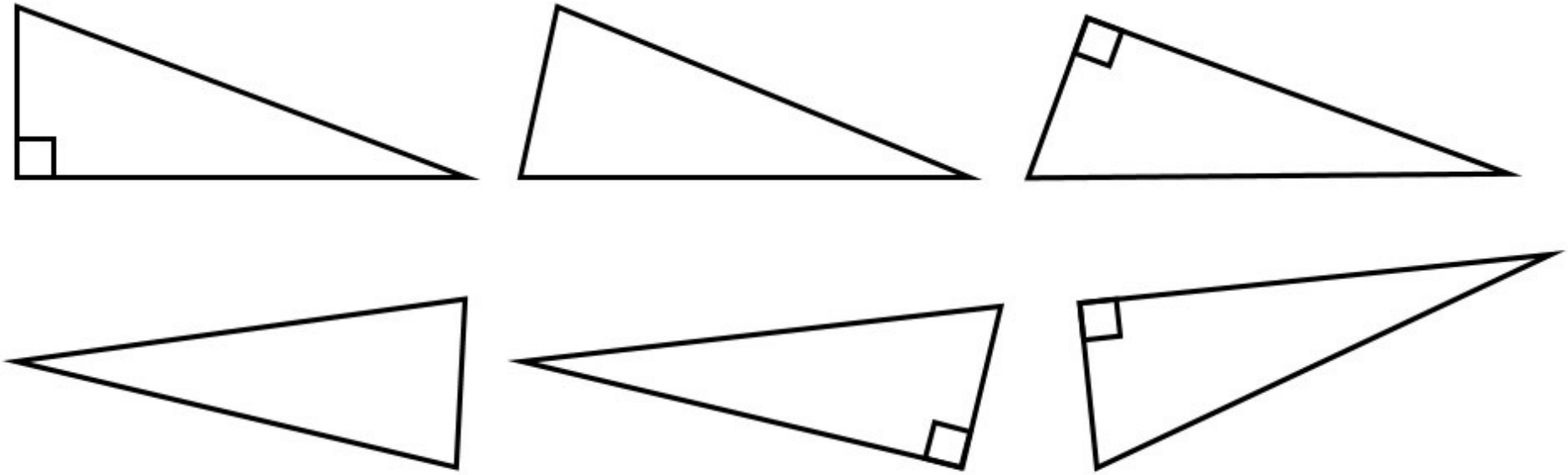
Fluency Practice

In each triangle that has a hypotenuse, label the hypotenuse with a letter C

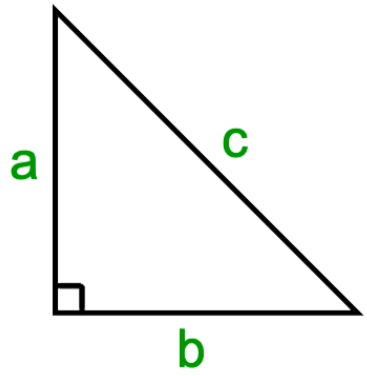


Fluency Practice

a) Cross out all shapes which Pythagoras' Theorem won't apply to.
b) In each remaining shape, label the hypotenuse c and the legs a and b.



Pythagoras' Theorem

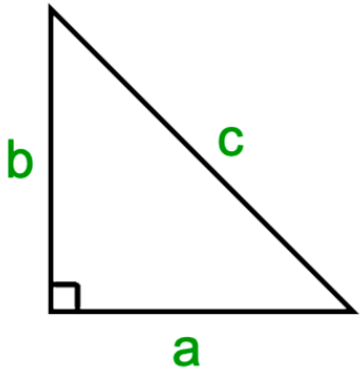


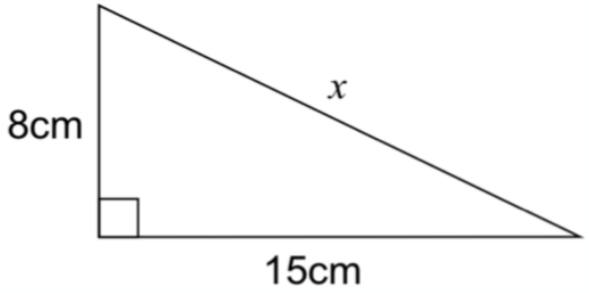
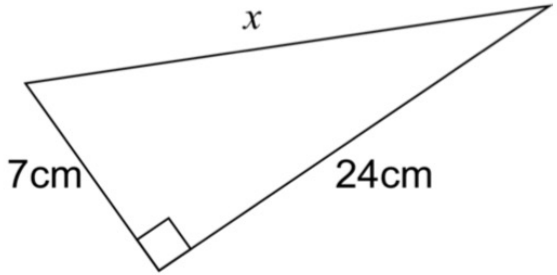
In any *right angled triangle*, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

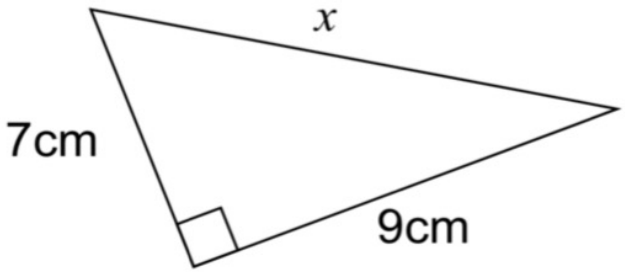
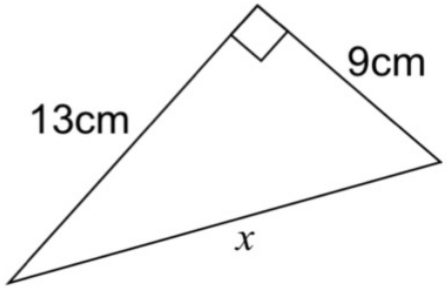
In other words:

$$a^2 + b^2 = c^2$$

Note: a and b can be labelled in any order but c has to be the hypotenuse i.e the triangle could be labelled like this:



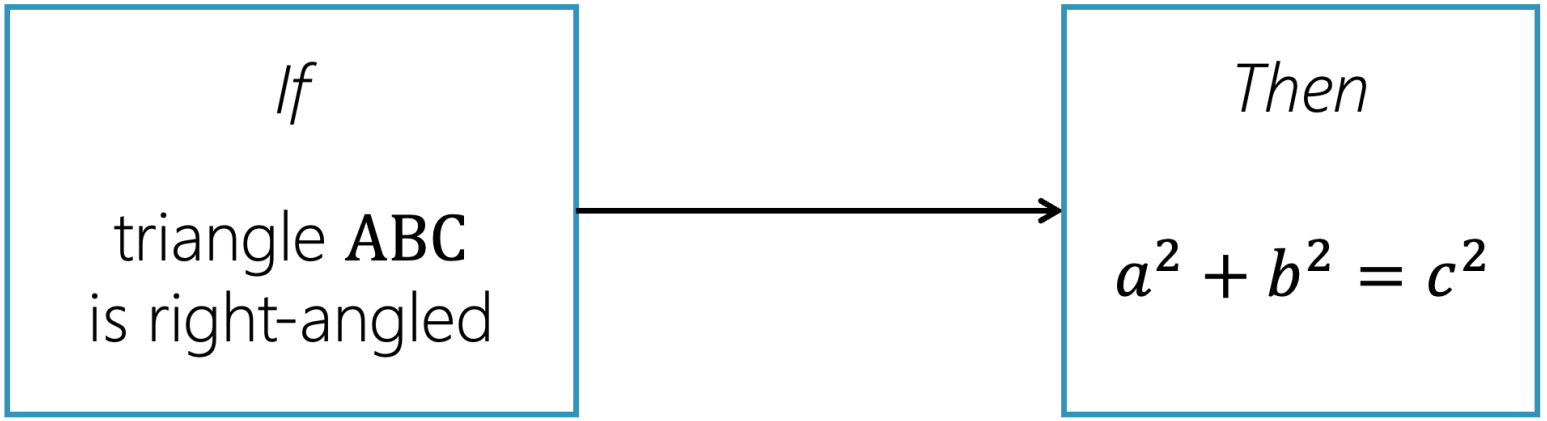
Worked Example	Your Turn
Calculate the unknown side in this triangle.  	Calculate the unknown side in this triangle. 

Worked Example	Your Turn
Calculate the unknown side in this triangle. Give your answer to 2 decimal places.  	Calculate the unknown side in this triangle. Give your answer to 2 decimal places. 

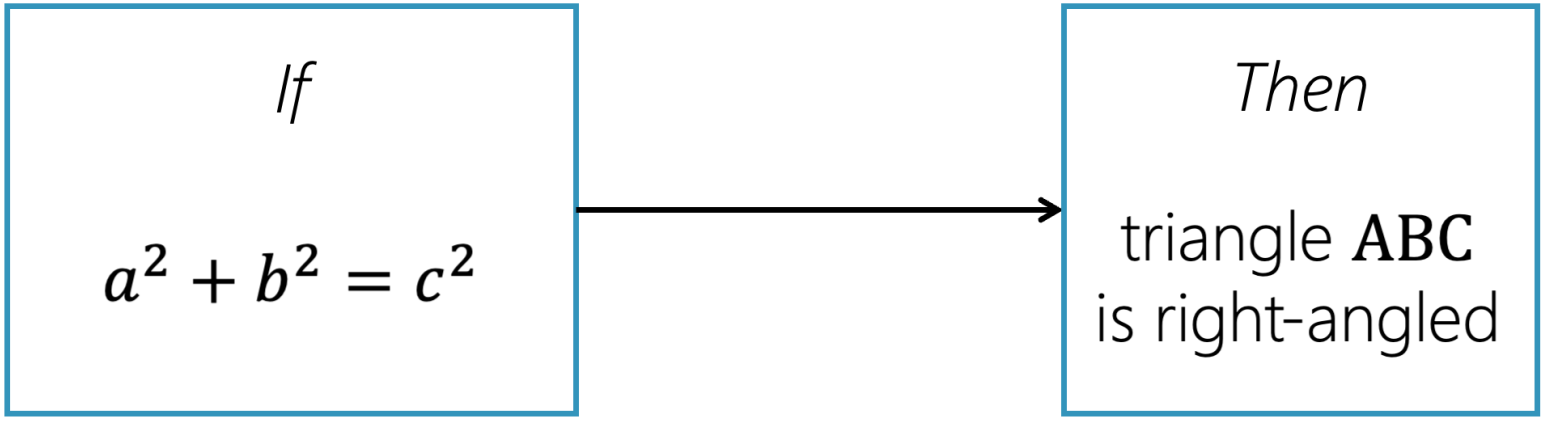
Dr Frost 288a

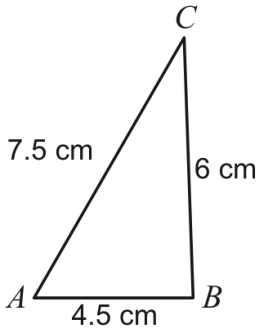
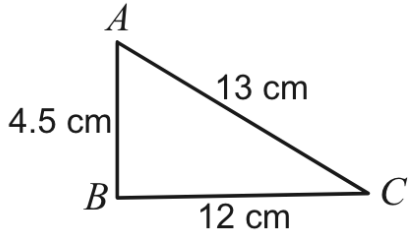
Converse of Pythagoras' Theorem

Pythagoras' Theorem has an 'If … then …' structure.



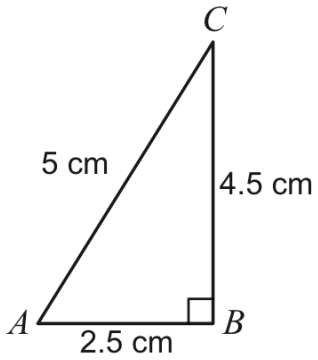
The converse of Pythagoras' Theorem is also true.



Worked Example	Your Turn
Determine whether the triangle below is right-angled.  	Determine whether the triangle below is right-angled. 

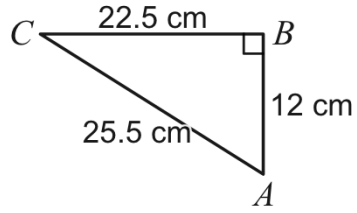
Worked Example

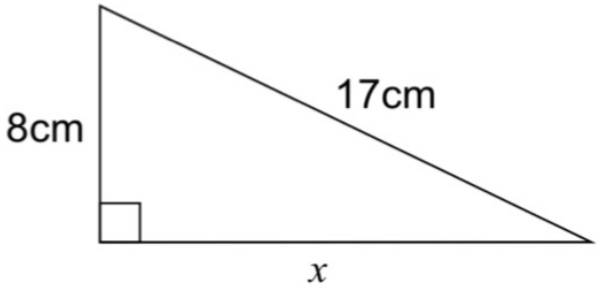
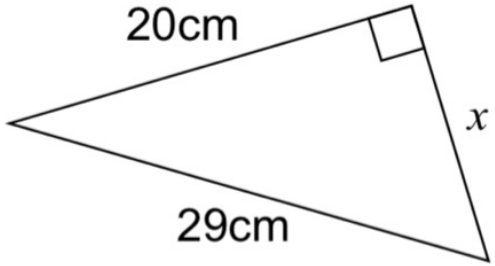
Determine whether it is possible to construct the triangle with the lengths and angles given in the diagram below.

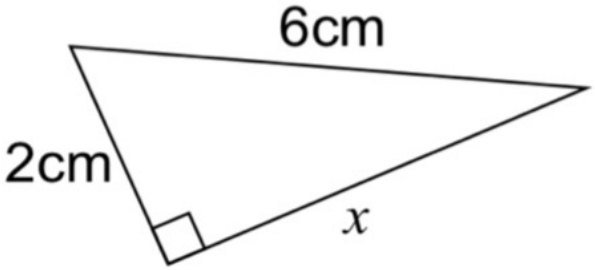
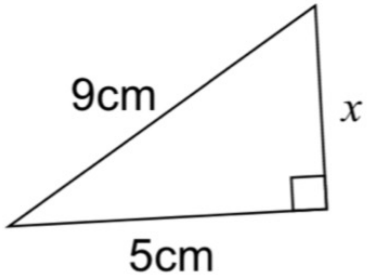


Your Turn

Determine whether it is possible to construct the triangle with the lengths and angles given in the diagram below.

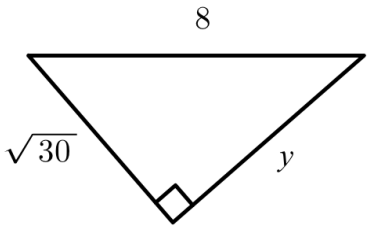


Worked Example	Your Turn
Calculate the unknown side in this triangle.  	Calculate the unknown side in this triangle. 

Worked Example	Your Turn
Calculate the unknown side in this triangle. Give your answer to 2 decimal places.  	Calculate the unknown side in this triangle. Give your answer to 2 decimal places. 

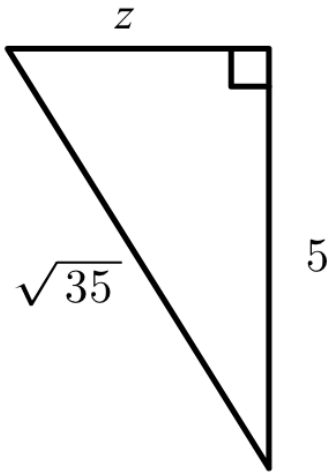
Worked Example

Given that all lengths are in centimetres, work out the exact value of y



Your Turn

Given that all lengths are in centimetres, work out the exact value of z

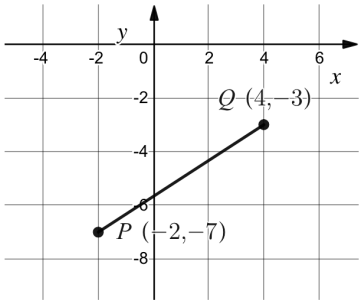


Dr Frost 338c

Worked Example	Your Turn
From point A, Tim walks 100 m due west to point B. From B, they then walks x m due north to point C. Tim is now 180 m from point A. Find the value of x. Round your answer to 1 decimal place.	From point A, Fatima walks 90 m due east to point B. From B, she then walks x m due north to point C. Fatima is now 280 m from point A. Find the value of x. Round your answer to 1 decimal place.

Worked Example

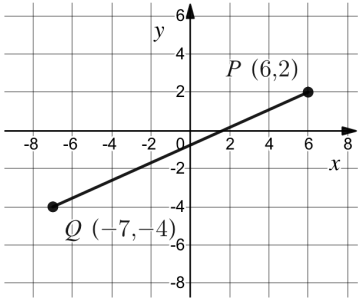
The line segment that connects $P(-2, -7)$ and $Q(4, -3)$ is drawn on the coordinate grid.



Determine the length PQ.
Give your answer correct to 1 decimal place.

Your Turn

The line segment that connects $P(6, 2)$ and $Q(-7, -4)$ is drawn on the coordinate grid.



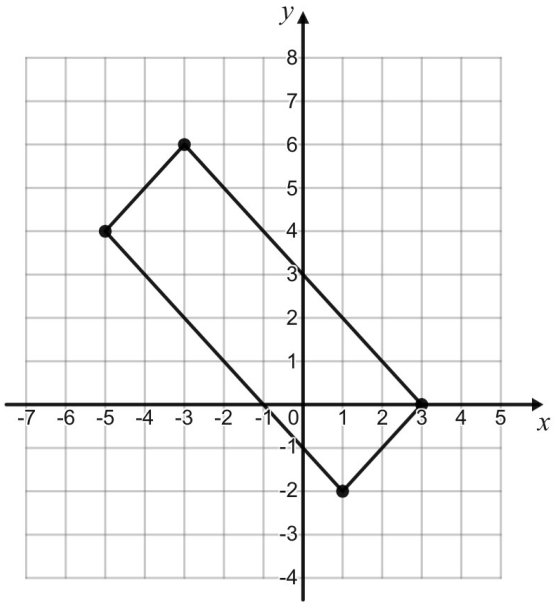
Determine the length PQ.
Give your answer correct to 1 decimal place.

Worked Example	Your Turn
The line segment connects $P(-6, -4)$ and $Q(-3, 3)$ Determine the length PQ. Give your answer correct to 1 decimal place.	The line segment connects $P(-6, -1)$ and $Q(-2, 6)$ Determine the length PQ. Give your answer correct to 1 decimal place.

Dr Frost 289a and 338b

Worked Example

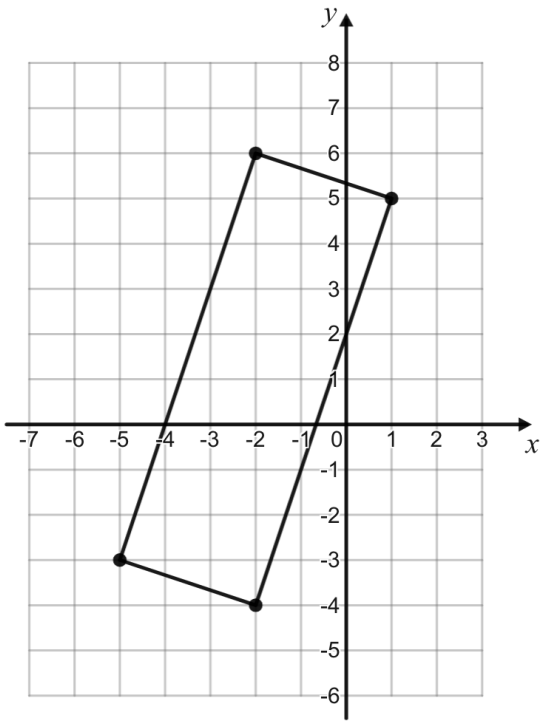
A rectangle is drawn on the coordinate grid below.



Calculate the perimeter of the rectangle.
Give your answer correct to 2 decimal places.

Your Turn

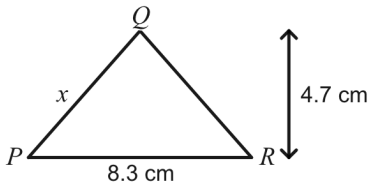
A rectangle is drawn on the coordinate grid below.



Calculate the perimeter of the rectangle.
Give your answer correct to 1 decimal place.

Worked Example

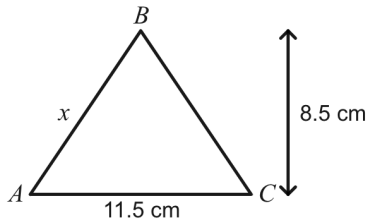
PQR is an isosceles triangle where $PQ = QR$.



Find the length marked x on the diagram.
Give your answer correct to 1 decimal place.

Your Turn

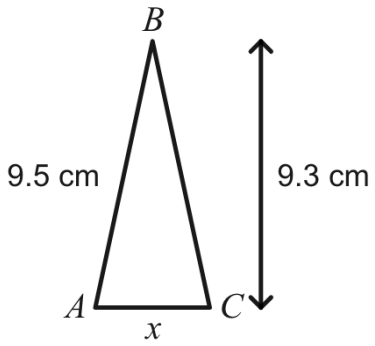
ABC is an isosceles triangle where $\mathrm{AB} = BC$.



Work out the length marked x on the diagram.
Give your answer correct to 1 decimal place.

Worked Example

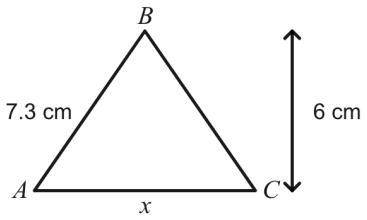
ABC is an isosceles triangle where $AB = BC$.



Find the length marked x on the diagram.
Give your answer to correct to 1 decimal place.

Your Turn

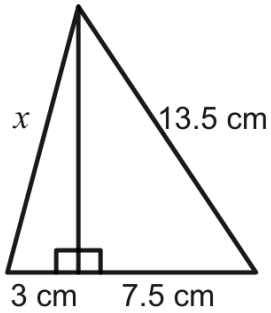
ABC is an isosceles triangle where $AB = BC$.



Calculate the length marked x on the diagram.
Give your answer to correct to 1 decimal place.

Worked Example

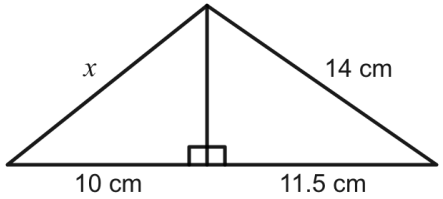
Work out the value of x.



Give your answer correct to 1 decimal place.

Your Turn

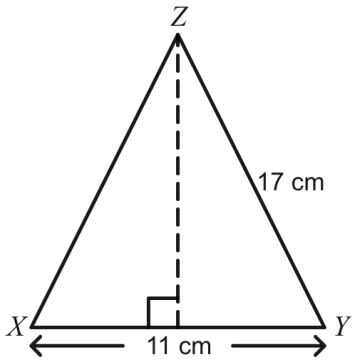
Work out the value of x.



Give your answer correct to 1 decimal place.

Worked Example

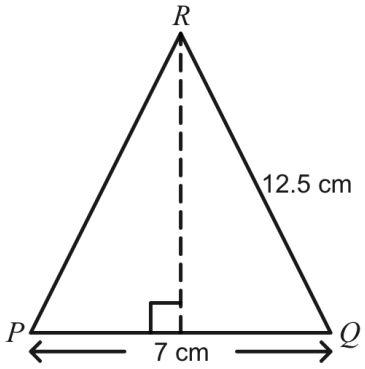
The diagram below shows the isosceles triangle XYZ.



Find the area of triangle XYZ.
Give your answer to 1 decimal place.

Your Turn

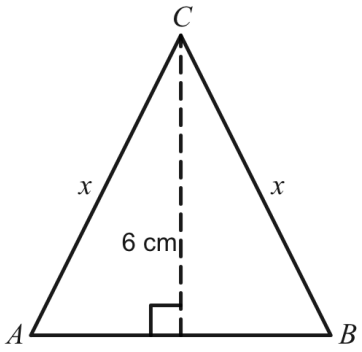
The diagram below shows the isosceles triangle PQR.



Find the area of triangle PQR.

Worked Example

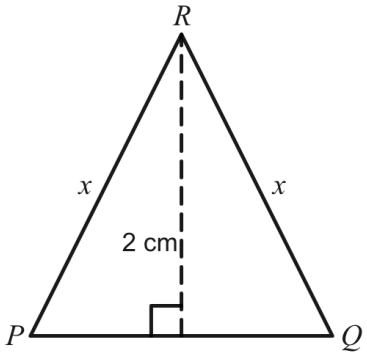
The diagram below shows the isosceles triangle ABC.



The area of triangle ABC is 15 cm^2
Find the length marked x in the diagram.

Your Turn

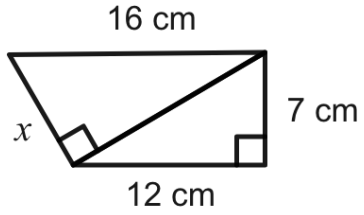
The diagram below shows the isosceles triangle PQR.



The area of triangle PQR is 3 cm^2
Find the length marked x in the diagram.

Worked Example

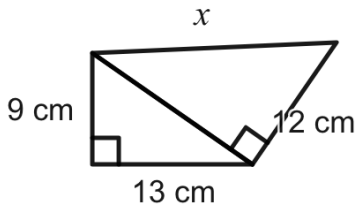
Find the value of x.



Give your answer correct to 1 decimal place.

Your Turn

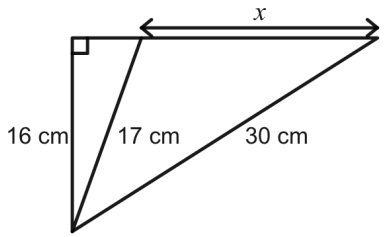
Calculate the value of x.



Give your answer correct to 1 decimal place.

Worked Example

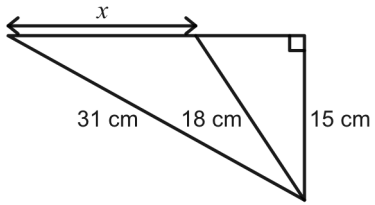
Find the value of x.



Give your answer correct to 1 decimal place.

Your Turn

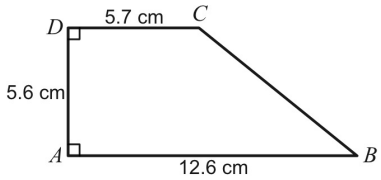
Find the value of x.



Give your answer correct to 1 decimal place.

Worked Example

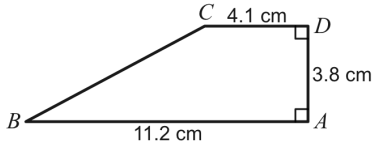
The diagram shows a trapezium $ABCD$.



Find the length BC.
Give your answer to 2 decimal places.

Your Turn

The diagram shows a trapezium $ABCD$.

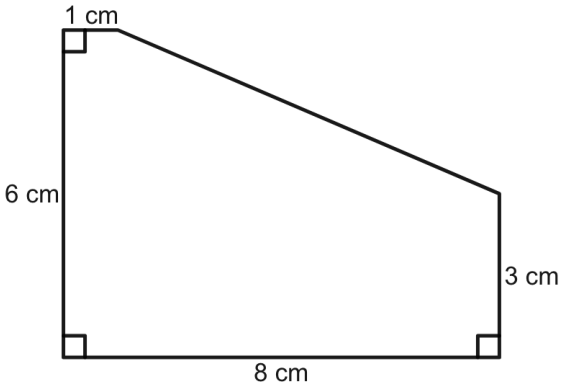


Find the length BC.
Give your answer to 2 decimal places.

Dr Frost 288q

Worked Example

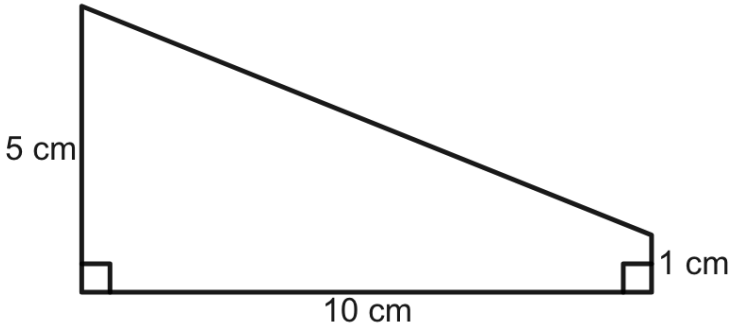
Work out the perimeter of the following shape.



Give your answer in surd form.

Your Turn

Work out the perimeter of the following shape.

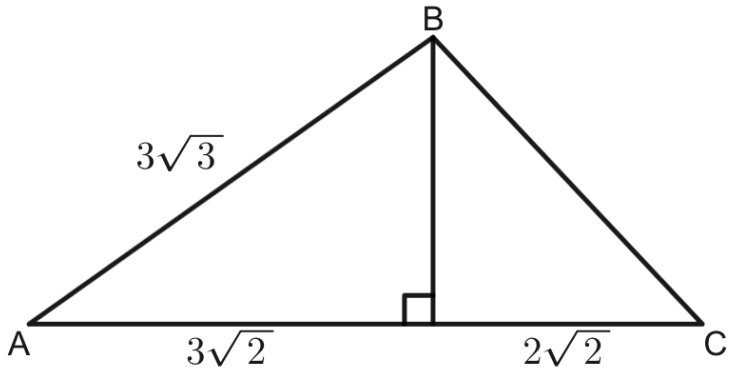


Give your answer in surd form.

Dr Frost 338e

Worked Example

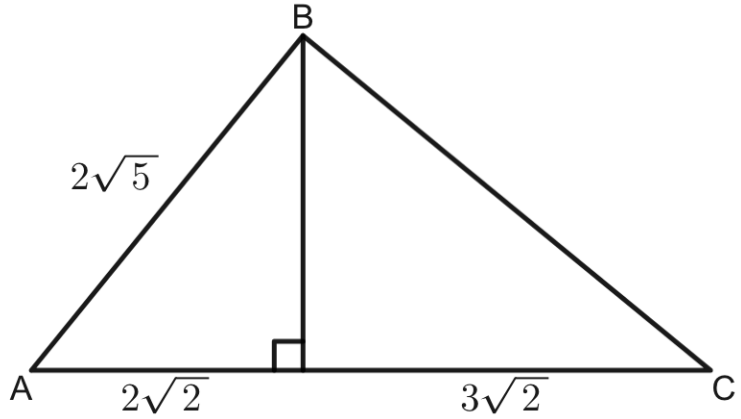
Given that all lengths are in centimetres, find the area of the triangle ABC



Give your answer in simplified surd form.

Your Turn

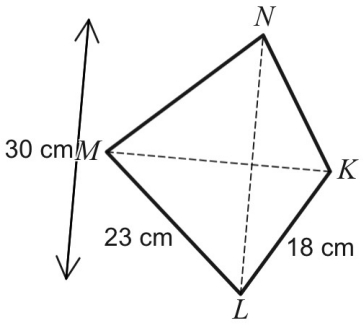
Given that all lengths are in centimetres, find the area of the triangle ABC



Give your answer in simplified surd form.

Worked Example

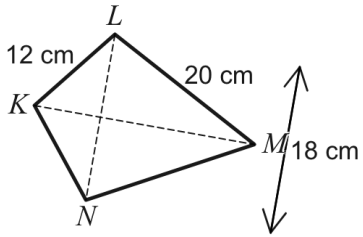
The diagram shows the kite $KLMN$



Calculate the area of the kite.
Give your answer correct to 1 decimal place.

Your Turn

The diagram shows the kite $KLMN$

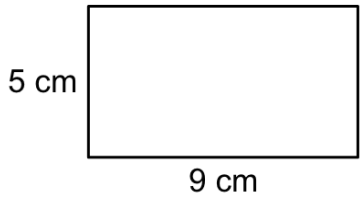


Calculate the area of the kite.
Give your answer correct to 1 decimal place.

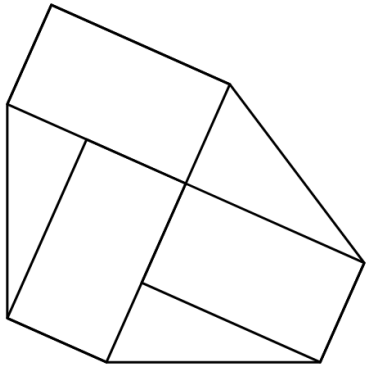
Dr Frost 288g

Worked Example

Here is a rectangle.



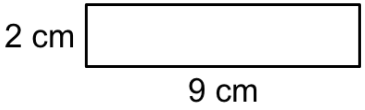
The 7-sided shape below is made from 3 of these rectangles and 3 right-angled triangles.



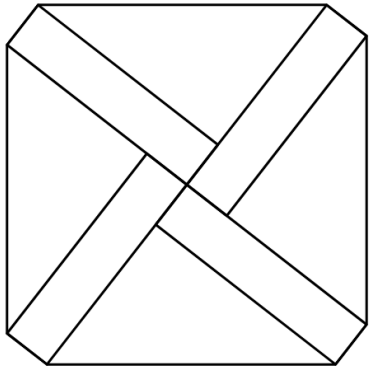
Work out the perimeter of the 7-sided shape.
Give your answer to 1 decimal place.

Your Turn

Here is a rectangle.

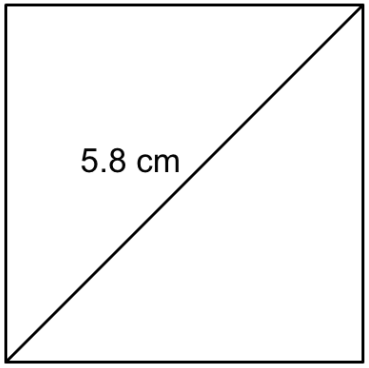


The 8-sided shape below is made from 4 of these rectangles and 4 right-angled triangles.



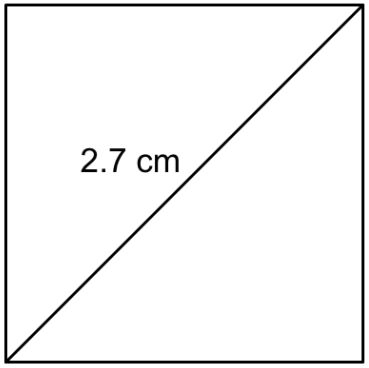
Work out the perimeter of the 8-sided shape.
Give your answer to 1 decimal place.

Worked Example



The diagram shows a square with diagonal 5.8 cm.
Find the perimeter of the square.
Give your answer correct to 2 decimal places.

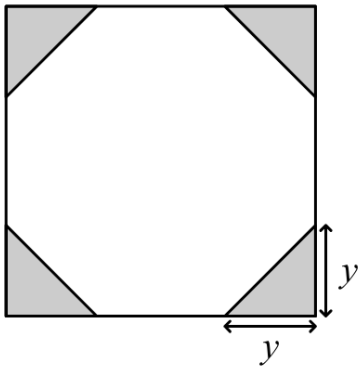
Your Turn



The diagram shows a square with diagonal 2.7 cm.
Find the perimeter of the square.
Give your answer correct to 2 decimal places.

Worked Example

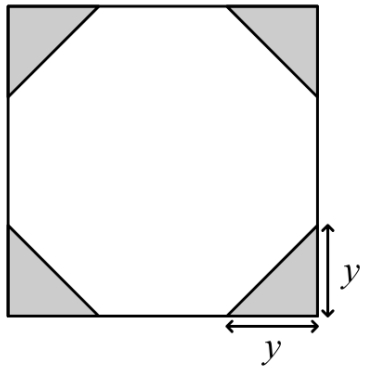
I have a square piece of card of side length 6 cm.
I cut a triangle from each corner so that the remaining shape is in the shape of a regular octagon.



Work out the length y
Give your answer correct to 2 decimal places.

Your Turn

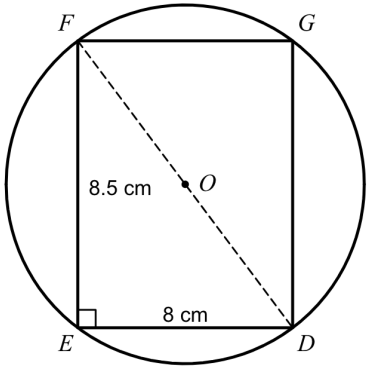
I have a square piece of card of side length 10 cm.
I cut a triangle from each corner so that the remaining shape is in the shape of a regular octagon.



Work out the length y
Give your answer correct to 2 decimal places.

Worked Example

The diagram below shows a rectangle $DEFG$ inscribed in a circle, centre O.
The lengths of the sides of the rectangle are 8 cm and 8.5 cm.
DF is a diameter of the circle.

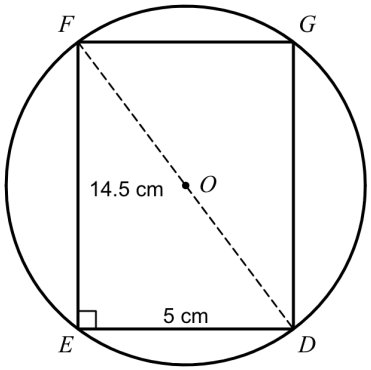


a) Calculate the area of the circle.
b) Calculate the circumference of the circle.

Give your answers correct to 1 decimal place.

Your Turn

The diagram below shows a rectangle $DEFG$ inscribed in a circle, centre O.
The lengths of the sides of the rectangle are 5 cm and 14.5 cm.
DF is a diameter of the circle.

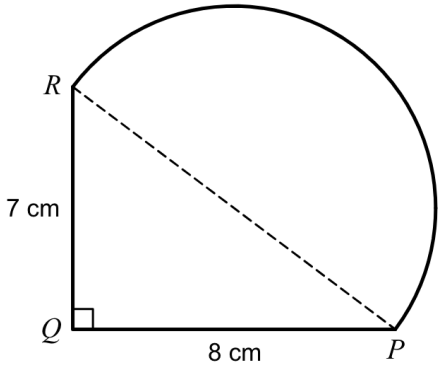


a) Calculate the area of the circle.
b) Calculate the circumference of the circle.

Give your answers correct to 1 decimal place.

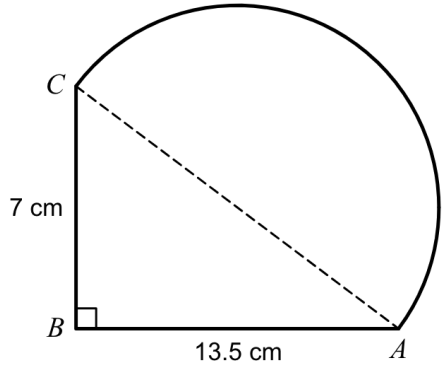
Worked Example

The shape below consists of a right-angled triangle PQR and a semicircle.
PQ has length 8 cm and QR has length 7 cm.
Calculate the area of the shape.
Give your answer correct to 1 decimal place.



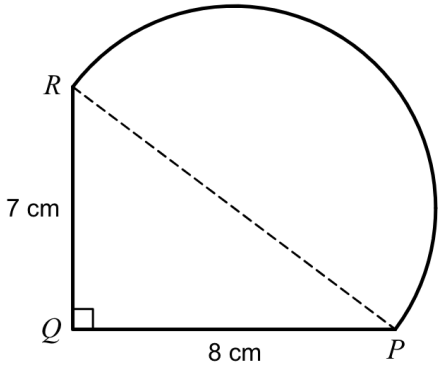
Your Turn

The shape below consists of a right-angled triangle ABC and a semicircle.
AB has length 13.5 cm and BC has length 7 cm.
Calculate the area of the shape.
Give your answer correct to 1 decimal place.



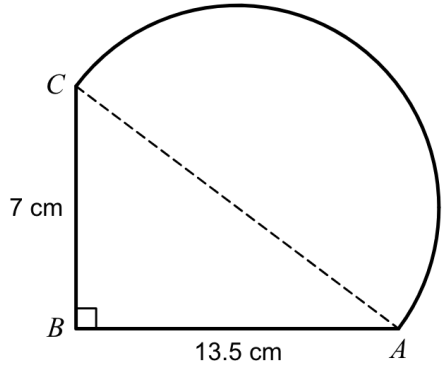
Worked Example

The shape below consists of a right-angled triangle PQR and a semicircle.
PQ has length 8 cm and QR has length 7 cm.
Calculate the perimeter of the shape.
Give your answer correct to 1 decimal place.



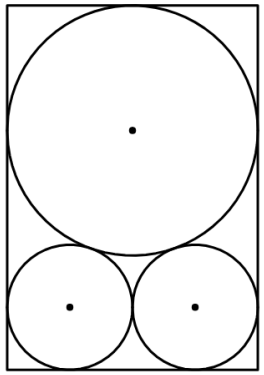
Your Turn

The shape below consists of a right-angled triangle ABC and a semicircle.
AB has length 13.5 cm and BC has length 7 cm.
Calculate the perimeter of the shape.
Give your answer correct to 1 decimal place.



Worked Example

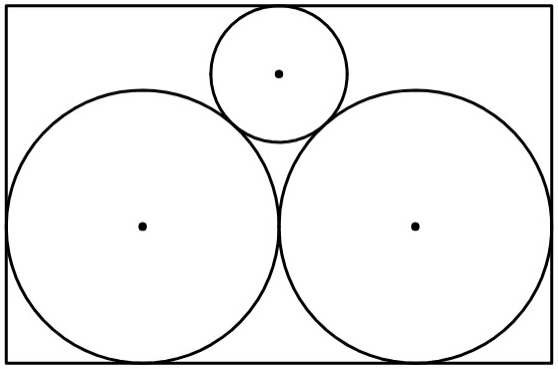
The diagram shows two identical circles and a third, larger, circle inside a rectangle.
Each circle touches the other two circles and the sides of the rectangle, as shown in the diagram.



The radius of each of the smaller circles is 5 cm.
Work out the perimeter of the rectangle.
Give your answer correct to 1 decimal place.

Your Turn

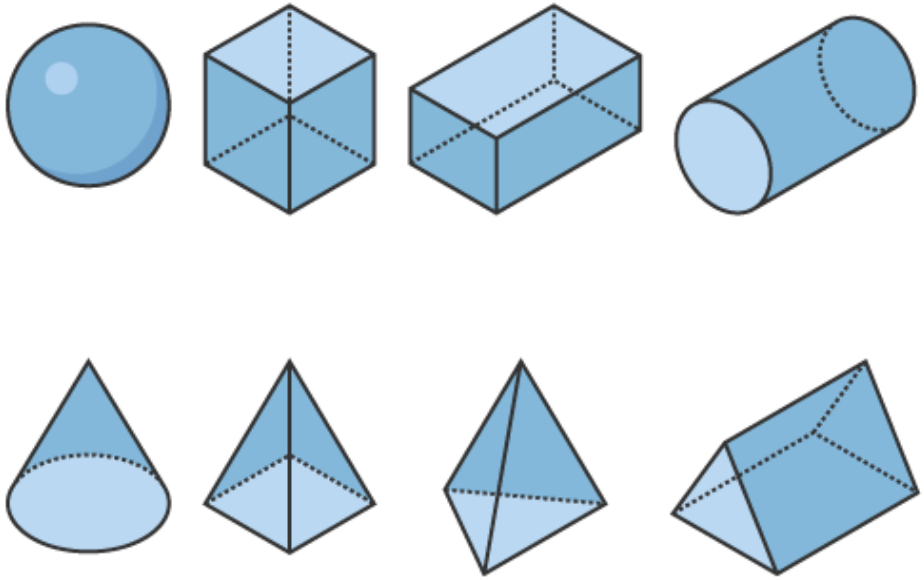
The diagram shows two identical circles and a third, smaller, circle inside a rectangle.
Each circle touches the other two circles and the sides of the rectangle, as shown in the diagram.



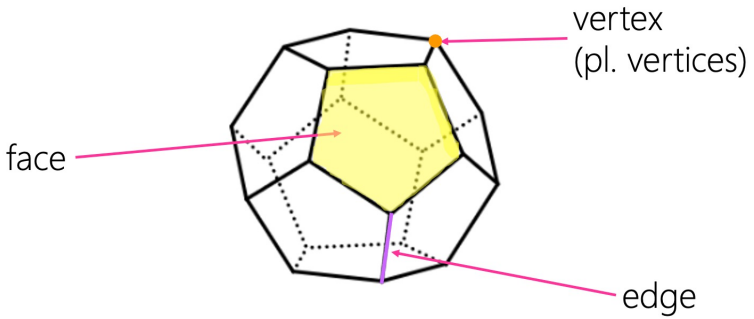
The radius of each of the identical circles is 10 cm, and the radius of the smaller circle is 5 cm.
Work out the area of the rectangle.
Give your answer correct to 1 decimal place.

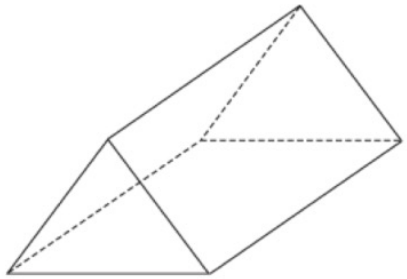
Extra Notes

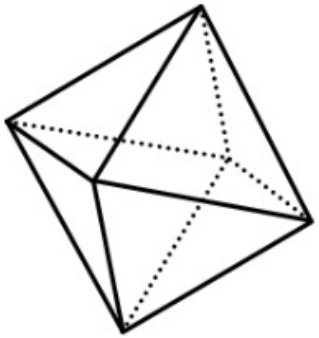
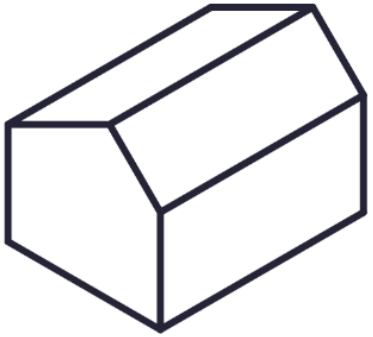
2 Properties of 3D Shapes

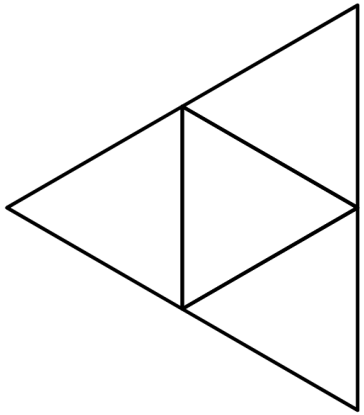
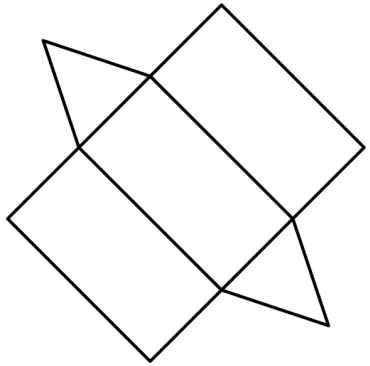


A **vertex** is a corner.
An **edge** is a line segment between faces.
A **face** is a single flat surface.



Worked Example	Your Turn
For the cuboid, write down the:  Number of faces (F) The number of edges (E) The number of vertices (V) Calculate $V - E + F$	For the triangular prism, write down the:  Number of faces (F) The number of edges (E) The number of vertices (V) Calculate $V - E + F$

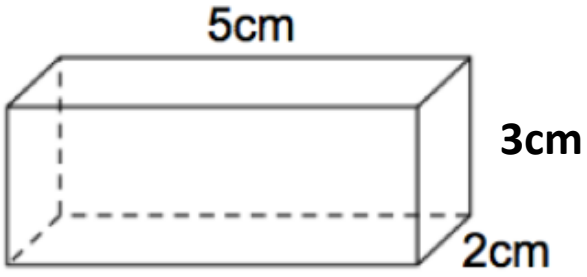
Worked Example	Your Turn
Here is an octahedron. How many faces, edges and vertices does it have? 	Here is a pentagonal prism. How many faces, edges and vertices does it have? 

Worked Example	Your Turn
Which 3D shape is this a net of? 	Which 3D shape is this a net of? 

Dr Frost 143a

Worked Example

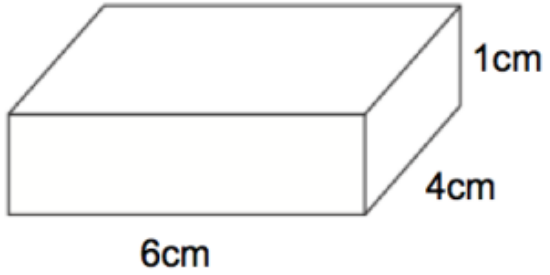
Draw a net for the cuboid.



Each square represents 1 cm^2

Your Turn

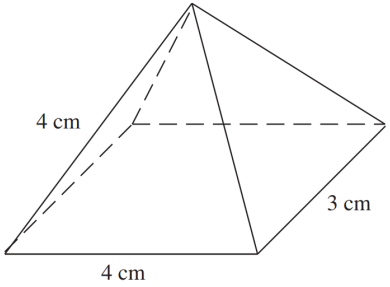
Draw a net for the cuboid.



Each square represents 1 cm^2

Worked Example

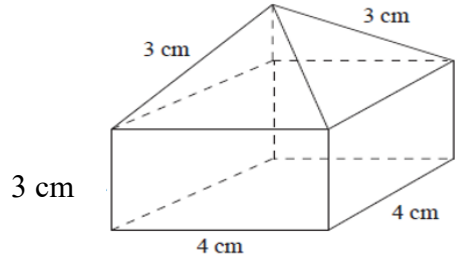
Draw a net for the solid.



Each square represents 1 cm^2

Your Turn

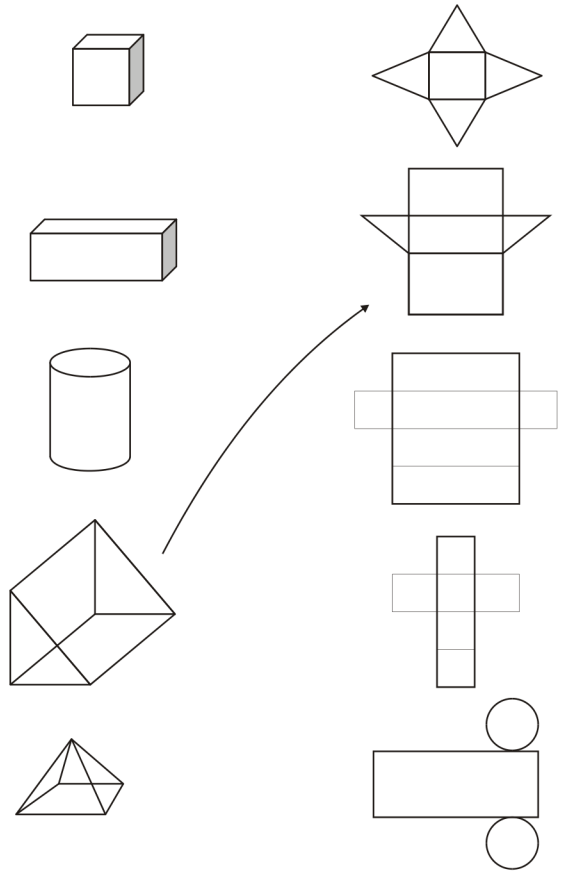
Draw a net for the solid.



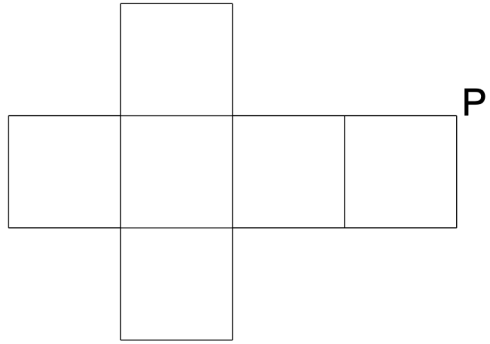
Each square represents 1 cm^2

Fluency Practice

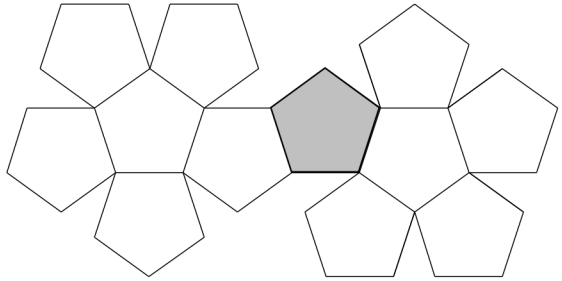
1. Match the 3D solids with their net



2. The net is folded to make a cube.
Two other vertices meet at *P.*
Mark each of these vertices with the letter *P*.

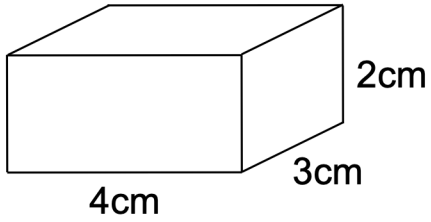


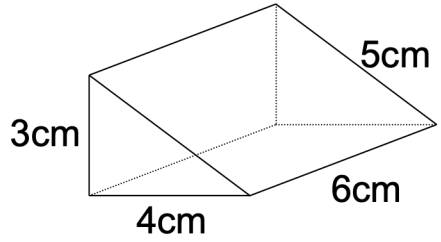
3. The net shown is folded to make a dodecahedron. Label the face which is opposite the shaded one



Fluency Practice

4. Using the grid provided with 1 square = 1 cm, draw an accurate net of these solids

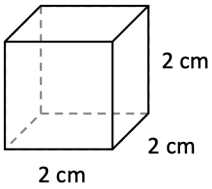




Fluency Practice

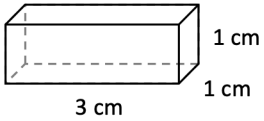
On the scale grid draw the **NET** for each cuboid.

a)

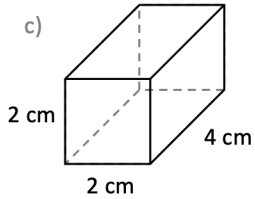


3 cm

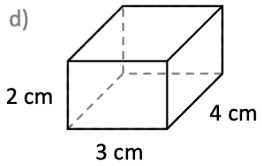
b)



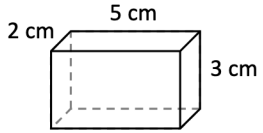
c)



d)



e)



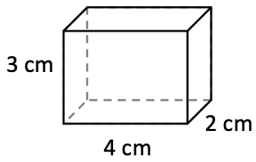
①

Fluency Practice

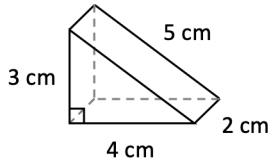
On the scale grid draw the **NET** for each 3D shape.

2 cm

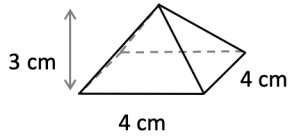
a) cuboid



b) triangular prism

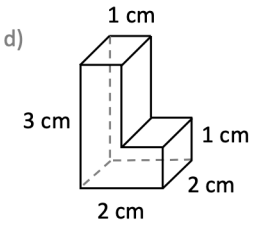


c) regular pyramid



rectilinear prism

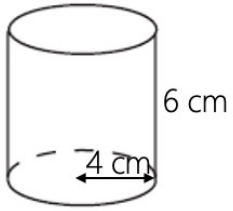
d)



②

Worked Example

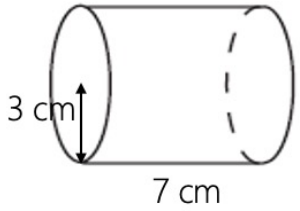
Draw a net for the cylinder.



Each square represents 1 cm^2

Your Turn

Draw a net for the cylinder.



Each square represents 1 cm^2

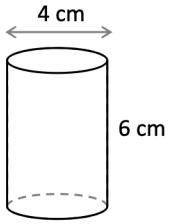
Fluency Practice

On the scale grid draw the **NET** for each type of cylinder.

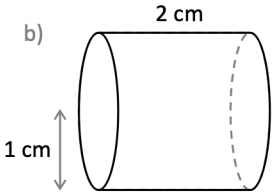
Label the lengths of each rectangle.

3 cm

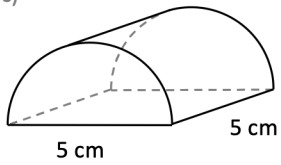
a)



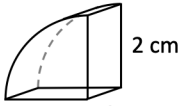
b)

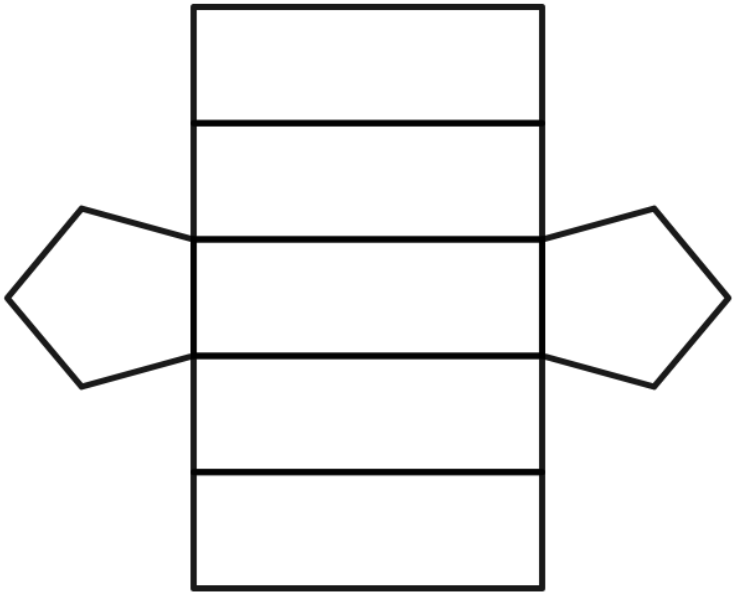
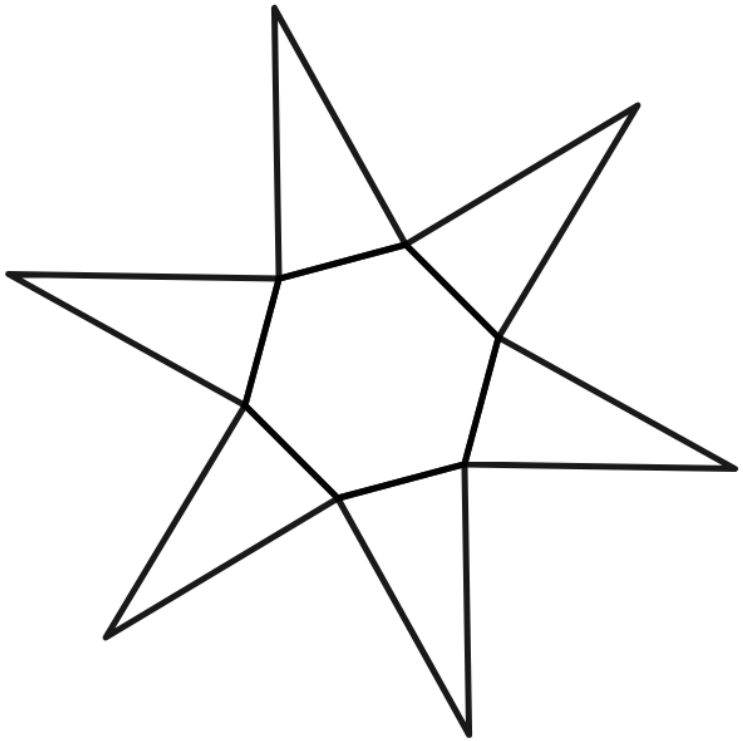


c) half cylinder



d) quarter cylinder



Worked Example	Your Turn
How many edges does this shape have? 	How many edges does this shape have? 

Dr Frost 143c

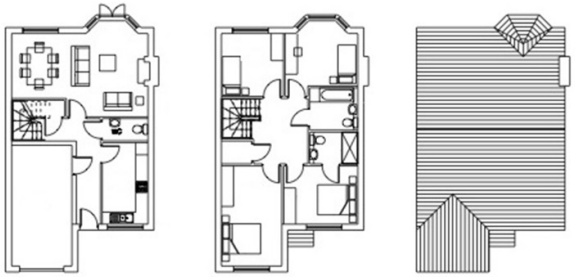
Extra Notes

3 Plans and Elevations

The **plan** is the view from the top of a 3D solid.

Elevations are horizontal views of a 3D object:

- **Front elevation**: The view from the front of an object.
- **Back elevation**: The view from behind the object.
- **Side elevation**: The view from the side of an object.



plans

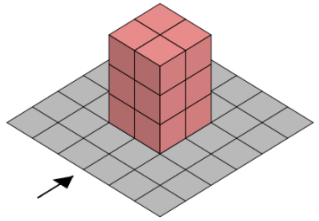
front elevation

side elevation

back elevation

side elevation

Worked Example

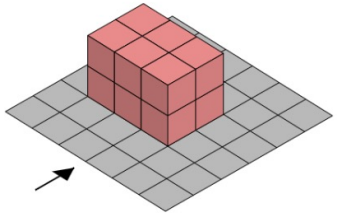


Plan:

Front (with arrow):

Side (from right):

Your Turn

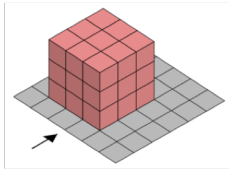
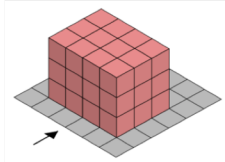
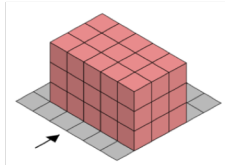
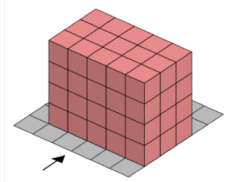
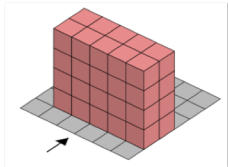
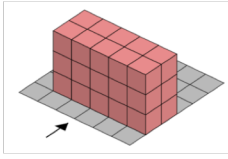


Plan:

Front (with arrow):

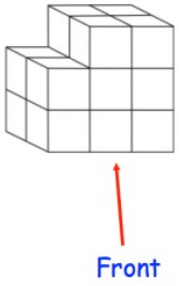
Side (from right):

1 For each of the shapes below, draw the plan view, front view (shown with the arrow) and side view (from the right).

		Plan View	Front View	Side View
a				
b				
c				
d				
e				
f				

Worked Example

A shape is made of centimetre cubes. On the centimetre square grid, draw the elevations:



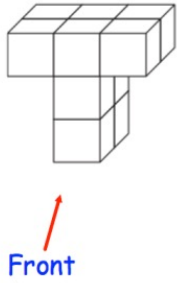
Front:

Left Side:

Plan:

Your Turn

A shape is made of centimetre cubes. On the centimetre square grid, draw the elevations:

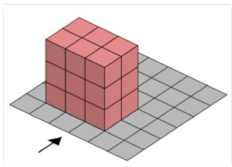
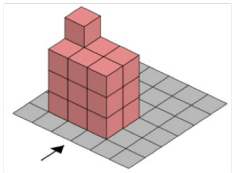
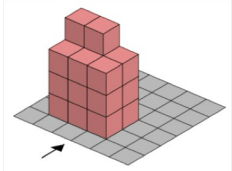
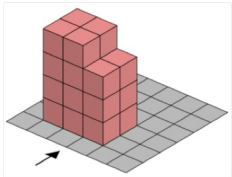
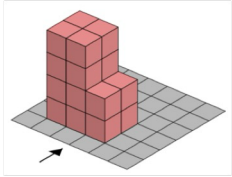
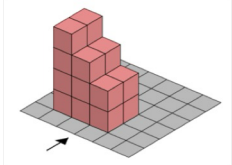


Front:

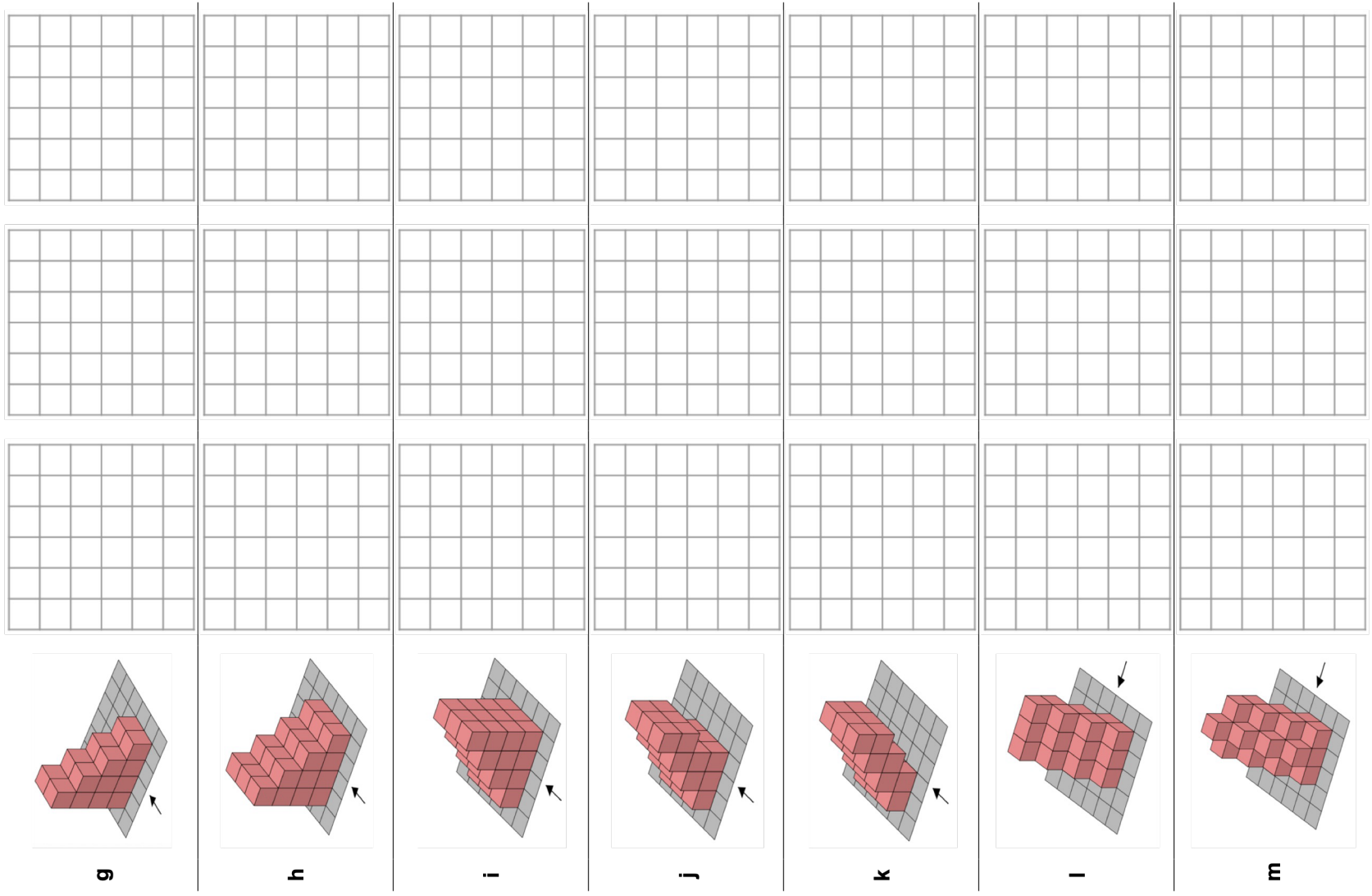
Left Side:

Plan:

1 For each of the shapes below, draw the plan view, front view (shown with the arrow) and side view (from the right).

		Plan View	Front View	Side View
a				
b				
c				
d				
e				
f				

Fluency Practice

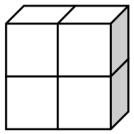


4 Cubes

4 cubes can be arranged in 8 different ways.

Draw the plan, the front elevation and the side elevation for each arrangement.

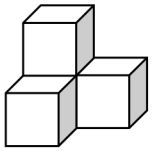
Why are there only 8 arrangements?



Plan

Front Elevation

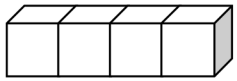
Side Elevation



Plan

Front Elevation

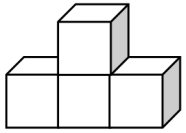
Side Elevation



Plan

Front Elevation

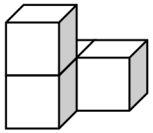
Side Elevation



Plan

Front Elevation

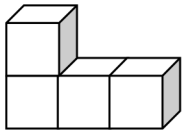
Side Elevation



Plan

Front Elevation

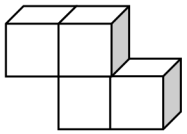
Side Elevation



Plan

Front Elevation

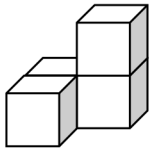
Side Elevation



Plan

Front Elevation

Side Elevation



Plan

Front Elevation

Side Elevation

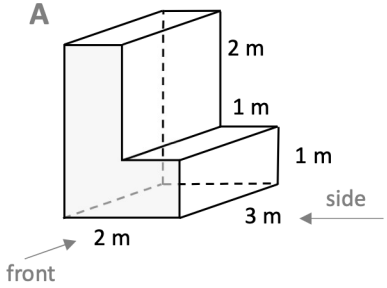
Fluency Practice

not to scale

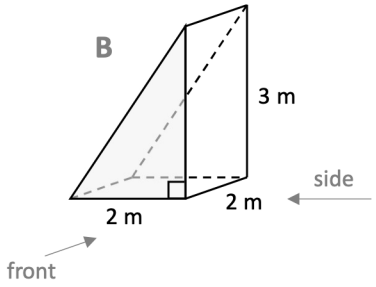
Plans & Elevations

On the scale grid draw the
front & **side elevations**, and the **plan**, for these prisms.

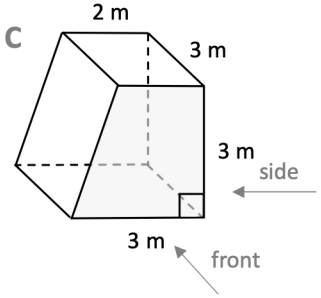
A



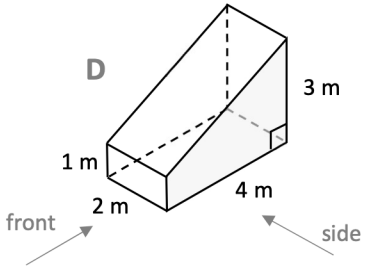
B



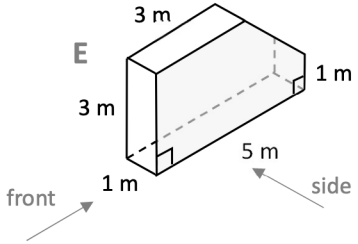
C

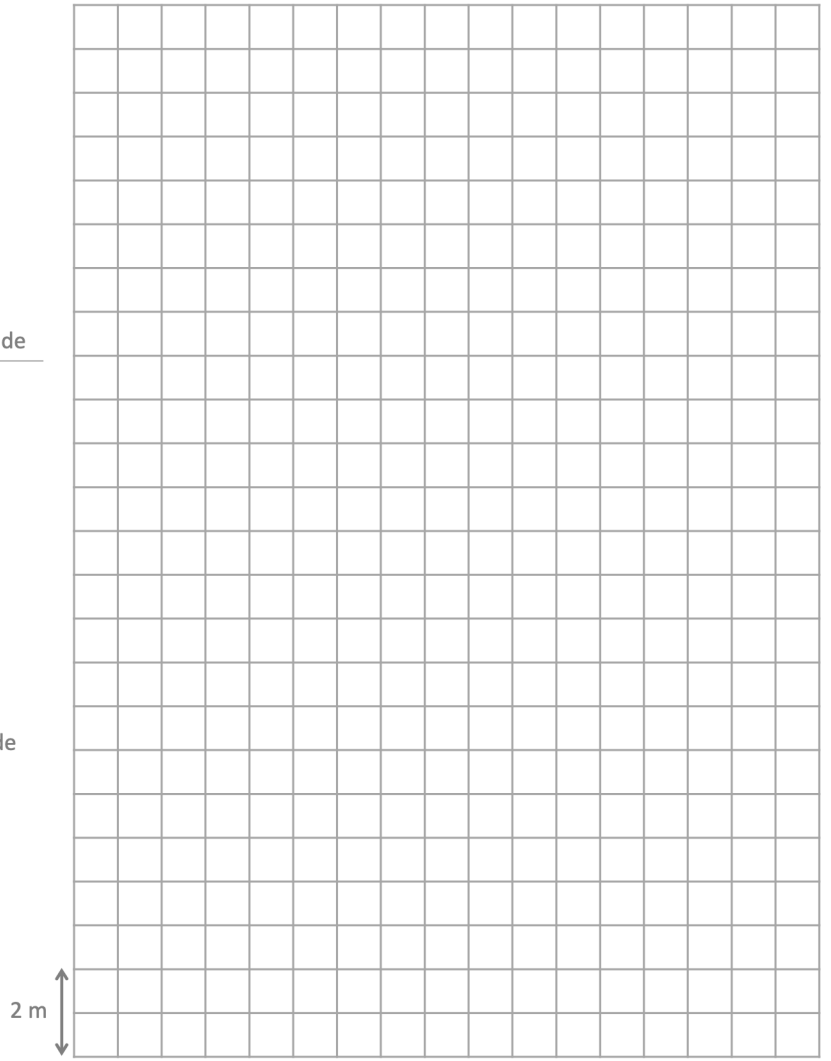


D



E





Fluency Practice

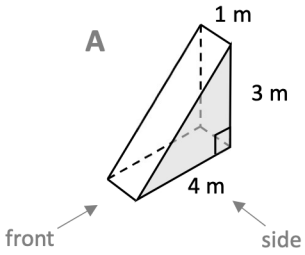
Pythag & Plans & Elevations

not to scale

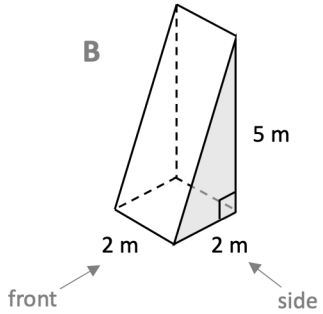
On the scale grid draw the **front** & **side elevations**, and the **plan**, for these **prisms**.

Label lengths that are not on the diagrams below.

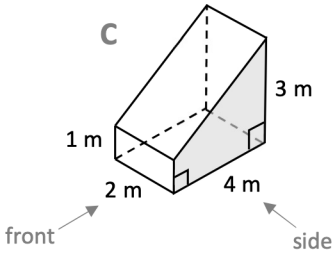
A



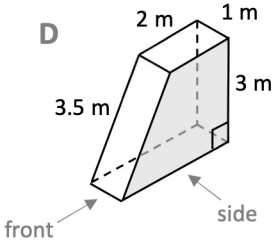
B



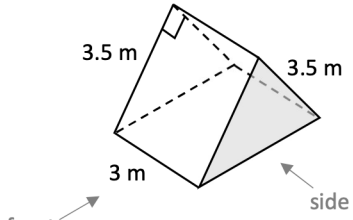
C

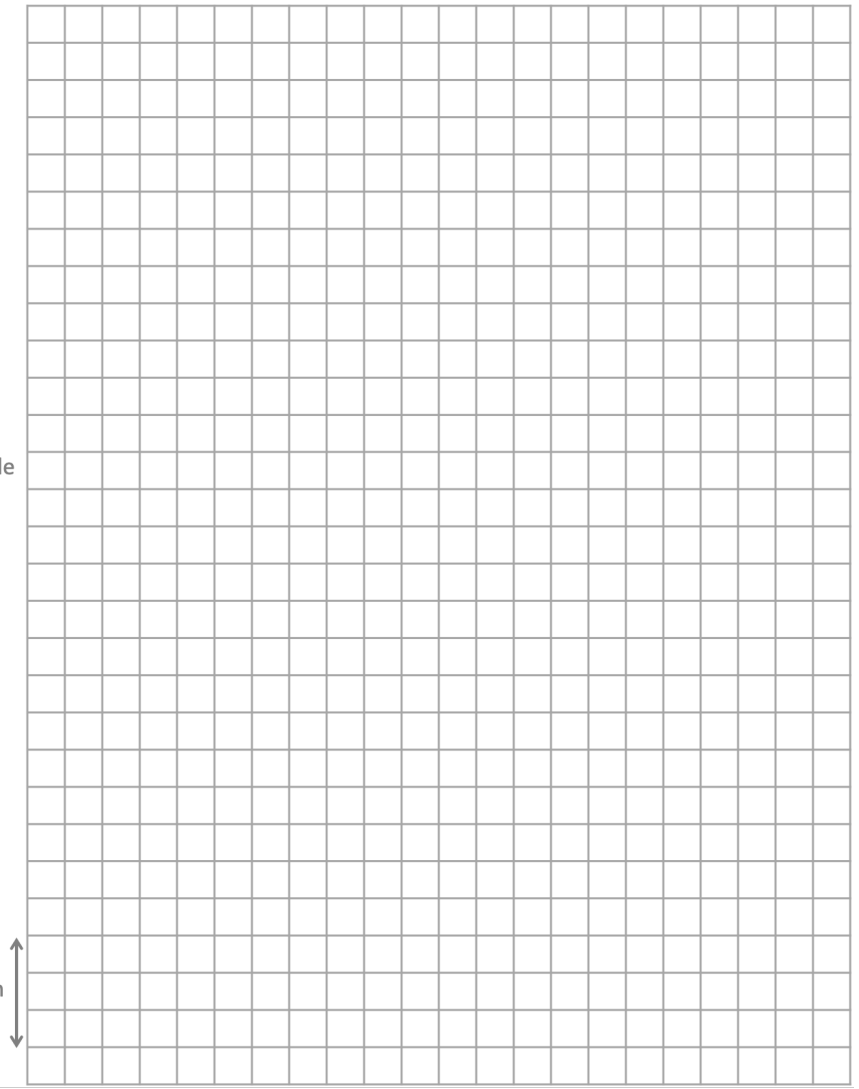


D



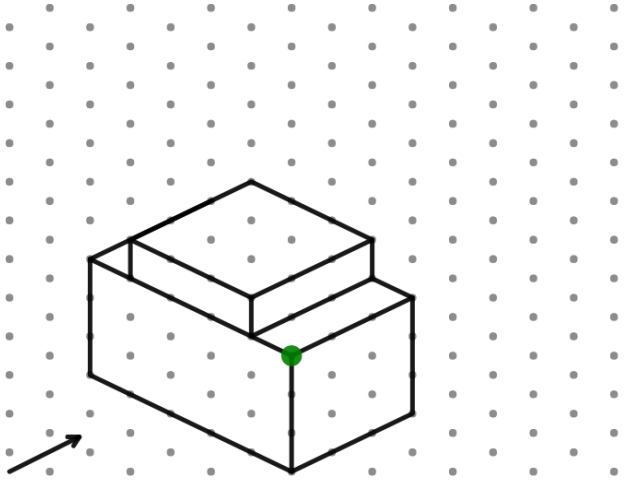
E





Worked Example

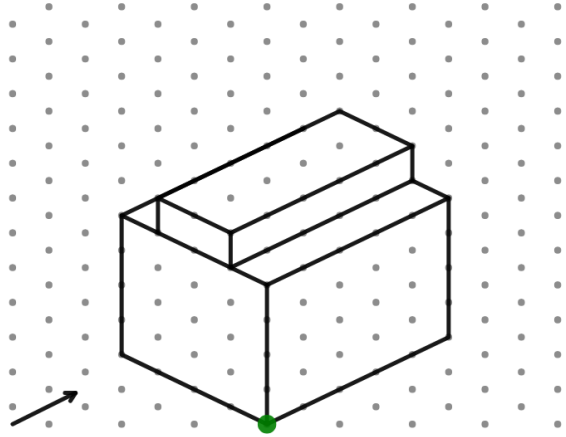
The arrow indicates the front elevation of the 3D shape.



Draw the plan of the 3D shape.

Your Turn

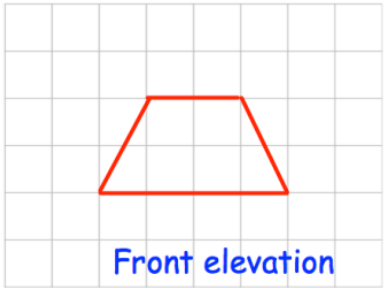
The arrow indicates the front elevation of the 3D shape.

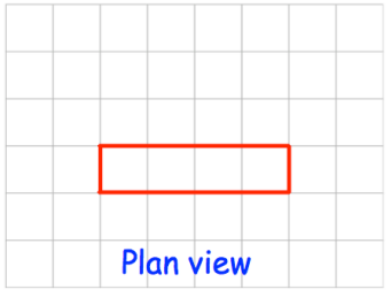


Draw the side elevation of the 3D shape.

Worked Example

Given the elevations



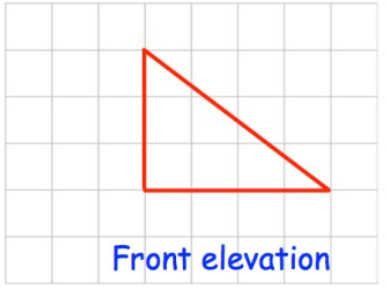


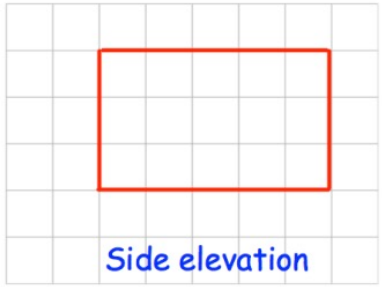
Draw the side elevation

Sketch the solid shape

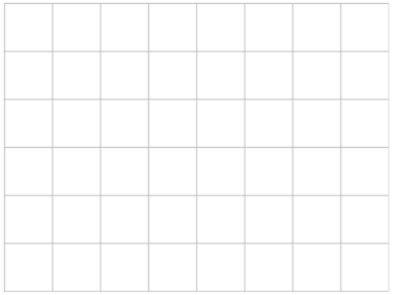
Your Turn

Given the elevations





Draw the plan view



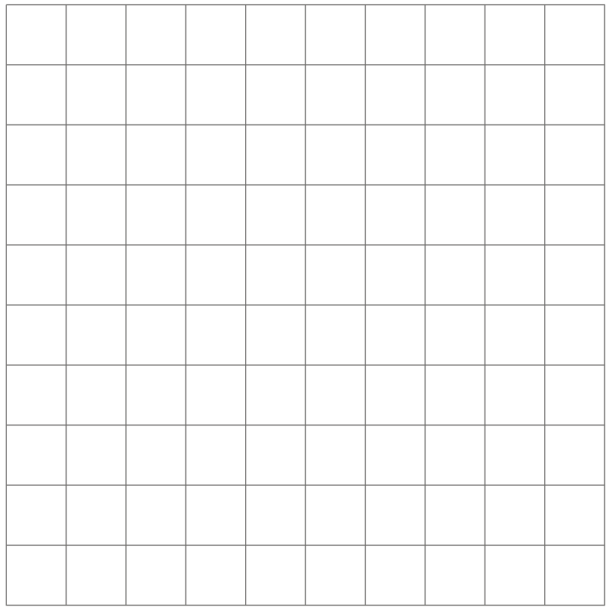
Sketch the solid shape

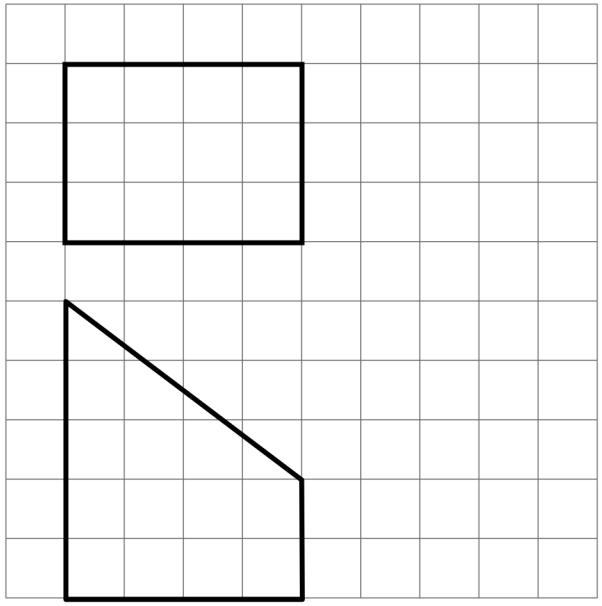
Fluency Practice

1. Here is the plan and side elevation of a prism.

The side elevation shows the cross section of the prism.

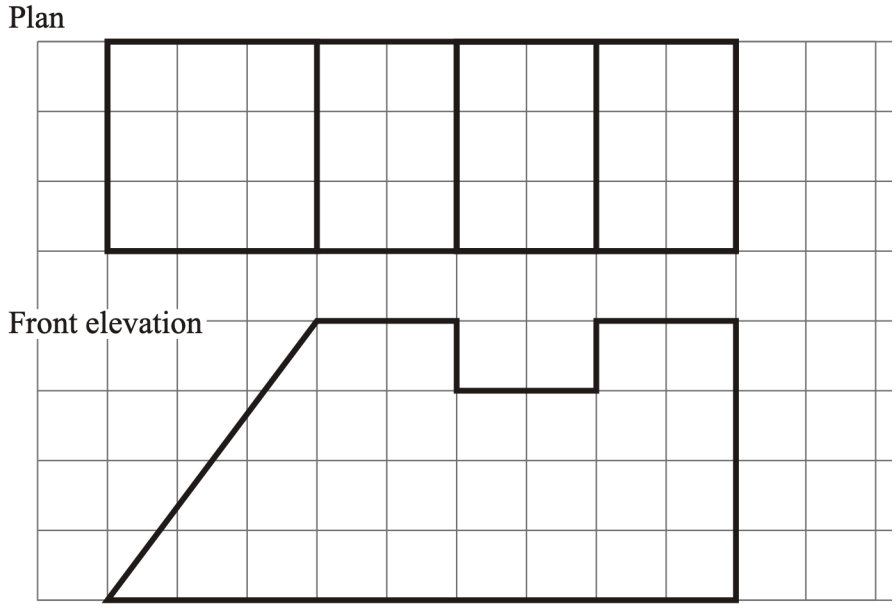
On the grid below, draw the front elevation of the prism.



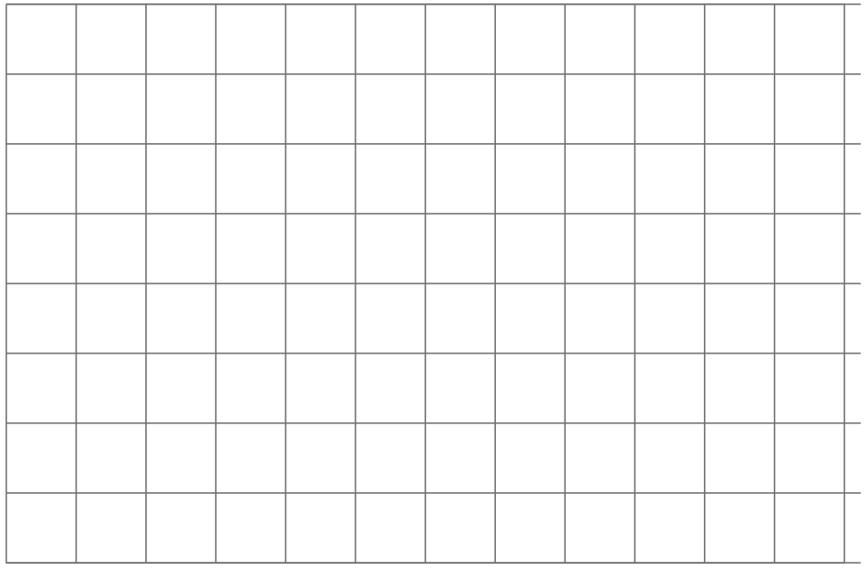


(b) In the space below, draw a 3-D sketch of the prism.

2. Here are the plan and front elevation of a prism.
The front elevation shows the cross section of the prism.

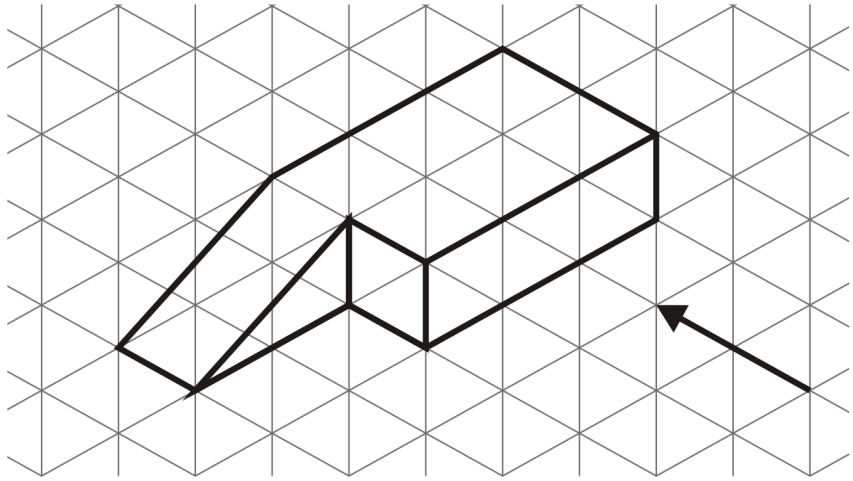


(a) On the grid below, draw a side elevation of the prism.



(b) In the space below, draw a 3-D sketch of the prism.

3. The diagram shows a solid object.



(a) In the space below, sketch the front elevation from the direction marked with an arrow.

(b) In the space below, sketch the plan of the solid object.

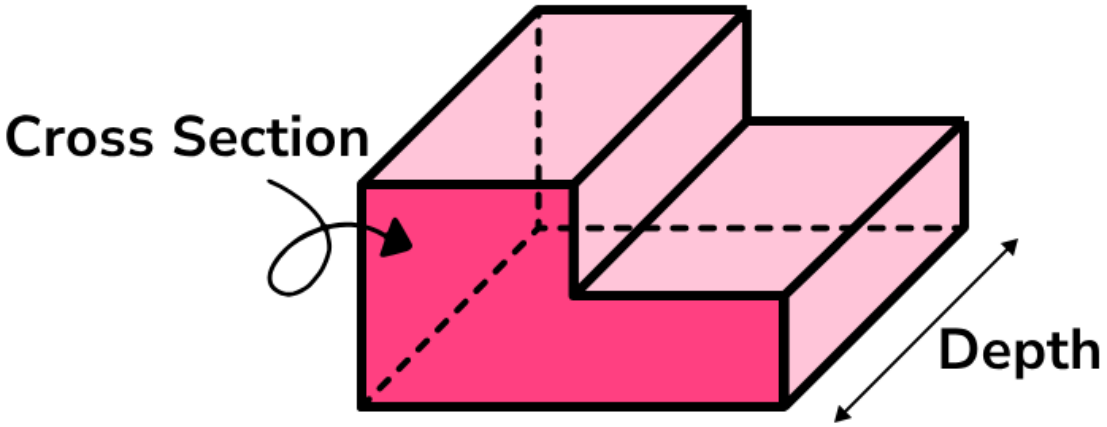
Extra Notes

4 Volume and Surface Area of Prisms

Volume of Prisms

Volume of Prism = Area of Cross Section × Depth

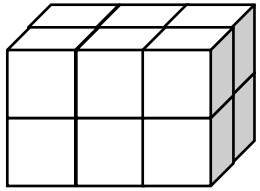
$V = A \times D$



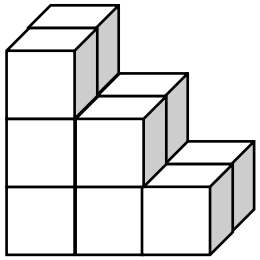
Worked Example

Write down the volume of the shape:

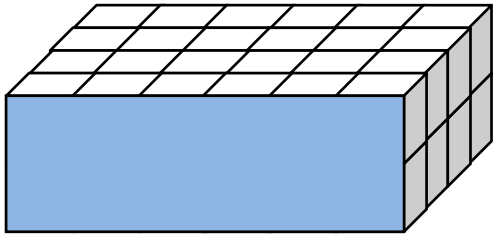
a)



b)



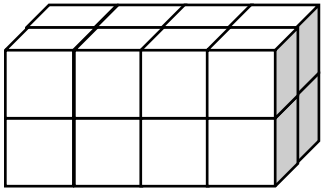
c)



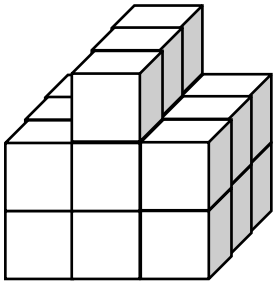
Your Turn

Write down the volume of the shape:

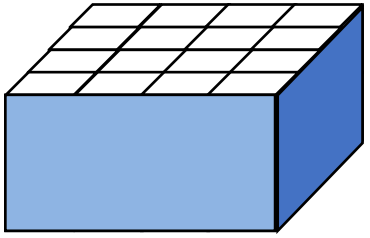
a)



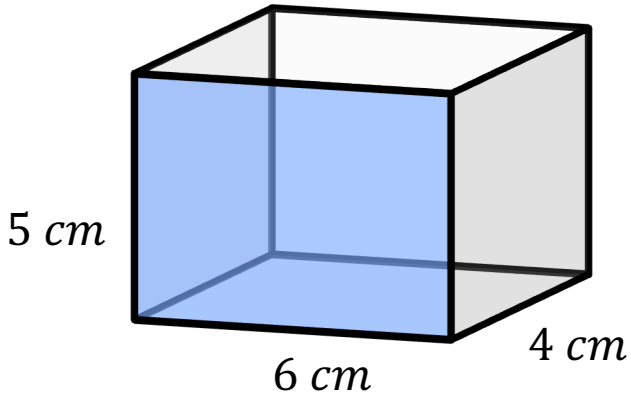
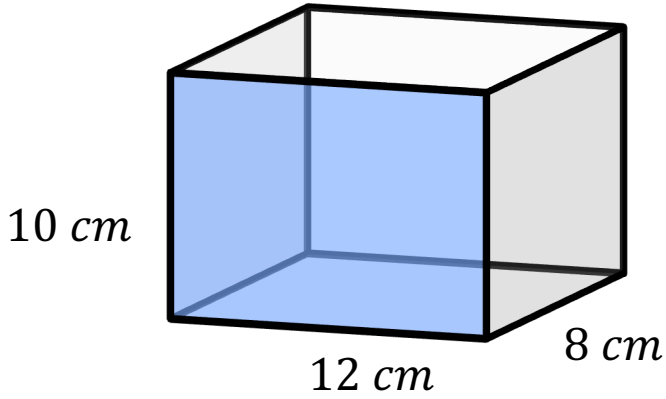
b)



c)



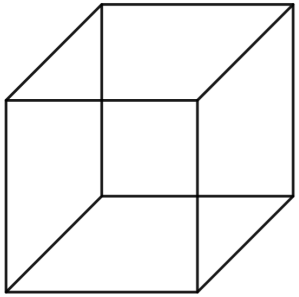
Dr Frost 144a, 144b and 231a

Worked Example	Your Turn
Calculate the volume of the cuboid:  	Calculate the volume of the cuboid: 

Dr Frost 145a

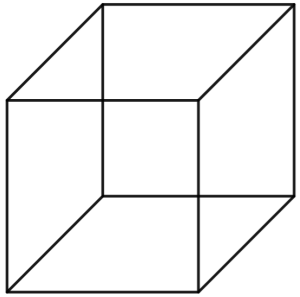
Worked Example

Calculate the volume of the cube.



Your Turn

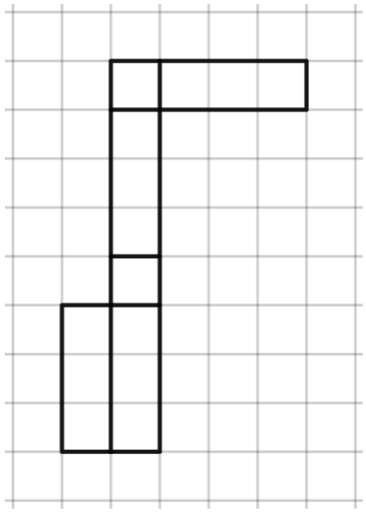
Calculate the volume of the cube.



Dr Frost 145b

Worked Example

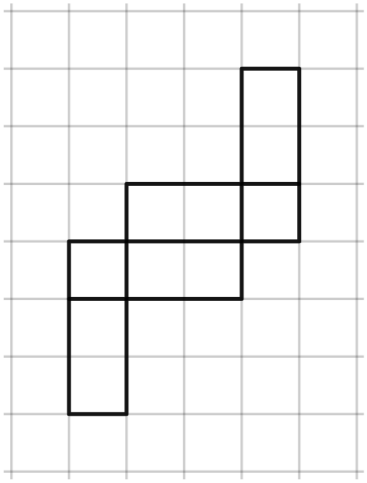
Below is the net of a cuboid drawn on metre squared paper.



Determine the volume of the cuboid.

Your Turn

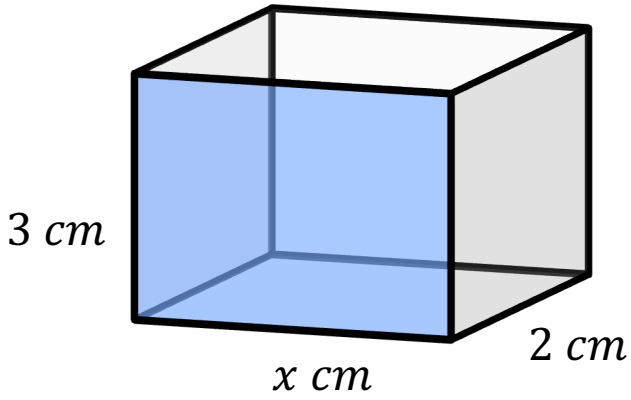
Below is the net of a cuboid drawn on metre squared paper.



Determine the volume of the cuboid.

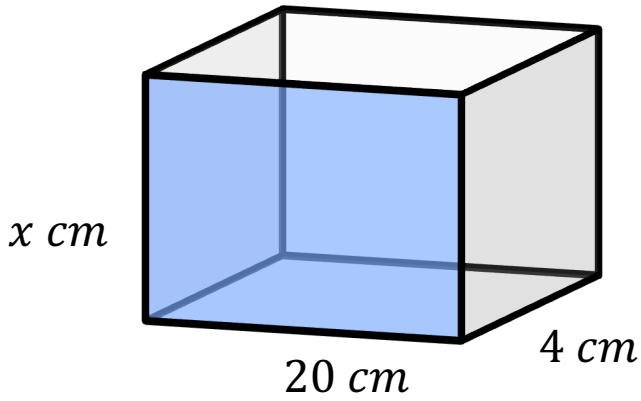
Worked Example

Find x, given that the volume of the cuboid is $60\ cm^3$



Your Turn

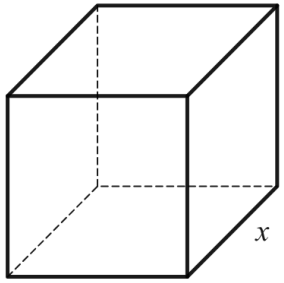
Find x, given that the volume of the cuboid is $480\ cm^3$



Dr Frost 230a

Worked Example

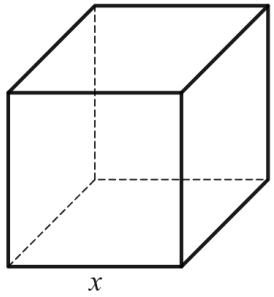
The diagram shows a cube with volume 343 cm^3



Find the length x

Your Turn

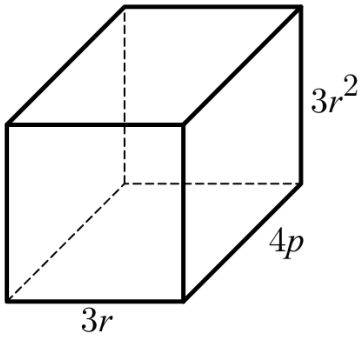
The diagram shows a cube with volume 5832 m^3



Find the length x

Worked Example

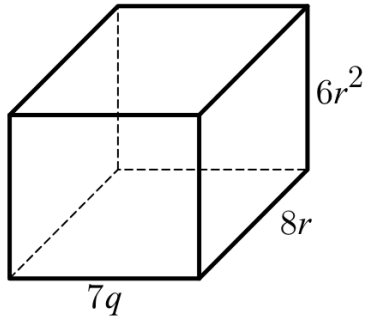
A cuboid is drawn below.
The expression for the length of each side is given on the diagram.



Write an expression for the total volume of the cuboid.
Give your answer in its simplest form.

Your Turn

A cuboid is drawn below.
The expression for the length of each side is given on the diagram.



Write an expression for the total volume of the cuboid.
Give your answer in its simplest form.

Worked Example

The volume of the cuboid is 672 cm³

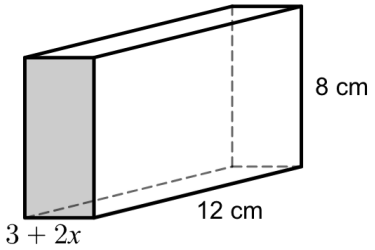


*Diagram **not** accurately drawn.*

Form an equation and find the value of x

Your Turn

The volume of the cuboid is 5248 cm³

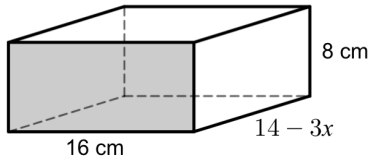
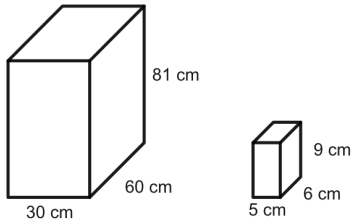


*Diagram **not** accurately drawn.*

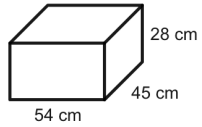
Form an equation and find the value of x

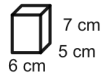
Worked Example



Connor has a crate in the shape of a cuboid which measures 30 cm by 60 cm by 81 cm. He has n cuboid-shaped bricks which he is going to completely fill the crate with. These measure 5 cm by 6 cm by 9 cm. Calculate the value of n.

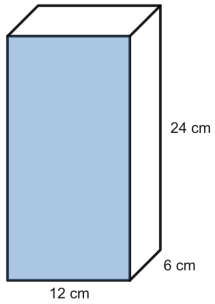
Your Turn





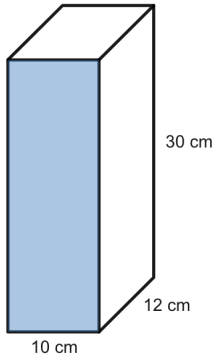
A cuboid-shaped create measures 54 cm by 45 cm by 28 cm. The crate is going to be completely filled with n bars. Each bar is a cuboid and measures 6 cm by 5 cm by 7 cm. Calculate the value of n.

Worked Example



Diana has a carton of milk which is shaped like a cuboid. The base of the carton measures 12 cm by 6 cm. The height of the carton is 24 cm. The milk partially fills the carton to a depth of 8 cm. The carton is turned over so that the shaded side is facing upwards. The depth of milk in the carton is now d cm. Calculate the value of d.

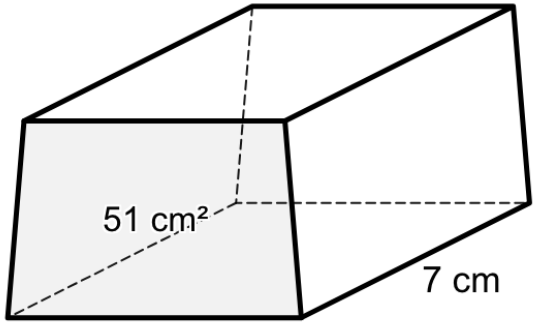
Your Turn



Awa has a carton of milk which is shaped like a cuboid. The base of the carton measures 10 cm by 12 cm. The height of the carton is 30 cm. The oat milk partially fills the carton to a depth of 10 cm. The carton is turned over so that the shaded side is facing upwards. The depth of oat milk in the carton is now d cm. Calculate the value of d.

Worked Example

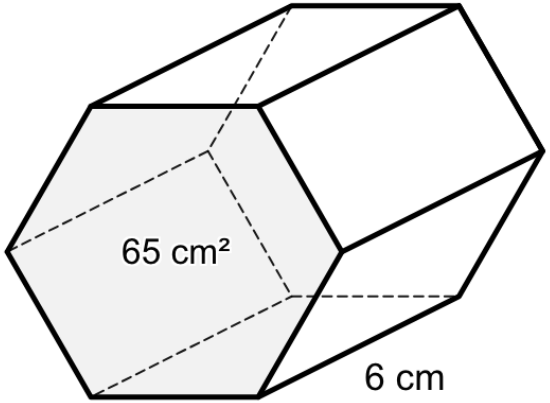
The diagram shows a prism with a cross-sectional area of 51 cm^2



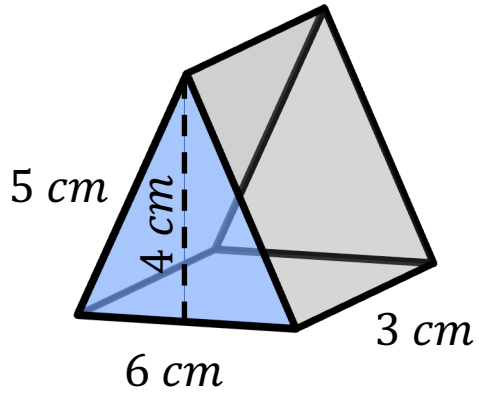
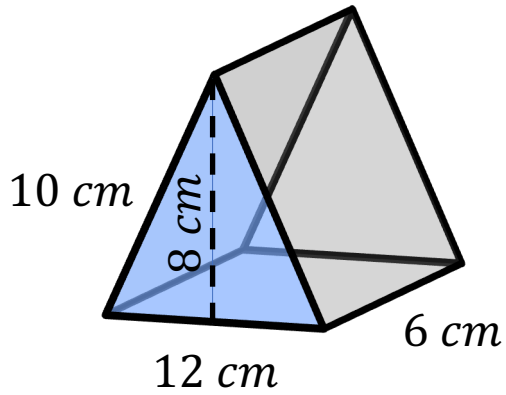
Find the volume of the prism.

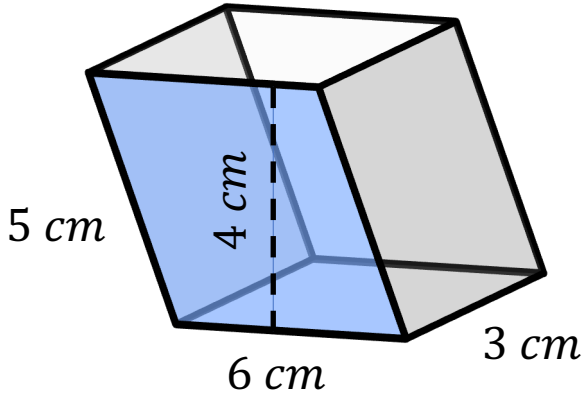
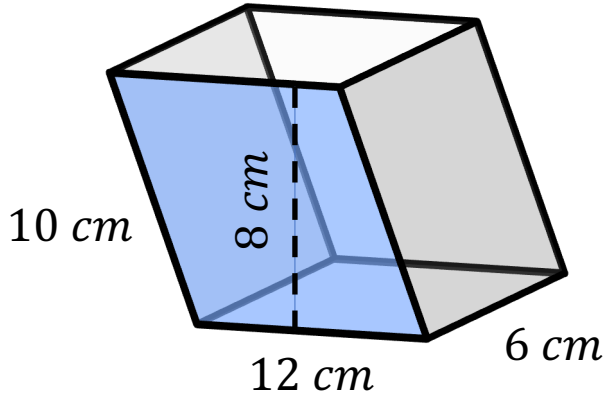
Your Turn

The diagram shows a hexagonal prism with a cross-sectional area of 65 cm^2



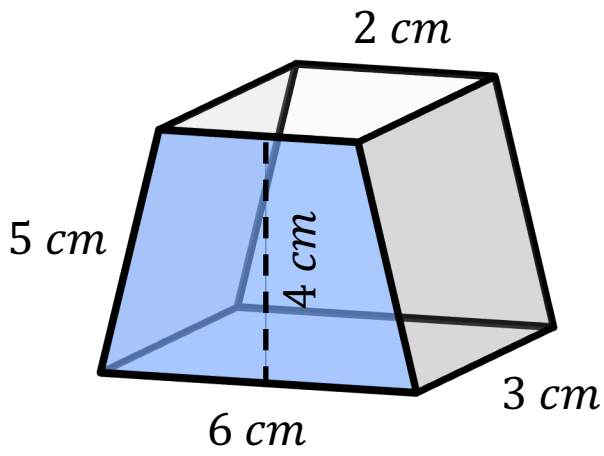
Find the volume of the prism.

Worked Example	Your Turn
Calculate the volume of the triangular prism:  	Calculate the volume of the triangular prism: 

Worked Example	Your Turn
Calculate the volume of the parallelepiped:  	Calculate the volume of the parallelepiped: 

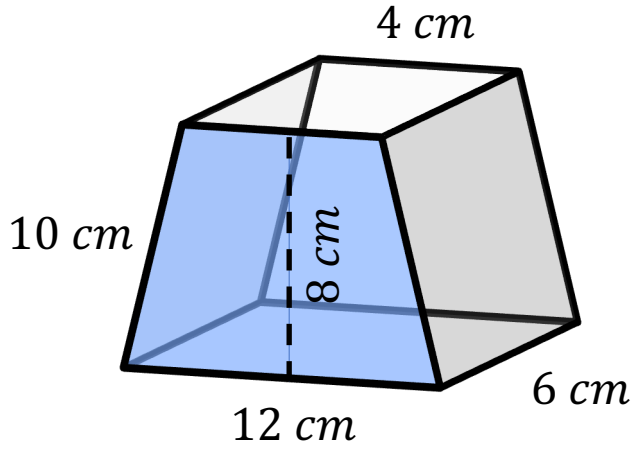
Worked Example

Calculate the volume of the trapezium prism:

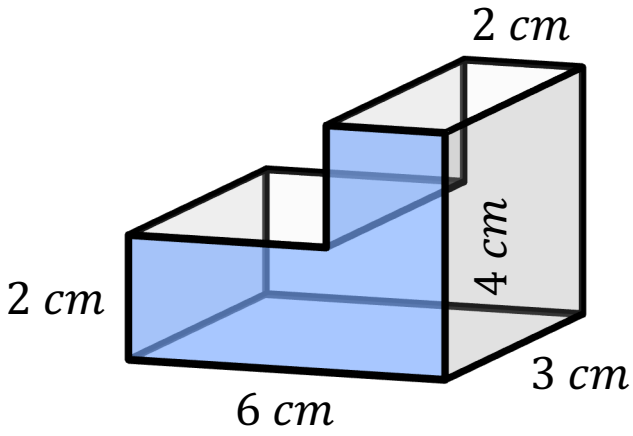
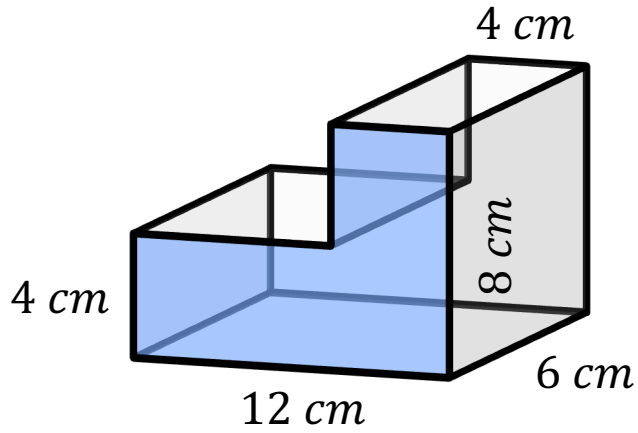


Your Turn

Calculate the volume of the trapezium prism:

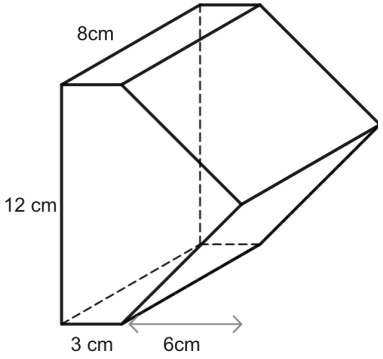


Dr Frost 231c

Worked Example	Your Turn
Calculate the volume of the L-shaped prism:  	Calculate the volume of the L-shaped prism: 

Worked Example

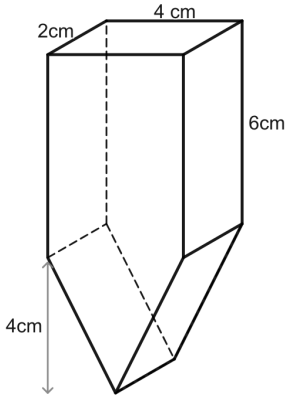
The diagram below shows a prism.



Work out the volume of the prism.

Your Turn

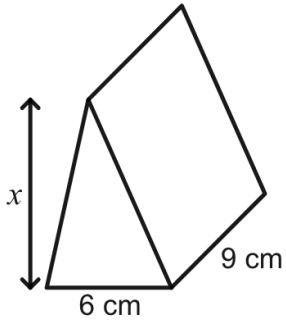
The diagram below shows a prism.



Find the volume of the prism.

Worked Example

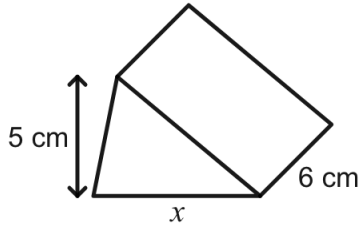
The volume of the prism is 243 cm^3



Find the value of x

Your Turn

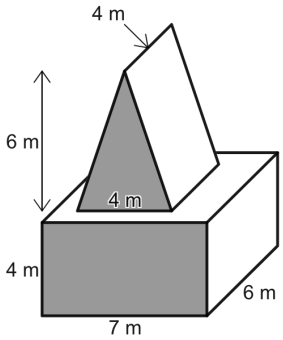
The volume of the prism is 105 cm^3



Find the value of x

Worked Example

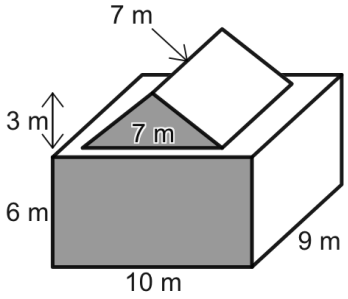
A composite solid is made from a cuboid and a triangular prism joined together, as shown in the diagram below.



Calculate the volume of the composite solid.

Your Turn

A composite solid is made from a cuboid and a triangular prism joined together, as shown in the diagram below.

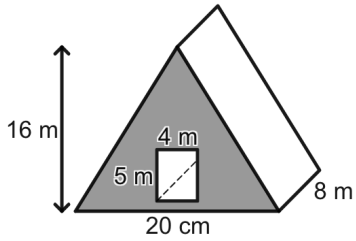


Calculate the volume of the composite solid.

Dr Frost 231f

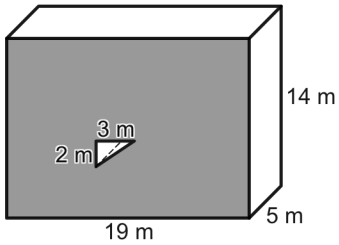
Worked Example

Calculate the volume of the prism with the cut out removed.



Your Turn

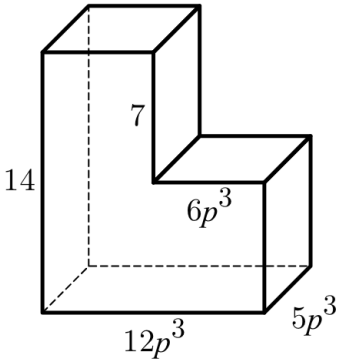
Calculate the volume of the prism with the cut out removed.



Dr Frost 231g

Worked Example

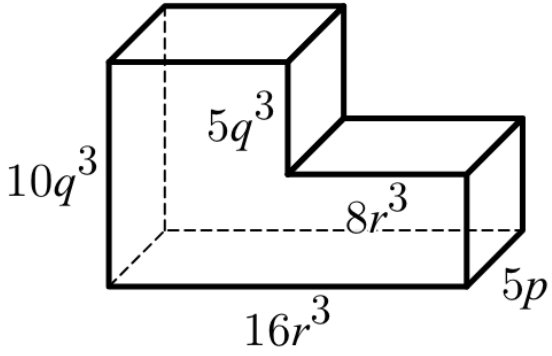
A prism is drawn below.
The expressions for the widths, depth and heights are given on the diagram.



Write an expression for the total volume of the prism.
Give your answer in its simplest form.

Your Turn

A prism is drawn below.
The expressions for the widths, depth and heights are given on the diagram.



Write an expression for the total volume of the prism.
Give your answer in its simplest form.

Worked Example

The volume of the trapezoidal prism is 36 cm^3

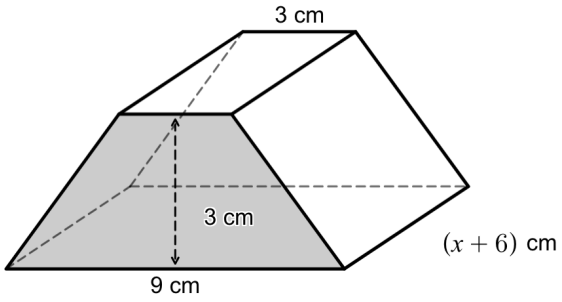


*Diagram **not** accurately drawn.*

Form an equation and find the value of x

Your Turn

The volume of the right-angled trapezoidal prism is 27 cm^3

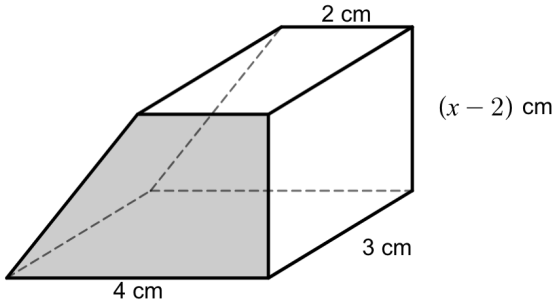


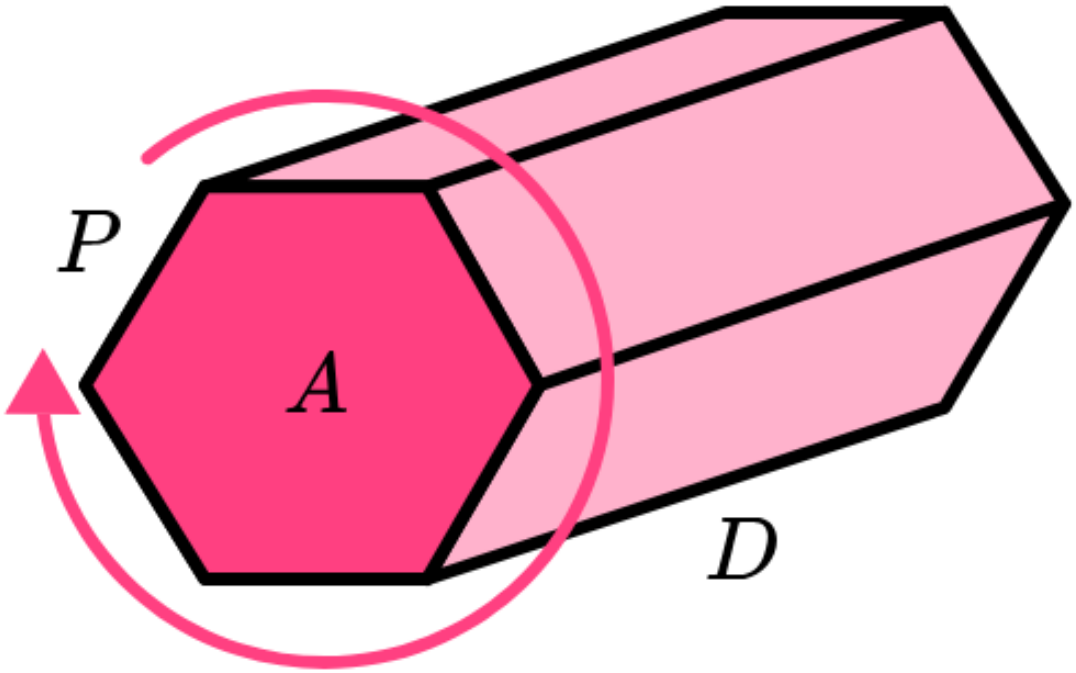
*Diagram **not** accurately drawn.*

Form an equation and find the value of x

Surface Area of Prisms

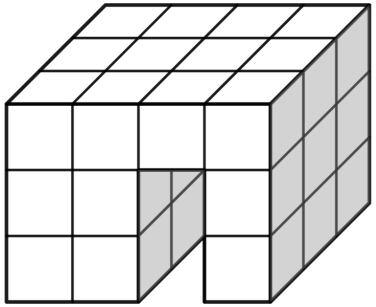
Surface Area of Prism = 2 × Area of Cross Section + Perimeter of Cross Section × Depth of Prism

SA = 2A + PD



Worked Example

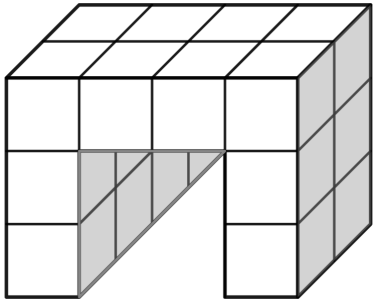
This solid prism is made from centimetre cubes.



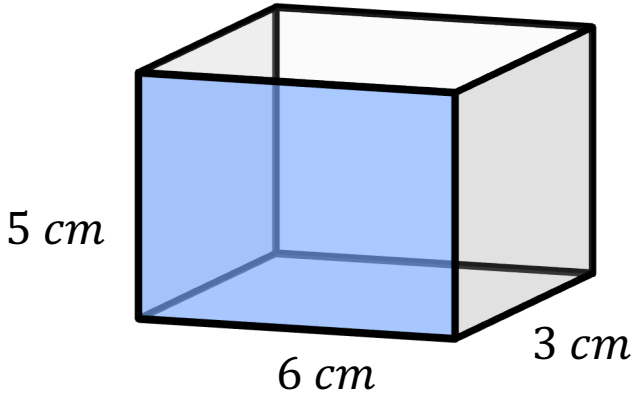
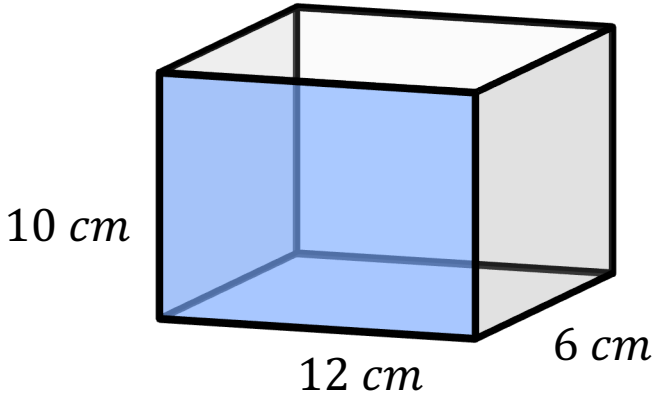
Determine the surface area of the prism.

Your Turn

This solid prism is made from centimetre cubes.

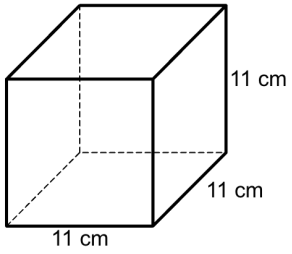


Determine the surface area of the prism.

Worked Example	Your Turn
Calculate the surface area of the cuboid:  	Calculate the surface area of the cuboid: 

Worked Example

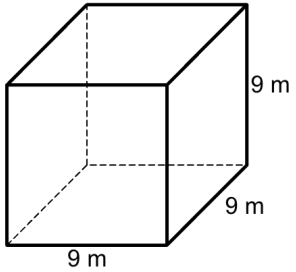
The diagram shows a cube of side 11 cm.



Find the total surface area of the cube.

Your Turn

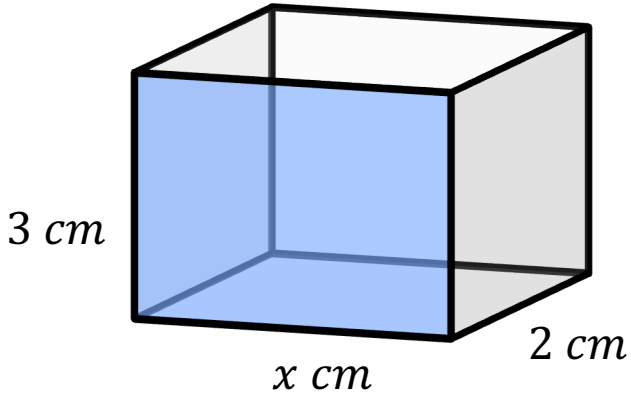
The diagram shows a cube of side 9 m.



Find the total surface area of the cube.

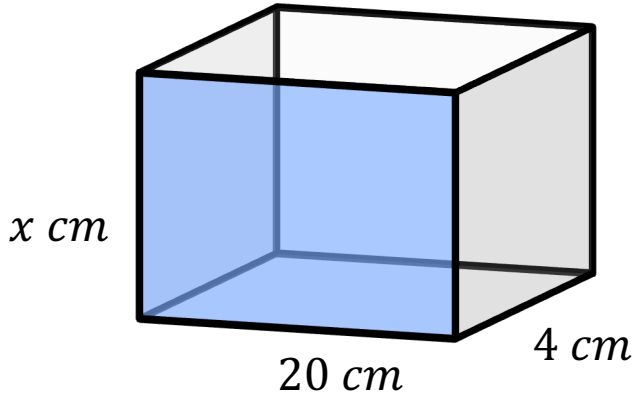
Worked Example

Find x, given that the total surface area is $112\ cm^2$



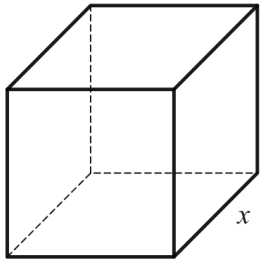
Your Turn

Find x, given that the total surface area is $448\ cm^2$



Worked Example

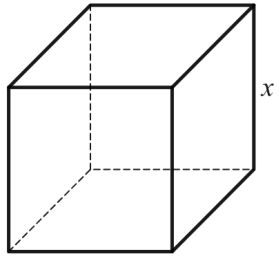
The diagram shows a cube with a surface area of 486 cm^2



Calculate the length x

Your Turn

The diagram shows a cube with a surface area of 294 cm^2

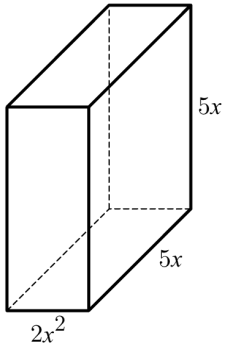


Work out the length x

Worked Example

A cuboid is drawn below.

The expression for the length of each edge is given on the diagram.

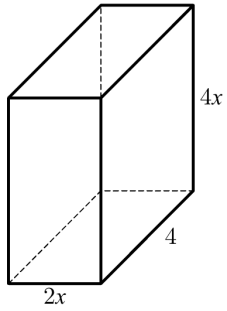


Write an expression for the total surface area of the cuboid.
Give your answer in its simplest form.

Your Turn

A cuboid is drawn below.

The expression for the length of each edge is given on the diagram.



Write an expression for the total surface area of the cuboid.
Give your answer in its simplest form.

Worked Example

The surface area of the cuboid is 442 cm^2.

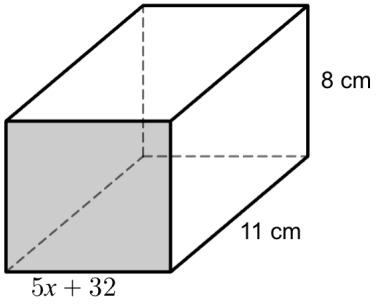


*Diagram **not** accurately drawn.*

Form an equation and find the value of x

Your Turn

The surface area of the cuboid is 576 cm^2.

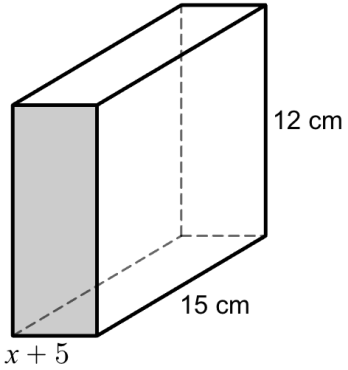


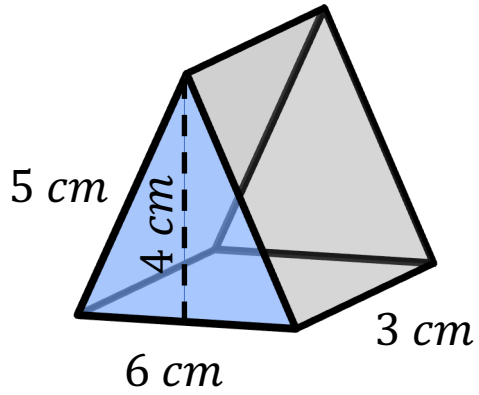
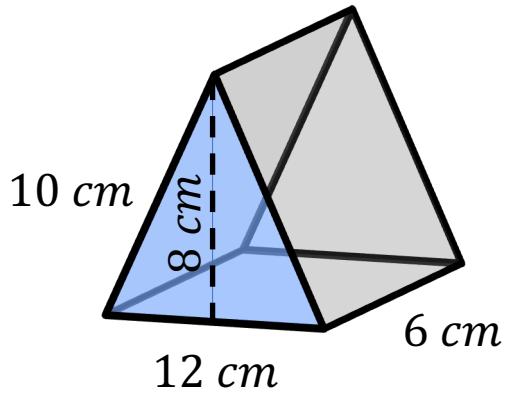
*Diagram **not** accurately drawn.*

Form an equation and find the value of x

Dr Frost 259j

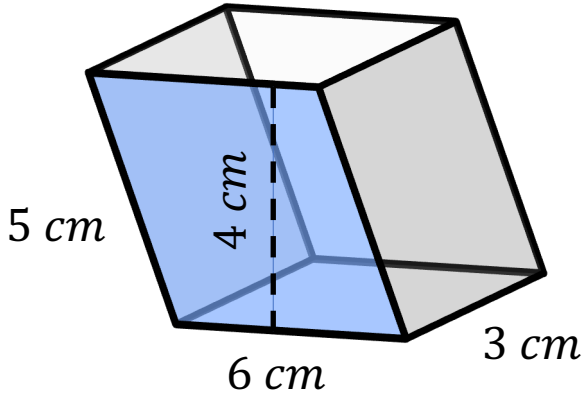
Fill in the Gaps

Cube or Cuboid	Length	Width	Height	Volume	Surface Area
Cuboid	10 *cm*	5 *cm*	3 *cm*		190 cm^2
Cube	4 *cm*			64 cm^3	
Cuboid	12 *cm*	8 *cm*	2 *cm*		
Cuboid	30 *mm*	25 *mm*	15 *mm*		
Cube		1.8 *m*			
Cuboid	10 *cm*	7 *cm*		350 cm^3	
Cube				729 cm^3	
Cuboid		3.6 *cm*	20 *cm*	259.2 cm^3	
Cuboid	45 *mm*	20 *mm*		22500 mm^3	
Cube					294 cm^2
Cuboid	4 *cm*		6 *cm*		228 cm^2
Cuboid	20 *mm*	12 *mm*			1568 mm^2
Cuboid		11 *cm*		528 cm^3	404 cm^2
Cuboid	2 *mm*			720 mm^3	876 mm^2

Worked Example	Your Turn
Calculate the surface area of the triangular prism:  	Calculate the surface area of the triangular prism: 

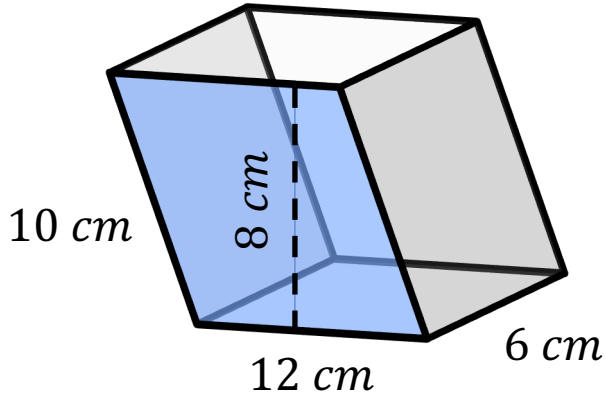
Worked Example

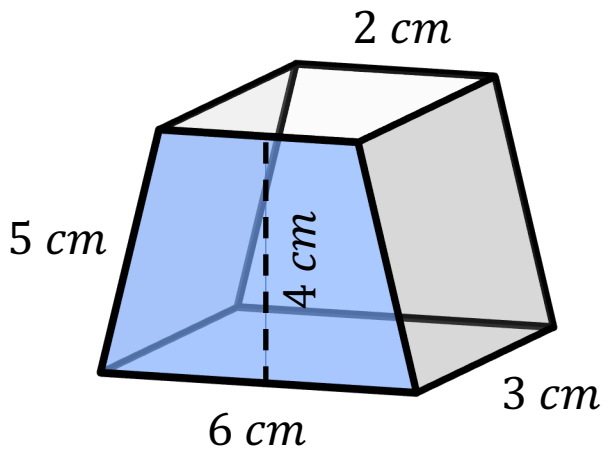
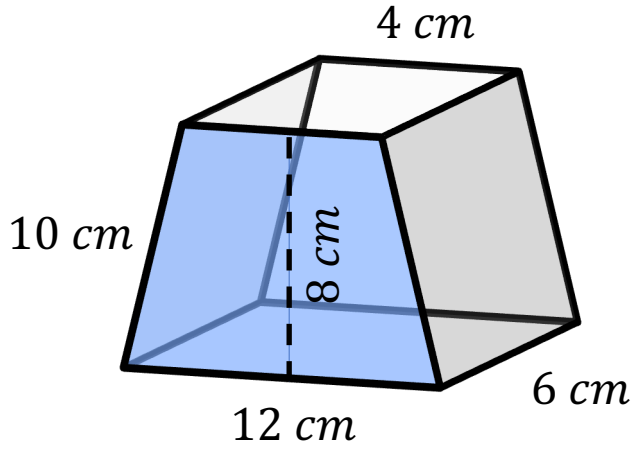
Calculate the surface area of the parallelepiped:

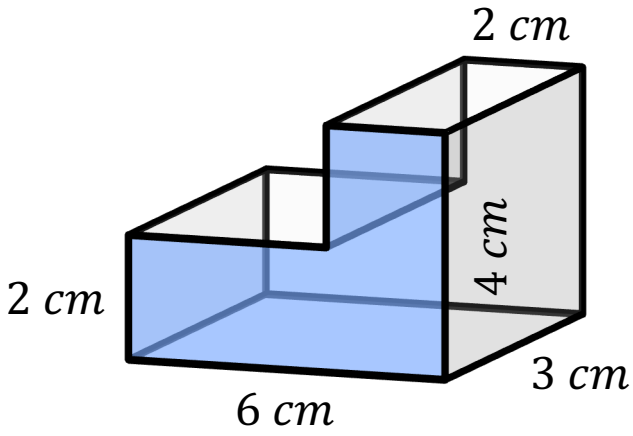
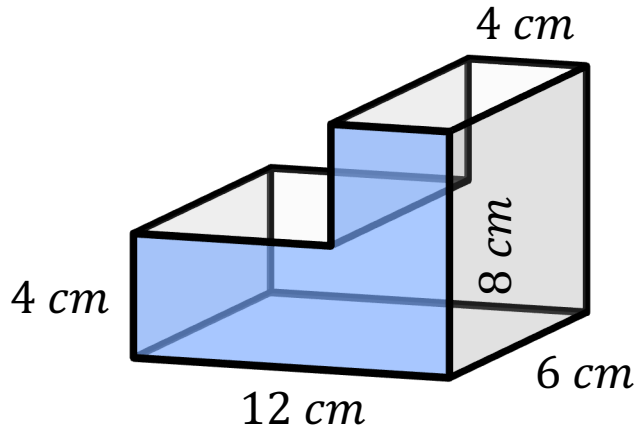


Your Turn

Calculate the surface area of the parallelepiped:

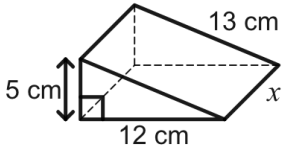


Worked Example	Your Turn
Calculate the surface area of the trapezium prism:  	Calculate the surface area of the trapezium prism: 

Worked Example	Your Turn
Calculate the surface area of the L-shaped prism:  	Calculate the surface area of the L-shaped prism: 

Worked Example

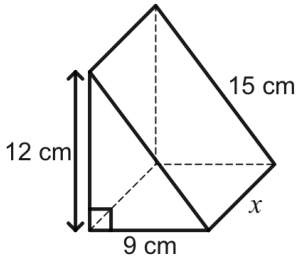
The diagram shows a prism with surface area 330 cm^2



Calculate the unknown length x

Your Turn

The diagram shows a prism with surface area 468 cm^2



Calculate the unknown length x

Worked Example

The surface area of the isosceles trapezoidal prism is 324 cm^2

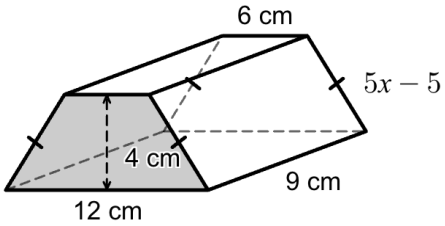


*Diagram **not** accurately drawn.*

Form an equation and find the value of x

Your Turn

The surface area of the isosceles trapezoidal prism is 376 cm^2

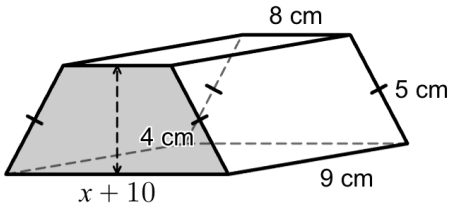


*Diagram **not** accurately drawn.*

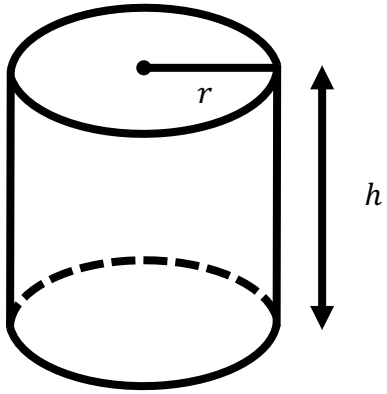
Form an equation and find the value of x

Dr Frost 259k

Volume of Cylinders

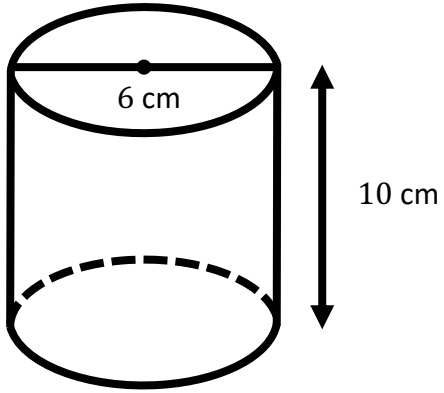
Volume of Cylinder = Area of circle × height
Volume of Cylinder = π × radius^2 × height

$V = \pi r^2 h$



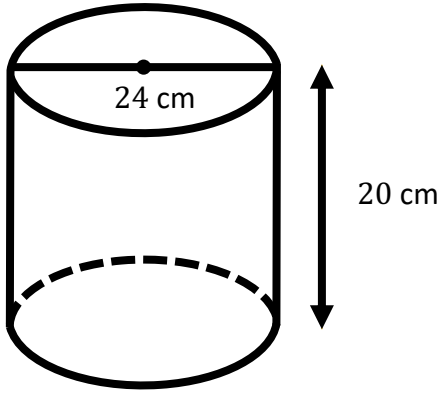
Worked Example

Calculate the volume of the following cylinder. Give your answer in terms of π and to 1 decimal place.



Your Turn

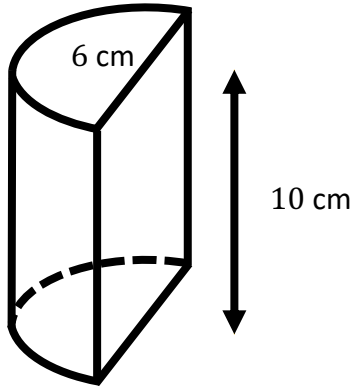
Calculate the volume of the following cylinder. Give your answer in terms of π and to 1 decimal place.



Dr Frost 233a and 233b

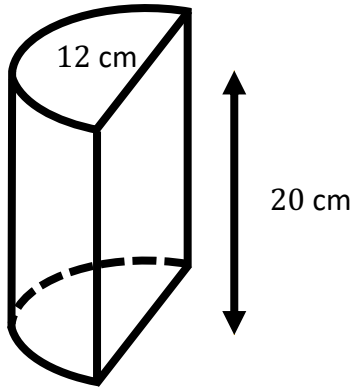
Worked Example

Calculate the volume of the following half cylinder. Give your answer in terms of π and to 1 decimal place.



Your Turn

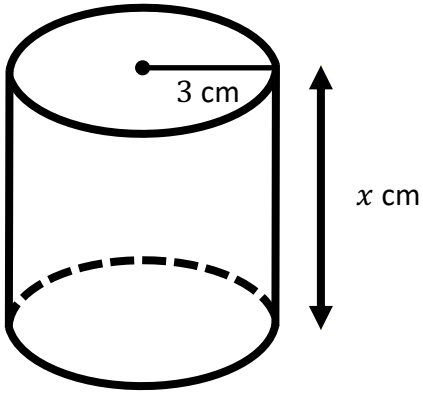
Calculate the volume of the following half cylinder. Give your answer in terms of π and to 1 decimal place.



Dr Frost 233c

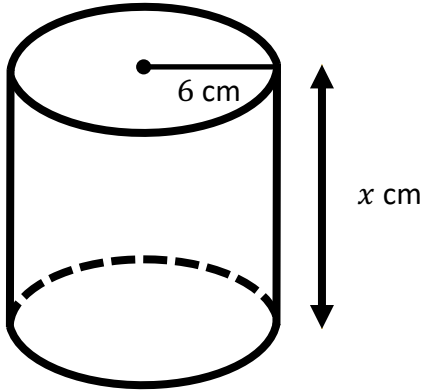
Worked Example

Find the height, x, given that the volume of the following cylinder is $282.7\ cm^3$. Give your answer to 1 decimal place.



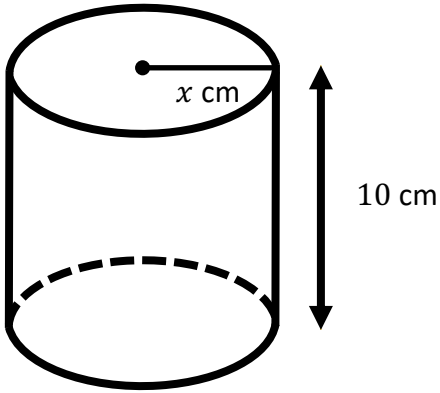
Your Turn

Find the height, x, given that the volume of the following cylinder is $2261.9\ cm^3$. Give your answer to 1 decimal place.



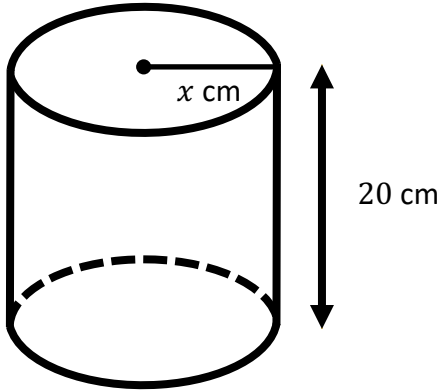
Worked Example

Find the radius, x, given that the volume of the following cylinder is $282.7\ cm^3$. Give your answer to 1 decimal place.



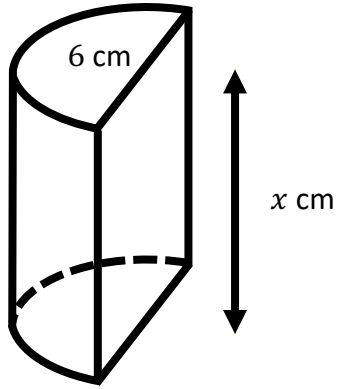
Your Turn

Find the radius, x, given that the volume of the following cylinder is $2261.9\ cm^3$. Give your answer to 1 decimal place.



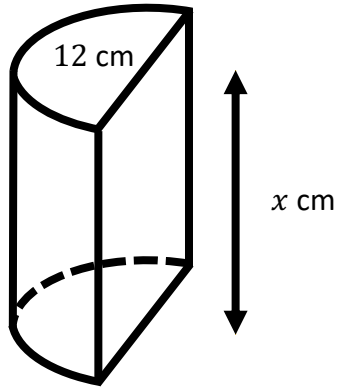
Worked Example

Find the height, x, given that the volume of the following half cylinder is $141.4\ cm^3$. Give your answer to 1 decimal place.



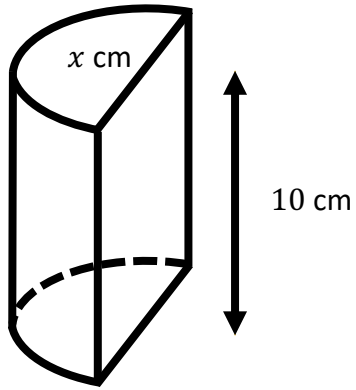
Your Turn

Find the height, x, given that the volume of the following half cylinder is $1131.0\ cm^3$. Give your answer to 1 decimal place.



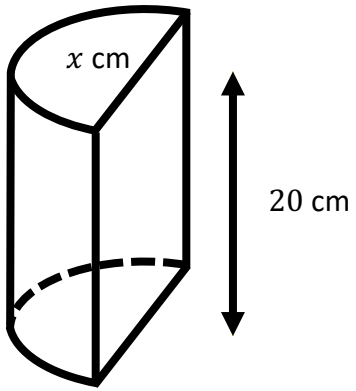
Worked Example

Find the diameter, x, given that the volume of the following half cylinder is $141.4\ cm^3$. Give your answer to 1 decimal place.



Your Turn

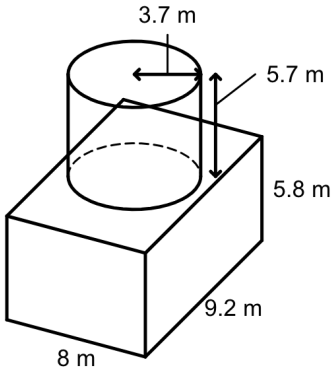
Find the diameter, x, given that the volume of the following half cylinder is $1131.0\ cm^3$. Give your answer to 1 decimal place.



Worked Example

The diagram shows a shape made from a solid cylinder attached to a solid cuboid.

The cuboid has sides of length 8, 9.2 and 5.8 m.
The cylinder has a radius of 3.7 m and a height of 5.7 m.

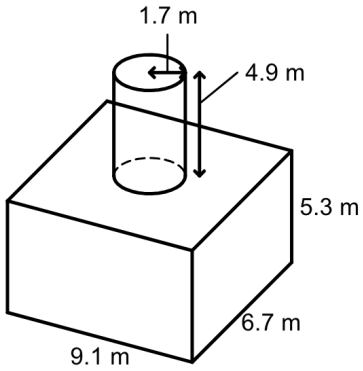


Calculate the total volume of the solid shape.
Give your answer correct to 1 decimal place.

Your Turn

The diagram shows a shape made from a solid cylinder attached to a solid cuboid.

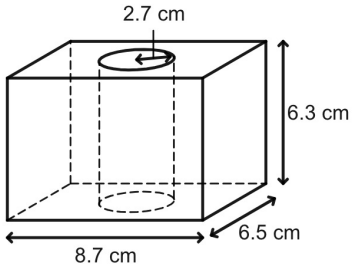
The cuboid has sides of length 9.1, 6.7 and 5.3 m.
The cylinder has a radius of 1.7 m and a height of 4.9 m.



Calculate the total volume of the solid shape.
Give your answer correct to 1 decimal place.

Worked Example

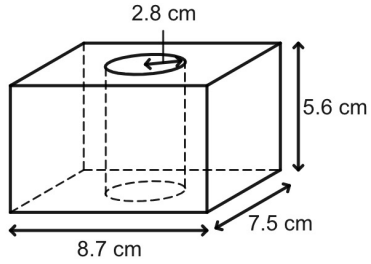
A vertical cylinder of radius 2.7 cm is removed from a cuboid with sides of length 8.7 cm, 6.5 cm and 6.3 cm, leaving behind the object shown below.



Determine the volume of the remaining object.
Give your answer to 1 decimal place.

Your Turn

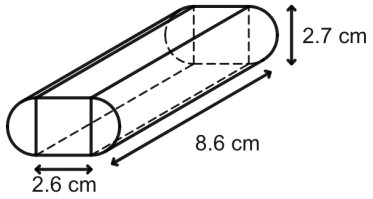
A woodworker takes a cuboid with sides of length 8.7 cm, 7.5 cm and 5.6 cm and removed a central cylinder or radius 2.8 cm from the middle of it, producing the following shape.



Evaluate the remaining volume after the cylinder has been removed.
Give your answer to 1 decimal place.

Worked Example

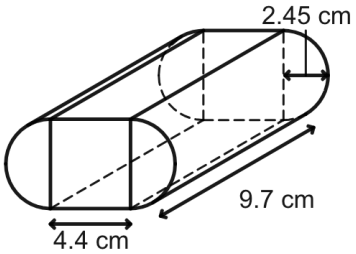
A composite shape is formed by attaching two semi-cylinders to the sides of a cuboid of width 2.6 cm, length 8.6 cm and height 2.7 cm as shown in the diagram below.



Find the volume of the composite shape.
Give your answer correct to 1 Decimal palace.

Your Turn

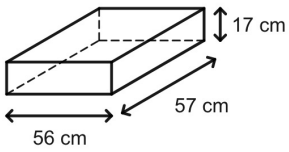
A composite shape is formed by attaching two semi-cylinders of radius 2.45 cm to the sides of a cuboid of width 4.4 cm, length 9.7 cm as shown in the diagram below.

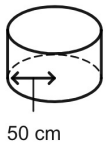


Find the volume of the composite shape.
Give your answer correct to 1 Decimal palace.

Worked Example

A rectangular tray measuring 56 cm by 57 cm by 17 cm is full of water. All of the water is then poured into a cylindrical container with radius 50 cm.

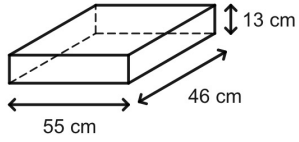


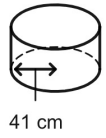


Find the height of the water while in the cylindrical container.
Give your answer correct to one decimal place.

Your Turn

A rectangular tray measuring 55 cm by 46 cm by 13 cm is full of water. All of the water is then poured into a cylindrical container with radius 41 cm.





Find the height of the water while in the cylindrical container.
Give your answer correct to one decimal place.

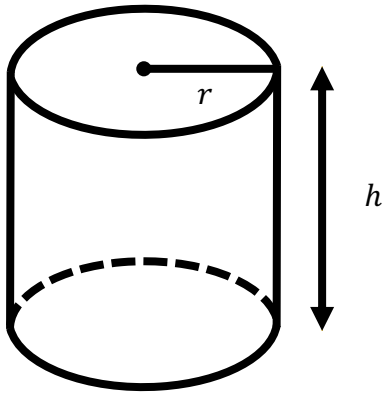
Surface Area of Cylinders

Curved Surface Area of Cylinder = $2 \times \pi \times$ radius $\times$ height

CSA = $2\pi rh$

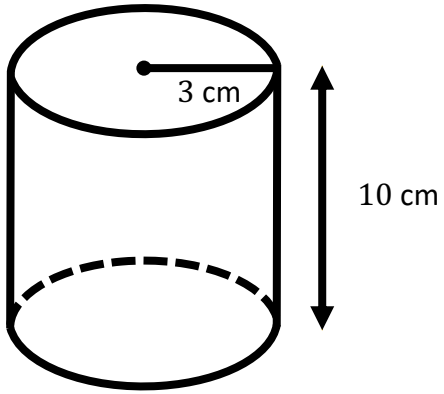
Total Surface Area of Cylinder = $2 \times \pi \times$ radius $\times$ height + $2 \times \pi \times$ radius^2

TSA = $2\pi rh + 2\pi r^2$



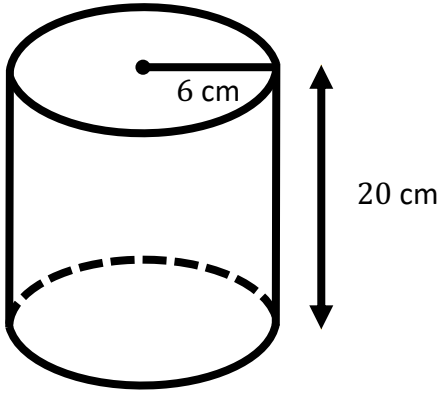
Worked Example

Calculate the total surface area of the following cylinder. Give your answer in terms of π and to 1 decimal place.



Your Turn

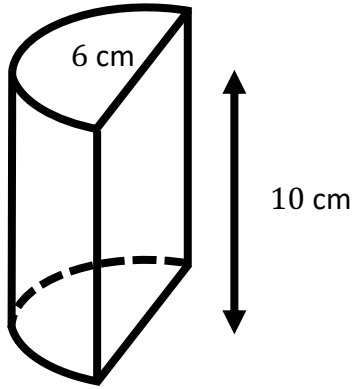
Calculate the total surface area of the following cylinder. Give your answer in terms of π and to 1 decimal place.



Dr Frost 234a and 234b

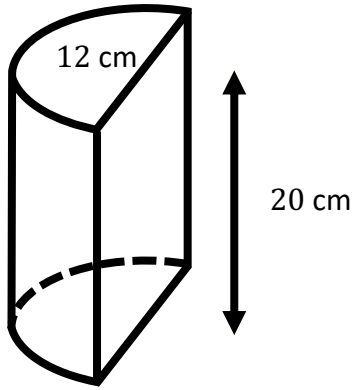
Worked Example

Calculate the total surface area of the following half cylinder.
Give your answer in terms of π and to 1 decimal place.



Your Turn

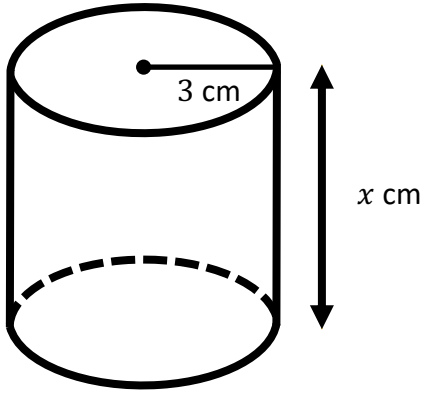
Calculate the total surface area of the following half cylinder.
Give your answer in terms of π and to 1 decimal place.



Dr Frost 234c

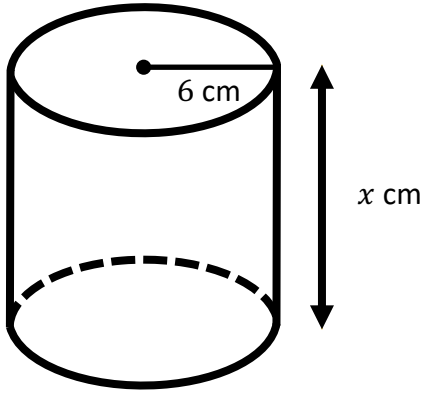
Worked Example

Find the height, x, given that the total surface area of the following cylinder is $245.0\ cm^2$. Give your answer to 1 decimal place.



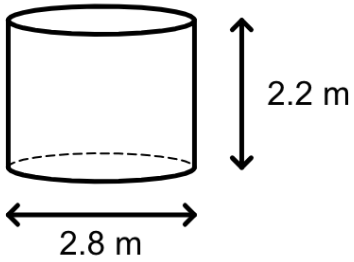
Your Turn

Find the height, x, given that the total surface area of the following cylinder is $980.2\ cm^2$. Give your answer to 1 decimal place.



Worked Example

Gael has to cover 4 tanks completely with paint.



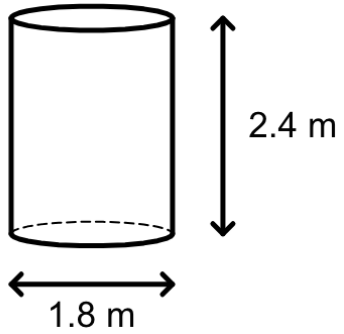
Each tank is in the shape of a cylinder with a top and a bottom.
The tank has a diameter of 2.8 m and a height of 2.2 m.

Each m^2 costs £4.43 to paint.
Gael has £562.00 available.

Determine if Gael has enough money to cover completely the 4 tanks.

Your Turn

Pari has to cover 7 tanks completely with paint.



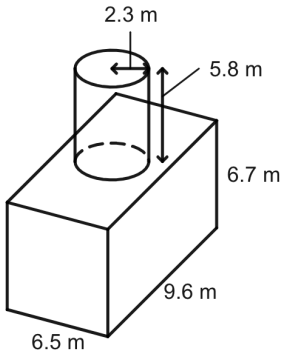
Each tank is in the shape of a cylinder with a top and a bottom.
The tank has a diameter of 1.8 m and a height of 2.4 m.

Each m^2 costs £2.68 to paint.
Pari has £350.00 available.

Determine if Pari has enough money to cover completely the 7 tanks.

Worked Example

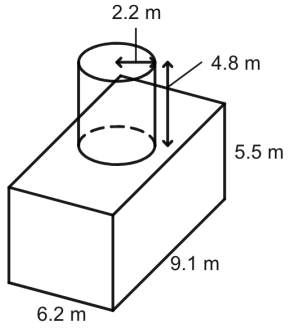
The diagram shows a shape made from a solid cylinder attached to a solid cuboid. The cuboid has sides of length 6.5, 9.6 and 6.7 m. The cylinder has a radius of 2.3 m and a height of 5.8 m.



Calculate the total surface area of the solid shape.
Give your answer correct to 3 significant figures.

Your Turn

The diagram shows a shape made from a solid cylinder attached to a solid cuboid. The cuboid has sides of length 6.2, 9.1 and 5.5 m. The cylinder has a radius of 2.2 m and a height of 4.8 m.

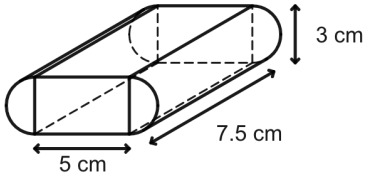


Calculate the total surface area of the solid shape.
Give your answer correct to 3 significant figures.

Dr Frost 234g

Worked Example

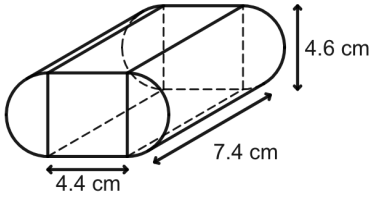
A cuboid of width 5 cm, length 7.5 cm and height 3 cm is joined to two semi-cylinders on its sides. The object created is shown below.



Find the surface area of the composite object.
Give your answer correct to 1 decimal place.

Your Turn

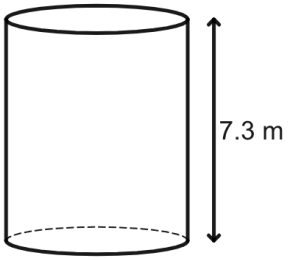
A cuboid of width 4.4 cm, length 7.4 cm and height 4.6 cm is joined to two semi-cylinders on its sides. The object created is shown below.



Find the surface area of the composite object.
Give your answer correct to 1 decimal place.

Worked Example

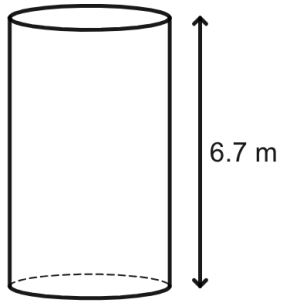
The diagram shows a solid cylinder with height 7.3 m.



The volume of the cylinder is 65.7π m^3.
Calculate the total surface area of the cylinder.
Give your answer correct to 1 decimal place.

Your Turn

The diagram shows a solid cylinder with height 6.7 m.



The volume of the cylinder is 26.8π m^3.
Calculate the total surface area of the cylinder.
Give your answer correct to 1 decimal place.

Dr Frost 234f

Fill in the Gaps

Radius	Height	Volume in terms of π	Volume to 3 s.f.	Curved Surface Area in terms of π	Total Surface Area in terms of π	Total Surface Area to 3 s.f.
$5\ cm$	$10\ cm$	$250\pi\ cm^3$		$100\pi\ cm^2$	$150\pi\ cm^2$	
$7\ cm$	$15\ cm$			$210\pi\ cm^2$		
$16\ mm$	$20\ mm$					
$0.6\ m$	$2.4\ m$					
$10\ cm$		$500\pi\ cm^3$				
	$12\ cm$			$192\pi\ cm^2$		
$1.5\ m$					$\frac{39}{2}\pi\ m^2$	
	$20\ mm$				$312\pi\ mm^2$	

Extra Notes

5 Area and Volume Unit Conversions

Worked Example	Your Turn
Convert: a) $7\ cm^2$ to mm^2 b) $2500\ cm^2$ to m^2	Convert: a) $7\ km^2$ to m^2 b) $2500\ mm^2$ to cm^2

Dr Frost 323a and 323b

Worked Example	Your Turn
Convert: a) 7 cm^3 to mm^3 b) 5 mm^3 to cm^3	Convert: a) 7 m^3 to cm^3 b) 5 cm^3 to m^3

Dr Frost 323c and 323d

Worked Example	Your Turn
Convert: a) 241 litres to cm^3 b) 83400 cm^3 to litres	Convert: a) 4500 litres to cm^3 b) $813\,000$ cm^3 to litres

Dr Frost 323e and 323f

Extra Notes

6 Compound Measures

Worked Example	Your Turn
a) Convert 3.1 m/s to km/h. Give your answer correct to 1 decimal place. b) Convert 84 km/h to m/s. Give your answer correct to 1 decimal place.	a) Convert 2.9 m/s to km/h. Give your answer correct to 1 decimal place. b) Convert 51 km/h to m/s. Give your answer correct to 1 decimal place.

Speed

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$s = \frac{d}{t}$$

Worked Example	Your Turn
A car travels 50 miles in 2 hours. What speed does it travel at?	A car travels 60 miles in 2 hours. What speed does it travel at?
A car travels at $50mph$ (miles per hour) for 2 hours. How far does it travel?	A car travels at $60mph$ (miles per hour) for 2 hours. How far does it travel?
A car travels 50 miles at $25mph$ (miles per hour). How long does it take?	A car travels 30 miles at $60mph$ (miles per hour). How long does it take?

Dr Frost 325c, 325e and 325f

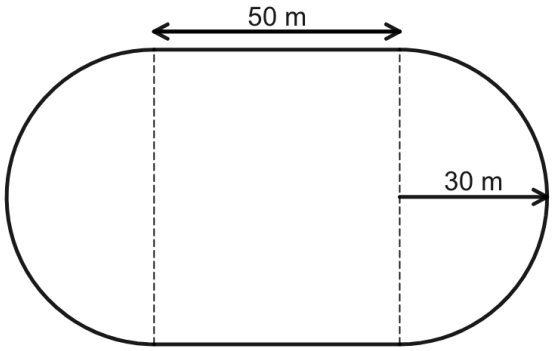
Worked Example	Your Turn
Abdul drives the distance of 70 km between London and Plymouth. The journey took 1 hours and 5 minutes. Calculate the average speed of Abdul's journey in km/h. Give your answer correct to the nearest whole number.	A plane takes 34 hours and 20 minutes to fly between Dubai and Singapore. The distance the plane flies is $18,326$ miles. Calculate the average speed of the plane. Give your answer in mph, correct to the nearest whole number.

Worked Example	Your Turn
Mahmoud leaves his home at $6:48$ am in his car. Mahmoud drives 64 miles from his home to get to the airport to pick up a friend. He drives at an average speed of 40 mph. Work out the time that Mahmoud gets to the airport.	Maelie leaves her home at $5:07$ am in her car. Maelie drives 77 miles from her home to get to the airport to pick up a friend. She drives at an average speed of 55 mph. Work out the time that Maelie gets to the airport.

Worked Example	Your Turn
An aeroplane flew a distance of 155 km. The average speed was 200 km/h Calculate the time taken for the journey. Give your answer in minutes, correct to the nearest whole number.	An aeroplane flew a distance of 70 km. The average speed was 160 km/h Calculate the time taken for the journey. Give your answer in minutes, correct to the nearest whole number.

Worked Example

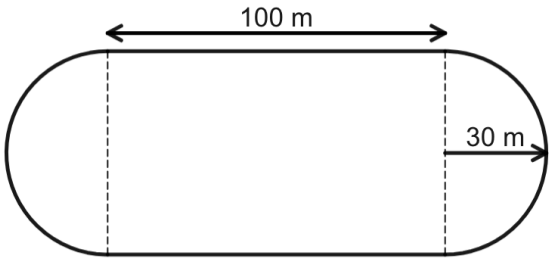
A running track has two identical semi-circular ends and two straight sides as shown.



Lyna completes one lap.
Her average speed was 8.6 m/s.
Work out how long it took her to complete the lap.
Give your answer in seconds to 1 decimal place.

Your Turn

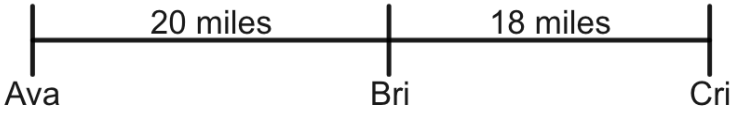
A running track has two identical semi-circular ends and two straight sides as shown.



Ruby completes one lap.
Her average speed was 11.1 m/s.
Work out how long it took her to complete the lap.
Give your answer in seconds to 1 decimal place.

Worked Example

The distance from Ava to Bri is 20 miles.
The distance from Bri to Cri is 18 miles.



Melissa is going to drive from Ava to Bri.
Then she will drive from Bri to Cri.

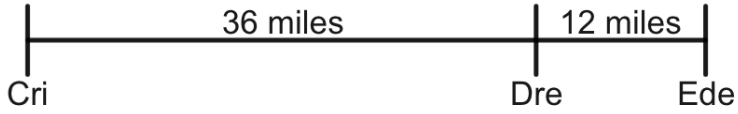
Melissa leaves Ava at $12:38$

She drives from Ava to Bri at an average speed of 50 mph.
She then drives from Bri to Cri at an average speed of 36 mph

Calculate the arrival time at Cri.
Give your answer using the 24h clock.

Your Turn

The distance from Cri to Dre is 36 miles.
The distance from Dre to Ede is 12 miles.



Raphaël is going to drive from Cri to Dre.
Then he will drive from Dre to Ede.

Raphaël leaves Cri at $09:14$
He drives from Cri to Dre at an average speed of 60 mph.

Raphaël wants to get to Ede at $10:26$

Work out the average speed Raphaël must drive at from Dre to Ede.
Give your answer correct to the nearest whole number.

Worked Example	Your Turn
John travels 94 miles at a speed of 47 mph. John then travels 115 miles at a speed of 46 mph. Work out John's overall speed for the entire journey. Give your answer correct to 1 decimal place.	Fred travels 105 km at a speed of 35 km/h. Fred then travels 126 km at a speed of 60 km/h. Work out Fred's overall speed for the entire journey. Give your answer correct to 1 decimal place.

Worked Example	Your Turn
Reuben and Alice take part in the same charity running race. Reuben completed the run in 210 minutes. His average speed was 8 kilometres per hour. Alice completed the run in 224 minutes. Calculate Alice's average speed.	Bruno and Jin set out at the same time to get to the rugby pitch for $6:30$ pm. Bruno's journey was 17 miles, and his average speed was 34 miles per hour. Jin's average speed was 22 miles per hour. Calculate the distance Jin travelled to get to the rugby pitch.

Density

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

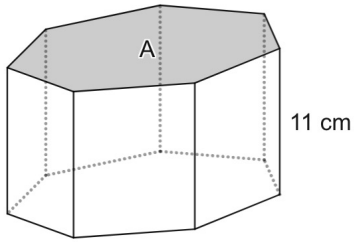
$$\rho = \frac{m}{V}$$

Worked Example	Your Turn
The mass of an object is $50\ g$. The volume is $10\ cm^3$. What is the density of the object?	The mass of an object is $100\ g$. The volume is $25\ cm^3$. What is the density of the object?
The density of an object is $10\ g/cm^3$. The volume is $5\ cm^3$. What is the mass?	The density of an object is $10\ g/cm^3$. The volume is $25\ cm^3$. What is the mass?
The density of an object is $10\ g/cm^3$. The mass is $50\ g$. What is the volume?	The density of an object is $10\ g/cm^3$. The mass is $25\ g$. What is the volume?

Dr Frost 328a, 328b and 328c

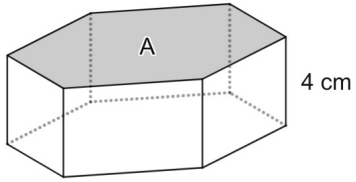
Worked Example

A heptagonal metal prism with base area A of 274 cm^2 and length 11 cm has a density of 12.51 g/cm^3 as shown below. Find the mass in g to the nearest gram.



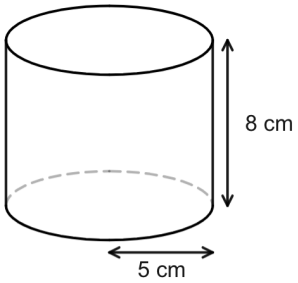
Your Turn

A hexagonal wooden prism with base area A of 94 cm^2 and length 4 cm has a mass of 233 g as shown below. Find the density in g/cm^3 to 2 decimal places.



Worked Example

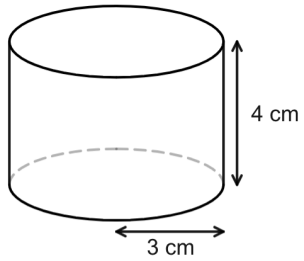
A wooden cylinder with radius 5 cm and height 8 cm has a density of 0.36 g/cm^3.



Find the mass of the wooden cylinder.
Give your answer correct to the nearest whole number.

Your Turn

A metal cylinder with radius 3 cm and height 4 cm has a density of 2.55 g/cm^3.

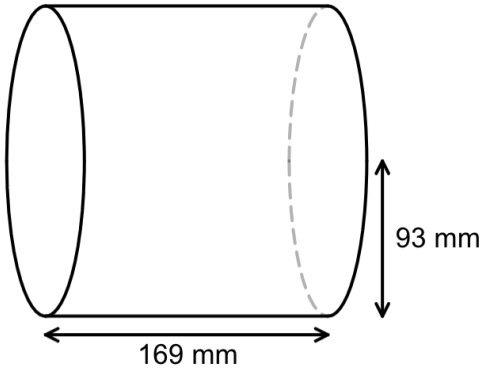


Find the mass of the metal cylinder.
Give your answer correct to the nearest whole number.

Worked Example

There are lots of small plastic cylinders of radius 93 mm and height 169 mm.

Some will be melted down to make one large heptagonal prism of mass 416 kg and density 0.25 g/cm^3.

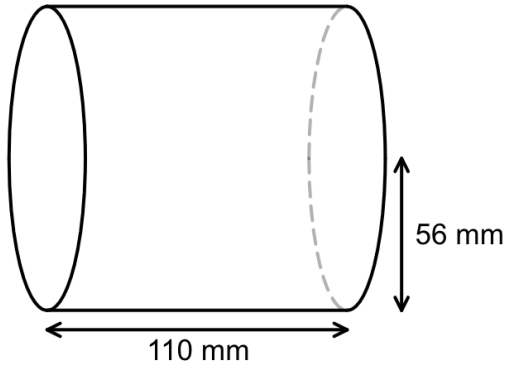


Find how many small cylinders are needed to make the large prism.

Your Turn

There are lots of small metal cylinders of radius 56 mm and height 110 mm.

Some will be melted down to make one large cylinder of mass 6357 kg and density 11.53 g/cm^3



Find how many small cylinders are needed to make the large cylinder.

Worked Example	Your Turn
Liquid A has a density of 1.15 g/cm^3. Liquid B has a density of 1.23 g/cm^3. 76 cm^3 of liquid A and 116 cm^3 of liquid B are mixed to make liquid C. Work out the density of liquid C. Give your answer correct to 2 decimal places.	Liquid A has a density of 1.11 g/cm^3. Liquid B has a density of 1.3 g/cm^3. 41 cm^3 of liquid A and 143 cm^3 of liquid B are mixed to make liquid C. Work out the density of liquid C. Give your answer correct to 2 decimal places.

Worked Example	Your Turn
Metal A has a density of 9.57 g/cm^3. Metal B has a density of 14.18 g/cm^3. 117 g of metal A and 247 g of metal B are mixed to make an alloy. Calculate the density of the alloy. Give your answer correct to 2 decimal places.	Metal A has a density of 6.47 g/cm^3. Metal B has a density of 11.94 g/cm^3. 136 g of metal A and 234 g of metal B are mixed to make an alloy. Calculate the density of the alloy. Give your answer correct to 2 decimal places.

Pressure

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

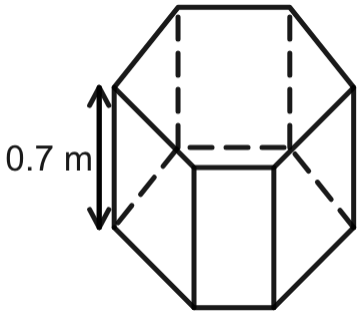
$$P = \frac{F}{A}$$

Worked Example	Your Turn
The force exerted by an object on a surface is $50N$. The surface area in contact with the object is $10cm^2$. What is the pressure exerted by the object?	The force exerted by an object on a surface is $100N$. The surface area in contact with the object is $25cm^2$. What is the pressure exerted by the object?
The pressure exerted on a surface by an object is $50N/cm^2$. The surface area in contact with the object is $10cm^2$. What is the force exerted?	The pressure exerted on a surface by an object is $100N/cm^2$. The surface area in contact with the object is $25cm^2$. What is the force exerted?
The pressure exerted on a surface by an object is $50N/cm^2$. The force exerted on the surface is $10N$. What is the surface area in contact with the object?	The pressure exerted on a surface by an object is $100N/cm^2$. The force exerted on the surface is $25N$. What is the surface area in contact with the object?

Worked Example	Your Turn
A pressure of 0.19 N/cm^2 is applied to an area using a force of 5510 N. Calculate the area the force is applied to. Give your answer in m^2	An elephant puts a total force of 82179 N on its four feet. Each foot has an area of 9925 cm^2 Calculate the pressure the elephant exerts on the ground. Give your answer in N/m^2

Worked Example

The diagram shows a water tank in the shape of a prism placed on a horizontal floor.



The height of the tank is 0.7 m and the volume is 3.5 m^3

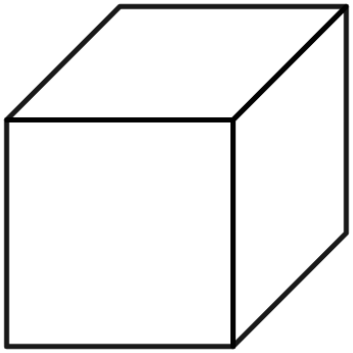
The pressure on the floor due to the tank is 2000 N/m^2

Calculate the force exerted by the tank on the floor. Give your answer in newtons.

Your Turn

The diagram shows a solid cube.

The cube is placed on a table so that the whole of one face of the cube is in contact with the table.



The cube exerts a force of 226.8 newtons on the table.
The pressure exerted by the cube is 0.7 N/cm^2

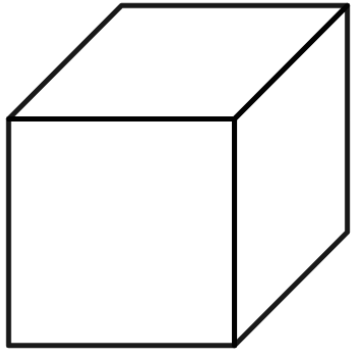
Calculate the volume of the cube.
Give your answer in cm^3

Dr Frost 329c

Worked Example

The diagram shows a solid cube.

The cube is placed on the floor so that the whole of one face of the cube is in contact with the floor.

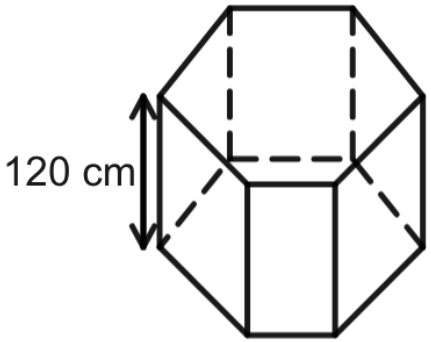


The cube exerts a force of 1587 newtons on the floor.
The pressure exerted by the cube is 0.03 N/cm^2

Calculate the width of the cube.
Give your answer in metres.

Your Turn

The diagram shows a water tank in the shape of a prism placed on a horizontal floor.



The height of the tank is 120 cm and the volume is 4.8 m^3

The pressure on the floor due to the tank is 2390 N/m^2

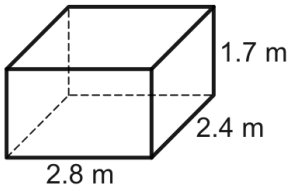
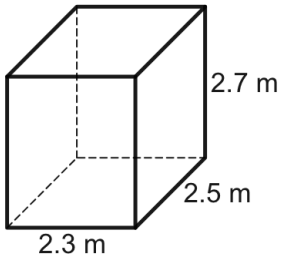
Calculate the force exerted by the tank on the floor.
Give your answer in newtons.

Fill in the Gaps

Mass	Volume	Density	
$500\ g$	$200\ cm^3$		g/cm^3
$6.2\ kg$	$0.004\ m^3$		kg/m^3
$1.6\ kg$		2000	kg/m^3
	$2.25\ cm^3$	1.6	g/cm^3
	$0.2\ m^3$	750	kg/m^3
$264\ g$		0.88	g/cm^3
$0.24\ kg$	$400\ cm^3$		g/cm^3
$56000\ g$		800	kg/m^3
	$400000\ cm^3$	2180	kg/m^3
$8000\ g$	$0.0025\ m^3$		g/cm^3
$13.8\ kg$	$0.015\ m^3$		g/cm^3

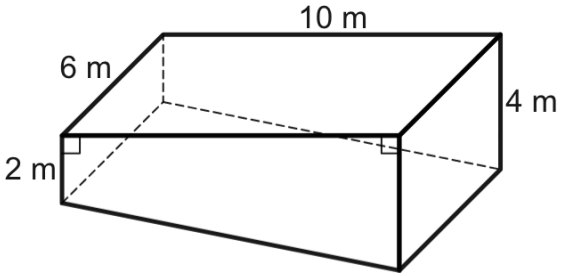
Force	Area	Pressure	
$7\ N$	$0.4\ m^2$		N/m^2
$60\ N$	$2.4\ m^2$		N/m^2
	$0.06\ m^2$	70	N/m^2
$56\ N$		32	N/m^2
	$0.001\ m^2$	3800	N/m^2
$99\ N$		450	N/m^2
$85\ N$	$20000\ cm^2$		N/m^2
	$80000\ cm^2$	12.75	N/m^2
$174\ N$	$725\ cm^2$		N/m^2
$135\ N$	$5000000\ mm^2$		N/m^2
	$3600\ mm^2$	1850	N/m^2

Other Compound Measures

Worked Example	Your Turn
An empty tank is in the shape of a cuboid with dimensions 2.8 m by 2.4 m by 1.7 m as shown.  Water flows into the tank at a rate of 42 litres per minute. Find the time it takes to fill the tank. 1 m$^3 = 1000$ litres	An empty tank is in the shape of a cuboid with dimensions 2.3 m by 2.5 m by 2.7 m as shown.  Water flows into the tank at a rate of 9 litres per minute. Find the time it takes to fill the tank. 1 m$^3 = 1000$ litres

Worked Example

A swimming pool is in the shape of a prism with dimensions as shown. The cross section is a trapezium.



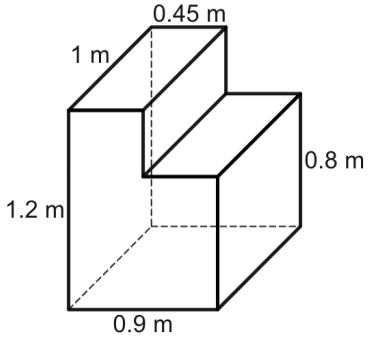
Water flows into the pool at a rate of 32 litres per minute.

$1\text{ m}^3 = 1000$ litres

Find the time it takes to fill the pool.

Your Turn

A tank is in the shape of a prism with dimensions as shown.



The tank is full of water. Lexi opens the tap, and water starts to flow out of the tank at a rate of 18 litres per minute.

$1\text{ m}^3 = 1000$ litres

Find the time it takes to empty the tank.

Extra Notes