

Surface Area of Prisms

Lesson 10-4

Name: _____

Date: _____

Class: _____

Key Vocabulary

Level 1 support

Picture first, then the word, then a plain-language meaning. Say each word out loud.

Paint every outside surface of a box — the total painted area is the surface area

Surface area

The total area of all the flat sides of a solid.

A box with 6 flat rectangle sides: top, bottom, front, back, left, right

Rectangular prism

A solid box shape with six flat rectangle sides.

Shaped like a tent or a wedge of cheese — 2 triangle ends + 3 rectangle sides

Triangular prism

A solid with two triangle ends and three flat rectangle sides.

A triangular prism has 5 faces: 2 triangles + 3 rectangles

Face

One flat side of a solid shape.

Unfold a triangular prism flat: you see 2 triangles and 3 rectangles side by side

Net

A flat shape that folds up into a solid.

On a triangular prism, the 3 rectangles that wrap around the sides are lateral faces

Lateral face

The side faces of a solid, not the top or bottom.

Key Ideas & Notes

- Your class is painting the outside of different time capsule shapes to protect them from weather.
- Some capsules are rectangular prisms and others are triangular prisms (wedge-shaped).
- To buy the right amount of paint, you need to calculate the surface area of each shape!
- Calculate the surface area of each time capsule shape. For rectangular prisms, use $SA = 2lw + 2lh + 2wh$. For triangular prisms, find the area of each face and add them up.

Think About It

- How many faces does a rectangular prism have? A triangular prism?
- What shapes make up the faces of a triangular prism?
- How is finding surface area different from finding volume?

My Notes

Guided Examples

Example 1

What is the surface area of a rectangular prism with $l = 5$ cm, $w = 4$ cm, $h = 3$ cm?

Solution: $SA = 2(5 \times 4) + 2(5 \times 3) + 2(4 \times 3) = 40 + 30 + 24 = 94 \text{ cm}^2$.

Answer: A. 94 cm^2

Example 2

How many faces does a triangular prism have?

Solution: A triangular prism has 5 faces: 2 triangular bases and 3 rectangular lateral faces.

Answer: A. 5

Example 3

A triangular prism has two triangular bases each with area 12 cm^2 and three rectangular faces with areas 30 cm^2 , 40 cm^2 , and 40 cm^2 . What is the total surface area?

Solution: $SA = 2(12) + 30 + 40 + 40 = 24 + 110 = 134 \text{ cm}^2$.

Answer: A. 134 cm^2

Write About the Math

The Writing Revolution

I can explain my work using the words surface area, rectangular prism, triangular prism, and face.

1. Kernel Sentence subject + verb

Model: Surface area is the total area of all the flat sides of a solid.

Área de superficie es el área total de todos los lados planos de un sólido.

Write a kernel sentence about surface area. Use a subject and a verb.

Escribe una oración base sobre área de superficie. Usa un sujeto y un verbo.

2. Sentence Expansion because · but · so

Kernel: Surface area matters in math

Área de superficie importa en matemáticas

Expand the kernel three ways. Add a reason, a contrast, and a result.

because
porque

Surface area matters in math because ____.

Área de superficie importa en matemáticas porque ____.

but
pero

Surface area matters in math, but ____.

Área de superficie importa en matemáticas, pero ____.

so
entonces

Surface area matters in math, so ____.

Área de superficie importa en matemáticas, entonces ____.

3. Sentence Types 4 ways to write a math idea

Statement
Afirmación

Tell one true fact about surface area.
Di un hecho verdadero sobre surface area.

Surface area ____.

Question
Pregunta

Ask a question about surface area.
Haz una pregunta sobre surface area.

How does ____ ?
¿Cómo ____ ?

Exclamation
Exclamación

Show excitement about surface area.
Muestra entusiasmo sobre surface area.

Wow, ____ !
¡Guau, ____ !

Command
Mandato

Tell a partner what to do with surface area.
Dile a un compañero qué hacer con surface area.

First, ____ .
Primero, ____ .

4. Explain Your Reasoning use a sentence starter

Each face has area ____ .
Cada cara tiene área ____ .

The total surface area is ____ .
El área total de la superficie es ____ .

I would use this to ____ .
Usaría esto para ____ .

Try It

Solve on your own. Check the answer key when you are done.

1. A triangular prism has two triangular bases each with area 12 cm^2 and three rectangular faces with areas 30 cm^2 , 40 cm^2 , and 40 cm^2 . What is the total surface area?

- A. 134 cm^2
- B. 110 cm^2
- C. 122 cm^2
- D. 134 cm^3

Show your work:

2. A triangular prism has triangular bases with base 6 in and height 4 in. The prism is 10 in long and the two slant sides of the triangle are each 5 in. What is the surface area?

- A. 184 in^2
- B. 160 in^2
- C. 124 in^2
- D. 184 in^3

Show your work:

Stretch Your Thinking

Level 2 enrichment

Challenge task — explain your reasoning in full sentences.

A company ships products in two container options: a rectangular prism ($8 \times 6 \times 4$ in) or a triangular prism (triangle base 8 in, triangle height 6 in, prism length 8 in, slant sides 6.3 in each). Both must be wrapped in protective film. Which shape uses LESS film? Show your work.

Sentence starter: Rectangular prism SA = $2(\text{---}) + 2(\text{---}) + 2(\text{---}) = \text{---}$ in². Triangular prism SA = $2(\text{---}) + \text{---} + \text{---} + \text{---} = \text{---}$ in². The --- uses less film because --- .

Show your work:

Reflect — Exit Ticket

A rectangular prism has $l = 8$ ft, $w = 6$ ft, $h = 3$ ft. What is the surface area?

- A. 180 ft^2
- B. 144 ft^2
- C. 180 ft^3
- D. 90 ft^2

Your answer:

Answer Key & Teacher Guide

1. **Try It 1:** A. 134 cm^2 — $SA = 2(12) + 30 + 40 + 40 = 24 + 110 = 134 \text{ cm}^2$.
2. **Try It 2:** A. 184 in^2 — *Triangular bases:* $2 \times (\frac{1}{2} \times 6 \times 4) = 24 \text{ in}^2$. *Three rectangular faces:* $6(10) + 5(10) + 5(10) = 60 + 50 + 50 = 160 \text{ in}^2$. $SA = 24 + 160 = 184 \text{ in}^2$.
3. **Exit Ticket:** A. 180 ft^2 — $SA = 2(8 \times 6) + 2(8 \times 3) + 2(6 \times 3) = 96 + 48 + 36 = 180 \text{ ft}^2$. *Surface area uses square units (ft^2).*

Writing (TWR) — what to look for

- **Kernel sentence:** A complete sentence needs a subject and a verb. Example: Surface area is the total area of all the flat sides of a solid.
- **Expansion:** *because* gives a reason, *but* shows a contrast or exception, *so* shows a result. Answers vary; each must keep the kernel idea and add the correct kind of detail.
- **Sentence types:** Statement ends with a period, question with "?", exclamation with "!", and a command starts with an action verb (a "bossy" verb).