ST. JEAN DE BREBEUF
MATHEMATICS

CHAPTER 9.1

VOLUME OF PRISMS and PYRAMIDS

CHAPTER 9.1 VOLUME OF PRISMS and PYRAMIDS

KEY CONCEPTS

The **volume** of an object is the **amount of space** occupied by the object.

Volume is measured in **cubic units** (ie. Cubic centimetres is **cm^3**).

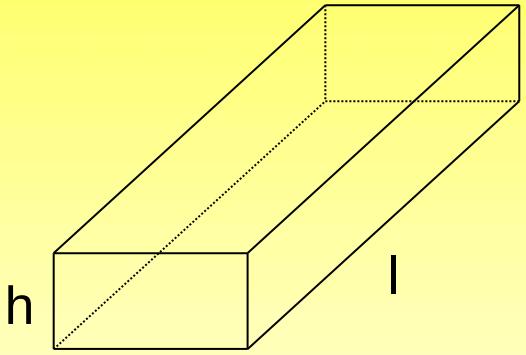
To find the **volume of a <u>prism</u>**, <u>multiply</u> the **base, height** and **length** together

FORMULA:

$$V_{Prism} = \text{Base} \times \text{Height} \times \text{Length}$$

also

$$V_{Prism} = \text{Length} \times \text{Width} \times \text{Height}$$



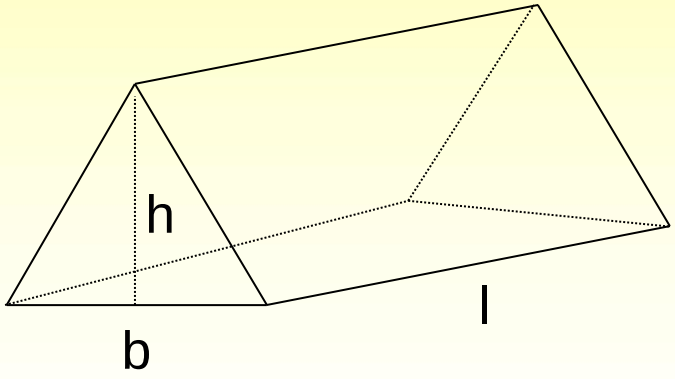
CHAPTER 9.1 VOLUME OF PRISMS and PYRAMIDS

KEY CONCEPTS

The **volume of a <u>triangular</u> prism**, is <u>half</u> the volume of a prism with the same base and height.

FORMULA:

$$V_{TRIANGULARPRISM} = \frac{Base \times Height \times Length}{2}$$



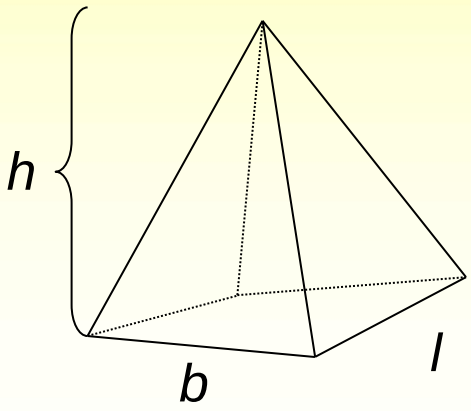
CHAPTER 9.1 VOLUME OF PRISMS and PYRAMIDS

KEY CONCEPTS

The **volume of a <u>pyramid</u>** is <u>one third</u> the volume of a prism with the same base and height.

FORMULA:

$$V_{PYRAMID} = \frac{Base \times Height \times Length}{3}$$

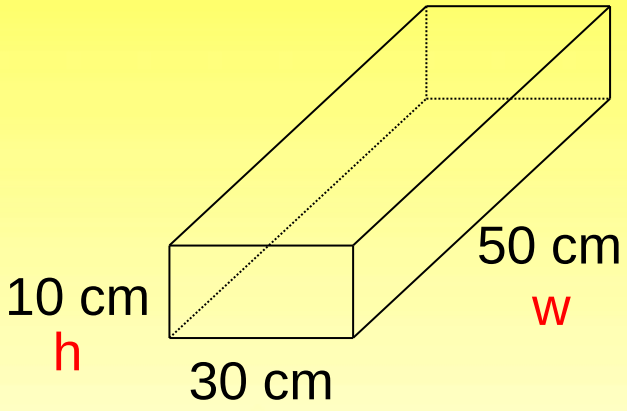


CHAPTER 9.1 VOLUME OF PRISMS and PYRAMIDS

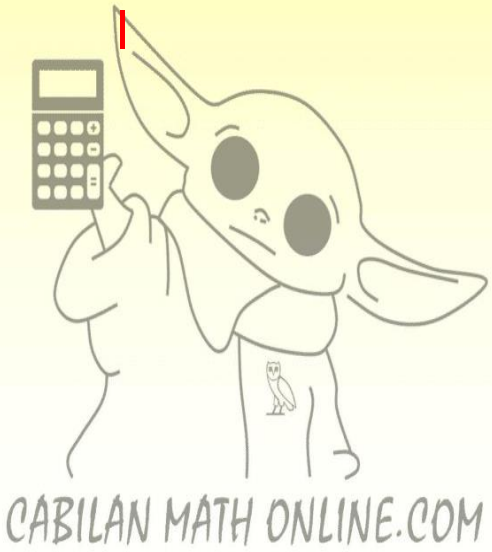
EXAMPLE 1 *Volume of a Rectangular Prism*

Find the volume for the rectangular prism pictured

$$V = length \times width \times height$$
$$= (50cm)(30cm)(10cm)$$
$$= 15000cm^3$$



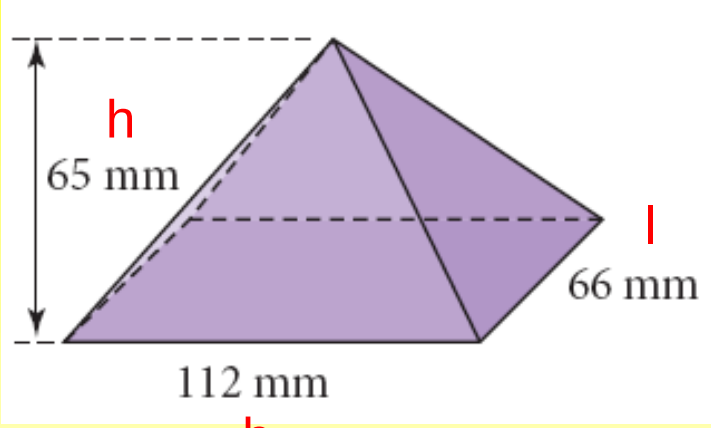
The volume of the square prism is **15 000 cubic centimetres**.



CHAPTER 9.1 VOLUME OF PRISMS and PYRAMIDS

EXAMPLE 2 *Volume of a Rectangular Pyramid*

Find the volume of the pyramid pictured.



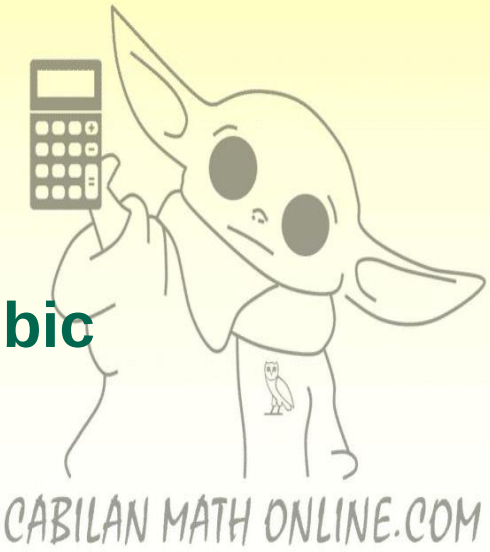
$$V_{PYRAMID} = \frac{Base \times Height \times Length}{3}$$

$$= \frac{(112mm)(65mm)(66mm)}{3}$$

$$= \frac{480480\,mm^3}{3}$$

$$= 160160\,mm^3$$

The volume of the pyramid is **160 160 cubic millimetres**.

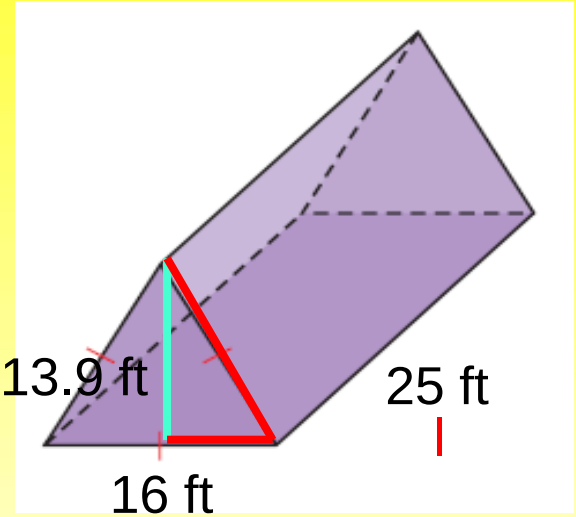


CHAPTER 9.1 VOLUME OF PRISMS and PYRAMIDS

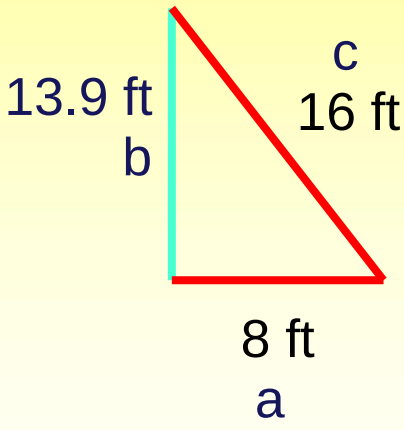
EXAMPLE 3 *Volume of a Triangular Prism*

Find the volume of the triangular prism shown

We are missing the **height (h)**



Step 1: Calculate the height of the triangle using the *Pythagorean Theorem* ($c^2 = a^2 + b^2$)



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

$$(16)^2 = (8)^2 + b^2$$

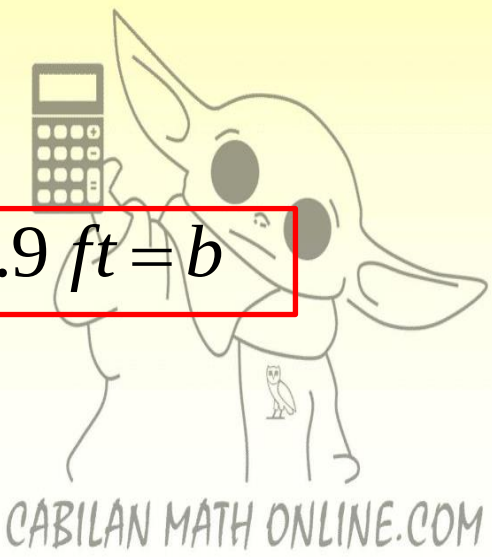
$$256 = 64 + b^2$$

$$256 - 64 = b^2$$

$$192 = b^2$$

$$\sqrt{192} = \sqrt{b^2}$$

$$13.9\ ft = b$$



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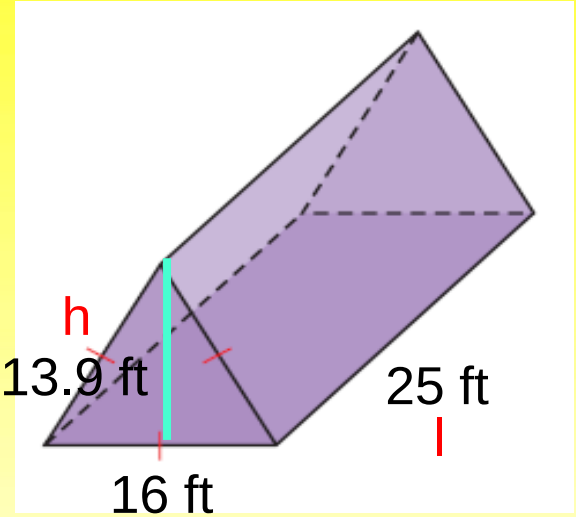
EXAMPLE 3 *Volume of a Triangular Prism*

Find the volume of the triangular prism shown



Step 2: Calculate the volume

$$V_{TRIANGULARPRISM} = \frac{Base \times Height \times Length}{2}$$

$$= \frac{(16\,ft)(13.9\,ft)(25\,ft)}{2}$$

$$= \frac{5560\ ft^3}{2}$$

$$= 2780\ ft^3$$

The volume of the triangular prism is **2780 cubic feet**.

Homework:

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#1ac, 2a, 3ace, 4ac,

5a, 6b, 9, 10