

Grade 7 - Area, Volume and Surface Area - Lesson

Common Core 7.G.B.6 · maths-pdf.fr/en/

The area of a triangle is half the base times the height, and a trapezoid has area half the sum of its bases times the height. The volume of a right prism is the base area times the height. The surface area of a prism is the sum of the areas of all its faces, found from its net.

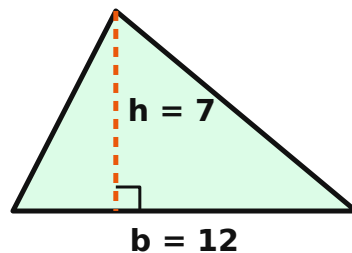
Grade 7 · Common Core State Standards: **7.G.B.6**

Key facts

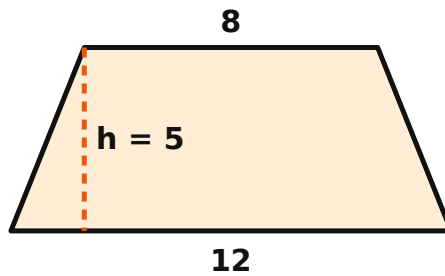
- Triangle: $A = \frac{1}{2}bh$. Trapezoid: $A = \frac{1}{2}(b_1 + b_2)h$.
- Composite polygon: add the areas of simple pieces or subtract a missing piece.
- Volume of a prism: $V = Bh$ (base area times height).
- Surface area of a prism: add the areas of all faces from the net.
- Area uses square units; volume uses cubic units.

How do you find the area of triangles and quadrilaterals?

Each formula comes from the rectangle. The area of a rectangle is base times height, $A = bh$. A **parallelogram** has the same formula with a perpendicular height. A **triangle** is half of a parallelogram.



Triangle: $A = \frac{1}{2}bh$. Here $A = \frac{1}{2} \times 12 \times 7 = 42$.

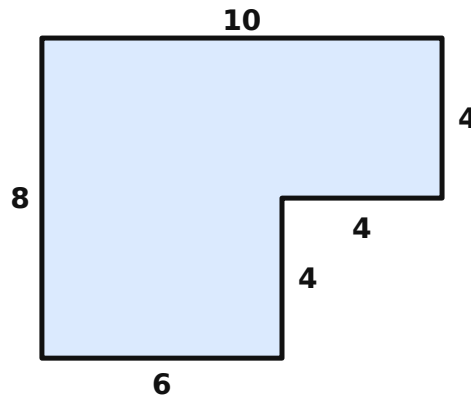


Trapezoid: $A = \frac{1}{2}(b_1 + b_2)h = \frac{1}{2}(8 + 12)(5) = 50$.

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

How do you find the area of a composite polygon?

Break the polygon into rectangles and triangles, find each area, and add. Or find the area of a bigger shape and subtract the missing part.

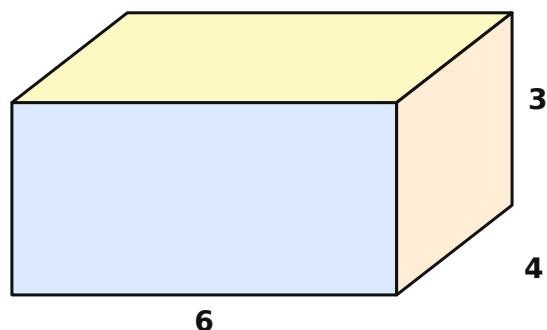


Split an L-shape into rectangles or subtract a missing piece: $10 \times 8 - 4 \times 4 = 64$.

How do you find the volume of a right prism?

Volume of a prism

$V = Bh$, where B is the area of the base and h is the height (the distance between the two bases). Volume is measured in cubic units.



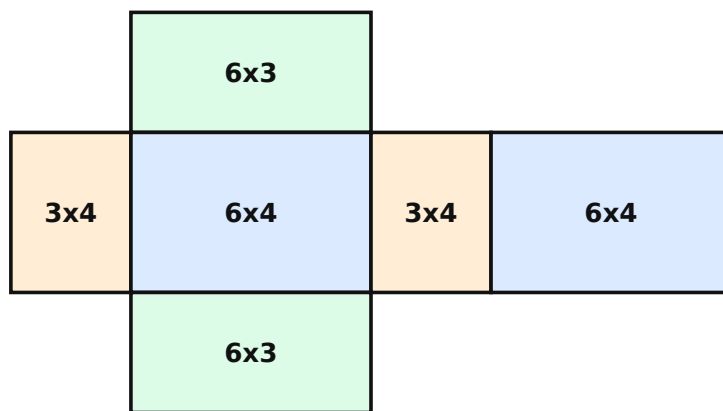
Volume of a prism = base area $\times$ height: $6 \times 4 \times 3 = 72$ cubic units.

For a rectangular prism, $B = l \times w$, so $V = lwh$. For a triangular prism, $B = \frac{1}{2}bh$ of the triangle, and the length of the prism plays the role of height.

How do you find the surface area of a prism?

The **surface area** is the total area of all faces. Draw the net and add the areas of the rectangles and other shapes. A box 6 by 4 by 3 has pairs of faces:

$$2(6 \times 4) + 2(6 \times 3) + 2(4 \times 3) = 48 + 36 + 24 = 108 \text{ square units.}$$



The net of a $6 \times 4 \times 3$ box has six rectangles. Their areas add to the surface area: 108.

Surface area is measured in square units and volume in cubic units, so always check the units in your final answer.

Questions about area, volume and surface area

What is the formula for the area of a triangle?

The area is half the base times the height, $A = \frac{1}{2}bh$. The height must be perpendicular to the base.

How do you find the volume of a triangular prism?

Find the area of the triangular base, then multiply by the length of the prism. For a base of $\frac{1}{2}(4)(3)=6$ and length 10, the volume is 60.

What is surface area?

Surface area is the total area of all the faces of a solid. For a prism, draw the net and add the areas of every face.

How do I find the area of an L-shaped figure?

Split it into rectangles or subtract a missing rectangle from a larger one. Then add or subtract the areas.

What is the difference between volume and surface area?

Volume measures the space inside a solid in cubic units. Surface area measures the covering outside in square units.