

Grade 7 · Area, Surface Area and Volume of Prisms · Lesson

Common Core 7.G.B.6 · mathovore.fr

To find the area of a composite figure, split it into rectangles and triangles and add the pieces. The volume of a right prism is $V = Bh$, the base area times the height. Surface area is the sum of the areas of all faces. Grade 7 students apply these to prisms and composite solids.

Grade 7 Common Core: 7.G.B.6

Key facts:

- Area of a triangle: $A = \frac{1}{2}bh$.
- Volume of a right prism: $V = Bh$.
- Surface area of a right prism: $SA = 2B + Ph$.
- Area uses square units, and volume uses cubic units.
- Break composite figures and solids into simple parts, then add.

How do you find the area of a composite figure?

A **composite figure** is built from simple shapes such as rectangles and triangles. To find its area, break it into pieces you know, find each area, and add. You can also draw a larger rectangle and subtract the missing piece.

Shape	Area formula
Rectangle	$A = \ell w$
Triangle	$A = \frac{1}{2}bh$
Parallelogram	$A = bh$
Trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$

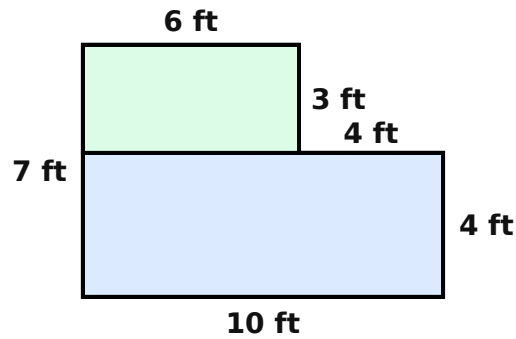


Figure 1. The L-shape splits into a 10 ft by 4 ft rectangle and a 6 ft by 3 ft rectangle.

In Figure 1, the area is $10 \times 4 + 6 \times 3 = 40 + 18 = 58 \text{ ft}^2$.

How do you find the volume of a prism?

Volume of a right prism

$V = Bh$, where B is the area of one base and h is the height of the prism. Volume is measured in cubic units.

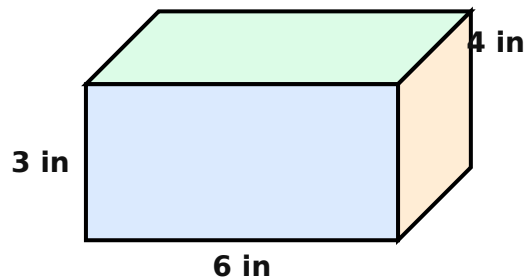


Figure 2. A rectangular prism with base 6×4 and height 3.

For the prism in Figure 2, $B = 6 \times 4 = 24$ and $V = 24 \times 3 = 72 \text{ in}^3$.

How do you find the surface area of a prism?

Surface area is the total area of all faces. Draw the net, find the area of each face, and add. For a right prism, $SA = 2B + Ph$, where P is the perimeter of the base.

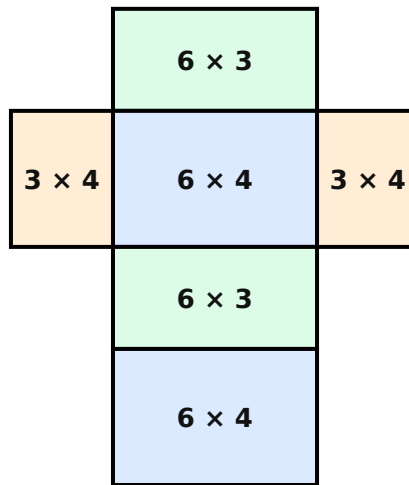


Figure 3. The net of the prism has 6 faces, in 3 matching pairs.

For the prism in Figure 3, $SA = 2(24) + 2(18) + 2(12) = 48 + 36 + 24 = 108 \text{ in}^2$.

How do you solve a prism problem step by step?

1. Sketch or label the figure, including the base and the height.
2. Find the area of the base (split it into simple shapes if needed).
3. For volume, multiply the base area by the height. For surface area, add the areas of every face.
4. Write the answer with square or cubic units.

Worked example. Find the volume and surface area of the triangular prism with right-triangle bases (legs 3 cm and 4 cm, hypotenuse 5 cm) and length 10 cm.

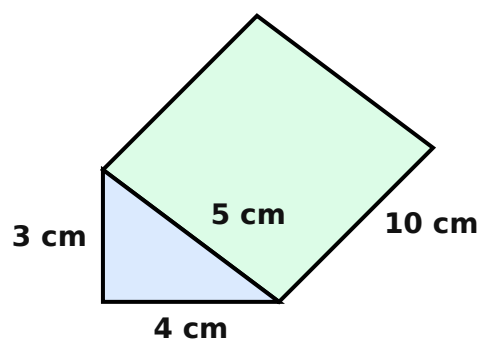


Figure 4. A triangular prism: right triangle bases with legs 3 cm and 4 cm, length 10 cm.

Base area: $B = \frac{1}{2} \times 3 \times 4 = 6$, so $V = 6 \times 10 = 60 \text{ cm}^3$. Surface area: the two bases give 12, and the rectangles give $(3+4+5) \times 10 = 120$, so $SA = 132 \text{ cm}^2$.

For a composite solid, find the volume of each part and add them.

Area, Surface Area and Volume of Prisms: frequently asked questions

What does B mean in $V = Bh$?

The letter B stands for the area of the base of the prism, not a side length. For a rectangular prism, $B = \ell w$. For a triangular prism, $B = \frac{1}{2}bh$ using the triangle's base and height.

Does $V = Bh$ work for a triangular prism?

Yes. It works for every right prism. Find the area of the triangular base first, then multiply by the length of the prism, which is the distance between the two triangular bases.

What is the difference between area and surface area?

Area measures a flat 2D region, such as one face. Surface area measures the total area of all the faces of a 3D solid. Both use square units.

How do you find the volume of a composite solid?

Break the solid into rectangular prisms or other right prisms, find the volume of each part, and add them. You can also find the volume of a larger box and subtract any missing piece.

Why is volume measured in cubic units?

Volume counts how many unit cubes fit inside a solid. A unit cube has edges of 1 unit, so the count is in cubic units, such as in^3 or cm^3 .