

Volume of a pyramid

Year 11 General Maths
Units 1 and 2

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Learning Objectives

By the end of the lesson, I hope that you understand and can apply the following to a range of questions from the Unit 1 and 2 General Mathematics course.

- To be able to calculate the volume of a square pyramid given its height and the width of its base.
- To be able to calculate the volume of a pyramid given its height and the area of its base.



Recap

In the previous lesson we looked at how to find the volume of the more common shapes shown below:

Rectangular prisms
Square prisms
Triangular prisms
Cylinders
Spheres

Another shape we need to know how to find the volume (and surface area) of is a pyramid.

I've always wanted to go and see the Pyramids but I'm afraid of camels. Too many people are killed each year by camels … and so I don't want to chance it.



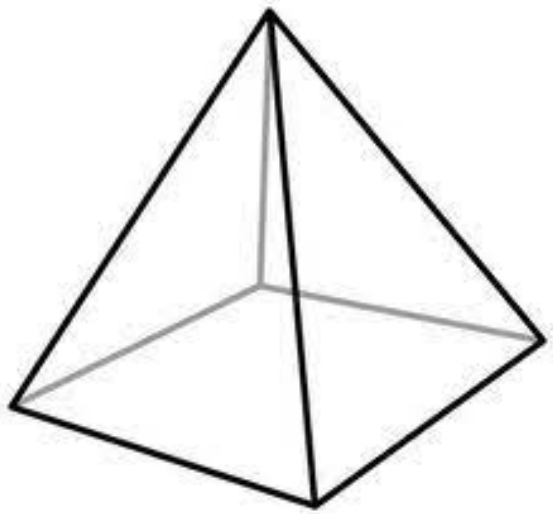
"According to another study, the yearly occurrence of camel/vehicle collisions in Saudi Arabia is over 600, with a mortality rate of one out of every four camel/vehicle collisions," or about 150 human deaths per year, "a rate that is six times higher than all other forms of road traffic incidents." 13 Mar 2022

Finding the volume of a pyramid

The reason I really like this topic is because it's all formula driven. If I can identify the shape and find the correct formula, it just needs me to write the correct numbers into my CAS and round to the appropriate degree of accuracy.

$$Volume\ of\ pyramid = \frac{1}{3} \times area\ of\ base \times height$$

$V = \frac{1}{3} \times \pi r^2 \times h$



Note: there are different types of pyramids. There are square based (shown) and triangular based and others.

Hence, you still need to know how to find the areas of basics shapes.



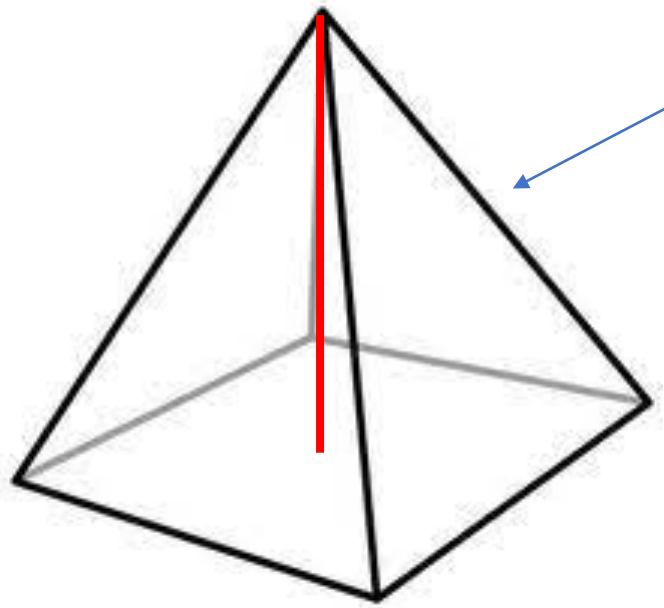
Tricks, tricks and more tricks

Maths is more tricky because Barry tries to trick you.

The formula needs you to use the height.

But there is also something called the **slant height**.

We rarely – if ever – use the slant height.



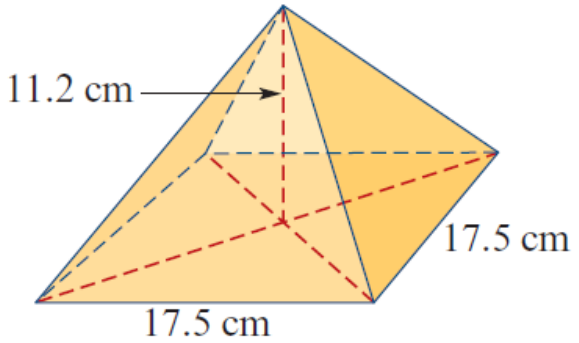
Slant height is the side length of the triangle

The height is from the centre of the base to the highest point



Example

Find the volume of a square pyramid of height 11.2 cm and base length of 17.5 cm. Give your answer to two decimal places.



$$V = \frac{1}{3} \times BA \times h$$

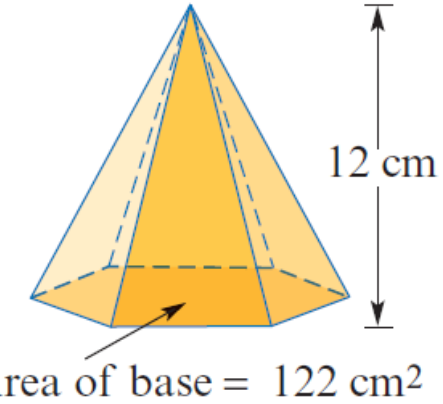
$$= \frac{1}{3} \times 17.5 \times 17.5 \times 11.2$$

$$= 1143.33 \text{ cm}^3$$



Example

Find the volume of this hexagonal pyramid that has a base of area 122 cm^2 and a height of 12 cm.



Note: The question is trying to help you as it has given the area of the base already. Lots of people get tricked here!

$$V = \frac{1}{3} \times BA \times h$$

$$= \frac{1}{3} \times 122 \times 12$$

$$= 488\ cm^3$$



Work to complete

The work I am asking to be completed for this topic is shown below.

This is the minimum work which should be completed. The more questions which are answered the better your chance of success in exams. Questions towards the end of the exercises and in the Chapter Review are the best practice you can do.

Questions to complete:
Exercise 10F: all questions

