

Pyramid Face-Off

Find the total area of every face on a square pyramid.

GRADE 8 • 8.MG.2.a

8.MG.2.a "Determine the surface area of square-based pyramids by using concrete objects, nets, diagrams, and formulas."

NAME _____

DATE _____

ADD EVERY FACE

A square-based pyramid has 1 square base and 4 matching triangular faces. To find total surface area, use $SA = b \times b + 2 \times b \times l$, where b is the side length of the square base and l is the slant height of a triangular face. The slant height runs up a triangle face, not straight down through the pyramid.

WORKED EXAMPLE

Find the total surface area of a square pyramid with base side length 9 cm and slant height 7 cm.

1. Find the base area: $9 \times 9 = 81 \text{ cm}^2$.
2. Find the four triangle areas: $2 \times 9 \times 7 = 126 \text{ cm}^2$.
3. Add the areas: $81 + 126 = 207 \text{ cm}^2$.

Answer: 207 cm²

PRACTICE 6 problems

- 1** Find the total surface area of a square pyramid with base side length 4 cm and slant height 3 cm.

ANSWER _____

- 2** Find the total surface area of a square pyramid with base side length 6 m and slant height 5 m.

ANSWER _____

- 3** Find the total surface area of a square pyramid with base side length 8 in. and slant height 2 in.

ANSWER _____

- 4** A square pyramid has a base side length of 10 ft and a slant height of 4 ft. Find its total surface area.

ANSWER _____

- 5** A net has a square with side length 5 cm and four congruent triangles. Each triangle has a base of 5 cm and a height of 6 cm. Find the total surface area of the pyramid.

ANSWER _____

- 6** Find the total surface area of a square pyramid with base side length 12 yd and slant height 8 yd.

ANSWER _____

APPLY IT Show your work

- 1** A school art club is making a closed, square-pyramid display case for a game tournament. The square base has side length 14 cm, and each triangular face has a slant height of 10 cm. How much plastic is needed to cover all 5 faces?

WORK SPACE

ANSWER _____

- 2** A designer is creating a closed pyramid-shaped prize box for a music contest. Its square base has side length 15 cm, and its slant height is 8 cm. What is the total area of cardboard needed for the box?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A square pyramid has a total surface area of 384 cm^2 . Its base side length is 12 cm. Find the slant height, and explain how you know.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Find the total surface area of a square pyramid with base side length 4 cm and slant height 3 cm.	40 cm²
2	Find the total surface area of a square pyramid with base side length 6 m and slant height 5 m.	96 m²
3	Find the total surface area of a square pyramid with base side length 8 in. and slant height 2 in.	96 in.²
4	A square pyramid has a base side length of 10 ft and a slant height of 4 ft. Find its total surface area.	180 ft²
5	A net has a square with side length 5 cm and four congruent triangles. Each triangle has a base of 5 cm and a height of 6 cm. Find the total surface area of the pyramid.	85 cm²
6	Find the total surface area of a square pyramid with base side length 12 yd and slant height 8 yd.	336 yd²

PART 2 • APPLY IT

- 476 cm²** Find the square base area, $14 \times 14 = 196 \text{ cm}^2$. Then add the four triangle areas, $2 \times 14 \times 10 = 280 \text{ cm}^2$, for 476 cm².
- 465 cm²** The base area is $15 \times 15 = 225 \text{ cm}^2$. The triangular faces total $2 \times 15 \times 8 = 240 \text{ cm}^2$, so the total is 465 cm².

CHALLENGE

The slant height is 10 cm. The base area is $12 \times 12 = 144 \text{ cm}^2$, so the triangular faces have area $384 - 144 = 240 \text{ cm}^2$. Since $2 \times 12 \times l = 240$, $l = 10 \text{ cm}$.

Accept equivalent work that adds the square base area and the areas of all four triangular faces. Require square units for surface area and a linear unit for the challenge slant height.