Grade 6 · Surface Area and Nets · Lesson

Common Core 6.G.A.4 · mathovore.fr

> Surface area is the total area of all the faces of a three-dimensional solid. A net is a flat pattern that folds into the solid and shows every face. To find surface area, find the area of each face in the net, add the areas, and write the answer in square units.

Grade 6Common Core: 6.G.A.4

> **Key facts:**
>
> - A net shows all faces of a solid laid flat.
> - Cube: $SA = 6s^2$. Rectangular prism: $SA = 2(\ell w + \ell h + wh)$.
> - Triangular prisms and square pyramids have 5 faces; add every face.
> - Surface area is measured in square units; volume is measured in cubic units.

What is surface area?

Surface area is the total area of all the faces of a solid. Imagine covering a box with wrapping paper without any gaps or overlaps: the amount of paper is the surface area. It is measured in square units, such as square inches or square feet.

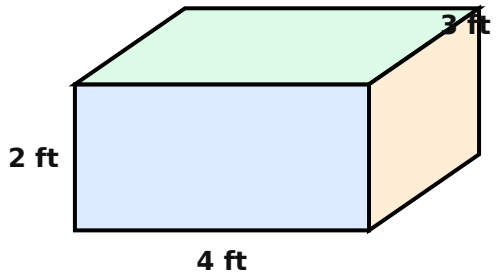

Figure 1. A rectangular prism 4 ft long, 3 ft wide, and 2 ft tall.

How does a net show every face?

A net is a flat pattern that folds up into a solid. Each shape in the net is one face, so a net lets you see every face at once. Figure 2 is a net of the box above, with the area of each face written inside it.

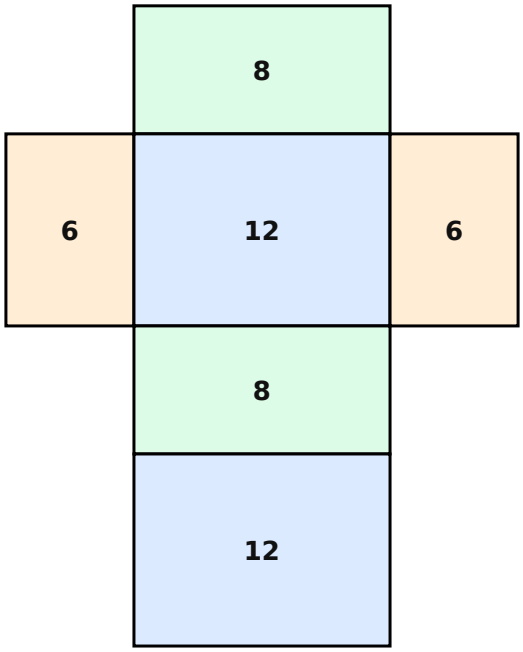

Figure 2. The six faces of the box: 12, 12, 8, 8, 6, and 6 square feet.

Solids and their faces

Solid	Faces	Surface area
Cube	6 squares	$6s^2$
Rectangular prism	6 rectangles	$2(\ell w+\ell h+wh)$
Triangular prism	2 triangles, 3 rectangles	add all 5 faces
Square pyramid	1 square, 4 triangles	add all 5 faces

How do you find surface area from a net?

1. Draw or picture the net and name each face.
2. Find the area of each face with the rectangle or triangle formula.
3. Add the areas of all the faces.
4. Write the answer in square units.

Example. For the box in Figure 1, $SA=12+12+8+8+6+6=52\ \text{ft}^2$. The formula gives the same answer: $2(4\times3+4\times2+3\times2)=2(26)=52$.

How do you handle triangular prisms and pyramids?

Use the same steps. The net of a triangular prism has two triangles and three rectangles. For triangles with legs $3\ \text{in}$ and $4\ \text{in}$, a prism length of $10\ \text{in}$, and a hypotenuse of $5\ \text{in}$:

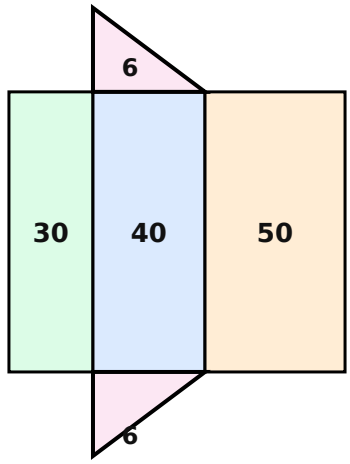

Figure 3. Triangles: 6 and 6. Rectangles: 30, 40, and 50 square inches.

$SA = 6+6+30+40+50 = 132\ \text{in}^2$. The net of a square pyramid has one square and four triangles. With a $6\ \text{m}$ base edge and triangles of slant height $5\ \text{m}$, each triangle has area $\frac{1}{2} \times 6 \times 5 = 15\ \text{m}^2$, so $SA = 36 + 4 \times 15 = 96\ \text{m}^2$.

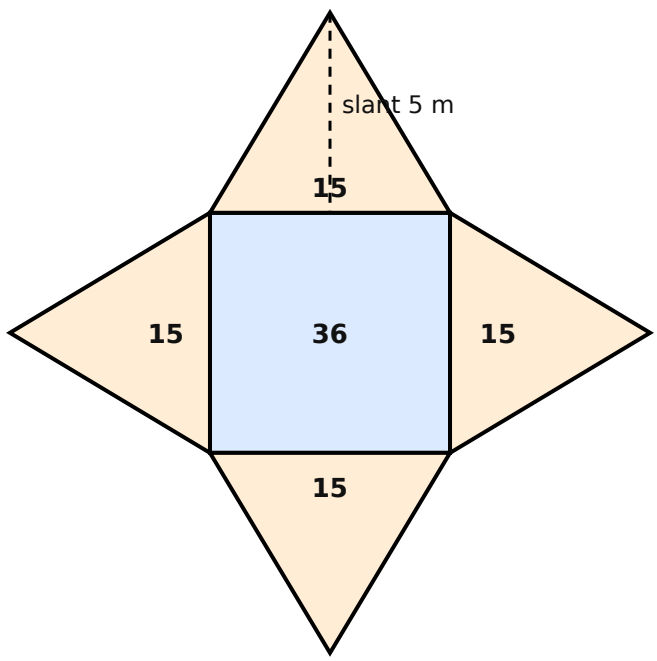

Figure 4. Square pyramid: a base of 36 square meters and four triangles of 15 square meters.

Surface Area and Nets: frequently asked questions

What is surface area?

Surface area is the sum of the areas of all the faces of a solid. It tells how much material

covers the outside, such as wrapping paper or paint.

What is a net in geometry?

A net is a two-dimensional pattern made of the faces of a solid. When it is folded along its edges it forms the solid, with no gaps or overlaps.

How do you find the surface area of a rectangular prism?

Find the areas of the three different faces, ℓw, ℓh, and wh, add them, and double the sum. Each face has an identical partner on the opposite side.

How do you find the surface area of a pyramid?

Add the area of the base to the area of every triangular face. For a square pyramid, that is one square plus four triangles of area $\frac{1}{2}bh$.

Why is surface area measured in square units?

Each face is flat, so its area is counted in squares. The total is still a count of unit squares that cover the outside.