Surface Area (Pyramids and Cones)

Thursday, 15 March 2018 3:48 PM

By the end of teaching you are expected to complete the following questions:

Lesson 2	6E Surface area –pyramids and cones (10A) Let's start: *The cone formula* Key ideas Example 12, 13	Exercise 6E Page 394	Understanding 1-3	2(½)	—
			Fluency 4-7	4-6(a,c), 7	4-7(b)
			Problem-solving 8-12	9-11	10, 11, 12(½)
			Reasoning 13-15	13, 14	14, 15
			Enrichment 16	—	

RECAP:

We have so far looked at finding the surface areas of the following shapes:

- Prisms
  - Trapezoidal
  - Triangular

We have found that there are certain shapes which are more commonly used:

- Cylinders

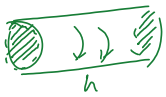
There are many, many more shapes which we can find the surface area of.

Today we are going to look at:

- Pyramids
- Cones

Important Formulae:

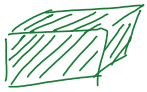
Surface Area of a Cylinder: $2\pi r^2 + 2\pi rh$



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

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

Surface area of a Prism = Sum of the area of each surface

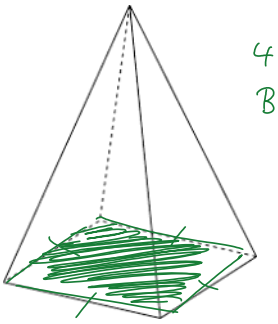


Surface area of a Pyramid

There are lots of different pyramids. We tend to deal with two in Mathematics:

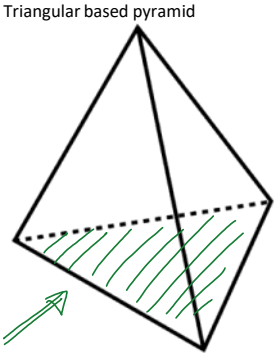
- Square based
- Triangular based

Square based pyramid



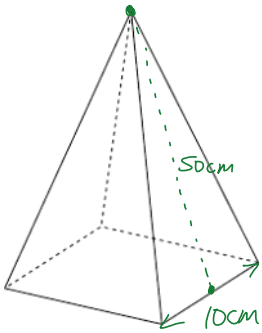
4 Triangles
Base +

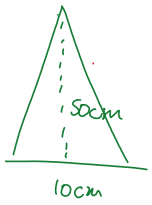
Triangular based pyramid



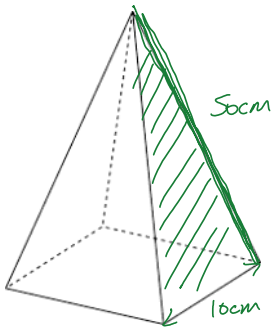
SA Base
Side 1
Side 2
Side 3

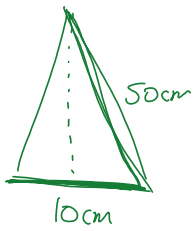
In both cases, you find the area of the base and then the area of each of the sides.
You need to be careful as they can try and trick you!
They can give you the **slant height** or the **side length**.
This makes all the difference!





$\frac{1}{2} \times 10 \times 50$



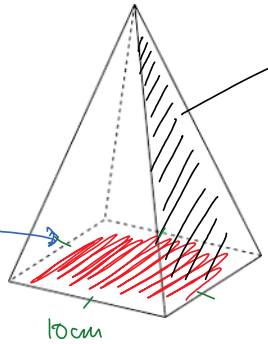


To find the surface area you break the shape into:

- Base
- One Triangular face (which you will multiply by 3 or 4 depending on how many it has!)

Square base triangle

Triangular Base

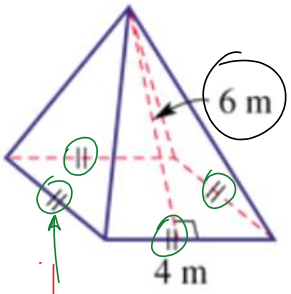


You need the dimensions of the base. Generally this will be a square

The areas of an 4 faces will generally be the same!

Find the area of one Δ and then multiply by 4.

Example: Find the surface are of the square based pyramid shown below:



This is an excellent height as we can find the area really easily

Remember this means all sides with this mark are the same length.

$A = \frac{1}{2} \times 6 \times 4$

$= 12m^2$ (2)

working out.

Base $= 4 \times 4$ (1) units

$= 16m^2$

Area of $\Delta = \frac{1}{2} \cdot 4 \cdot 6$

$= 12m^2$

Area of $\Delta = 16 + 4 \times (12)$

$= 16 + 48$

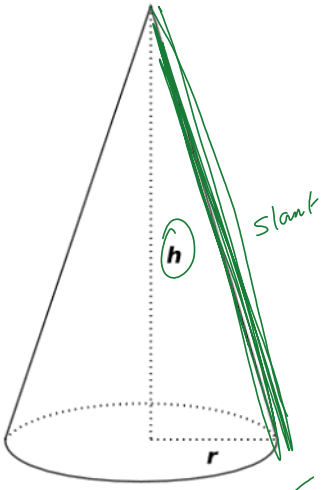
$= 64m^2$ (5)

Finding the surface area of a cone

I always think of ice-cream when I see the word cone!
But … this is great as there is a formula (or two) we can use to find the area of a cone:

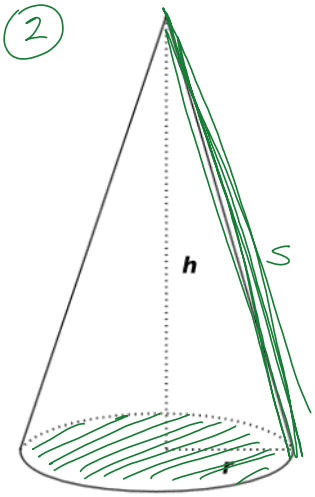
This cone has the vertical height given

This shape has the slant height given



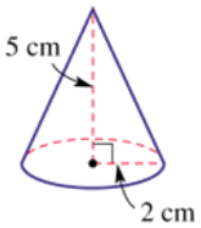
Surface area = $\pi r(r + \sqrt{h^2 + r^2})$

(2)



Surface area = $\pi r^2 + \pi rs$

Example: Find the surface area of the following cone



The great thing with most of these questions is that they can be done on a calculator.

$r = 2cm$

$h = 5cm$

$SA = \pi . r\left(r + \sqrt{h^2 + r^2}\right)$

$= \pi . 2\left(2 + \sqrt{5^2 + 2^2}\right)$

$= 2\pi\left(2 + \sqrt{25 + 4}\right)$

$= 2\pi\left(2 + \sqrt{29}\right)$ → CAS =

Composite solids:

Composite solids are shapes which are made up of one (or more) different shapes.
These shapes will generally be ones which can have their individual surface areas worked out and then added together.

Example: Find the surface area of the following composite shape