

Surface area of a cylinder



Year 9 Mathematics

www.maffsguru.com

MAFFSGURU



Maths made ...
Easy
Engaging
Educational
Entertaining

Sign up for free!

Videos come with downloadable notes at
www.maffsguru.com

www.maffsguru.com

Learning Objectives

By the end of the lesson I would hope that you have an understanding and be able to apply to questions the following concepts:

- Know how to draw the net of a cylinder
- Know how to find the area of each section of a net of a cylinder
- Know how to find the surface area of a cylinder.

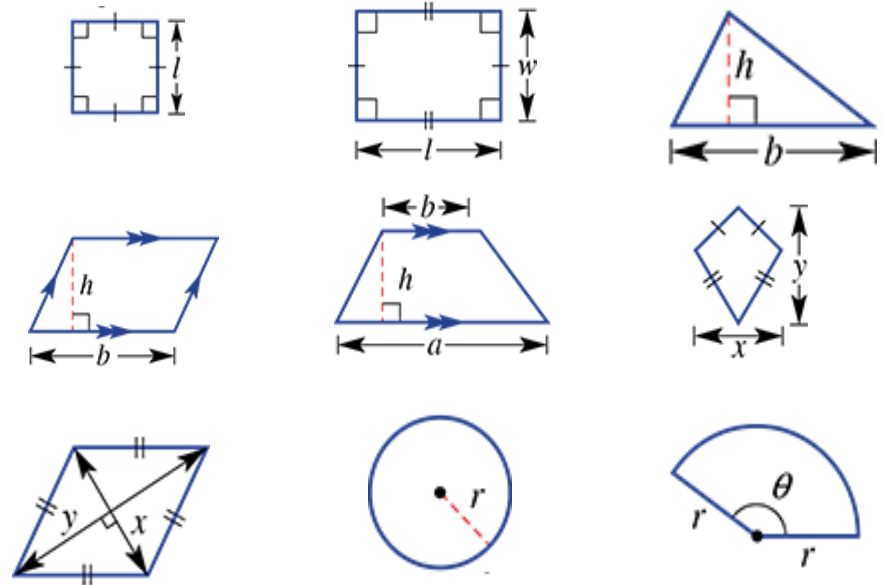
Recap

We have been finding area, surface areas and volumes of a range of shapes. Most shapes are made up of the same building blocks as shown to the right.

Once we know how to find the area of each of the building blocks, we can find the area of much more complex shapes.

We have met this before with composite shapes.

Now we are going to look at one of the most interesting shapes; the cylinder.



Nets of Cylinders

Jelly Tots are, without a doubt, one of my favourite sweets in the world.

They are small pellets of sugar, coated with sugar. Heaven!

The packaging is quite awesome as it shows how cylinders are created.

There is a top (red lid) which is a circle.

There is a base (white cardboard) which is a circle.

There is the rest of the packaging, which if I slice it with a knife, can be rolled out to form a rectangle.



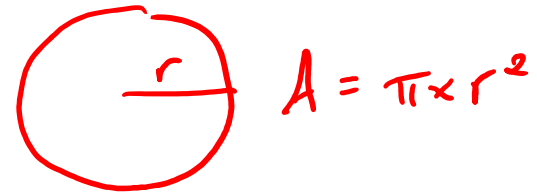
Nets of Cylinders

We know how to find the areas of circles, as there is a formula:

$$\text{Area of circle} = \pi \times \text{radius}^2$$

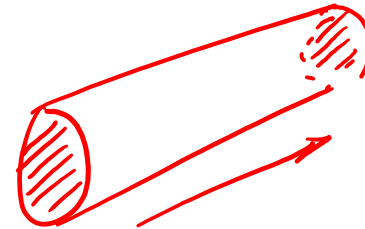
$$\text{Area} = \pi r^2$$

All I need to know is the radius (or diameter) of the circle and I'm away.



$$d = 2 \times r$$

$$r = d \div 2$$



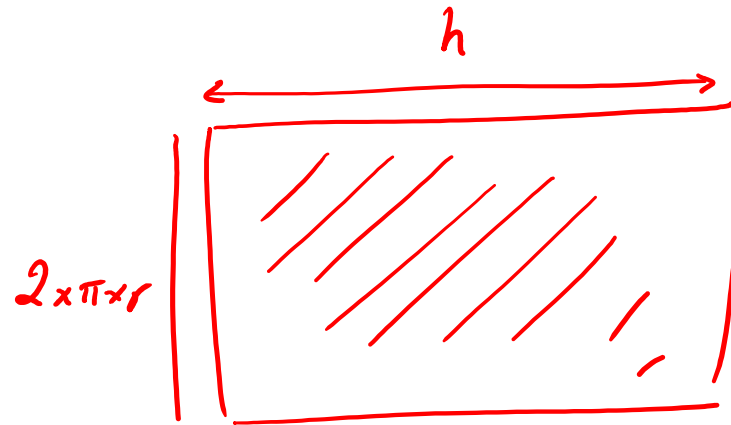
How do we find the dimensions of the rectangle though?

We know the height (or length) of the tube which forms one of the measurements.

But how do I find the other?

Well, the width is actually equal to the circumference of one of the circles!

$$C = 2 \times \pi \times r$$



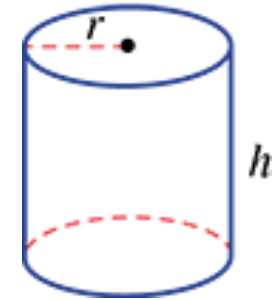
$$\begin{aligned} A &= 2 \times \pi \times r \times h \\ &= \underline{\underline{2\pi r h}} \end{aligned}$$

Finding the surface area of a cylinder

If we know the area of the two circles and the area of the rectangle, then we can find the surface area of the whole cylinder.

There is a formula:

$$\text{Surface area of a cylinder} = 2\pi r^2 + 2\pi rh$$



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

2 ends \uparrow \uparrow Area of curved section!

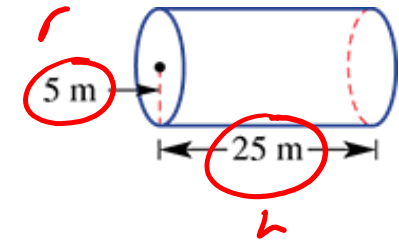
$$\pi r^2 + \pi r^2$$
$$= 2\pi r^2$$

Examples: Using the formula

Find the surface area of this cylinder, rounding to two decimal places.

I am going to use the formula for this question:

$$\begin{aligned} SA &= 2\pi r^2 + 2\pi r h && r \quad h \\ &= 2 \times \pi \times 5^2 + 2 \times \pi \times 5 \times 25 \\ &= \underline{\underline{942.48 \text{ m}^2}} \end{aligned}$$



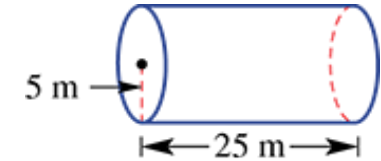
Surface area of a cylinder = $2\pi r^2 + 2\pi r h$

Examples have been extracted, with permission, from the Cambridge Essential Mathematics (Year 9) Textbook

www.maffsguru.com

Examples: By looking at the two ends and the rounded part

The reason it helps to think of it this way is that some of the questions might tell you that the cylinder is "open" which means that it doesn't have one of the ends. If we keep using the formula, then we are regurgitating the content and not thinking about what it is asking us to do.



$$A_{\circ} = \pi r^2 = \pi \times 5^2 = \underline{\underline{25\pi}}$$

$$A_{\square} = 2 \times \pi \times r \times h = 2 \times \pi \times 5 \times 25 = \underline{\underline{250\pi}}$$

$$TSA = 25\pi + 25\pi + 250\pi$$

$$= 300\pi$$

$$= \underline{\underline{942.48 \text{ m}^2}}$$

Surface area of a cylinder = $2\pi r^2 + 2\pi rh$

Examples have been extracted, with permission, from the Cambridge Essential Mathematics (Year 9) Textbook

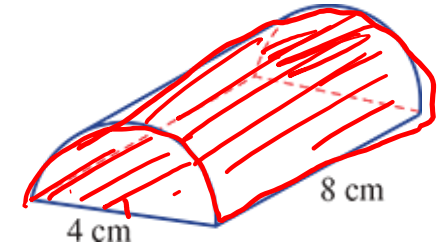
www.maffsguru.com

Examples: Parts of a cylinder

This is a very good question where it shows that using a formula doesn't always help!

Remember, surface area requires you to find the area of each surface.

Find the total surface area of this half cylinder, rounding to two decimal places.



Surface area of a cylinder = $2\pi r^2 + 2\pi rh$

$$\begin{aligned}TSA_{\text{cyl}} &= 2\pi r^2 + 2\pi rh \\ &= 2 \times \pi \times 2^2 + 2 \times \pi \times 2 \times 8 \\ &= 125.6637061 \dots \text{cm}^2\end{aligned}$$

$$\begin{aligned}SA_{\Delta} &= 125.663 \dots \div 2 \\ &= 62.83185 \dots \text{cm}^2\end{aligned}$$

$$\begin{aligned}SA_{\square} &= 4 \times 8 \\ &= 32 \text{cm}^2\end{aligned}$$

$$\begin{aligned}\therefore TSA &= 62.8318 \dots \\ &\quad + 32 \\ &= \underline{\underline{94.83 \text{cm}^2}}\end{aligned}$$

Examples have been extracted, with permission, from the Cambridge Essential Mathematics (Year 9) Textbook

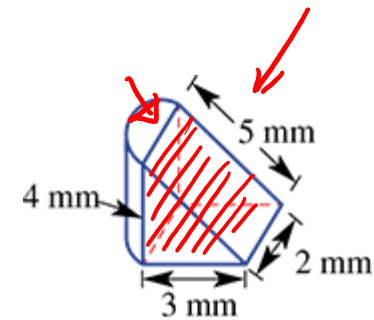
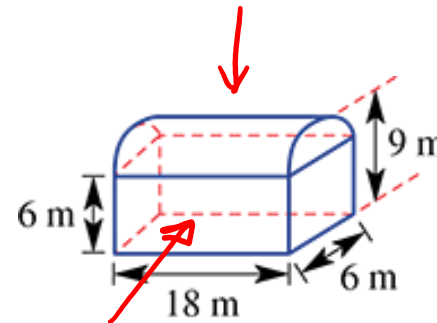
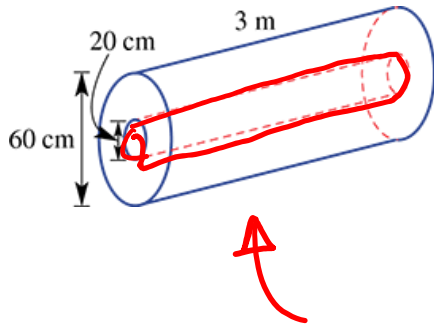
www.maffsguru.com

Gotchas

These are some of the questions which you will need to think about.

You have all the knowledge, but you need to see past the tricks!

$$\text{Surface area of a cylinder} = 2\pi r^2 + 2\pi rh$$



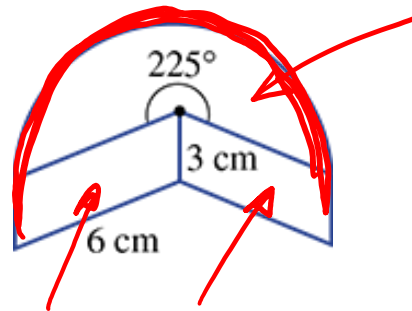
Examples have been extracted, with permission, from the Cambridge Essential Mathematics (Year 9) Textbook

Gotchas

These are some of the questions which you will need to think about.

You have all the knowledge, but you need to see past the tricks!

$$\text{Surface area of a cylinder} = 2\pi r^2 + 2\pi rh$$



Examples have been extracted, with permission, from the Cambridge Essential Mathematics (Year 9) Textbook

Questions to complete

Here are the questions I ask that you complete and upload to my OneNote. You are always welcome to do more questions if you feel that would improve your understanding.

If you are unsure, at any time, please email me. You can ask questions in the lessons.

Year 9 textbook

Exercise 5F

Questions: 2a, 3c, 4, 5c, 6aeh, 8, 11, 12a

Thanks for watching

All videos are available to view at **www.maffsguru.com**
Lesson notes can be downloaded too

Please visit **www.youtube.com/maffsguru** and subscribe