

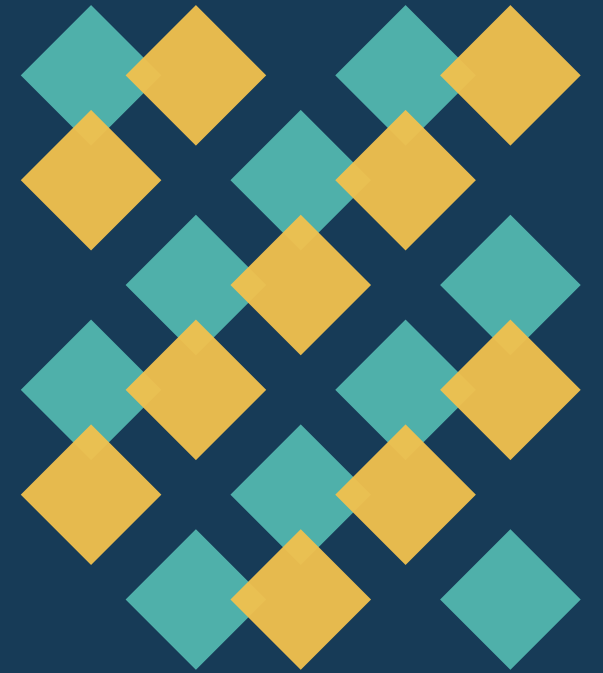
SURFACE AREA

Polyhedra, Nets & Volume

Review for Math 6 • Unit 1 • Lessons 12–16

Goal: identify faces, use nets to find surface area,
and distinguish square units from cubic units.

Access IDEAS presents a customized session for OUSD Math 6.



ACCESS IDEAS
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What are we trying to understand?

Five lessons connect through three big ideas.

1

VISUALIZE

A polyhedron's flat faces can unfold into a net.

2

CALCULATE

Surface area is the sum of all face areas.

3

DISTINGUISH

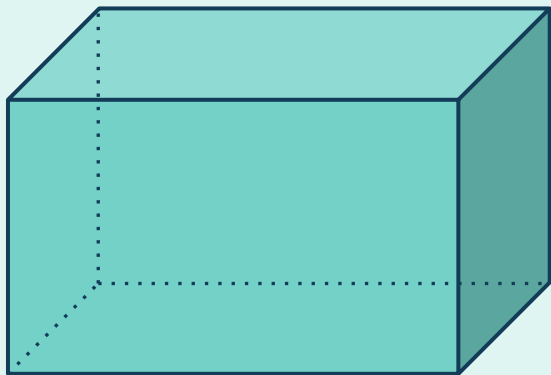
Surface area uses square units; volume uses cubic units.

Big idea: surface area covers the outside, while volume fills the inside.

What is surface area?

Surface area measures how much material covers the outside.

ONE OBJECT



A rectangular prism

six flat faces cover the outside

THREE IDEAS TO CHECK

- 1 Each flat side is called a face.
- 2 Find the area of every face.
- 3 Add face areas and use square units.

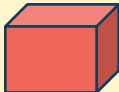
SURFACE AREA IS NOT



edge length



base area

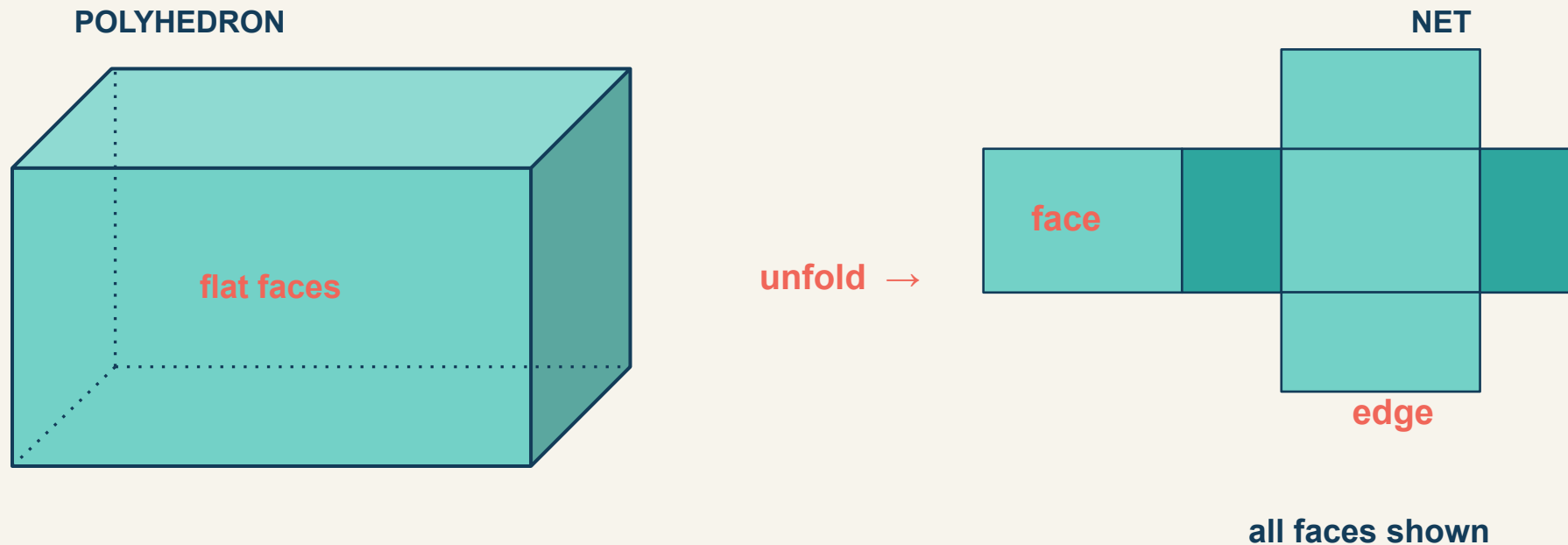


volume

Surface area covers the outside; it does not measure the space inside.

Polyhedra and nets

A polyhedron is closed, three-dimensional, and made from polygon faces.

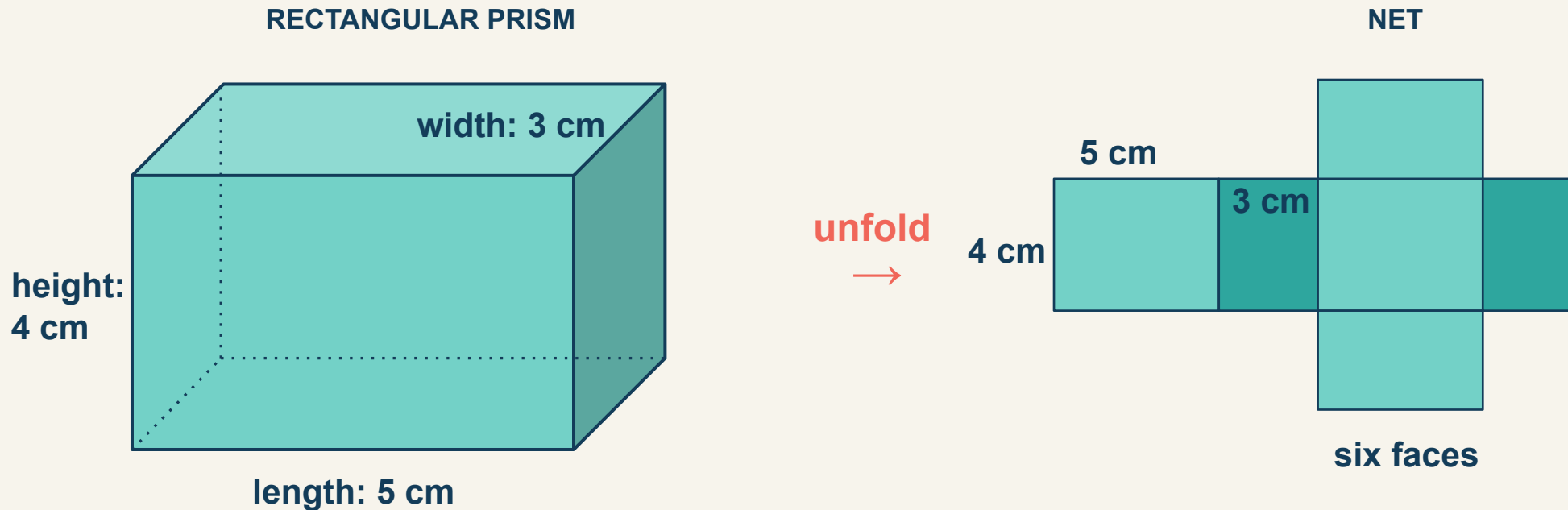


A prism has two identical parallel bases.

A pyramid has one base and triangular faces that meet at one vertex.

A net shows every face

Unfold the prism without changing the size or shape of any face.

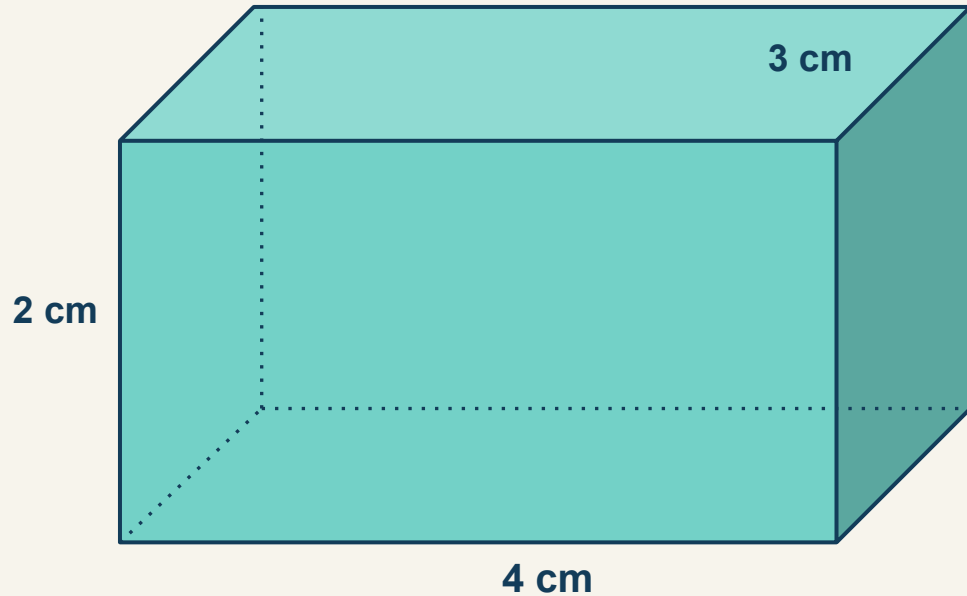


$$2 \text{ faces: } 5 \times 4 \quad \bullet \quad 2 \text{ faces: } 5 \times 3 \quad \bullet \quad 2 \text{ faces: } 4 \times 3$$

The net makes it easier to see and add all six face areas.

Example 1 — Try it first

A rectangular prism has length 4 cm, width 3 cm, and height 2 cm.
What is its surface area?



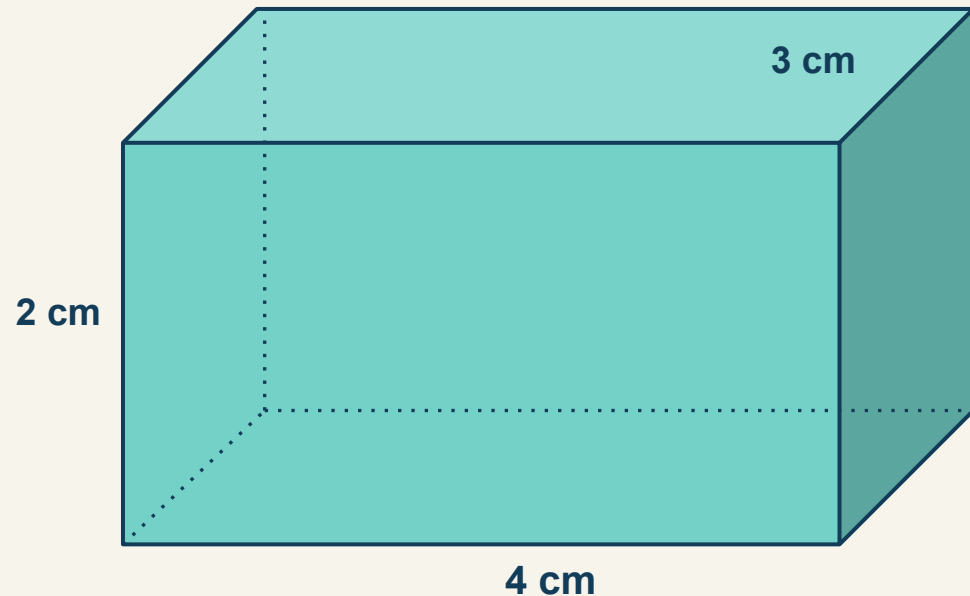
YOUR TURN

**Find all six face areas.
Look for matching pairs.**

Start by listing the three face types.

Example 1 — Step 1: Pair the faces

A rectangular prism has length 4 cm, width 3 cm, and height 2 cm.
What is its surface area?



STEP 1: PAIR THE FACES

Two faces are 4×2 .

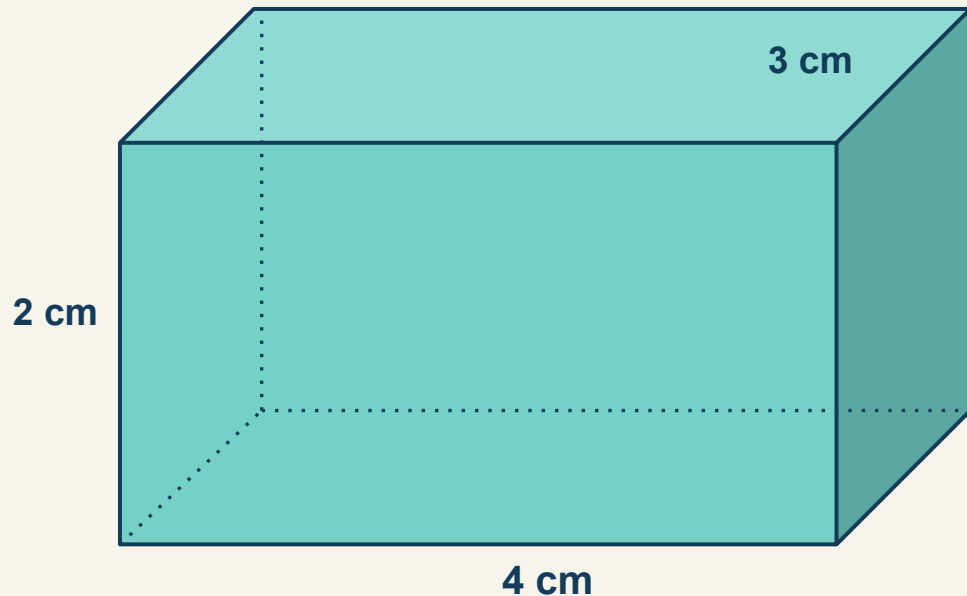
Two faces are 4×3 .

Two faces are 3×2 .

Next: find each pair's total.

Example 1 — Step 2: Add the pairs

A rectangular prism has length 4 cm, width 3 cm, and height 2 cm.
What is its surface area?



STEP 2: ADD THE PAIRS

$$2(4 \times 2) = 16$$

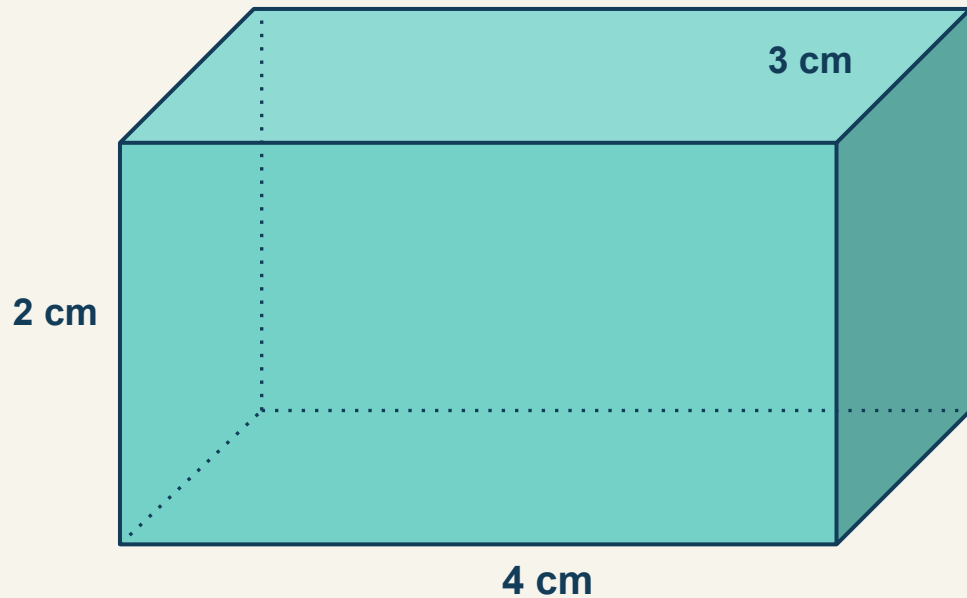
$$2(4 \times 3) = 24$$

$$2(3 \times 2) = 12$$

Next: combine $16 + 24 + 12$.

Example 1 — Solution

A rectangular prism has length 4 cm, width 3 cm, and height 2 cm.
What is its surface area?



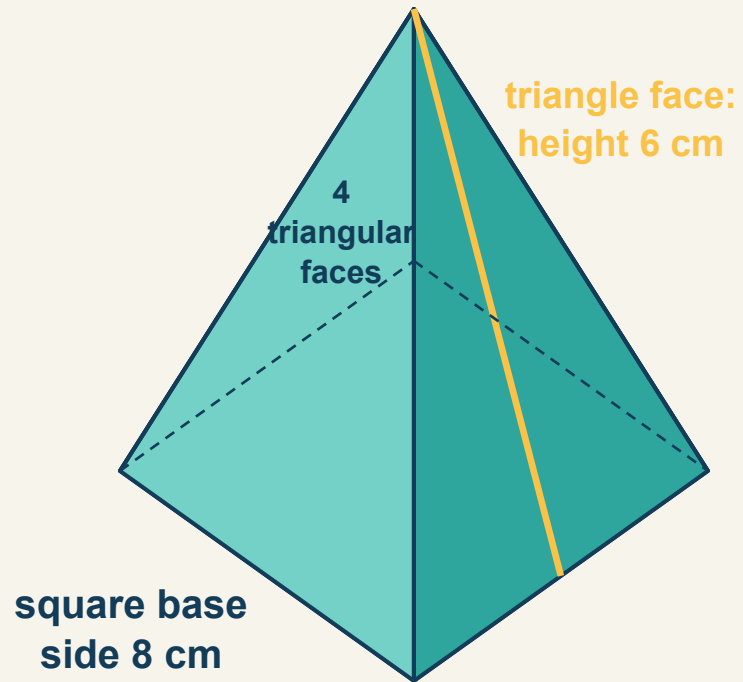
SOLUTION

Surface area:
 $16 + 24 + 12 = 52 \text{ cm}^2$

All six faces are included exactly once.

Example 2 — Try it first

A square pyramid has a base with side length 8 cm.
Each triangular face has base 8 cm and height 6 cm. Find its surface area.

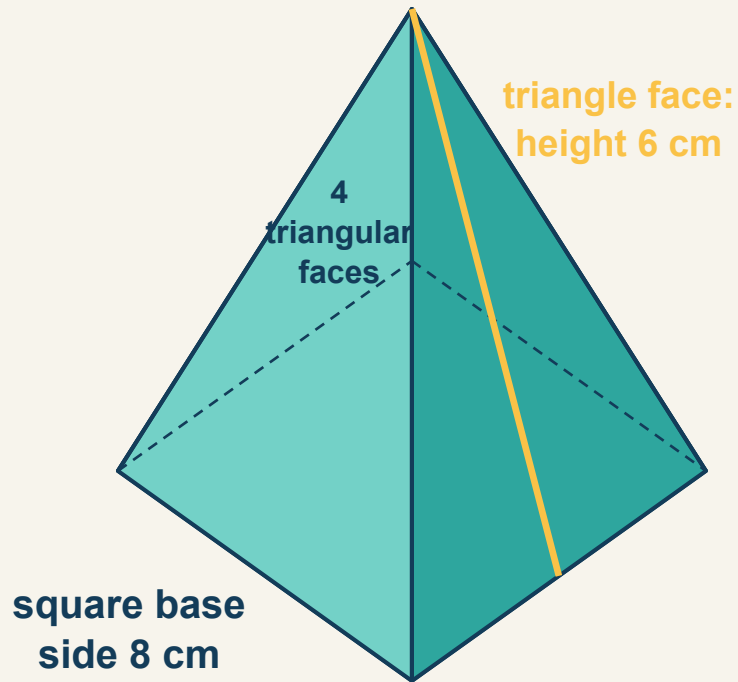


YOUR TURN

Find the area of
square base
and four triangles.

Example 2 — Step 1: Find the base

A square pyramid has a base with side length 8 cm.
Each triangular face has base 8 cm and height 6 cm. Find its surface area.



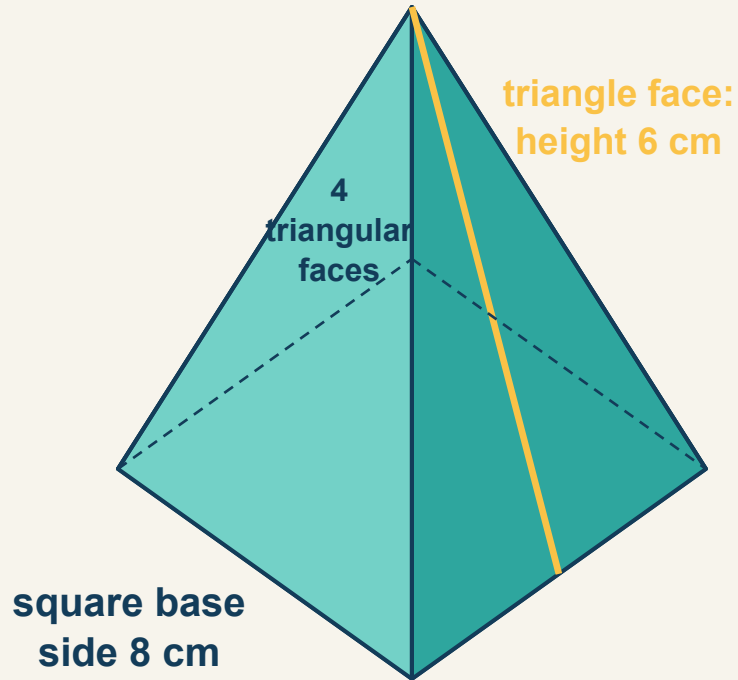
STEP 1: FIND THE BASE

Square base area:
 $8 \times 8 = 64 \text{ cm}^2$

**Next: find the
triangular faces.**

Example 2 — Solution

A square pyramid has a base with side length 8 cm.
Each triangular face has base 8 cm and height 6 cm. Find its surface area.



SOLUTION

One triangle:

$$\frac{1}{2} \times 8 \times 6 = 24 \text{ cm}^2$$

Four triangles:

$$4 \times 24 = 96 \text{ cm}^2$$

Surface area:

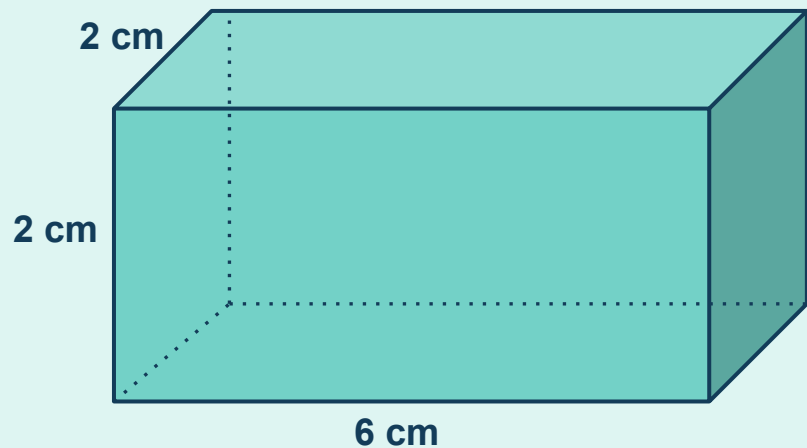
(square + 4 triangles)

$$64 + 96 = 160 \text{ cm}^2$$

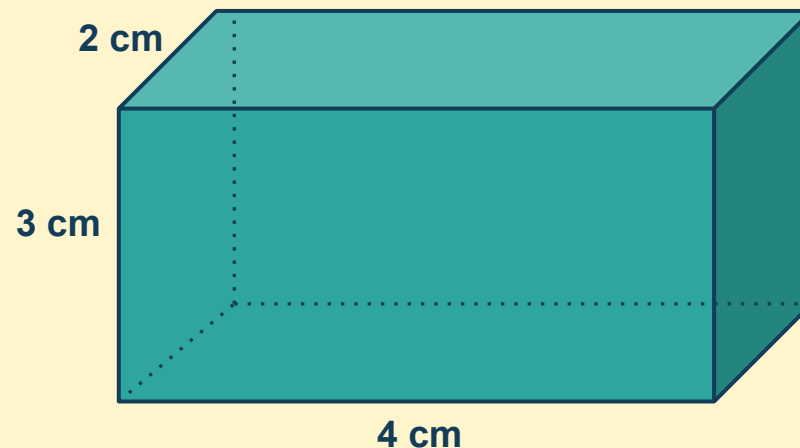
Example 3 — Try it first

Prism A is $2 \times 2 \times 6$. Prism B is $2 \times 3 \times 4$. Compare their volumes and surface areas.

PRISM A



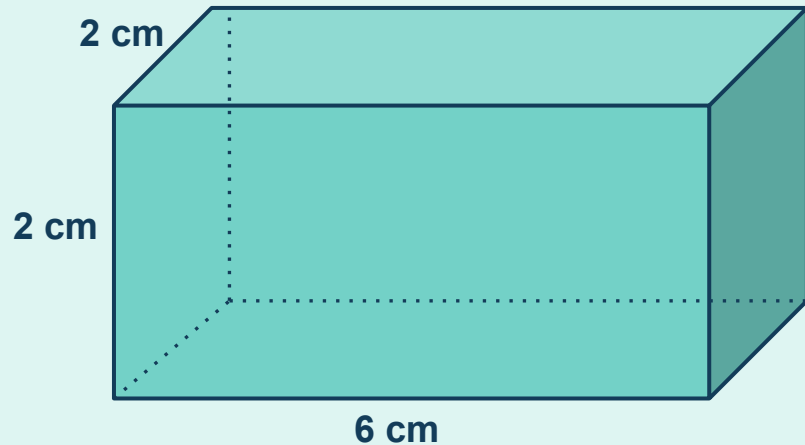
PRISM B



Example 3 — Step 1: Compare volume

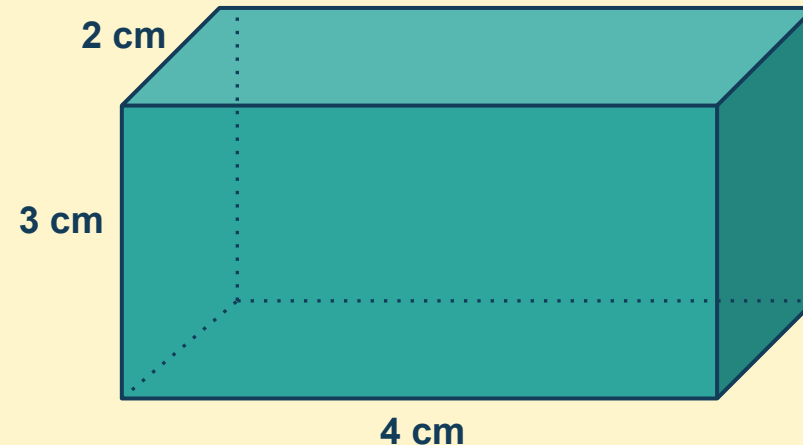
Volume measures the cubic units inside each prism.

PRISM A



$$\text{Volume: } 2 \times 2 \times 6 = 24 \text{ cm}^3$$

PRISM B



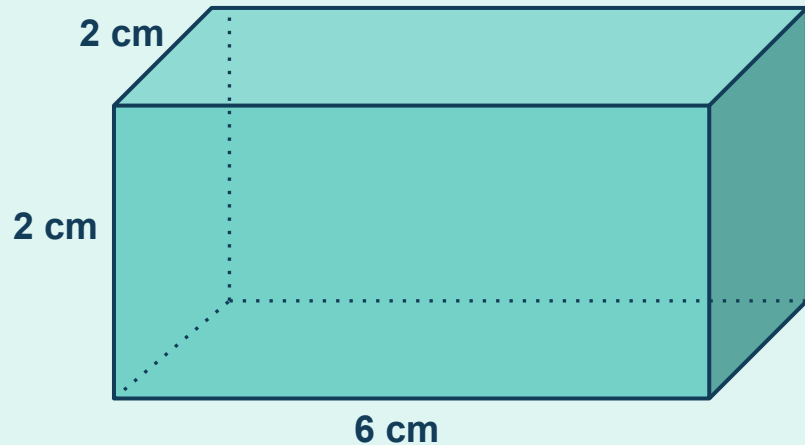
$$\text{Volume: } 2 \times 3 \times 4 = 24 \text{ cm}^3$$

**Both prisms have volume 24 cm^3 .
Do equal volumes guarantee equal surface areas?**

Example 3 — Step 2: Compare surface area

Surface area measures the square units covering the outside.

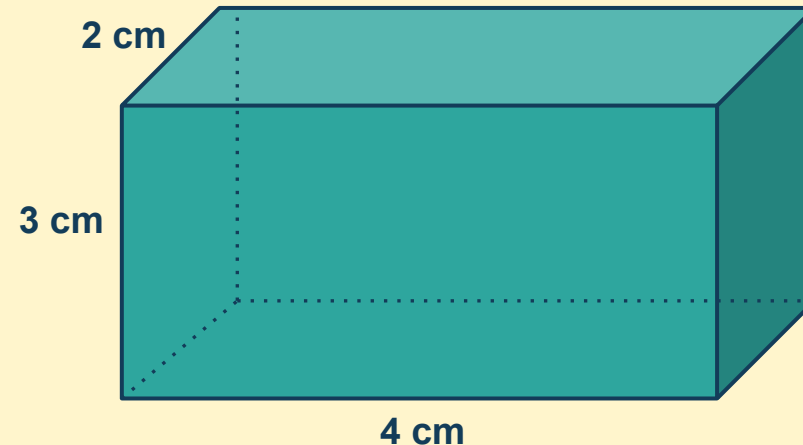
PRISM A



Faces: two 2x2, two 6x2, two 6x2

$$\text{SA: } 2(4 + 12 + 12) = 56 \text{ cm}^2$$

PRISM B



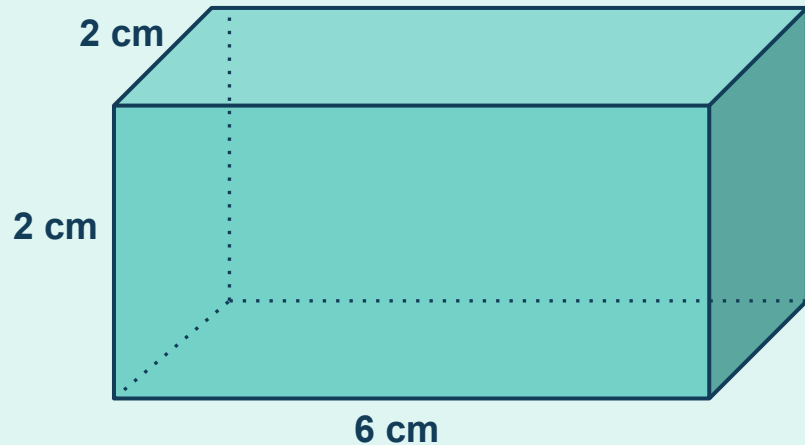
Faces: two 2x3, two 2x4, two 3x4

$$\text{SA: } 2(6 + 8 + 12) = 52 \text{ cm}^2$$

Example 3 — Solution

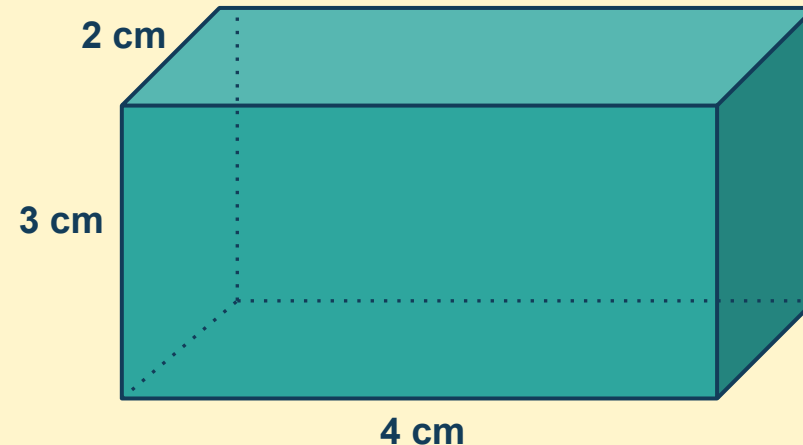
Equal volume does not require equal surface area.

PRISM A



Volume = 24 cm^3
Surface Area = 56 cm^2

PRISM B



Volume = 24 cm^3
Surface Area = 52 cm^2

Both volumes are 24 cm^3 , but Prism B has less surface area.

Common mistakes to avoid

Decide what is being measured before choosing a formula or unit.

A

Only the visible faces are counted.

Surface area includes hidden faces unless the problem says a face is open or uncovered.

count faces

check pairs

square units

B

Surface area and volume are treated as the same measure.

Surface area covers outside; volume fills inside.

Use square units for surface area and cubic units for volume.

A labeled net or organized face list helps prevent missed or double-counted faces.

Takeaway + exit ticket

Surface area is the sum of face areas; volume measures the space inside.

1

Identify every face

Use a net or matching face pairs.

2

Calculate surface area

Add each face area and write square units.

3

Distinguish volume

Multiply three dimensions and write cubic units.

EXIT TICKET

**A rectangular prism is 4 m by 3 m by 7 m. Find its surface area and volume.
Explain why the units are different.**

Bonus: sketch a net and label each face pair.



THANK YOU

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