LESSON MAKER PRO

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;"

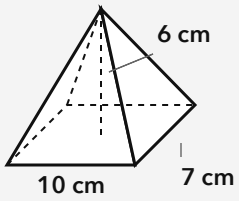
NAME _____ DATE _____

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 = 1/3lwh for a pyramid.

WORKED EXAMPLE

The rectangular pyramid shown has base length 10 cm, base width 7 cm and perpendicular height 6 cm. A rectangular prism has the same base and height. Find the pyramid volume.



1. Base area = 10 × 7 = 70 cm^2.
2. Prism volume = 70 × 6 = 420 cm^3.
3. Pyramid volume = 420 ÷ 3 = 140 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 _____

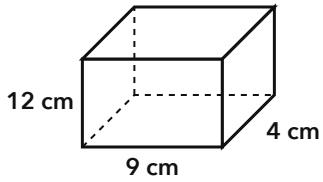
4 A rectangular prism has a base 12 cm by 5 cm and a height of 15 cm. Find the volumes of the prism and a matching pyramid.

ANSWER _____

_____

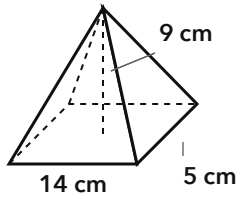
APPLY IT Show your work

1 The storage box shown is a rectangular prism 9 cm long, 4 cm wide and 12 cm high. A prize container is a rectangular pyramid with the same base and height. What is the prize container volume?



ANSWER _____

2 The rectangular pyramid display shown has base length 14 cm, base width 5 cm and perpendicular height 9 cm. A rectangular-prism supply box has the same base and height. What volume does the supply box hold?



ANSWER _____

3 Use the matched open rectangular prism and pyramid supplied by your teacher. Check that their base rectangles and perpendicular heights match. Fill the pyramid level with dry rice, then transfer it into the prism. Repeat and record how many pyramid fills fill the prism. On separate paper sketch and label both containers with base area B and height h. Use your observed comparison to explain V(prism) = Bh and V(pyramid) = Bh/3.

WORK SPACE

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

ANSWER KEY

One Third Volume

GRADE 7 · TEKS 7.8.A

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 cm^3**
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 cm^3**
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 cm^3; pyramid: 300 cm^3**

PART 2 · APPLY IT

1. **144 cm^3** The matching prism has volume 9 × 4 × 12 = 432 cm^3. Divide by 3 to get 144 cm^3.
2. **630 cm^3** A matching prism has volume 14 × 5 × 9 = 630 cm^3.
3. **About three pyramid fills fill the matching prism. V(prism) = Bh; V(pyramid) = Bh/3.** Before this task teacher supplies matched watertight or rice-holding model containers with congruent rectangular bases and equal perpendicular heights, plus dry rice and a tray. Teacher verifies their internal dimensions and demonstrates level filling without packing; learners actually transfer, record and model. Check matching labels and a connection from three equal fills to the 1/3 factor. Accept small measurement variation and discuss spillage; do not invent a result if apparatus is unavailable.

CHALLENGE

x = 4 cm; 288 cm^3

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