

Shape Space Lab

Find area, volume, and surface area from dimensions and figures.

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 _____

You will need: Pencil; Ruler

BUILD WITH AREAS

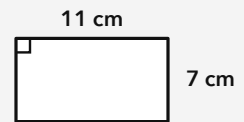
For a triangle, $A = b \times h / 2$. For a trapezoid, $A = (b_1 + b_2) \times h / 2$, and for a right prism, $V = \text{base area} \times \text{height}$. Surface area is the total area of every outside face.

WORKED EXAMPLE

Find the area of the rectangle shown.

1. A rectangle has area $A = \text{length} \times \text{width}$.
2. $A = 11 \times 7$.
3. $A = 77 \text{ cm}^2$.

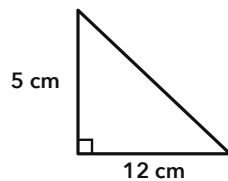
Answer: 77 cm^2



PRACTICE 6 problems

Show your calculation or reasoning. Include units when needed.

- 1** Find the area of the right triangle shown.



ANSWER _____

- 2** A rectangular prism has a length of 8 cm, a width of 3 cm, and a height of 6 cm. Find its volume.

ANSWER _____

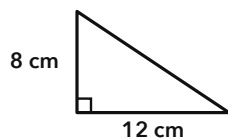
- 3** Find the surface area of a rectangular prism with length 10 m, width 2 m, and height 5 m.

ANSWER _____

- 4** A trapezoid has bases of 14 in. and 6 in. Its height is 3 in. Find its area.

ANSWER _____

- 5** The diagram shows the triangular end of a prism. Its base is 12 cm and its perpendicular height is 8 cm. The prism is 5 cm long. Find its volume.



ANSWER _____

- 6** An L-shaped patio starts as a 13 m by 10 m rectangle. A 3 m by 2 m corner is removed. Find the area of the patio.

ANSWER _____

APPLY IT Show your work

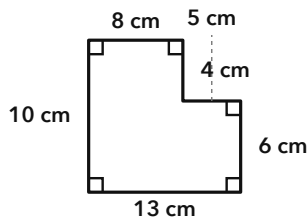
- 1** A gaming club makes a triangular-prism display for a tournament. Each triangular end has a base of 14 in. and a height of 9 in. The display is 20 in. long. What is the volume of the display?

- 2** The student council paints the outside of a rectangular stage prop that is 12 ft long, 5 ft wide, and 3 ft high. The bottom will not be painted. How many square feet will be painted?

CHALLENGE

One step up

The top face shown is the base of a right prism that is 3 cm tall. Find the volume of the prism and explain how you found the base area.

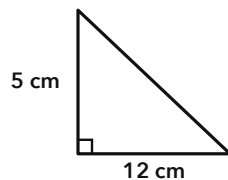


PRACTICE 2**144 cm³****PRACTICE 3****160 m²****PRACTICE 4****30 in.²****PRACTICE 6****124 m²****APPLY IT 1**

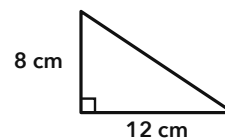
1,260 in.³ Find the triangular base area: $14 \times 9 / 2 = 63 \text{ in.}^2$. Multiply by the length: $63 \times 20 = 1,260 \text{ in.}^3$.

APPLY IT 2

162 ft² The full surface area is $2(12 \times 5 + 12 \times 3 + 5 \times 3) = 222 \text{ ft}^2$. Do not paint the $12 \times 5 = 60 \text{ ft}^2$ bottom, so $222 - 60 = 162 \text{ ft}^2$.

PRACTICE 1**30 cm²****PRACTICE 5**

240 cm³ Triangular base area = $12 \times 8 \div 2 = 48 \text{ cm}^2$. Volume = $48 \times 5 = 240 \text{ cm}^3$.

**CHALLENGE**

330 cm³; base area = $13 \times 10 - 5 \times 4 = 110 \text{ cm}^2$, then $110 \times 3 = 330 \text{ cm}^3$.

Accept equivalent numerical expressions and correct unit notation. For the challenge, accept any valid explanation that finds the L-shaped base area as 110 cm^2 and then multiplies by 3 cm.

