Surface Area of Pyramids

Lesson 10-5

Name: _____ Date: _____ Class: _____

Key Vocabulary

Level 1 support

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

Like the Great Pyramid of Giza — a square on the bottom, 4 triangles slanting up to a point

Pyramid

A solid with a flat bottom and triangle sides that meet at one point on top.

If you slide your finger from the bottom edge up the triangle face to the top point — that distance is the slant height

Slant height

The height of a side triangle, measured along its slanted face.

A square pyramid has 4 lateral faces — one triangle for each side of the square base

Lateral face

A triangle side of a pyramid, not the bottom.

A square pyramid sits on a square base; base area = side × side

Base

The flat bottom of a pyramid.

The pointy top of a pyramid — all the slanted edges connect here

Apex

The point at the top of a pyramid where the sides meet.

For a square pyramid: lateral area = 4 × (½ × base edge × slant height)

Lateral area

The total area of just the side triangles, not the bottom.

Key Ideas & Notes

- Your class is building a pyramid-shaped display to showcase the time capsule at the school entrance.
- The pyramid will be covered in gold leaf to make it shine.
- To figure out how much gold leaf you need, you must calculate the total surface area — the base plus all the triangular faces!
- Calculate the surface area of each pyramid display. SA = Base Area + Lateral Area. For each triangular face, use A = ½ × base × slant height.

Think About It

- How many faces does a square pyramid have?
- What shape is the base? What shape are the side faces?
- What is the difference between the height of the pyramid and the slant height?

My Notes

Guided Examples

Example 1

A square pyramid has a base edge of 5 in and a slant height of 7 in. What is the surface area?

Solution: Base: $5 \times 5 = 25$ in². Each lateral face: $\frac{1}{2} \times 5 \times 7 = 17.5$ in². Four faces: $4 \times 17.5 = 70$ in². SA = 25 + 70 = 95 in².

Answer: A. 95 in²

Example 2

How many lateral (triangular) faces does a square pyramid have?

Solution: A square pyramid has a square base and 4 triangular lateral faces — one for each side of the square.

Answer: A. 4

Example 3

What is the area of one triangular face with base 8 in and slant height 6 in?

Solution: Area of a triangle = ½ × base × height = ½ × 8 × 6 = 24 in².

Answer: A. 24 in²

Write About the Math

The Writing Revolution

I can explain my work using the words pyramid, slant height, lateral face, and base.

1. Kernel Sentence

subject + verb

Model: Pyramid is a solid with a flat bottom and triangle sides that meet at one point on top.
Pirámide es un sólido con un fondo plano y lados triangulares que se unen en un punto arriba.

Write a kernel sentence about pyramid. Use a subject and a verb.
Escribe una oración base sobre pirámide. Usa un sujeto y un verbo.

2. Sentence Expansion

because · but · so

Kernel: Pyramid matters in math
Pirámide importa en matemáticas

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

because *porque*	**Pyramid matters in math because ____.** *Pirámide importa en matemáticas porque ____.*
but *pero*	**Pyramid matters in math, but ____.** *Pirámide importa en matemáticas, pero ____.*
so *entonces*	**Pyramid matters in math, so ____.** *Pirámide importa en matemáticas, entonces ____.*

3. Sentence Types

4 ways to write a math idea

Statement
Afirmación

Tell one true fact about pyramid.
Di un hecho verdadero sobre pyramid.

Pyramid ____.

Question
Pregunta

Ask a question about pyramid.
Haz una pregunta sobre pyramid.

How does ____ ?
¿Cómo ____ ?

Exclamation
Exclamación

Show excitement about pyramid.
Muestra entusiasmo sobre pyramid.

Wow, ____ !
¡Guau, ____ !

Command
Mandato

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

First, ____ .
Primero, ____ .

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4. Explain Your Reasoning

use a sentence starter

The pyramid has ____ triangular faces.
La pirámide tiene ____ caras triangulares.

I added the base and the ____.
Sumé la base y las ____.

I see pyramids in ____.
Veo pirámides en ____.

Try It

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

1. What is the area of one triangular face with base 8 in and slant height 6 in?

A. 24 in^2

B. 48 in^2

C. 14 in^2

D. 24 in^3

Show your work:

2. A square pyramid has a base area of 49 cm^2 and a total lateral area of 84 cm^2. What is the surface area?

A. 133 cm^2

B. 84 cm^2

C. 49 cm^2

D. 133 cm^3

Show your work:

Stretch Your Thinking

Level 2 enrichment

Challenge task — explain your reasoning in full sentences.

Two pyramids have the same base area (64 in²) but different slant heights. Pyramid A has slant height 6 in and Pyramid B has slant height 10 in. How much more surface area does Pyramid B have? Why does slant height affect surface area but NOT base area?

Sentence starter: Pyramid A: SA = 64 + 4(½ × 8 × 6) = 64 + ____ = ____ in². Pyramid B: SA = 64 + 4(½ × 8 × 10) = 64 + ____ = ____ in². Pyramid B has ____ more in² because ____. Slant height only affects ____ because ____.

Show your work:

Reflect — Exit Ticket

A square pyramid has a base edge of 6 in and a slant height of 5 in. What is the total surface area?

A. 96 in²

B. 60 in²

C. 96 in³

D. 36 in²

Your answer:

Answer Key & Teacher Guide

1. **Try It 1:** A. 24 in² — *Area of a triangle = ½ × base × height = ½ × 8 × 6 = 24 in².*
2. **Try It 2:** A. 133 cm² — *SA = Base Area + Lateral Area = 49 + 84 = 133 cm².*
3. **Exit Ticket:** A. 96 in² — *Base: 6 × 6 = 36 in². Each lateral face: ½ × 6 × 5 = 15 in². Four faces: 4 × 15 = 60 in². SA = 36 + 60 = 96 in². Surface area uses square units (in²).*

Writing (TWR) — what to look for

- **Kernel sentence:** A complete sentence needs a subject and a verb. Example: Pyramid is a solid with a flat bottom and triangle sides that meet at one point on top.
- **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).