

Shape Space Lab

Break apart shapes and measure their space.

GRADE 7 • 7.G.B.6

CCSS.Math.Content.7.G.B.6 "Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms."

NAME _____

DATE _____

MEASURE THE PARTS

Find the area of a flat shape by splitting it into familiar pieces and adding their areas. For a right prism, volume equals the area of the base $\times$ the height, and surface area is the total area of every outside face. Use square units for area and surface area, and cubic units for volume.

WORKED EXAMPLE

Find the volume of a rectangular prism with length 13 cm, width 7 cm, and height 5 cm.

1. Use $V = l \times w \times h$.

2. $13 \times 7 = 91$.

3. $91 \times 5 = 455$.

Answer: 455 cm^3

PRACTICE 6 problems

- 1** Find the area of a triangle with a base of 12 cm and a height of 8 cm.

ANSWER _____

- 2** Find the area of a parallelogram with a base of 9 m and a height of 11 m.

ANSWER _____

- 3** Find the area of a trapezoid with bases of 6 in. and 10 in. and a height of 4 in.

ANSWER _____

- 4** A figure is made from a 14 in. by 6 in. rectangle and a triangle on top. The triangle has a base of 14 in. and a height of 8 in. Find the total area.

ANSWER _____

- 5** Find the volume of a rectangular prism with length 9 ft, width 4 ft, and height 6 ft.

ANSWER _____

- 6** Find the surface area of a rectangular prism with length 10 cm, width 3 cm, and height 2 cm.

ANSWER _____

APPLY IT Show your work

- 1** The esports club is making a triangular-prism display stand. Its triangular end has a base of 16 in. and a perpendicular height of 9 in. The stand is 4 in. deep. What is the volume of the display stand?

WORK SPACE

ANSWER _____

- 2** A student is wrapping a rectangular gift box that is 14 in. long, 10 in. wide, and 4 in. high. How much wrapping paper is needed to cover the box, ignoring overlap and waste?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A 12-unit by 9-unit by 6-unit rectangular prism has a 3-unit by 3-unit by 3-unit cube cut from one corner. Find the remaining volume and surface area. Explain why the surface area does or does not change.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Find the area of a triangle with a base of 12 cm and a height of 8 cm.	48 cm²
2	Find the area of a parallelogram with a base of 9 m and a height of 11 m.	99 m²
3	Find the area of a trapezoid with bases of 6 in. and 10 in. and a height of 4 in.	32 in.²
4	A figure is made from a 14 in. by 6 in. rectangle and a triangle on top. The triangle has a base of 14 in. and a height of 8 in. Find the total area.	140 in.²
5	Find the volume of a rectangular prism with length 9 ft, width 4 ft, and height 6 ft.	216 ft³
6	Find the surface area of a rectangular prism with length 10 cm, width 3 cm, and height 2 cm.	112 cm²

PART 2 • APPLY IT

- 288 in.³** Find the area of the triangular base, $\frac{1}{2} \times 16 \times 9 = 72 \text{ in.}^2$. Multiply 72 by the depth of 4 in. to get 288 in.³.
- 472 in.²** Find the surface area: $2 \times (14 \times 10 + 14 \times 4 + 10 \times 4) = 2 \times 236 = 472 \text{ in.}^2$.

CHALLENGE

Remaining volume: 621 cubic units. Surface area: 468 square units. The cut removes three 3 by 3 outside squares and creates three new 3 by 3 inside squares, so the surface area stays the same.

Accept correct equivalent expressions and units. For the challenge, students must show that the removed and newly exposed face areas are equal to justify the unchanged surface area.