

One Third Volume

Compare matching prisms and pyramids.

GRADE 7 • TEKS 7.8.A

7.8.A "model the relationship between the volume of a rectangular prism and a rectangular pyramid having both congruent bases and heights and connect that relationship to the formulas;"

NAME _____

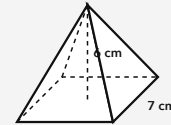
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THE VOLUME CONNECTION

When a rectangular prism and rectangular pyramid have the same base and height, the pyramid's volume is one-third of the prism's volume. Use $V = lwh$ for a prism and $V = \frac{1}{3}lwh$ for a pyramid.

WORKED EXAMPLE

The pyramid shown has the same base and height as a rectangular prism. Find the pyramid's volume.



1. Base area = $10 \times 7 = 70 \text{ cm}^2$.
2. Prism volume = $70 \times 6 = 420 \text{ cm}^3$.
3. Pyramid volume = $420 \div 3 = 140 \text{ cm}^3$.

Answer: 140 cm^3

PRACTICE 4 problems

- 1** A rectangular pyramid has a base 8 cm by 3 cm and a height of 5 cm. Find its volume.

ANSWER _____

- 2** A rectangular pyramid has a base area of 18 cm^2 and a volume of 54 cm^3 . Find its height.

ANSWER _____

- 3** A rectangular prism has a volume of 180 cm^3 . A rectangular pyramid has the same base and height. Find the pyramid's volume.

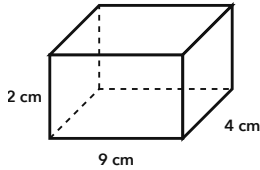
ANSWER _____

- 4** A rectangular prism has a base 12 cm by 5 cm and a height of 15 cm. Find the volumes of the prism and a matching pyramid.

ANSWER _____

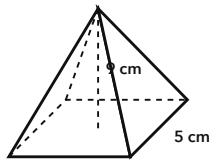
APPLY IT Show your work

- 1** A game designer uses the storage box shown. A prize container is a rectangular pyramid with the same base and height. What is the prize container's volume?



ANSWER _____

- 2** The art club makes the pyramid display shown. A rectangular-prism supply box has the same base and height. What volume does the supply box hold?



ANSWER _____

CHALLENGE One step up

A rectangular pyramid has a base length of 8 cm, a base width of x cm, and a height of 9 cm. Its volume is 96 cm^3 . Find x . Then find the volume of a matching rectangular prism.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A rectangular pyramid has a base 8 cm by 3 cm and a height of 5 cm. Find its volume.	40 cm³
2	A rectangular pyramid has a base area of 18 cm ² and a volume of 54 cm ³ . Find its height.	9 cm
3	A rectangular prism has a volume of 180 cm ³ . A rectangular pyramid has the same base and height. Find the pyramid's volume.	60 cm³
4	A rectangular prism has a base 12 cm by 5 cm and a height of 15 cm. Find the volumes of the prism and a matching pyramid.	Prism: 900 cm³; pyramid: 300 cm³

PART 2 • APPLY IT

1. **144 cm³** The matching prism has volume $9 \times 4 \times 12 = 432 \text{ cm}^3$. Divide by 3 to get 144 cm^3 .
2. **630 cm³** A matching prism has volume $14 \times 5 \times 9 = 630 \text{ cm}^3$.

CHALLENGE

x = 4 cm; 288 cm³

Accept equivalent multiplication expressions and correct units. For the challenge, accept $x = 4$ followed by a matching prism volume of 288 cm^3 .